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THE COMPARATIVE STRUCTURE OF AGRIFOOD PRODUCTIS CONSUMPTION IN ROMANIA

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Abstract

Food problem has been and remains a major concern, both nationally and globally, and the population has or does not have enough income to ensure structural physichological requirements of consumption. In the context of the importance of the role incumbent main categories of food consumption, the paper aims to study the level both total consumption in Romania and derivatives products and cereals, vegetables and fruits. Comparative dynamics shown by appropriate indicators (quantitative physical units and calories) report highlights that resources/total consumption is assured, but the differences in the levels of consumption of fruits and vegetables are considered significant. Consumption aspect qualitative comparisons analyzed by means a reduction in the level of human consumption, but there are slight differences (insignificant) for cereals, vegetables and very sharp significant fruit. For dynamic analysis period can be reported elements of concern, the existence of annual decreases in the consumption of fruit and vegetables.

Key words**:** *agri/food product, availability of consumer, calories, consumption structure, level of consumption. resources*

INTRODUCTION

Referring to the movements of the foodservice market is taken into question the need for a permanent balance that must exist in the resource / consumption . This paper discusses ways to increase the resources available for consumption and the main categories of agricultural products and foodstuffs . In Romania it finds a resource group that is growing (cereals and vegetables) , and other produse la which is a decrease (of fruit) . These types of movements in the market are considered to be items of interest , which exerts pressure on the family budget for food safety. This is compounded by inequalities in income distribution , which created large differences in quality of use (for certain types of food cart is daily) . This paper seeks to attract attention, both in terms of energy content of food, especially the opportunity to improve the structure and quality.

MATERIALS AND METHODS

The theme addressed primarily aims to analyze the consumption of resources and the main categories of crops (being accumulated and their derivatives) at national level showing the need for a more complete product range to ensure an optimal structure of annual household consumer demand. The research conducted was used in methods and techniques of knowledge of descriptive identification problems between differentiations between consumption levels for the main categories of food products (cereals, vegetables, fruits). The methodology has been defined: consumption (consumer availability) annual average food per capita, expressed in physical units, that later on appropriate indicators to determine the content in calories and nutrients for average daily consumption (according to the average consumption daily net for the three categories of food products). There have been calculated

and dynamic analyzes of two categories of indicators by physical or percentage:
- Quantitative about the available resources and existing national human consumption, expressed in physical units (tons) annual total;
- Qualitative structure of food consumption in Romania, expressed as daily average calories /capita.
Comparative structure was performed while (growth from 2006 to 2011) and to the overall level of the indicator, followed surprise differentiation existence consumptions for the three categories of products consistent with the average insurance possibilities food basket. Information base of the work was the data taken from the National Institute of Statistics of Romania and the results of investigations.

RESULTS AND DISCUSSIONS

In our country, according to data from the available resources and consumption is one of the most representative indicators of living standards and thus of the level of economic and social development. The representativeness of this indicator analyzed the structure of its main plant products has however certain limitations, since not reflect and qualitative elements of nutrition. Food consumption is a socio-economic phenomenon caused by a multitude of factors, which include: the amount of resources, the development of food production, household consumption and consumer traditions and so on, which plays an important role. According to statistics, in the last decade quantitative structure was influenced mainly by the price increase product quality while reducing consumption.
According to these views in the original work was done in the knowledge differentiation total human consumption of resources and the availability of the main categories of food products plant, later to be known as the comparative structure of food consumption.

Table 1. And the available resources for human consumption in the main categories of food products in Romania.

Specify	U. M	2006	2007	2008	2009	2010	2011
CEREALS AND CEREAL PRODUCTS (grains equivalent)							
Resources	total tons	16183897	9458701	18359495	16679409	18187170	22312739
	% Compared to 2006	100	58.44	113.44	103.06	112.37	137.87
Available for human consumption	total tons	4487369	4455973	4387288	4310620	4277194	4385824
	% Compared to 2006	100	99.30	97.76	96.06	95.31	97.73
	% of total resources	27.72	47.10	23.89	25.84	23.51	19.65
VEGETABLES AND VEGETABLE PRODUCTS (equivalent vegetables)							
Resources	total tons	3895131	3149515	3677355	3645947	3677091	3976878
	% Compared to 2006	100	80.85	94.40	93.60	94.40	102.09
Available for human consumption	total tons	3361849	3103772	3263413	3030231	3153854	3281687
	% Compared to 2006	100	92.32	97.07	90.13	93.81	97.61
	% of total resources	86.30	98.54	88.74	83.11	85.77	82.51
FRUITS AND FRUIT PRODUCTS (fresh fruit equivalent)							
Resources	total tons	3145314	2665017	2977117	2922036	2840020	3055366
	% Compared to 2006	100	84.72	94.65	92.90	90.29	97.74
Available for human consumption	total tons	1795354	1459899	1432279	1337730	1353943	1506861
	% Compared to 2006	100	81.31	79.77	74.51	75.41	83.93
	% of total resources	57.08	54.78	48.10	45.78	47.67	49.31

Source: Food balance sheets in the year 2007-2011, National Institute of Statistics, 2008-2012[3][4]

1.Resources and availability for human consumption in the main categories of food products.

Availability of human resources and consumption characterize reducing negative impact on the natural environment while maintaining or increasing the living standards of the people. In the study the level and degree of representativeness of these indicators was played dimensional, a comparison of the dynamics of time, along with a comparison to the available resources.

Table 1 illustrates this in that category agro grain products, fruits and vegetables (equivalent grains and fresh produce) for the dynamics of the period 2006-2011.

- Cereals and cereal products, the quantity of resources successively years amplification analyze records that in 2011 over 2006 is represented by an increase of 37.87 %. For the same period, and a basis for comparison, available for human consumption is below the 2006 level oscillations is between 95.31 % and 99.30 %. Simultaneously to the available resources consumption is much lower (between 47.10 % and 19.65 %), the trend recording a declining trend;
- The category of vegetables and vegetable products resource levels report resources/consume are oscillating, the trend is growing, noting that in 2011 compared to 2006 where the growth is 37.87 %. In comparison to the available for human consumption in 2006 is shown by a decrease reaching in 2009 to 96.06 %, followed by an increase that reached in 2011 to 97.73 %. Also consumer availability is inferiror to total resource levels are oscillating in all years analyzed, but where there is a slight decrease in the consumption;
- The category of fruits and fruit products for comparison base in 2006 the downward trend is uncertain as to how the available resources consumption. Resources is significant decrease in 2007, with -25.28 % and consumer availability in 2010 of -9.71 %. In the category of fruit and fruit products, it is found that the available human consumption to the level of annual resources is much lower (one can see the situation of the period 20062008 the percentage values are between 57.08 % and 48.10 %, while in the 2009-2011 values lie between 45.78 % and 49.31 %, which indicates a decreasing rate).

From all this we can deduce the existence of a resource increases in grains and vegetables, but a decrease in fruit. On availability there is a quantitative diminution for all three product categories analyzed is inferiror to level resources.

2.Comparative structure of food consumption. Previously analyzed quantitative disparities join the qualitative, expressed in calories (average daily calories/capita) consumption necessary to ensure the structure of food consumption needs of the population. On this problem was analyzed on the one hand and the dynamics of total food consumption in the consumption of animal products, continued through a comparative analysis of the situation of consumption categories of grain products, vegetables, fruits.

a) the level and dynamics of consumption in Romania, shown in Table 2, means an annual trend of decreasing both total calories and for animal consumption. By comparison to 2006, there may be successively the annual consumption decreases, which in 2011 reached a -7.41 % decrease in total calorie intake and calorie consumption -12.55 % animal.

Table 2. The level and dynamics of consumption in Romania (daily average calories/capita)

Specify	U. M.	2006	2007	2008	2009	2010	2011
Total calorie consumption nationwide	Average daily / capita	3455	3290	3300	3273	3212	3199
	% Compared to 2006	100	95,22	95,51	94,73	92,96	92,59
Total consumption of calories of animal origin	Average daily / capita	925	912	920	888	833	809
	% Compared to 2006	100	98,59	99,45	96	90,05	87,45
	% Of total consumption	26.77	27.72	27.87	27.13	25.93	25.28

Source: Romanian Statistical Yearbook, years 2007-2012, National Institute of Statistics[4]

Comparison of annual consumption of animal calories to total calorie decrease recorded the same trend (which in 2011 reached 25, 28 %).

*b)*The Comparative structure of the power consumption of the main categories of vegetable, shown in Table 3, mentioned a trend of consumption of these products, the annual 2006-2011 differentiated structure can be shown below.

Table 3. Comparative structure of food consumption in Romania (expressed in average daily calories /capita).

Specify	**U, M,**	**2006**	**2007**	**2008**	**2008**	**2010**	**2011**
Cereals and cereal products	total calorie consumption	1329,8	1315,6	1299,4	1280	1268,1	1308,8
	% Compared to 2006	100	98,93	97,71	96,25	95,36	98,42
	% of total calories national	38.48	39.98	39.37	39.10	39.48	40.91
	% of total calories of animal origin	143,76	144,25	141,23	144,14	152,23	161,78
Vegetables and vegetable products	total calorie consumption	119.7	114.3	122.7	110.7	115.0	120.3
	% Compared to 2006	100	95.48	102.50	92.48	96.07	100.50
	% of total calories national	3.46	3.47	3.71	3.38	3.58	3.76
	% of total calories of animal origin	12.94	12.53	13.33	12.46	13.80	14.87
Fruits and fruit products	total calorie consumption	155.3	133.4	135.1	118.	118.9	132.2
	% Compared to 2006	100	85.89	86.99	76.30	76.56	85,12
	% of total calories national	4.49	4.05	4.09	3.62	3.70	4.13
	% of total calories of animal origin	16.78	14.62	14.68	13.34	14.27	16.34

Source: Food balance sheets in the year 2007-2011, National Institute of Statistics, 2008-2012. [3][4]

- For cereals and cereal products consumption is uniform, even if recorded oscillations can be considered insignificant. This level is maintained and share to the total national consumption of calories (between 38.48 % and 40.91 %), but there is a growing percentage of the total consumption of calories of animal origin (which is between 143, 76 %, and 161.78 %);
- The category of vegetables and vegetable products, there is an absence of increased calorie consumption (as reported and an annual non-uniformity). Compared to the national average amount of annual oscillations are reported but not caused an increase in consumption. Making comparison and vegetable consumption of vegetable products to total calorie consumption animal is an increase in successively years is between 12.94 % (in 2006) and 14.87 % (2011);
- Fruits and fruit products are observed oscillations of consumption levels that can be played as follows: to the total calories consumed is a decrease in consumption for the category fruit and fruit products, which in 2011 compared to 2006 is -14 88 % (from 155.3 to 132.2 calories/day) comparing fruit to fruit derived from the national level is also declining (4.49% in 2006 to 4.13% in 2011), the reported annual levels and oscillations (between 4.49% and 3.70 %), the comparison category fruit and fruit products, total calorie consumption to animal within the same reduction (16.78 % and 13.34 %) who maintained annual oscillations.

Regarding the problem with the structure qualitative consumption compared there is a decrease in human consumption but there are slight differences (insignificant) for cereals, vegetables and very sharp significant fruit.

CONCLUSIONS

In a study addressed several issues, among which the most important can be played by the following:

Given the importance that is given to improving nutrition structure concluded that the available resources and consumption on the one hand and indicators calculated per capita consumption on the other hand, are important indicators in assessing the standard of living of the population.

At the national level by the presence of food resources is said to be producing more, which can be appreciated and consumer availability. Found the existence of a resource increases in grains and vegetables, but a decrease in fruit.

For available is a decrease in the level of all three product categories analyzed is inferior to level resources. This is because food consumption is linked to declining purchasing power, disposable income, the rate of inflation, rising prices and tariffs for some goods and services. Thus during the period 2006-2011 remains an unstable situation, which in the end is characterized by maintaining fluctuations in resource levels and the available food and food of plant origin are required to participate in quantities of increasingly large food population.

Regarding the energy content of the food expressed in average per capita today is no question of recovering the disparities, but rather of structural- qualitative improvements. Total calorie consumption per capita national decreases, but the level and pace consumption reduction by comparison to animal calories is much more pronounced. This is because the pressure on the family budget food security is reinforced by inequalities in income distribution, deepened after 1990, which created the striking differences in qualitative structure of human consumption (food basket daily) for certain categories of consumers.

For the main vegetable products analyzed (cereals, vegetables, fruits and their derivatives), of consumption versus qualitative analysis of the problem is a decrease in human consumption but there are slight differences (insignificant) for cereals, vegetables and very sharp significant in fruits.

Currently providing physiologically normal consumption for the entire population is closely related to the structure of foods by analyzing the achieved annual growth, evidenced by the positions they occupy the most important categories of food products. Are given in terms of quantity resources/available consumer and qualitatively in terms of annual consumption rate changes and in accordance with the requirements of increasing consumption, which warranted items of concern relating to annual reductions in the consumption of fruit and vegetables.

REFERENCES

[1]Barbulescu Aurica, 1991, Disponibilităţile alimentare de calorii pe locuitor-zi", Romanian Academy, National Institute of Economic Research "Costin C. Kiriţescu", Thesaurus, 1991, Vol XI, Economic Information and Documentation Centre;

[2]Constantin, M., 2007, „Marketingul producţiei agroalimentare", Ed AgroTehnica, Bucharest

[3] Food balance sheets in the year 2007-2011, INS, 2008-2012

[4] Romanian Statistical Yearbook, 2007-2012 year, INS

[5]The socio-economic country development evaluation compared to other countries, study by CEROPE in the programme PHARE RO 2003/005-551.02.03

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ESTIMATION OF RESOURCE-HEALING ROLE LUPINE AND STRAW IN THE GRAIN-ROW CROP ROTATION

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Abstract

In field experiences on soddy-podzolic sandy soil of Meshchersky lowland high agroeconomic efficiency of an adaptive link of a crop rotation with, grown up on grain, a potato and barley is established, at entering winter wheat straw under lupine . Straw in a combination with lupine has proved to be a perspective reserve of reproduction of fertility of soils without participation of nitrogen of mineral fertilizers.

Keywords*: annual (blue) lupine, crop rotation, fertilizer, nitrogen fixation, straw grain*

INTRODUCTION

Feature of bean cultures is their ability partially to satisfy requirement for nitrogen at the expense of its symbiotic fixing with bacteria from atmosphere [1]. By E.P. Trepachev's (1999) estimations, at the expense of atmosphere nitrogen it is formed from 30 to 80 % of a crop of the bean. The sizes of alienation of nitrogen of soil depend on factor symbiotic nitrogen fixation [4]. It is more, the less share of alienated nitrogen from soil and on the contrary.

Straw influence as fertilizers on circulation of nutrients and productivity can be carried out by two ways: first, available in straw and nutrients released as a result of a mineralization can directly raise their stock in soil and be consumed by plants; secondly, thanks to processes of decomposition owing to amplifying microbiological activity availability of nutrients of soil to plants can change [2,3].

Operating ratios of elements of the food which is a part of the vegetative rests (except nitrogen), usually in 3-4 times above, than from mineral fertilizers or from stocks of mobile elements in soil [5,6].

For each bean culture the factor nitrogen fixation in the given concrete conditions is defined [7,8,9]. As the most simple and satisfactory method with reference to field conditions bean and cereals under the maintenance the method of comparison can serve in them of nitrogen counting on unit of the area [4]. Improvement of technology of use of straw under blue lupine in a field crop rotation was the purpose of our researches.

MATERIALS AND METHODS

The investigation took place in the Long-term Fertilization Experiment located in Meshcherskaya Lowland (in the center of the East European Plain) (56° 03’ N, 40° 29’ E) at 150 m above sea level. The site is situated in the zone temperate continental climate, average rainfall for the year - 599 mm, the average temperature for the year - 3.9° C. Soddy-podzolic sandy soil, are low in organic matter (C_{org} content – 0,79 %) and nutrients, unstable water regime, acidity (pH_{kcl} – 5,1).

Researches spent in long field experience in VNIIOU skilled field. Here (in this experience) since 1995 influence application of straw grain on fertility of soddy-podzolic sandy soil and efficiency of cultures grain-row crop rotation is studied: lupine - a potato – barley.

Under a potato and barley mineral fertilizers did not bring, under lupine ploughed an eddish and winter wheat straw under the

following scheme: 1. Eddish: plowing (in the autumn) - the control (EP); 2. Eddish: disking & plowing (in the autumn) (EDP); 3. Eddish + straw: plowing (in the autumn) (ESP); 4. Eddish + straw: disking & plowing (in the autumn) (ESDP); 5. Eddish + straw: disking & plowing (in the spring) (ESDPs).

RESULTS AND DISCUSSIONS

The weight of the ploughed straw on the average has made 4,8 t ha^{-1}, an eddish and roots - 2,7 t ha^{-1}. With straw in soil 19,8 kg of nitrogen, 10,4 kg of phosphorus and 48,5 kg Kalium per 1 ha^{-1}, with an eddish and roots - 8,5 have arrived; 4,7 and 19,5 kg, according to (Table 1). More boldly to estimate efficiency of straw under lupine and it after effect together with lupine on a potato and barley, a winter wheat grain yield at calculations did not consider

Table 1. The agrochemical characteristic of the plant rests of a winter wheat (an average for 3 years)

Plant rest	Weight of air-dry organic substance, t ha^{-1}	The maintenance of elements of a food in a solid, %				
		C	N	C/N ratio	P_2O_5	K_2O
Straw	4,24	47,6	0,47	102	0,25	1,14
Eddish and roots	2,03	47,7	0,43	113	0,23	0,95

Thus, in soil with an eddish and roots 33 kg/hectares NPK (variants 1, 2), and with straw, an eddish and roots - 111 kg/hectares NPK have arrived on the average (variants 3-5).

Research has shown, that at fertilizer straw the factor nitrogen fixation (Table 2) raises. The general carrying out of nitrogen and its carrying out from atmosphere on a straw background considerably increase. So, the general carrying out of nitrogen in the treatments with straw depending on a way and term entering has increased on 31-69 % in comparison with the control, carrying out of nitrogen from atmosphere - on 48-107 %. For the size of carrying out lupine from soil fertilizer influence straw practically has not rendered some nitrogen.

Table 2. Influence of application straw on the maintenance of the nitrogen in a lupine biomass, nitrogen fixation factors and the sizes of consumption by lupine plants (on the average for 3 years)

Variant of experience	General carrying out N, kg ha^{-1}	Carrying out N from soil, kg ha^{-1}	Consumption N from atmosphere, kg ha^{-1}	Nitrogen fixation rate
EP	80,9	28,3	52,6	0,65
EDP	87,5	28,4	59,1	0,66
ESP	106,0	27,9	78,1	0,74
ESDP	118,0	28,1	89,9	0,77
ESDPs	137,0	28,0	109,0	0,80

Processing methods of use of straw on fertilizer were reflected in efficiency of a link of a crop rotation (Table 3). In treatment "ESP" in was the most effective, efficiency of a link of a crop rotation has increased by 23,1 % in comparison with the control. Efficiency of a link of a crop rotation has increased by 18,6 % in treatment "ESDP", at "ESDPs" - on 21,1 %.

Table 3. Efficiency of straw application in a link of a crop rotation with lupine

Variant of experience	Gathering g. u. of a commodity output, dt ha^{-1}	Increase		Level of profitability, %	Rate power it is effective, %
		dt ha^{-1} g.u.	%		
EP	79,8	-	-	154,2	2,40
EDP	83,9	4,1	5,1	160,8	2,51
ESP	98,2	18,4	23,1	213,8	2,99
ESDP	94,5	14,7	18,6	200,9	2,83
ESDPs	96,6	16,8	21,1	199,1	2,86

Least significant difference 05 t ha^{-1} 10,8

The analysis of economic and power efficiency from straw application under blue lupine in a crop rotation link has shown, that level of profitability of cultivation of cultures at straw use on fertilizer has raised on 41,8-58,7 %, the factor of power efficiency in variants with straw has increased by 15,0-21,5 %.

Carrying out NPK from soil on 1 т basic production, taking into account collateral, defined by the laboratory analysis, has shown, that consumption nitrogen by lupine (with a deduction symbiotic) in variants without straw on the average there was above on 19,4 % (Table 4). Carrying out of phosphorus and Kalium has appeared above in variants with straw. Phosphorus consumption at straw entering was more on 15,7-29,8 %, and Kalium - on 16,2-31,5 %.

Table 4. Total balance NPK in a link of a crop rotation with blue lupine, a potato and barley

Variant of experience	N	P_2O_5	K_2O
Has arrived with straw and symbiotic nitrogen kg ha^{-1}			
EP	61,1	4,7	19,5
EDP	67,6	4,7	19,5
ESP	106,4	15,6	68,0
ESDP	118,2	15,6	68,0
ESDPs	137,3	15,6	68,0
Carrying out from soil of three crops kg ha^{-1}			
EP	96,9	67,1	150,0
EDP	106,5	67,1	151,0
ESP	132,3	88,3	204,1
ESDP	116,0	82,5	182,2
ESDPs	90,9	89,5	188,0

Thus, straw entering under Lupine impoverishes its nitrogen and accordingly fiber, increasing the maintenance of Phosphorus and Kalium. The nitrogen "intended" Lupine, is spent soil microbial biota at a straw mineralization. At the same time during straw decomposition a food Lupine Kalium and Phosphorus that promotes their accumulation in a crop improves.

Straw entering after effect on a potato and barley under Lupine did not influence size of carrying out of elements of a food by a unit of production. On the average by five variants of experience the leguminous culture – lupine annual (blue) differed from grain culture - barley three times the smaller expense of soil nitrogen, in 1,6 times - potassium on a unit of production that underlines resource saving a role of lupine in a crop rotation.

In table 5 the parity of three basic elements of the food lupine consumed, by a potato and barley from soil in a crop rotation link is shown. If on all cultures to accept the nitrogen maintenance for unit on phosphorus for lupine it will make 1,1, potato 0,7 and barley - 0,4. And on potassium - 1,8; 1,7; 1,1 accordingly

Table 5. Parity of the elements consumed by cultures in a crop link

Variant of experience	Lupine annual (blue) on grain $N:P_2O_5:K_2O$	Potato $N:P_2O_5:K_2O$	Barley $N:P_2O_5:K_2O$
EP	1:0,9:1,5	1:0,8:2,0	1:0,4:1,07
EDP	1:0,8:1,4	1:0,7:1,7	1:0,4:1,07
ESP	1:1,2:2,0	1:0,7:1,7	1:0,4:1,06
ESDP	1:1,2:2,0	1:0,6:1,7	1:0,4:1,09
ESDPs	1:1,2:2,6	1:0,6:1,4	1:0,4:1,08

At definition of actual carrying out NPK by each culture on the average for 3 years in a crop rotation link it is shown: the potato after lupine consumes nutrients in 1,2-1,6 times more lupine and in 1,5-2 times of more barley following it. Plowing of straw in the spring under lupine its best use of lupine was provided at absence effect on barley. Total carrying out NPK on three cultures in variants with straw has appeared above on 17,5-36,2 % above, than on the control.

Table 6. Condition of balance (kg ha^{-1}) and its intensity (%)

Variant of experience	N		P_2O_5		K_2O	
	Balance	Intensity	Balance	Intensity	Balance	Intensity
EP	-35,8	63,1	-62,1	7,0	-130,5	13,0
EDP	-38,9	63,5	-62,4	7,0	-131,5	12,9
ESP	-25,9	80,4	-72,7	17,7	-136,1	33,3
ESDP	+2,2	101,9	-66,9	18,9	114,2	37,3
ESDPs	+46,4	151,0	-73,9	17,4	120,0	36,2

If to compare the total maintenance of lupine nutrient elements and a potato, including fixed air nitrogen, close enough results turn out. However sources of nitrogen for these cultures the different: its most part lupine was received from air, and row by culture - a potato - from soil, a stubbly root rests and lupine exudates.

Lupine as a crop rotation component - resource saving culture, a potato consuming. Lupine advantage before a potato and barley - its ability positively to react to entering of straw without application of nitrogen fertilizers.

Table 7. Operating ratios of nutrients elements, %

Variant of experience	N	P_2O_5	K_2O
EP	-	-	-
EDP	14,2	0	5,0
ESP	33,2	136,0	54,1
ESDP	16,1	98,7	56,1
ESDPs	4,0	144,0	55,9

Analyzing data of tables 6 and 7 it is possible to draw following conclusions:

- nitrogen balance in a link of a crop rotation with lupine, fertilized by straw, positive only at its preliminary disking before plowing. The operating ratio of nitrogen from straw and soil at the expense of increase in a share of symbiotic nitrogen thus decreased;
- balance of Phosphorus and Kalium deeply scarce by all variants of experience;
- the combination lupine with straw provides increase in carrying out of phosphorus for rotation on size close phosphorus maintenances in straw;
- straw introduction in a link of a crop rotation with lupine saves up resources soil potassium in the quantity, arriving with straw;
- for three-year rotation at straw use under lupine increases intensity of balance on nitrogen on 17.3-87.9 %, on phosphorus - on 10.9 - 11.9 %, on potassium - on 20.3-24.3 %;
- on straw operating ratios of phosphorus and potassium from soil and straw increase.

CONCLUSIONS

As a result of carrying out of researches it is revealed high agroeconomic, agrochemical, resource-healing and energy-saving efficiency of sharing blue lupine and winter wheat straw in a link grain-crow a crop rotation on soddy - podzolic sandy soil. Straw application under blue lupine in a crop rotation link was economically and energetically favourably. It was most effective autumn запашка straw without application disking.

Lupine differed from grain culture - barley three times the smaller expense of soil nitrogen and in 1,6 times -potassium on a unit of production that underlines resource saving a role of lupine in a crop rotation. Total carrying out NPK on three cultures (blue lupine-potato-barley) in variants with straw above on 17,5-36,2 % in comparison with the control that is connected with increase of productivity of cultures.

Nitrogen balance in a link of a crop rotation with lupine, fertilized by straw, positive only at its preliminary disking before plowing (from 2,2 to 46,4 kg ha^{-1}. The operating ratio of nitrogen from soil and straw at the expense of increase in a share and prevalence of symbiotic nitrogen in lupine crop are decreased. At the same time lupine and straw do not compensate some phosphorus and potassium with a crop. The balance on these two elements negative also demands a heavy use of mineral and organic fertilizers.

REFERENCES

[1]Кожемяков А.П., 1989, Приемы повышения продуктивности азотфиксации и урожая бобовых культур // Биологический азот в сельском хозяйстве. - М.: Наука, С.15-26.

[2]Кольбе Г., Штумпе Г., 1972, Солома как удобрение. М.: - Колос, 75 с.

[3]Найдин П.Г., 1963, Удобрение зерновых и зернобобовых культур. М.: Сельхозгиз, 263 с.

[4] Трепачев Е.П., 1999, Агрохимический аспекты биологического азота в современном земледелии. М., 498 с.

[5]Фокин А.Д. и др. 1979, Роль растительных остатков в обеспечении растений зольными элементами на подзолистых почвах Почвоведение. № 6./1979, С.53-61.

[6]Семенов В. М., Ходжаева А.К., 2006, Агроэкологические функции растительных остатков в почве //Агрохимия. №. 7/2006, С. 63-81.

[7] Гукова М. М. др.1971, Использование люпином азота атмосферы и удобрений //Докл. ТСХА. №. 162.

[8]Такунов И.П., 1996, Люпин в земледелии России. Брянск. Придесенье.372с.

[9]Summerell B. et al., 1969, Decomposition and chemical composition of cereal straw//Soil. Biol. and Biochem. 21. №4.p.551-559.

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STUDY UPON THE MELLIFEROUS BASIS OF VURPĂR LOCALITY (SIBIU COUNTY)

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Abstract

The goals of our research were to identify the melliferous base of Vurpăr locality (Sibiu County), emphazing the important aspects, such as: the diversity of the melliferous species, the heating index of blooming (T^0 C), the average data of starting of blooming, the honey production (kg/ha), the apical balance. The applied research methods were as follows: observation in the field, the method of direct gathering of different plant species and their identification in the lab. As a result of our researches there was established the taxonomic structure of melliferous flora in the researched area, in this respect being identified 38 taxonomic groups belonging to herbs, bushes or trees, Besides these species of melliferous plants there were identified other 5 tree species without flowers (manna honey) in the area. As a conclusion there can be asserted that the territory of Vurpăr locality holds a valuable malliferous potential. The apiarists dealing with putting into value this territory need to know exactly this potential and also the weather conditions of the area.

***Key words*:** *the melliferous basis, vegetable*

INTRODUCTION

The From the insects, ones that have fascinated the imagination of man during his existence were, of course, the bees. Creation of Gods, the bees have always impressed through their organization, their behavior and especially through the result of their work, the honey. The bees' ethnology inspired beliefs, legends, literary works, material for studies and scientific researches, generating complex symbols, which found their expression through the texture with golden thread of tiny creatures even on an imperial mantle.

The present economic importance raises a high pedestal through the bees' products in the traditional folk medicine, in the allopathic medicine as well as in the cosmetic and pharmacy industry.

In the antiquity Plinius the Old allotted a great space in his encyclopedia, Naturalis Historia, to the bees and honey. The honey was considered a God's gift. "This substance, Plinius said, was coming from air, especially at the rising of constellations. It represented the sweat of the stars, the saliva of stars or a secretion of the air when it was purifying" [9]. The bees gathered it from the leaves of the trees and vegetation.

Controversies upon the origin of the manna there were and there still are. The idea that the honey came from the air persisted till the 18th century when there were drawn two theories: the idea of vegetal origin, which sustained that the manna was a secretion of the plant and the theory of animal origin, which gave priority to the aphids' dejections. Till nowadays, the fact that the honey could come from the fleas' dejections horripilate a lot of people.

The bees-plants binominal with their reciprocal existential conditioning is one of the most fascinating phenomena within the Mother Nature. The bees gather the nectar of the plants and, in change assure the perpetuation through pollinating. The plants' pollinating is a restrictive factor in cultivating the fruit trees, the cereals, vegetables, fodder plants, and so one... In this blessed binominal stand one in front of other the bees and the plants. There was appreciated that in Europe for an efficient pollinating of the cultures

there would be needed 13 millions beehives [13].

The melliferous plants, those plants producing the nectar and those supplying manna through the plant fleas are the second factor of importance in this binominal.

The study upon the plants on the Sibiu County territory was started in the 17th century. Till the 19th century there were collected 850 cormophit species and there were published 460 species [2]. In the list of professor J. C. Eder from "Observations of Natural History" (1786-1799) was mentioned for the first time Vurpăr locality, as being part from the list of 70 cormophite species in Sibiu [2]. A significant contribution in this field was also brought by Schullerus Pauline round 1916 [10] and 1920 [11], which came to complete this list. Nowadays the total of cormophite species on the territory of Sibiu County is of 2455 [2].

The melliferous potential of an area consists of the capacity of this zone to assure the food of the bees' families. The quantity of the nectar and of the pollen from the spontaneous flora and from the cultures as animal and vegetal manna is influenced by numerous factors depending directly on melliferous flora. Among these determinative factors there are: the species, the plants age, the blooming period, genetic factors as well as the size of the flowers, their position on the plant assuring the development as well as the easiness of approaching it by the bees and last but not least the sanitary stage of the area. At national level Sibiu County is situated on the 34th place among the counties of Romania, having a potential of 6242.4 tones honey [4].

The present study wants to bring a plus to the literature of specialty regarding the melliferous flora in Vurpăr locality, Sibiu County.

MATERIALS AND METHODS

The researches took place in Vurpăr locality during 2013.

For achieving the goal of researching and knowing the flora from the studied ecosystem there were taken into consideration specific methods, such as:

- the observation regarding the inventory of the flora within the area of Vurpar locality (Sibiu County), the 4th apical area in our country, identifying the melliferous species and their blooming period;
- the method of direct collecting of the plants, quantitative method, using the simple tools and materials: little metallic shovel used for taking out the underground part of herbs; little metallic box for caring the plants.
- the lab phase comprised operations of unwrapping of the botanical material and determination; for this operation there were also used bibliographic sources [1], [2], [3], [5], [6], [7], and [8].

RESULTS AND DISCUSSIONS

Vurpăr locality is situated in Hartibaciu plateau, in the centre of Sibiu County and is a part of those 90,000 hectares that were declared Sit Natura 2000. The relief of the locality is a hilly one with the height round 500 and 712 meters. In this area the agriculture is friendly with the environment, living together with a rich flora.

Figure 1. The localization of Vurpăr locality in Sibiu County
Source:http:/upload.Wikimedia.org/wikipedia/commons/5/59/Vurpar_jud_Sibiu.jpg

This area comprises: meadows 18%, hay field 20%, forest 38% and the rest of 24% being arable land. The hay fields with their wild flora have an economic importance both for the selection of fodder cultures as well as for the apiculture [15]. This melliferous base of

Vurpăr locality includes species of herbs, trees and bushes with variable apical balance (Table 1).

Table 1. The meliferous basis in Vurpăr locality (Sibiu County) in 2013

Nr	Species name	Heat index of blooming (T^0 C)	The average data of blooming	Honey production (kg/ha)	Apical balance
1.	2.	3.	4.	5.	6.
1	*Vaccinium myrtillus* L. (afin)	525-680	05-15.05	15-30	medium
2	*Aesculus hippocastanum* L. (castan sălbatic)	475-525	27.04.-07.05	50-100	medium
3	*Allium cepa* L. (ceapă seminceră)	1330-1540	20-30.06	120	medium-high
4	*Thymus vulgaris* L. (cimbru)	1230-1430	15-25.06	150	medium
5	*Cerasus avium* (L.) Moench(cireș)	220-330	10-20.04	30-40	medium
6	*Ribes nigrum* L. (coacăz negru)	275-395	14-24.04	20-50	medium
7	*Salvia verticilata* L. (urechea porcului)	1330-1540	20-30.06	400-600	medium
8	*Cucurbita pepo* L. (bostan, dovleac)	765-940	20-30.05	40-50	medium
9	*Fragaria vesca* L. (fragi de pădure)	689-765	15-20.05	40	medium
10	*Mentha aquatica* L. (izma broaștei)	1400-1575	22-30.06	220	high
11	*Menthe piperita* L. (izma bună)	1620-1870	05-15.07	100-200	medium
12	*Stachys recta* L. (jaleș sălbatic)	1130-1335	10-20.06	150-250	medium
13	*Medicago sativa* L. (lucernă)	680-850	15-25.05	25-250	medium
14	*Malus domestica* L. (măr)	350-450	20-30.04	30-42	medium
15	*Vicia pannonica* Crantz (măzăriche ungurească)	765-940	20-30.05	30-50	medium
16	*Vicia sativa* L. (măzăriche de primăvară)	850-960	25-31.05	10-30	medium
17	*Vicia villosa* Roth (măzăriche păroasă)	765-940	20-30.05	30-50	medium
18	*Rubus caesius* L. (mur)	798-960	22-31.05	30-50	medium
19	*Sinapis arvensis* L. (muștar sălbatic)	765-940	20-30.05	40	medium
20	*Taraxum officinale* L. (păpădie)	176-275	05-15.04	200	medium
21	*Prunus spinosa* L. (porumbar)	350-450	20-30.04	25-40	medium
22	*Prunus domestica* L. (prun)	300-350	15-25.04	20-30	medium
23	*Brassica napus* L. (rapiță)	220-330	10-20.04	40-50	high
24	*Robinia pseudoacacia* L. (salcâm)	600-765	10-20.05	1000	very high
25	*Salix alba* L. (salcia albă)	100-135	20-30.03	100-500	high
26	*Salvia pretensis* L. (salvie de camp)	798-960	22-31.05	280	medium
27	*Salvia nemorosa* L. (jaleș de camp)	1750-1980	10-20.07	300	medium
28	*Eryngium campestre* L. (scaiul darcului)	1750-1980	10.-30.07	100	medium
29	*Origanum vulgare* L. (sovârf)	1130-1335	10-20.06	70-80	medium
30	*Onobrychis viciifolia* Scop. (sparcetă)	1038-1235	05.05-06	120-300	high
31	*Melilotus Officinalis* Lam. (Sulfina Galbena)	990	01.06-09	300	high
32	*Tilia tomentosa* Moench (tei argintiu)	1400-1450	17-27.06	1000-1200	very high
33	*Tilia cordata* Miller (tei pucios)	1050-1100	02-12.06	600-1000	high
34	*Trifolium repens* L. (trifoi alb târâtor)	765-940	20-30.05	100-250	high
35	*Trifolium pretense* L. (trifoi roșu)	1230-1430	15-25.06	25-50	medium
36	*Lamium maculatum* L. (urzică moartă)	680-850	15-25.05	50-150	medium
37	*Lamium purpureum* L. (sugel puturos)	80-135	20-31.03	50-90	medium
38	*Rubus idaeus* L. (zmeur)	1038-1235	05-15.06	50-200	very high

The analysis of the data in table 1 emphasizes the diversity of plant species having the blooming period between March (20th March 2013 at *Salix alba* L.) and ending in September (*Melilotus officinalis* Lam.). The maximum of favorability of harvesting is in May (14 species) and June (12 species). The long interval of blooming till March to September covers the entire season of harvesting for the bees, the obtained "poly flower" honey being a quality honey. In the same time the long period of blooming assured favorable conditions for the bees' families, meaning less manipulations and transports for these.

Our study in the area of Vurpăr locality showed that the territory is isolated from the pollution agents so that the melliferous flora assuring nectar and pollen without polluting agents, the obtain honey being considered an ecologic product.

From the point of view of apical balance the melliferous base of Vurpăr locality is relatively high. From the total of 38 species, which constitutes the melliferous flora 27 species, representing 71.05% have a medium apical balance, 6 species (18.42%) have a high apical balance and 3 species (7.89%) have a very high apical balance and only one species frames in the medium-high category (2.64%).

The highest production of honey (kilograms/ha) in 2013 was obtained from the species *Tilia tomentosa* Moench (1000-1200 kg/ha) and *Tilia cordata* Miller (600-1000 kg/ha).

Table 2. Species of bushes without flowers (manna honey) on Vurpăr area (Sibiu County) in 2013

Nr crt	Species name	Heat index of blooming (T^0 C)	The average data of blooming	Honey production (kg/ha)	Apical balance
1.	2.	3.	4.	5.	6.
1	*Corylus avellana* L. (alun)	10-35	05-15.05	20	medium
2	*Abies alba* Miller (brad)	1335-1625	20.06-05.07	40	high
3	*Fagus sylvatica* L. (fag)	680-850	15-25.05	20	medium
4	*Picea abies* (L.) Karsten (molid)	1330-1540	20-30.06	50	high
5	*Querqus robur* L. (stejar)	350-450	20-30.04	20	medium

The manna production is provided in the researched area by other 5 species of bushes.

The apical balance for these species is a high one, being comprised between the values: middle (3 species) and high (2 species) (Table 2).

CONCLUSIONS

The study underlines the important aspects regarding the melliferous base of Vurpăr locality (Sibiu County) such as: the biodiversity of melliferous species, the heating index of blooming (T^0 C), the average data of blooming start , honey production (kg/ha), apical balance.

The methods and techniques used for research in doing this study were: analysis of the bibliographic material, the direct observation in the field, collecting the biologic material and the determination of the material in the lab.

In the melliferous base of Vurpăr locality (Sibiu County) during 2013 there were identified 38 species of mellifers belonging to herbs, bushes and trees.

The blooming period of the plants from the researched melliferous is comprised during March-September, with the maximum of favorability of collecting during May-June.

There were identified 5 bushes species without flowers (manna honey) in this area (*Corylus avellana* L., *Abies alba* Miller, *Fagus sylvatica* L., *Picea abies* (L.) Karsten, *Querqus robur* L.).

There can be established that the area of Vurpar locality (Sibiu County) has a valuable meliferous potential.

Taking into consideration the profitability of the apical activity there can be imposed that each and every apiarist to know this potential as well as the specific weather conditions of the area, conditions that can be determinative for placing the apiaries. In this respect, the blooming data of the melliferous plants can also be very useful.

Regarding the forest ecosystems on the territory of Vurpar locality there is recommended that the placing of apiaries to be done nearby in the clearing areas, lacking the powerful air draughts and in the proximity of the acacia trees.

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REFERENCES

[1] Ciocârlan, V., 2000, Flora ilustrată a României, Ed. Ceres, București.
[2]Drăgulescu, C., 2003, Cormoflora județului Sibiu, Ed. Pelecanus, Brașov.
[3]Grau Marga, 2009, Plante cu flori în decursul anotimpurilor. Ghid al plantelor din Transilvania, Ed. Hora, Sibiu.
[4] Jouveaux, J., 1988, Albinele și creșterea lor, Ed. Apimondia, București, 85-136.
[5] Pârvu, C, 2002, Enciclopedia plantelor. Plante din flora României, vol.I, Ed. Tehnică, București.
[6]Pârvu, C., 2003, Enciclopedia plantelor. Plante din flora României, vol.II, Ed. Tehnică, București.
[7]Pârvu, C., 2004, Enciclopedia plantelor. Plante din flora României, vol.III, Ed. Tehnică, București.
[8] Pârvu, C. 2005, Enciclopedia plantelor. Plante din flora României, vol.IV, Ed. Tehnică, București.
[9]Plinius, Naturalia Historia. Enciclopedia cunoștințelor din Antichitate, vol.II, Ed. Polirom, București, 180-228.
[10] Schullerus Pauline, 1916, Pflanzen in Glaube und Brauch der Siebenbürger Sachsen, Archiv des Vereins für siebenbürgische Landeskunde, N.F., 1:78-188.
[11] Schullerus Pauline, 1921, Pflanzen in Glaube und Brauch der Siebenbürger Sachsen, Archiv des Vereins für siebenbürgische Landeskunde, N.F., 3:348-426.
[12]Speta Elise, Rákosy L., 2010, Wildpflanzen Siebenbürgens, Plöchl Druck GmbH, Freistadt.
[13]http://gazetadeagricultura.info/animale/albine/15410
[14] http://www.uaiasi.ro/PN_2/Albine/fisiere/raport_I.pdf
[15]http://www.vurpar.ro/despre-vurpar/date-geografice/

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LOCAL INSTITUTIONS' MICRO CREDIT DELIVERY AND EFFECTS ON RURAL FARM HOUSEHOLDS' POVERTY IN ABIA STATE, NIGERIA

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Abstract

The study examined the effect of local institutions' micro credit delivery on rural farm household poverty status in Abia state, Nigeria. Multistage random sampling technique was employed in collecting data from two hundred and four (204) rural farm households in local institutions using structured interview schedule. The data were analyzed using descriptive statistics, poverty indices, and paired t-test. The study revealed reveals that the religious association granted the highest amount of credit (₦91,950.0) to their members more than any other local institutions in the study area, while the mean amount demanded was ₦ 128,491.3. The average annual contribution of members in different local association was ₦36357.35 with a low percentage cash contribution index of 10.59%. The result of the poverty indicators of the rural farm households in local institutions showed that the poverty line (mean monthly household expenditure) of the farm households was ₦16=₦20648.94 per month or ₦ 247787.28 per annum. The incidence of poverty otherwise called the head count ratio was 0.4863 while the coefficient of poverty gap (poverty depth) was 0.2458. The result of the paired t-test showed that the local institutions' micro credits impacted significantly on the mean annual farm income and monthly expenditures of the rural farm households in the study area. It was however, recommended that the autonomous local institutions should be integrated into the current poverty alleviation programme of the government and making them channels for loan delivery with a view to strengthening the financial capacity of its members as well as achieving the Millennium development goals of reducing poverty by half.

Key words: *farm households, local institutions, micro credit, poverty*

INTRODUCTION

Poverty is increasingly being recognised as both a policy and economic problem in Nigeria. The state of rural poverty in Nigeria is no less alarming with very sharp deterioration in the living standard of the people [17]. The percentage of people living on less than US$1.25 daily (the poor) in Nigeria jumped from 47.2 percent in 1981 to 62.4 percent in 2005 [19]. Farm households in South Eastern part of the country are predominantly poor farmers that maintain their traditional occupation mainly on small scales. They earn poor incomes from farms and therefore have increasing drive to diversify income sources from off-farms [14,15,7].

Inadequate capital is a major problem confronting small-scale enterprises including farmers in Nigeria, despite the fact that small scale farmers produce the bulk of the food consumed locally and some export crops which generate foreign exchange to the country. A large proportion of Nigeria's poor lack access to financial services. This presents a fundamental challenge for the rural financial sector development in the country. Inadequate access to credit by poor rural households has negative consequences for agricultural and non-agricultural productivity, income generation and household welfare [5].

In Nigeria, the decline in food production has partly been blamed on low investment in agriculture arising from unavailability of farm credit and farmers' inaccessibility to the available formal credit facilities [18,6]. Availability of credit is truly an issue that depends on supply factors and is quite different from accessibility to credit which is a demand driven concern. These among other issues bedeviling agriculture have provoked the need to increase investment in agriculture through interventions that cushion the conditions including encouraging farmers to form groups or local institutions that enable them access micro loans from the institutions//groups or other formal lending financial sources. Operations of Nigeria's quasi formal credit such as Family Economic Empowerment Programme (FEAP), Nigerian Bank of Agriculture), National Fadama Programme, and National Investment Loans in Agriculture rely greatly on the liquidity risk management power and power of interactions of these institutions in assuring identity and accountability to the members getting involved in such programmes.

A number of farmers come together with common (unifying) interest of improving their occupational operations and hence livelihood and form a group or institution within their village or community levels. The motivation and the unifying interest amongst members in such group suggest like-mindedness and potential to work for and even help each other absorb variability in personal income and other economic shocks.

Many of these traditional institutions and groups are social, others are economic while yet a good number serve both social and economic purposes in livelihood of their members. When the groups are social groups, they help in creating social capital which among other assets include; institutional identity, relationships within, members' attitudes, and values that govern interactions among them as a people. These contribute to economic and social development of the communities [10]. In the culture of some local institutions found in the eastern part of the country, they are characterized by some social dimensions like provision of food, healthcare services, credit facilities and day-care/primary education for children of members [16]. Within these communities abound cooperative groups, religious groups, mutual associations groups, Age grade groups and Fadama groups. The economic groups concern themselves with their mutual interest that revolve around solving problems of primary production and marketing of whatever is their products and services.

There is growing evidence that local networks can have an impact on developmental outcomes – growth, equity, and poverty alleviation. Social capital as reflected in associational activity may lead to less imperfect information and hence lower transactions costs and a greater range of market transactions which can in turn lead to better outcomes [11]. For instance, social links among borrowers may increase their ability to participate in credit transactions that involve some uncertainty about compliance. Specifically, social capital can lead to a better flow of information between lenders and borrowers and hence less adverse selection and moral hazard in the credit market. Social networks also potentially expand the range of enforcement mechanisms for default on obligations in environments in which recourse to the legal system is costly or impossible.

Effective functioning social network have fundamental roles to play in fostering development. At the level of individual livelihoods, local institutions can perform very crucial functions. They can be a principal means for the poor to get access to financial assets; through facilitating saving, they can be of importance in reducing the vulnerability associated with uneven and unpredictable year-to-year changes in circumstances, and they can help convert illiquid assets into liquid ones in the event of emergencies Meanwhile, with the introduction of micro credit programmes, the poor are provided small loans accompanied with training in business skills to expand their existing business. These small loans tend to supplement existing resources of individuals or households to engage in various business

activities including micro and small-scale production, trading activities of all kinds and provision of services that generate income for their survival, allowing them to care for themselves and their families.

Based on the foregoing, this study is anchored on the following specific objectives which includes: (i) to describe the socioeconomic characteristic of rural farm households that are members of local institutions in the study area; (ii) to analyze farm household's mean monthly contributions (savings) to local institutions in the study area; (iii) to examine the amount demanded by members vis-a vis disbursement by the local institutions in the area; (iv) to examine the poverty profiles (poverty incidence, poverty gap) of rural farm households in local institutions in the study area; (v) to determine the effect of micro credit from local institutions on farm income and expenditures of rural farm household in the study area.

MATERIALS AND METHODS

The study was conducted in Abia state, Nigeria. The state is located within the South-eastern Nigeria and lies between longitudes 04^0 45' and 06^0 07' East of the Greenwich Meridian and Latitudes 07^0 00' and 08^0 10' North of the equator. The State is blessed with young and vibrant population who are largely homogeneous in socio psychological characteristics with a lot of farmers and local organizations and very strong in terms of popular grassroots organizations. Abia state is divided into 17 Local Government Areas (LGAs), which is grouped into three (3) agricultural zones namely, Ohafia, Umuahia and Aba zones. Its population stood at about 2,883,999 persons with a relatively high density of 580 persons per square kilometre [12]. Agriculture is the dominant economic activity and main source of employment in the State providing employment and income for more than 70.0 per cent of the population. The people are predominantly farmers and have the potentials for the production of agricultural produce and products such as palm oil, cassava, vegetables, palm kernel, yam, and rice and they also engage in food processing [1].

The study adopted a multistage random sampling technique in the selection of LGA's, local institutions and farm households. In the first stage, two Local Government Areas (LGAs) were selected randomly from each of the three agricultural zones of the state, thus giving a total of six LGA's. The second stage involved a random selection of two communities from each of the Local Government Areas, giving a total of 12 communities. From each of the chosen communities, a list of local organizations was obtained from the village secretaries who were the key informants. These formed the sampling frames for the farmers association from which samples of two local organizations were randomly selected in each of the selected communities, thus giving a total of 24 local institutions. The last stage of sampling involved the random selection of ten farm households' beneficiaries of local institutions' micro credit in each of selected local institutions. In all, a grand total of two hundred and forty (240) households who have accessed micro credit from local institutions were sampled for the study, however, 204 respondents' interview schedules were found usable for analysis.

The study employed primary data for its analysis which elicited information on membership to local groups/institutions, benefits (income) of members from groups/institutions, consumption expenditure, contribution of members to local institutions. Six enumerators who administered the questionnaire by personal interview method were consistently used in generation of this information, two for each agricultural zone of the state collecting the same data from the same farm households using the same semi-structured questionnaire.

The data collected were analyzed both descriptively and inferentially. Descriptive statistics such as frequencies, means, tables and percentages were used to analyze the socioeconomic profiles of the rural farm households in local institutions. Per-capita poverty indicators were used to draw

conclusion on poverty incidences while paired 't' test analysis was carried out to determine the effect of local institutions' micro credit on farm income and expenditures of rural farm households.

The following specifications were used to determine poverty level according to Ezeh and Anyiro [8].

$H = q/n$ …… (1)

Where:

H = the head count ratio

q = numbers of rural farm household living below the poverty line

n = the total number of rural farm households

The poverty gap will be calculated as

$I = \{(Z-Y)/Z\}$ ……..(2)

Where

I = the poverty gap

Z = the poverty line using the mean household expenditure

Y = the average income of rural poor farm household.

Paired treatment test (paired't' test) was used according to Ezeh and Anyiro [8]; Nwachukwu and Ezeh [13] as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \ldots\ldots\ldots\ldots .. (3)$$

$n_1+n_2 - 2$ degree of freedom.

Where:

t = paired t statistic

$\bar{X}_1$ = Mean parameters of farm households before accessing micro loans from local institutions

$\bar{X}_2$ = Mean parameters of farm households after accessing micro loans from local institutions

S_1^2= Variance of parameters of farm households before accessing micro loans

S_2^2= Variance of parameters of farm households after accessing micro loans.

n_1 = number of selected farm households before accessing micro loans

n_2 = number of selected farm households after accessing micro loans

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Farm Households

The socio-economic characteristics of the respondents are shown in Table 1. The table shows that 52.0 percent of the rural household heads in local networks were males while 48.0% of them were females. This implies that male headed farm households were more interested in membership of local level institutions and possessed the ability to form social capital than female headed households. This result is in consonance with Christoforou [4] that women headed households tend to have significantly lower membership and levels of overall civic participation in social networks than males. The mean age of rural farm households was 40.79 years. This is an indication that the farm households involved in informal local networks in the study area were mostly middle aged that were within the active productive work force. Majority (90.7%) of the rural farm households in local institutions were literate possessing divers formal educational levels that ranged from primary school education to tertiary school education with a mean household size of 3.79 persons. This presupposed that educated households will generally appreciate the need to engage more in social networks in order to receive and evaluate information for business improvement and productivity [2]. The result also shows that the mean number of years spent in local institutions by the sample households was 23.12 years. This indicates a relatively high membership experience in social networks in the study area. It has been reported that higher social capital benefits accrue to individuals with a relatively longer period of local organization affiliation [3]. It may be noted that individuals do not affiliate without expectations of some social, psychological or material rewards. The mean annual income of the farm households in local institutions was ₦766,326.5. The relatively high income status of the rural farm households has implication for households' welfare, expenditures as well as their cash contribution to their associations. The mean

monthly household expenditure of farm households in local organizations in the study area was ₦20,648.94. This significantly low proportion of household expenditures on consumption and production outlets suggest and underscore the insidious and endemic nature of poverty often engulfing most rural households in Nigeria. Low expenditure and by extension low investment in agriculture result in low output and by extension low income and invariably the food sufficiency gap widens [8].

Table 1.Socioeconomics of rural farm households in local institutions in Abia State Nigeria

Variables	Mean
Age (years)	40.79
Household size (number)	3.79
Number of Years spent in local institution	23.12
Annual Income (₦)	766,326.5
Monthly expenditure (₦)	20,648.94
Gender of household head	**Percentage**
Male	48.0
Female	52.0
Education level	**Percentage**
No formal education	9.3
Primary education	21.67
Secondary education	27.5
Tertiary education	41.7

Source: Field Survey data, 2013:
Note 1 USD = ₦160

Annual cash contribution of members of local institutions

Cash contributions are made by households to their associations. Part of this savings are used for general running of the association and loaned as micro credit to members who signify interest in loan. Table 2 shows the distribution of the respondents according to their annual cash contributions to local level institutions in Abia State. The table revealed that a fairly good proportion (38.0%) of the rural farm households contributed between ₦20,000 and ₦39,000 annually to their local organization while 5.39% of them made annual cash contribution of ₦80,000 and above. These contributions include payment of membership dues, marriage levies, burial levies, project/ development levies, among others. The average annual contribution of members in different local association was ₦36,357.35. Of the maximum 100 score, the cash contribution scores averaged 10.59%. Given the low cash contribution index to different association, most farm households would seem not to partake in these associations for economic gains.

Table 2.Distribution of respondents according to their annual cash contribution to local level institutions in Abia state, Nigeria

Cash contribution (₦)	Frequency	Percentage
< 20,000	118	57.84
20,000-39,000	38	18.63
40,000-59,000	29	14.22
60,000-79,000	8	3.92
80,000 and above	11	5.39
Total	204	100.00
Minimum cash contribution (₦)	150	
Maximum cash contribution (₦)	150000	
Mean cash contribution (₦)	36357.35	
Standard deviation	120448.1	
Percentage Cash contribution index (%)	10.59157	

Source: computed from Field Survey data, 2013

Loan size demanded and disbursed by local institutions

The mean amount of credit demanded by farm households vis-a vis disbursement by their local institutions in Abia state is presented in Table 3. The table reveals that the religious association granted the highest amount of credit (₦91,950.0) to their members more than any other local institutions in the study area, while the mean amount demanded was ₦ 128,491.3. The reason could be attributed to the involvement of virtually all household members in religious activities and the dire need to reinforce their faith and belief in God and giving the desired assistance to their members. Also, farmers associations, age grades, village associations and gender based groups disbursed an average amount of ₦61,300.51, ₦45,975.38, ₦36,780.3, 30,650.25 respectively to their members, while the mean amount demanded was ₦ 85,660.89, ₦64,254.68, ₦51,396.53 and

₦42,830.5 respectively This indicate high influence of group dynamic effects.

The other local institutions: self help groups, cooperative societies, traders association and fadama groups granted a mean loan of ₦26,271.64, ₦24,520.2, ₦22,987.69 and ₦21,635.47 respectively to their members, while the mean loan amount applied to these local institutions were ₦36,711.81, ₦34,264.36, ₦32,122.83 and ₦30,233.26 respectively. Overall, the result shows that these local institutions' micro credit nearly bridged the credit supply and demand gap in the rural areas.

Table 3.Mean Distribution of loan Applied and disbursed by local institutions

Type of Local Institution	Mean Total amount applied by households (₦)	Mean total amount granted by institutions (₦)
Religious meetings	128491.3	91950.76
NGOs	-	-
Age grades	64254.68	45975.38
Gender-based	42830.45	30650.25
Dance groups	-	-
Parents/Teachers association	-	-
Village associations	51396.53	36780.3
Cooperative societies	34264.36	24520.2
Fadama groups	30233.26	21635.47
Farmers associations	85660.89	61300.51
Trader associations	32122.83	22987.69
Self help group	36711.81	26271.64

Source: Field Survey Data, 2013

Poverty profile of the rural farm household heads in local institutions

The poverty indicators of the rural farm household head in local institutions in Abia State are shown in Table 4. The table shows that the poverty line (mean monthly household expenditure) of the farm household heads was ₦20,648.94 per month or ₦ 24,7787.28 per annum. The incidence of poverty otherwise called the head count ratio [9] shows that the poverty incidence for rural farm household heads was 0.4863. This implies that 48.63% of the rural farm household heads in the study area were poor because their income fell short of the mean household expenditure used as poverty line.

The poverty gap (poverty depth) also known as the income short fall allows for the assessment of the depth of poverty among the rural farm household heads in local institutions in the study area. Table 4 shows that the poverty gap was 0.2458. This implies that the poor rural farm household heads in local institutions require 28.58% of the poverty line to get out of poverty. This amounts to ₦5,281.10 per rural farm household head per month or ₦63,383.99 per annum.

Table 4. Poverty Indicators of Rural farm household heads in local institutions in Abia State, Nigeria

Poverty indicators	Values
Mean monthly expenditure (₦)	20648.94
Poverty line (₦)	20648.94
Poverty incidence	0.4863
Poverty gap (Poverty Depth)	0.2458

Source: Field Survey Data, 2013; 1 USD = ₦160

The effect of micro credit accessed from local institutions in Abia State

The result of the paired t-test for difference in farm income and expenditures of rural farm households heads before and after accessing micro credit from local institutions is shown in Table 5.

The result shows that the mean farm income of the farmers before and after accessing micro credit from local institutions was ₦430611.22 and ₦ 766326.5 respectively. The mean difference between the two farm income levels was ₦335,715.28 with a standard error of 15975.7. The paired 't' result showed that this is statistically significant at 1.0% risk level because the calculated 't' = 4.5272 > the tabulated "$t"_{0.025}$ = 2.58. Therefore the null hypothesis is rejected. This implies that the farm income of the rural farm households after accessing micro credit from their local institutions was greater than their farm income before accessing micro loans. Therefore, the hypothesis of no significant difference in annual farm income of the farmers before and accessing micro loans from local institution is rejected.

The mean monthly expenditure value of the rural farm households before accessing micro credit from local institutions was ₦20648.94 while their mean monthly expenditure after accessing micro credit was ₦14306.38. The mean difference between the expenditure levels of the farm households was ₦6342.553 with a standard error of 1771.302. The paired 't' result showed that this is statistically significant at 1.0% risk level because the calculated 't' = 3.5807 is greater than the tabulated "t"$_{0.025}$ = 2.58. Therefore the null hypothesis is rejected.

Table 5: Result of paired t-test for difference in farm income and expenditures of rural farm households before and after accessing micro credit from local institutions in Abia State, Nigeria

Variable	Individual mean	Mean difference	Standard Error	T-value
Farm Income after accessing micro credit (Naira)	766,326.5			
Farm Income before accessing micro credit (Naira)	430,611.22	335,715.28	159,758.7	4.5272
Monthly expenditure after accessing micro credit (Naira)	20,648.94			
Monthly expenditure before accessing micro credit (Naira)	14,306.38	6,342.553	1,771.302	3.5807

Source: Field Survey data, 2013.

CONCLUSIONS

Based on the empirical evidence emanating from both descriptive and inferential statistics employed for this study, the following conclusions can be drawn on the findings: The mean annual cash contribution to local institution was surprisingly low while less than half of the farm household in local institutions were living below poverty line. Meanwhile, the local institutions' micro credit nearly bridged the credit supply and demand gap in the rural area. The research revealed also that the local institutions' micro credits impacted significantly on the mean annual farm income and monthly expenditures of the rural farm households in the study area.

Based on the findings of the research, the following recommendation will suffice;

The level of funding by the local institutions should be increased as evidence has shown that an appreciable number of their members were living below poverty line. Therefore, increase in the volume of credit disbursed to rural farm households has the attendant effect to enable them to meet up with their financial needs and help realize the much needed food security objectives.

The study observed a significant impact of local institutions' micro credit on the mean annual farm income and monthly expenditures of the rural farm households. Therefore, policy makers interested in improving the living conditions of farm households are advised to consider promoting social capital through group as one relevant ingredient to achieve the Millennium development goals of reducing poverty by half.

In terms of policy, the autonomous local institutions should be integrated into the current poverty alleviation programme of the Government. Their performance in finance-related and productive activities can be enhanced if they are linked up with basic skill acquisition schemes under the poverty reduction programmes of both the federal and state governments.

REFERENCES

[1]Abia State Government (ABSG), 1992, *Abia in Brief*. Published by the Abia State Government Press, Government House, Umuahia, Abia State, Nigeria. Pp. 1 – 3.

[2]Ajagbe, F.A, Adewoye, J.O., Ajetomobi, J.O., 2007, An Evaluation of Financial Performance of Community Banks in Ogbomoso Area of Oyo State, Nigeria. International Business Management, 1(4): 65-69.

[3]Akpabio, I.A., 2008, Significant Predictors of Social Capital in Farmers Organizations in Akwa Ibom State, Nigeria. The Journal of International Social Research. 1(3): 61-68.

[4]Christoforou, A., 2005, On the Determinants of Social Capital in Greece Compared to Countries of the European Union, .*FEEM Working Paper*, No. 68.
[5]Diagne, A., Zeller, M., 2001, Access to Credit and its Impact on Welfare in Malawi. IFPRI Research Report,No.116.http://www.ifpri.org/pubs/abstract/116/rr116.pdf. (accessed 12/03/2013).
[6]Emerole, C.O., 1996, Demand for institutional Credit by Small-Scale Farmers in Nigeria: A Case Study of Nigerian Agricultural and Cooperatives Bank (NACB) in Abia State. MSc. Thesis in Department of Agricultural Economics and Extension, Federal University of Technology Owerri, Nigeria.
[7]Emerole, C.O., Nwosu, A.C., Onyenweaku,C.E., Ukoha, O.O., 2008, Wage Differentials in Employments and Labour Supply Determinants in Smallholder Farm Households of Ikwuano, Abia State Nigeria. Journal of Research in Agriculture, 5(2): 8-14.
[8] Ezeh, C.I, Anyiro, C.O., 2013,The impact of micro financing on poverty levels of rural women farm households in Abia state, Nigeria; implication for policy intervention. Journal of Central European Agriculture. 14(2):168-180
[9]Ezeh, C.I., Anyiro C.O., Ehiemere I.O .,Obioma N.Q., 2012, Gender Issues on Poverty Alleviation Programmes in Nigeria; the Case of the National Fadama 1 Development Project in Abia State, Nigeria. Agris on-line Papers in Economics and Informatics. 4(3): 15-20.
[10]Grootaert, C., and Van Bastelaer, T., 2002, The role of social capital in development: An empirical assessment, Cambridge University Press.
[11]Narayan, D., Pritchett, L., 1999, Cents and Sociability: Household Income and Social Capital in Rural Tanzania., Economic Development and Cultural Change, 47(4): 871-897.
[12]National Population Commission (NPC), 2006, Census Report. National Population Commission, Umuahia, Abia State, Nigeria
[13]Nwachukwu, I.N., Ezeh, C.I., 2007, Impact of selected rural development programmes on poverty alleviation in Ikwuano LGA Abia State, Nigeria. African Journal of Food, Agriculture, Nutrition and Development (AJFAND) 7(5):1-17.
[14]Okafor, F.C., 1991, Population Pressure, Agricultural Change and Environmental Consequences in South Eastern Nigeria. Project on African Agriculture of the Joint Committee, on Africa Studies. Social Sciences Research Council of Learned Societies, Third Avenue, New York.
[15]Okali, D. Okpara, E., Olawoye, J., 2001, Rural-Urban Interactions and Livelihood Strategies: The Case of Aba and its Region, Southeastern Nigeria. Working Paper Series on Rural-Urban Interactions and Livelihood Strategies, Working Paper 4. International Institute for Environment and Development (iied).
[16]Okeke, E.C., Eneobong, H. N., Uzuegbunam, A. O., Ozioko, A. O., Kuhnlein H., 2008, Igbo Traditional Food System: Documentation, Uses and Research Needs. Asian Network For Scientific information, Pakistan Journal of Nutrition 7(2): 365 – 376.
[17]Oladipo, F.O., Aderati, F.O., Adefalu, L.L., Kareem, O.W., Olaleye, S.R.., Ibitunde, I.O., 2011, Women Farmers Assessment of Fadama II programme in Kwara State, Nigeria. Benin International Journal of Agricultural Economics and Extension Services, Nigeria. 1(2):124-130.
[18]Olaitan, M. A., 2006, Finance for Small and Medium Enterprises: Nigeria's Agricultural Credit Guarantee Scheme Fund. Journal of International Farm Management 3(2): 1- 9.
[19] World Bank, 2009, PovCalNet On-line Database http//:iresearch.worldbank.org

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EVOLUTION OF SUGAR BEET AND SUGAR PRODUCTION IN ROMANIA AFTER ITS ACCESSION INTO THE E.U.

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Abstract

The paper presents an analysis of the evolution for sugar beet production and sugar beet extraction after Romania accesion in European Union. The analysis is based on the evolutions of areas, total and average yields per unit of area. The last period (2007- 2013) is compared to the previous period (2001-2006), utilised at reference. Also, it is performed in the four sugar factories respectively (SC AGRANA Romania SA, Sugar Factory Bod, SC sugar Oradea SA, sugar Ludus SA) and it was made for the 2007-2013 period, after the application of EU's rules for sugar market. The study presents the evolution of the biological sugar content and white sugar content between the years 2007 and 2013 and it evaluates the variability of the way of achieving production quotas. The main conclusion imposed after the analysis is that the systems of sugar production from sugar beet are stabilized. Statistically multi-annual average deviation from the assigned quota is approx .2%. Annual variations of sugar production are set between (-) 15 % - (+) 43%, compared with the Romanian quota (104.688 tons white sugar).

Key words: *biological sugar, content, correlations, quotas, stability, sugar beet system, sugar factory, sugar content, sugar production, sugar yield, variability, white sugar*

INTRODUCTION

Until 1990, Romania produced approx. 500,000 tons of white sugar, from sugar beet, on a surface area of approx. 200,000-250,000 ha and an average yield of 2.2-2.5 tonsof white sugar per hectare. The annual consumption of sugar was about 20-22 kg sugar/capita/year, including sugar products [1].

Since 1991, some of the 35 sugar factories have ceased production gradually so that in 2007, from the EU accession, four factories were operational, extracting sugar from sugar beet, making annually approx. 100,000 tons of white sugar [1].

Romania's EU accession meant for the sugar beet chain the introduction of annual production quotas, calculated based on historical reference (average production of the last five years preceding accession (01/01/2007).

Following the accession negotiations, Romania had allocated a quota of 109.164 tonsof white sugar from sugar beet, a quantity of 329.636 tons of white sugar from imported raw sugar (known as the traditional supply of raw cane sugar) and isoglucose quota of 9,981 tons.

In accession moment 10 sugar factories functioned from which three factories (S.C. Agrana S.A.-Roman Branch, S.C. Fabrica de Zahăr Bod S.A., S.C. Zahărul Oradea S.A.) processed white sugar from sugar beet and refined raw sugar cane, one factory for sugar beet only, (S.C. Zahărul Luduş S.A.), six factories (S.C. Zahărul Lieşti S.A., S.C. Lemarco Cristal Urziceni SRL, S.C. Zaharul Corabia S.A., S.C. Agrana Buzău SRL, S.C. Agrana Ţăndărei SRL, S.C. Zahărul Călăraşi S.A) for processed raw sugar cane.

The paper analyses the evolution of the sugar beet and white sugar from beet production in Romania, fromthe EU accession in 2007 to 2013, trying to capture the changes that occurred in the system of white sugar from sugar beet production.

The main restrictions on the Community market system regarding the production of sugar from beet and /or cane sugar is the quotas. Production quotas in each Member State (MS) are the result of a pre-negotiation

phase.The MS quota level is determined by a conventional instrument called "historical reference of production" and that holds the average sugar production achieved in the last three years, elected from the last five calendar's years preceding the year of accession. Negotiated quotas are managed by administrative authorities of Member States.

In our country, the quota distribution was made in accordance with Article 7 of the Regulation (EC) No. 318/2006 on the common organization of the markets in the sugar sector. The criteria underlying the allocation of sugar quotas were established by the Accrediting Commission of the Ministry of Agriculture and Rural Development, in compliance with the Order no. 815/2006 on the accreditation economic operators performing the manufacture of sugar from beet and/or refining raw sugar from cane or isoglucose production, as well as those that use sugar and /or isoglucoseas raw material, along with the representatives of sugar factories.

As a result of the temporary restructuring of the EU sugar regime, in compliance with art. 11 of Regulation (EC) No. 320/2006, in marketing year 2008, Romania's quota was 104,168.8 tons. For the marketing years 2009/10 and 2010/11 Romania's sugar quota was established in accordance with Regulation (EC) No. 183/2009, and Regulation (EC) No. 513/2010 amending by the Annex VI of the Council Regulation (EC) No. 1234/2007 regarding the adjustment of sugar quota.

Besides the production quota system one of the main restrictions imposed by the European market regime is the payment of raw material in relation to sugar content. Prior to the EU accession, thenational system was administered through quantitative receptionin which the only quantitative parameter introduced was the permitted foreign bodies content (including root top fraction incorrectly removed in the harvesting process and the roots smaller than 150 grams that were removed in the sort process ofthe sugar factory).

In the reception and payment after beet quality there are two operating criteria such as biological sugar content and white sugar content.Biologicallysugar is the sugar existing in the root cellular juice, whereas white sugar is the crystallized sugar obtained after transformation of roots in sugar factories, the commercial product known as granulated sugar or sugar "in the bag".

It follows that after the transformation of sugar beet results a quantity of white sugar (the commodity production) and some sugar, bio-synthesized in the field, but lost in the process of manufacturing.In other words, in the transformation of sugar beet the content of white sugar is an indicator of the manufacturing efficiency.

In this context we cannot considerbiological sugar extraction efficiency because part of it, although extracted it is not found "in the bag" being found in molasses (which has a sugar content that can sometimes exceed 50%) [9]. Also a small amount of biological sugar remains in the noodles, the diffusion process used to extract sugar does not allow full extraction of the sugar stored in the reserve root cells [9].

Another restriction/significant feature of the CAP sugar market regime are the payment of the potentially extractable amountof sugar content in beet roots received by the factory. [6]

This payment method is made by introducing a threshold level (16^{o}S) of biological sugar content to which the purchase amount is recalculated depending on the effective content of sugar in the roots through a system of bonuses that proportionally rewards a high potential extraction output or decreases the shortagesof the value of roots [2,3,4].

This system is claimed by another quality characteristic of sugar beet namely cell juice purity (ratio between the sugar extracted from noodles in the process of diffusion and the biological sugar content in the cell juice).

Because purity analysis is laborious and time-consuming, the chain partners have agreed to affect the biological sugar content with bonuses and decreasesand in these conditions the determination of roots value had become significantly easier.

Note that for reasons of business confidentiality we could not analyze the evolution of the purchase price of beet and sugar production from sugar beet, so that we could not conclude on the economic impact of the accession on national chain of sugar.

MATERIALS AND METHODS

The statistical data used in this analysis came from the archive of Sugar Beet Producers Association of Romania and is restricted to sugar produced from beet. The period between 2001 and 2006 was used as a reference for evaluating system changes produced between 2007 and 2013.

As production estimators of the production system for sugar from beet there were used: acreage, production of received roots (net of payment), the production of extracted white sugar, the biological sugar content in the roots and white sugar content (extractable), average root production respectively white sugar per area unit and the number of contracts signed annually by sugar factories to ensure sugar quotas [1,9].

The average values of the production of roots and white sugar were calculated by averaging the total net production of roots received by the factories and the effectively collected beet area.

Surfaces grown on-farm were derived by averaging the acreage at the factory, based on the number of actual contracts.

Concerning the CAP conditionality for sugar beet regime, the only compliance that was analyzed was the way sugar quotas were realized at factory level.

The following sugar factories were analyzed: S.C. Agrana S.A. - Sucursala Roman (Agrana, in the text and tables), S.C. Fabrica de zahăr Bod S.A. (Bod), S.C. Zaharul Oradea S.A. (Oradea) and S.C. Zahărul Luduş S.A (Luduş).

The data was processed using statistical analysis of variation for the small string [7, 10] using the statistical estimators: the arithmetic mean, the variability of the mean (as a ratio between the average and standard deviation of the range of variation).

Variability was used in the interpretation of statistical analysis as an estimator of the constancy annual values recorded by the estimators of beet production system [2, 3, 5].

To determine the significance of mutations occurring in beet production system we used the method of establishing the significance for a 95% probability (LSD 5%).

To determine the influence of sugar production concentration through the contract imposed by the manufacturing plants we used the regression coefficient between the variable **x** (number of contracts) and **y** (biological sugar content, white sugar content and white sugar production perarea unit). The reason of this analysis stems from the fact that a smaller number of contracts allows technical apparatus of sugar factories better monitoring of the culture and, consequently, an increase in raw material quality indicators, namely the white sugar content (extracted [7,10]).

Abbreviations: **Σ**-total, **ū** - mean value, **s** - deviation, **s%** - variability, **Δ** - difference: DL5% - difference limit for a 95% probability; **Sign.** – Significant difference; *****– positive significant difference for a probability of 95%; **^{o}**– negative significant difference, for a probability of 95%.

RESULTS AND DISCUTIONS

I.The impact of EU accession upon the system of sugar beet production

The occupied area of sugar beet in Romania declined progressively from 2000 to present (Table 1). The decrease was approx. 35%, from an average of approx. 36.000 ha period prior to accession, to approx. 23.000 in post-accession. The decline was significant for each of the analyzed plants (Table 1).

Table 1. Evolution of sugar beet cultivated areas (ha)

SOC	2000	2001	2002	2003	2004	2005	2006
Agrana	21.949	17.097	19.348	15.876	6.330	8.081	14.746
Bod	8.617	7.080	8.130	15.539	4.668	4.939	7.332
Oradea	10.142	7.190	7.300	4.974	3.905	5.935	10.264
Luduş	7.273	7.268	5.938	4.364	5.721	6.007	6.802
Σ	47.981	38.635	40.716	40.753	20.624	24.962	39.144
	2007	2008	2009	2010	2011	2012	2013
Agrana	11.154	7.463	7.319	7.977	6.918	11.509	11.370
Bod	4.998	4.624	4.682	6.193	3.740	5.250	5.788
Oradea	5.925	5.381	5.062	4.706	2.234	4.340	5.137
Luduş	6.425	2.760	3.990	5.158	3.834	4.543	4.414
Σ	28.502	20.228	21.053	24.034	16.726	25.642	26.709

The variability of the occupied area, as an estimator of the culture system constancy (Table 2) experienced a decrease of contracted areas in each factory. Reducing of the occupied areas variability in pre-accession phase is due to management policy of agricultural departments of sugar factories, faced with the necessity to create a minimal area to cover the sugar quotas expected to be obtained after accession.

Table 2.The compliance influence with CAP sugar market conditionality on acreage cultivated with sugar beet

Factory	Period 2001-2006			Period 2007-2013		
	ū	*s*	*s%*	ū	*s*	*s%*
Agrana	**14.775**	5.702,5	***38,6***	**9.101**	2.123,2	***23,3***
Bod	**8.044**	3.628,3	***45,1***	**5.039**	808,9	***16,1***
Oradea	**7.101**	2.428,9	***34,2***	**4.684**	1.189,9	***25,4***
Luduş	**6.196**	1.029,6	***16,6***	**4.446**	1.144,5	***25,7***
Σ	**36.116**			**23.271**		
Differences Analysis 2007/2013 vs 2001-2006						
Soc	Δ	DL 5%	Sign			
Agrana	**-5.674**	***4.830***	*			
Bod	**-3.004**	***2.951***	*			
Oradea	**-2.418**	***2.147***	*			
Luduş	**-1.750**	***1.222***	*			

The most significant mutations in terms of occupied area were recorded from Oradea to the decrease in the surface occupied by approx. 3.000 ha associated with a 16% annual average variability.

At Luduş, the multiannual variability increased from 16% to 25%.In conclusion, after accession, sugar beet production branch has seen a significant reduction concerning the occupied areas, without their multiannual variability to be significantly affected.

In terms of roots production, the effort made by factories is evident as in the pre-accession period (especially in 2005 and 2006) to increase production, in order to maximize the sugar quota which would be returned after accession (Tab . 3).

Table 3. Evolution of the total net roots production - tons

SOC	2000	2001	2002	2003	2004	2005	2006
Agrana	319.839	309.623	392.972	277.637	148.722	175.808	394.418
Bod	111.051	132.503	172.594	186.651	145.953	124.204	218.982
Oradea	123.865	203.375	195.642	137.808	189.450	229.018	322.529
Luduş	105.373	222.606	175.416	133.279	179.224	193.706	202.978
Σ	**660.128**	**868.107**	**936.624**	**735.375**	**663.349**	**722.736**	**1.138.907**
SOC	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Agrana	226.928	221.752	225.567	259.131	241.070	310.294	428.924
Bod	127.879	154.552	194.588	134.029	109.871	128.422	225.365
Oradea	176.943	226.788	227.382	204.492	106.394	132.229	196.696
Luduş	210.685	96.545	160.836	187.289	151.242	132.687	185.024
Σ	**742.435**	**699.637**	**808.373**	**784.941**	**608.577**	**703.632**	**1.036.009**

The factories managerial decision concerning stabilization of the roots production before accession proved feasible, so basically, with the introduction of the Community's system of quotas beginning at 2006/2007, the recorded reduction has not suffered significant mutations. (Table 4).

Table 4.The compliance influence with CAP sugar market conditionality on total sugar beet

Soc	Period 2001-2006			Period 2007-2013		
	ū	*S*	*s%*	ū	*s*	*s%*
Agrana	**288.431**	96537,3	***33,5***	**273.381**	75180,7	***27,5***
Bod	**155.991**	38440,5	***24,6***	**153.529**	41677,0	***27,1***
Oradea	**200.241**	65397,6	***32,7***	**181.561**	46556,4	***25,6***
Luduş	**173.226**	40791,3	***23,5***	**160.615**	38269,1	***23,8***
Σ	**817.889**		***28,6***	**769.086**		***26,0***
Differences Analysis s 2007/2013 vs 2001-2006						
Soc	Δ	DL 5%	**Sign.**			
Agrana	-15.050	*97.119*	**NS**			
Bod	-2.462	*45.003*	**NS**			
Oradea	-18.680	*63.718*	**NS**			
Luduş	-12.611	*44.395*	**NS**			

The conclusion is reinforced by the fact that the multiannual variability of the system does not support significant mutations (28.6% 2001-2006 vs. 26.0%/2007-2013), which confirms that the total production of sugar beet roots has been managed in the pre-accession so that any eventual mutations imposed by the quotas does not significantly disturb the agricultural system of each sugar factory taken in part.

Roots yield per surface unit is the most expressive impact estimator of the accession, because it associates the managerial decision of sugar factories with the technological decision of farmers in terms of maximizing the profit for both partners.

This harmonization of management decisions is evident from the pre-accession period, the average yield had a progressive increase from 13.6 t/ha in 2001, to 29.5 t/ha in 2006, and to 39.2 t/ha in 2013 (Table 5).

It should be noted that the efforts of the partners to increase the production efficiency is evident at each of the four accredited factories.

Table 5. The evolution of net yield of roots per hectare (t / ha)

SOC	2000	2001	2002	2003	2004	2005	2006
Agrana	14,57	18,11	20,31	17,49	23,49	21,76	26,75
Bod	12,89	18,72	21,23	12,01	31,27	25,15	29,87
Oradea	12,21	28,29	26,80	27,71	48,51	38,59	31,42
Luduş	14,49	30,63	29,54	30,54	31,33	32,25	29,84
ū	***13,54***	***23,93***	***24,47***	***21,94***	***33,65***	***29,43***	***29,47***
s	*1,18*	*6,45*	*4,43*	*8,67*	*10,57*	*7,51*	*1,96*
s %	*8,7*	*27,0*	*18,1*	*39,5*	*31,4*	*25,5*	*6,7*
SOC	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Agrana	20,34	29,71	30,82	32,48	34,85	26,96	37,72
Bod	25,59	33,42	41,56	21,64	29,38	24,46	38,94
Oradea	29,86	42,15	44,92	43,45	47,62	30,47	38,29
Luduş	32,79	34,98	40,31	36,31	39,45	29,21	41,92
ū	***27,15***	***35,07***	***39,40***	***33,47***	***37,82***	***27,77***	***39,22***
S	*5,41*	*5,21*	*6,04*	*9,10*	*7,72*	*2,64*	*1,87*
s %	*19,9*	*14,9*	*15,3*	*27,2*	*20,4*	*9,5*	*4,8*

Therefore, the variability of yields between the two periods of analysis is medium to large (19.8%) in 2001-2006, and low (13%) in 2007-2013 (Table 6).

Table 6.The compliance influence with CAP sugar market conditionality on yield (t/ha)

Soc.	Perioada 2001-2006				Perioada 2007-2013			
	ū	$ū_d$	*s*	%	ū	ūd	s	%
Agrana	**20,4**	20,3	4,1	20,0	**30,4**	30,8	5,6	18,6
Bod	**21,6**	21,2	7,6	35,4	**30,7**	29,4	7,6	24,6
Oradea	**30,5**	28,3	11,2	36,7	**39,5**	42,1	7,0	17,7
Luduş	**28,4**	30,5	6,2	21,8	**36,4**	36,3	4,5	12,4
$ū_{Multian.}$	***25,21***	***25,0***	***7,27***	***28,4***	***34,27***	***34,6***	***6,18***	***18,31***
s	*4,99*	*5,09*	*3,00*	*8,79*	*4,47*	*5,81*	*1,37*	*5,00*
s %	***19,8***	*20,3*	*41,2*	*30,9*	***13,0***	*16,8*	*22,2*	*27,3*
Differences Analysis 2007/2013 vs 2001-2006								
	Δ	**DL5%**	**Sign.**					
Agrana	**(+)10,06**	***5,53***	*					
Bod	**(+)9,12**	***8,53***	*					
Oradea	(+)9,03	*10,48*	NS					
Luduş	**(+)8,05**	***6,08***	*					
$ū_{Multiyear.}$	**(+)9,07**	***7,57***	*					
s	0,52	*2,62*	NS					
e-s %*	**(-)6,76**	***37,14***	*					

e-s% * - used as the estimator of the stability of multiyearrecorded yields per surface unit

The average differences analysis performed in each factory shows that there were significant increases after accession for three of four factories; the highest growth was recorded in the S.C. AgranaS.A.

In S.C. Zahărul Oradea S.A. factory, the increase is insignificant probably because in this area of culture the resources of soil and climate are harmonized in relation to the requirements of sugar beet culture. In this area were recorded the highest average yields, in the both periods (2001-2006 respectively 2007-2013).

Average annual yield stability analysis through annual mean variability suggests that, except S.C. ZahărulLuduş S.A. at all other factories there is an average stability, even if at a national level there were recorded significant increases in stability due to reduced variability (Table 6).

The conclusion that emerges is that Romania's EU accession to the sugar market system, specific to the agricultural policies for the sugar market had the first major consequence: the significant increase of average yield based on a significant increase of its stability.

II.The impact of EU accession on the quality of sugar beet production

Production quality analysis was conducted for the period 2007-2013, during which the quality reception regime had came into effect in the national production of sugar beet.

It is noted that during the same analyzed period there is a progressive increase in the biological sugar content from 14,984^{o}S/2007 (first campaign in which the quality reception regime was officially applied) at 16.913ºS, with annual variations that in the very favorable years (2009, 2011) have reached 17.8 - 17.9 º S (Tab.7).

Average annual calculation of the discrepancies does not reveal as significant increases or decreases, the differences exceeding the limit of 1.8. It should be noted, however, that at the level of this quality parameter, variability is extremely low, being below 10% which imposes the conclusion that despite regional peculiarities the sugar beet farmers lead the technological process in such a way that they do not reflect in a very large extent on the quality of raw materials, notorious phenomenon known in the scientific literature [2, 3, 4].

Table 7. Evolution of biological sugar content (° S)

	2007	2008	2009	2010	2011	2012	2013	ū
Agrana	14,945	17,160	17,842	15,705	17,760	17,767	17,265	16,921
Bod	16,056	16,730	16,253	15,396	17,330	16,704	16,505	16,425
Oradea	14,625	14,193	19,160	16,485	16,593	16,750	16,530	16,334
Luduş	14,310	16,350	17,943	16,030	19,210	17,122	17,350	16,902
Ū	**14,984**	**16,108**	**17,800**	**15,904**	**17,723**	**17,086**	**16,913**	**16,645**
s.	0,760	1,319	1,192	0,466	1,102	0,491	0,458	0,310
s%.	5,0	8,1	6,7	2,9	6,2	2,9	2,7	1,8
Δ vs. ante		**1,124**	**1,691**	**-1,896**	**1,819**	**-0,637**	**-0,173**	
DL5%		*1,60*	*1,87*	***1,34***	***1,26***	*1,27*	*0,70*	
Sign		**NS**	**NS**	*	*	**NS**	**NS**	

The evolution analysis of the white sugar content shows a similar pattern to that of biological sugar content, with values which lie at around 14% (Tab.8).

Table 8. The evolution of white sugar content (%)

	2007	2008	2009	2010	2011	2012	2013	ū.
Agrana	12,500	14,400	15,280	13,260	15,000	15,205	14,820	**14,352**
Bod	13,160	14,400	13,250	12,500	15,000	13,701	13,609	**13,660**
Oradea	12,400	12,780	16,000	14,260	15,180	13,590	14,305	**14,074**
Luduş	11,880	13,740	15,000	13,600	16,600	14,179	14,920	**14,274**
ū.	**12,485**	**13,830**	**14,883**	**13,405**	**15,445**	**14,169**	**14,414**	**14,090**
s.	0,526	0,766	1,167	0,732	0,775	0,737	0,600	0,310
s%.	4,2	5,5	7,8	5,4	5,0	5,1	4,1	2,2
Δ vs. ante		**1,345**	1,053	**-1,478**	**2,040**	**-1,276**	0,245	
DL5%		***0,98***	*1,47*	***1,45***	***1,12***	***1,12***	*1,00*	
Sign		*	NS	*	*	*	NS	

The annual difference limit is about 1.1, so that it allows us to conclude that the system of payment by quality enhanced the expression of technological interventions forfarmers in terms of maximizing the effects of those technological links that contribute to maximizing the extraction performance, and indirectly of the revenues obtained per product unit delivered to the sugar factories.

The multiannual variation indicates a higher annual average value with approx. 22% variability, in absolute values, to the biological sugar (1.8% vs. 2.2%), which suggests that the existing extracting facilities in sugar factories are very different in terms of extraction efficiency.

The extraction performance analysis (Table 9) highlights the fact that the best performing systems are found in the factory in Oradea conducting the performance considered ideal by professionals in the field of quality extraction of sugar beet produced in Romania.

Table 9. The evolution of the extraction efficiency (%)

	2007	2008	2009	2010	2011	2012	2013	ū
Agrana	83,640	83,916	85,641	84,432	84,459	85,580	85,838	**84,787**
Bod	81,963	86,073	81,523	81,190	86,555	82,022	82,454	**83,112**
Oradea	84,786	90,044	83,507	86,503	91,484	81,134	86,540	**86,286**
Luduş	83,019	84,037	83,598	84,841	86,413	82,812	85,994	**84,388**
ū.	**83,352**	**86,018**	**83,567**	**84,241**	**87,228**	**82,887**	**85,207**	**84,643**
s.	1,180	2,861	1,681	2,223	2,994	1,922	1,860	1,308
s%.	1,4	3,3	2,0	2,6	3,4	2,3	2,2	1,5
Δ vs. ante		**2,665**	**-2,450**	**0,674**	**2,987**	**-4,341**	**2,319**	
DL5%		*3,25*	*3,48*	*2,93*	*3,92*	***3,74***	*2,81*	
Sign		NS	NS	NS	NS	°	NS	

The annual differences analysis shows that, except for 2012, when the excessive drought of the late growing range affected the sugar beet crop, national average extraction performance variation is not significant.

This fact requires the conclusion that the technical sugar extraction system in Romania has not undergone major changes in terms of the capacity to increase extraction performance.

The conclusion is supported by the fact that in the years 2010 and 2011, although there were significant differences in terms of biological sugar content (see Tab.7) and white sugar content (Table 8), the extraction has not seen significant differences, as expected.

Evolution of the system from the point of view of white sugar production per unit area (Table 10) as estimator of merged sugar factories management and technological management of farmers indicates a change deeper than the biological sugar content respectively white sugar content.

With a multiannual variability of 13%, with variations from 7.4%/2013 to 32%/2010 it is obvious that at the level of this efficiency indicator of the system there is still a potential growth of mean values both landing technical management of agricultural departments and manufacturing of sugar factories and from the point of view of technological farmers' interventions.

Table 10.The evolution of the production of white sugar per hectare (t / ha)

	2007	2008	2009	2010	2011	2012	2013	ū.
Agrana	2,543	4,279	4,709	4,307	5,227	4,099	5,591	**4,394**
Bod	3,367	4,813	5,507	2,705	4,407	3,351	5,299	**4,207**
Oradea	3,703	5,386	7,187	6,196	7,229	4,141	5,477	**5,617**
Luduş	3,896	4,806	6,046	4,938	6,548	4,141	6,254	**5,233**
ū.	**3,377**	**4,821**	**5,862**	**4,537**	**5,853**	**3,933**	**5,655**	**4,863**
s.	0,597	0,452	1,040	1,452	1,273	0,388	0,417	0,672
s%	17,7	9,4	17,7	32,0	21,8	9,9	7,4	13,8
Δ vs. ante		**1,444**	**1,041**	**-1,326**	**1,316**	**-1,920**	**1,722**	
DL5%		*0,79*	*1,19*	*1,88*	*2,03*	*1,40*	*0,60*	
Sign		*	NS	NS	NS	°	*	

The analysis suggests that there are sufficient resources so that the white sugar per area unit production maximization should be possible in terms of an integrated approach of the branch system for both partners.

III.The accession impact over the production of sugar beet system structure

The sugar quota introduced in 2007 (Table 11), in the seven years analyzed was not achieved in any of the years analyzed, with the exception of 2013 when it was surpassed by approx. 43,000 tons of white sugar (Table 12).

However, except the year 2007 (the first year of quota system application and whose implementation was made effective in 2006), the failure of quota rate was below the limit allowed by EU regulations (10%).

The exceeding of the quota made in 2013is a management decision of the sugar factories to create a new supply space to enable them to overcome the predicted shock of quota regime abrogation coming into effect from 2015.

The most obvious indicator of the changes occurring in the system of sugar beet production in Romania is the number of contractors/ farmers who participated in achieving the quotas.

Table 11. Sugar quotas (tons)

	2007	2008	2009	2010	2011	2012	2013
Agrana	20.967,6	24.240,0	24.240,0	24.240,0	24.240,0	24.240,0	36.575,0
Bod	15.921,2	18.406,0	18.406,0	18.406,0	18.406,0	18.406,0	22.750,0
Oradea	28.651,4	28.651,4	28.651,4	28.651,4	28.651,4	28.651,4	19.355,8
Luduş	28.886,4	33.391,4	33.391,4	33.391,4	33.391,4	33.391,4	26.008,0
RO	**94.426,6**	**104.688,8**	**104.688,8**	**104.688,8**	**104.688,8**	**104.688,8**	**104.688,8**

The number of contracts can give information on the average size of cultivated sugar beet areas.

Table 12. The evolution of the implementation of sugar beet quotas (tones)

	2007	2008	2009	2010	2011	2012	2013
Agrana	20.618,7	28.612,4	26.340,0	35.054,0	36.169,0	47.180,2	63.567,0
Bod	16.748,0	19.406,2	21.546,2	15.840,0	16.967,1	16.753,1	29.001,0
Oradea	22.095,3	31.069,1	28.809,3	25.377,6	25.018,2	17.969,0	28.137,6
Luduş	20.672,9	14.673,0	20.243,9	24.152,0	16.153,6	19.687,5	27.600,0
Σ	**80.134,9**	**93.760,7**	**96.939,4**	**100.423,6**	**94.307,8**	**101.589,8**	**148.305,6**
Differences regarding RO quotas							
t	**-14.291,7**	**-10.928**	**-7.749,4**	**-4.265,20**	**-10.380,9**	**-3.099,01**	**43.616,82**
%	-11,95	-6,04	-3,27	-2,11	-5,73	1,83	+ 38,19

It is well known that increasing the size of the area occupied induces better management of maintenance and harvesting.

The introduction of a quota system had resulted in a drastic reduction in the number of contracts from the first campaign (Table 13).

Table 13.Theproduction concentration of sugar beet

	Contr	Δ vs ante	Σ sup	ū	°S	% z.a	z.a. t/ha
2007	5341	-	28502	5,34	14,98	12,49	3,38
2008	1555	-3786	20228	13,01	16,11	13,83	4,82
2009	1483	-72	21053	14,20	17,80	14,88	5,86
2010	1276	-207	24034	18,84	15,90	13,41	4,54
2011	1117	-159	16726	14,97	17,72	15,45	5,85
2012	1543	426	25642	16,62	17,09	14,17	3,93
2013	1608	65	26709	16,61	16,91	14,41	5,66
ū	**1493**		**23533,2**	**15,85**	**16,92**	**14,36**	**5,11**
s	129,19		2822,20	2,29			
s%	8,65		11,99	14,42			
Correlations(r*for a P 95%= 0,63)					**-0,72**	**-0,75**	**-0,68**
Determination %					**52,0**	**56,2**	**46,6**

Thus in 2007 (the first year of application of the quota system implemented on cultivated surfaces from autumn 2006) the number of farmers decreased by cca.70% (1555/2008 vs. 5341/2007).

The average area increased from 5.34 contracted ha to 13.01 ha, stabilizing in the coming years around an average area about 16 ha with annual variations of 2 to 3 ha.

There is an inversely proportionate ratio in determining the number of contracts and qualitative parameters of sugar beet root achieved. Therefore, the increase in the number of contracts induces a decrease in expression of quality parameters at a significant rate for a statistical probability of 95%.

The determination coefficient calculation as a share estimator for the independent variable influence (annual number of contracts) on the dependent variables (qualitative) of sugar beet roots indicates that probably ca. 50% of the quality variation is due to farmer fluctuation and consequently the average contracted surfaces per farmer, in order to achieve production quotas imposed by the CAP.

It is obvious that this analysis is not exhaustive and does not retain other factors that influence the intrinsic quality of the raw material but we point out that it provides information that confirms that the management and mismanagement of the system of sugar beet production are significant factors of achieving the

communitarian output restrictions for the sugar market, managed by CAP instruments.

CONCLUSIONS

The main conclusion from this analysis is that imposing CAP restrictions on the market for the sugar obtained from sugar beet (the quota regime and minimum quality of raw materials) significantly influenced the production system in Romania by:

-The reduction of sugar beet cultivated areas,

-The significant increase of roots and sugar yields per unit area;

-The significant increasein the value of quality indicators for raw material;

-The increasing stability of multiannual beet production;

-Creating a critical mass of specialized sugar beet farmers interested in maximizing the incomes through technological management of the raw material quality.

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REFERENCES

[**1**]Badiu, A.F., 1997, Piaţa zahărului în lume şi în România, Economistul, Supliment nr.64, Economie teoretică şi aplicată

[**2**]Compte rendu des travaux effectue en 2002, 2003, L'Institut technique francais de la betterave industrielle, Paris

[**3**]Compte rendu des travaux effectue en 2007, 2008, LInstitut technique francais de la betterave industrielle, Paris

[**4**]Compte rendu des travaux effectue en 2009, 2010, LInstitut technique francais de la betterave industrielle, Paris

[**5**]Council Regulation (EC) No 318/2006 of 20 February 2006 of the common organisation of the markets in the sugar sector) www.apia.org.ro/legislatie_europeana

[**6**]Council Regulation (EC) No 1234/2007 of 22 October 2007 establishing a common organization of agricultural markets and on specific provisions for certain agricultural products (Single CMO Regulation)

[**7**]Neter John, Wasserman William, Kutner H. Michael, 1990, Applied Linear Statistical Models, Regression,

Analysisof variance and Experimental Designs, Boston

[8]Ordin 815/2006 privind creditarea operatorilor economici care desfasoara acticvităţi privind fabricarea zahărului din sfecla de zahăr şi/sau rafinarea zahărului brut din trestie sau fabricarea izoglucozei, precum şi a celor care utilizează zahăr şi/sau izoglucoză ca materie primă, 2007, MOF nr.23, Bucureşti

[9]Pascu, A, Badiu, A.F., 1996, Dicţionar al culturii de sfeclă de zahăr, Ed. Fermierul român, Bucureşti

[10]Sendecor W. Georges, Cochran G. William, 1984, Methodes statistiques, Paris

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THE INFLUENCE OF MICROBIOLOGICAL POLLUTION FACTORS ON THE QUALITY OF CONSUMPTION EGGS

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Abstract

Eggs' microbiological status intended for human consumption represents a determining factor of products' quality and safety. The possible contamination of eggs with pathogene microorganisms presents a major risk for food safety. In comparison with meat and milk, eggs have a better capacity of conservation and therefore they are more resistant to the aggression of damaging factors. However it is a perishable product and its age as food may cause affections to consumers. One cannot find out the defficiencies and prevent the risks of food safety without the awareness and knowledge of microbiological, enzymatic and biochemical mechanisms that occur in the process of eggs' becoming old. Thus, one can establish the critical limits in which eggs as food may endanger consumers' health status.

Key words: *egg, eggs' microbiological status, food safety, risk*

INTRODUCTION

1. Importance and purpose of study

The microbiological status of consumption eggs stands for a determining factor on products' quality and safety. The possible contamination of eggs intended for human consumption with pathogen microorganisms presents a major risk to public health.

In comparison to meat and milk, eggs have a better preservation capacity, therefore it is more resistant to aggressivity of damaging factors. However, eggs are perishable products that can cause diseases to consumers according to their different stages of staleness and alteration . [6, 8].

One can hardly detect defficiencies in the absence of microbiological, enzimatic and biochemical mechanisms that occur during eggs' alteration processes, therefore, risks cannot be prevented.

The physic -chemical modifications produced by the enzimes in eggs' whites and yolks are intensified by the micro-organisms that may penetrate inside eggs. Although eggs have natural protection means (shells, membrane, cuticles and whites' richness in lisozim substance), they are exposed to micro-organisms' invasions. Eggs' staining with faeces, surface moisture and preservation under normal temperature conditions are important factors of eggs' polution.

Certain investigators found out the degree of cleanliness of eggs' shells is revealed in the microbial plate count at eggs' surface and inside. Bacterias' penetration eggs' shells is closely related to shells' thickness, pores' sizes and preservation temperature. Among the isolates of germs there prevailed bacteria of Pseudomonas species, followed by Proteus, Staphylococcus, Eschirichia coli species [5].

Eggs can bear pathogen germs. The difficulty in the detection or suspicion of their presence consists in the fact that most of the times, the presence of pathogen germs is not accompanied by the modification of eggs' layers that can only be perceived by organoleptic and physic - chemical examination [2, 7].

Eggs' contamination can occur either in the bodies of birds, or during and after their eggs' laying. At ratites Salmonella enteritidis [5 6], NDV [4] and S. pullorum [10] one can convey by vertical level. Considering the large spread

of Salmonella in birds, especially in ducks' eggs that are often contaminated with these microorganisms, producing serious food borne diseases to humans, by consumption.
In order to grant the warranty of an appropriate food value, it is necessary that eggs and eggs' products shall be subject to microbiological examinations that enable the quality of salubrity and freshness.

MATERIALS AND METHODS

In order to follow the influence of microbiological pollution on the quality of consumption eggs according to its validity term and preservation temperature there have been made up two experimental models as follows:
- The microbiological study of eggs that were continuously preserved at the temperature of 4°C. They were analysed on the first day of laying and then at 6, 10, 20, 30 and 40 days. This model refers to the eggs preserved under the temperature conditions of the warehouse of establishment (group A).
- The microbiological study of eggs preserved under the temperature of 23-25 °C.
They were analysed after 1, 6, 10, 20, 30 40 preservation days. This model refers to eggs within the commercial network of turning into account during summer (group B).
The purpose of the study is to establish by means of comparison the dynamics of the evolution of the main group of bacteria according to validity term and preservation temperature for the two experimental pattern groups.
There have been analysed 360 eggs from the following 6 categories of different validity terms: 1 day, 6 days, 10 days, 20 days, 30 days and 40 days (summing up to 180 eggs).
There has been followed the microbiological quality according to the validity terms of eggs and the modifications that may occur as a result of growth and proliferation of different germs.
The 60 eggs of each category were scatterred in 6 groups made up of 10 eggs, thus rising up to 36 groups. The microbiological analyses were carried out in each group.
There has been investigated the microbiological quality of eggs' shells' surfaces and contents and the following parametres were observed : NTG, B coliform, E. coli, Pseudomonas, Micrococcus, Proteus, Salmonella, yeasts and moulds. The results refer to 1 cm2 shells and to 1 g contents. Salmonella represents the exception, as the results refer to the whole surface of eggs and to their entire contents (approximately 50g).
The detection of the total plate count of coliform bacteria and of Escherichia coli species relied on the presumption of an important biochemical property –namely the fermentation of lactose producing gas [3, 4, 10].
For this purpose, there have been used plate count environment that contain lactose and inhibitory substances for the plate count related to them.
-environment of selective enrichment: tryptose broth and both simple and doubly concentrated lauril sulphate
-environment for isolation, identification and confirmation: brilliant green lactose bile broth, Lactose Agar, Eosin-methylene blue (Levine), tryptone water, inclined nutritive agar, Kovacs reagent
There has been followed the establishment of the most probable total plate count –MPN on a growth environment, by using three tubes for each dilution,
There has been inoculated 1 ml from the homogenized product and from each dilution, in series of three tubes per dilution that contained one of the growth environment mentioned above.
The supports with the inseminated environments were introduced in the thermostat at a temperature of 37°C for 24 - 48 hours;
- After 24-48 hours since incubation, there have been checked the tubes with the inseminated environment and there have been noted for each series the tubes in which there was noticed the presence of gases in the fermentation tube (there was considered a positive reaction the presence of gases in at least 1/10 of the height of the tube);

According to the number of positive tubes from each dilution (confirmed in brilliant green lactose bile broth), there has been reported the most probable bacterial plate count of coliform bacteria per g (ml) product, according to Mc Crady table.

For confirmation, from two or more characteristic colonies of E coli, there has been inseminated the bacterial plate in three tubes with the following environments:

- one tube with BBLV (or lauril suphate) and a fermentation tube;
- one tube with tryptone water, heated at 45°C;
- one tube with inclined nutritive agar;

The tubes with inseminated bacterial plates were imAveragetely incubated within 24 hours. The 45°C temperature acted selectively, favouring the germ competing with the associated microflora;

After incubation, there were examined the tubes regarding the presence of gases that occurred in Durham tube from the tube with BBLV environment (lauril sulphate) and of the presence of indole in the tube with inseminated and incubated trypton water , by adding some drops of Kovacs reactive (red ring at the surface of environment). When bacterial plate reacted positively, there was considered E-coli confirmation ;

During the process of isolation and identification of germs of Salmonella type, there have been used several bacterial plate count:

- environments of non-selective pre-enrichments - peptonated water used for the revivification of Salmonella species present in eggs.
- environments of selective enrichment – malachite green and magnesium chloride broth (environment RV = Rappaport-Vassiliadis) and selenite-cistine broth
- selective, solide and identification isolation environments – phenol red and brilliant green agar (Edel şi Kampelmacher), a strongly inhibitory environment and a less inhibitory one- bile agar (Istrati-Meitert)
- identification environments: agar with iron citrate, trizaharides (TSI), environment for the hydrolysis of urea (Christensen), environment for the decarboxylation of L-lysine (LIA agar), etc..

For the determination of germs of Proteus type there was used inclined nutritive agar, freshly prepared- as plate count, with condensation liquid and humid surface without water condensation as drops. After the insemination of tubes and their incubation at 35º - 37 ºC, the development with inclined agar of a plate count that invaded as concentratic waves or as fine, whitish film, consisting of negative Gram small bacilli, there was considered the presence of Proteus type bacteria.

The method of determination of the total number of microorganisms and of yeasts and moulds was based on the inclusion of a certain quantity of the investigated sample in an appropriate nutritive environment (Plate count agar and respectively, agar with gelosis and potatoes), in Petri plaques, in which , after incubation under convenient temperatures (35^oC), there grew visible colonies accessible to eye sight, out of each microorganism or piles of microorganisms.

All sanitary microbiological indicators that were subject to analysis provided data on the state of contamination of the examined product.

RESULTS AND DISCUSSIONS

Table 1 summaries the results of microbiological analyses that were carried out on eggs originated from Group A according to their age, on the basis of which one can establish a series of observations.

The contents of eggs older than 10 days was free of mesophilic aerobic plate, including coliform B, E coli, Pseudomonas, Proteus, Micrococcus and Salmonella, as well as yeasts and moulds, therefore, one can be considered sterile.

This can be explained by the fact that eggs are protected against microorganism attacks by a series of physical, chemical factors and the efficiency of this defence factors depends on the integrity of and the freshness degree.

In the microbiological analysis of the contents of eggs which are older than 10 days, there

have been identified bacteria of the following types as follows:

- total plate count (N.T.G.) – varied from 5 ufc /g up to 25 ufc / g, only for the eggs older than 30 days;

Coliform bacteria - 2,9 x 10 ufc / g and respectively 1,1 x 103 ufc / g for the eggs older than 40 days..

-Escherichia coli was identified only in the case of the eggs older than 40 days., respectively of 1 and 1,1 x 10 ufc / g contents;

Bacteria of Pseudomonas type – for the eggs older than 30 and 40 days

The penetration of microbes through the pores of the shells does not occur under normal conditions, as cuticles that covers the surface of shells obstruct the external opening of pores.

This may be the situation of fresh eggs up to 10 days. In eggs which are older than 10 days, the cuticles covering the external surface of shells alters, so that they do not offer an efficient protection against microbes any longer.

The total plate count on the surface of eggs varied as follows:

- under 3,1 x 103 ufc / cm 2 in eggs from 1 day and 6 days;
- under 8,1 x 103 ufc / cm 2 in eggs from 10 days;
- under 4,6 x 105 ufc / cm 2 in eggs from 20 days;
- under 5,9 x 105 ufc / cm 2 in eggs from 30 days;
- under 5,4 x 105 ufc / cm 2 in eggs from 40 days.

At 26 groups of eggs, B. Coliform were not isolated from shells and in 30 groups, E. Coli neither. In 13 groups of eggs, Pseudomonas was not isolated, and neither Micrococcus.

But Proteus was present in the shells of eggs only in the case of eggs of 2 groups older than 40 days and the number of yeasts and moulds was relatively low, under 50 ufc / cm^2.

Table 1.Results obtained following eggs' microbiological analysis of group A

No. crt.	Eggs' age	Groups made up of 10 eggs	N.T.G.		B.coliforme		E.coli		Pseudomonas		Micrococcus		Proteus		Salmonella		Yeasts and moulds in shells / cm^2
			ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf/cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	
1	1 day	1	Abs.	2,7 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	6
2	1 day	2	Abs.	1,65 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	4
3	1 day	3	Abs.	3,1 x 10^3	Abs.	1,7 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
4	1 day	4	Abs.	2,1 x 10^3	Abs.	10	Abs.	1	Abs.	1,3 x 10	Abs.	1,3 x 10^2	Abs.	Abs.	Abs.	Abs.	12
5	1 day	5	Abs.	1,7 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
6	1 day	6	Abs.	2,1 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	1,4 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	4
Average			0,00	2225,00	0,00	30,00	0	0,17	0,00	25,50	0	21,67	0	0,0	0,0	0,0	7,7
7	6 days	1	Abs.	6,9 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	1,1 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	3
8	6 days	2	Abs.	1,3 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	1,3 x 10^2	Abs.	Abs.	Abs.	Abs.	5
9	6 days	3	Abs.	1,4 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	1,6 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	6
10	6 days	4	Abs.	2,2 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	1,2 x 10	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
11	6 days	5	Abs.	1,7 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	1,2 x 10^2	Abs.	Abs.	Abs.	Abs.	8
12	6 days	6	Abs.	1,4 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	2,1 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	5
Average			0,00	1448,33	0,00	0,00	0	0,00	0,00	82,00	0	41,67	0	0,0	0,0	0,0	6,2
13	10 days	1	Abs.	7.3 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	2,1 x 10^2	Abs.	Abs.	Abs.	Abs.	10
14	10 days	2	Abs.	1,1 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	1,8 x10	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
15	10 days	3	Abs.	1,3 x 10^3	Abs.	1,7 x 10^2	Abs.	10	Abs.	Prez.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	5
16	10 days	4	Abs.	2,1 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	4,3 x 10	Abs.	Abs..	Abs.	Abs.	Abs.	Abs.	8
17	10 days	5	Abs.	8,1 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	4,9 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	24
18	10 days	6	Abs.	1,4 x 10^3	Abs.	1,1 x 10	Abs.	5	Abs.	2,4 x 10	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
Average			0,00	3550,00	0,00	30,17	0,00	2,50	0,00	115,00	0,00	35,00	0,00	0,00	0,00	0,00	11,17

Table 1.Results obtained following eggs' microbiological analysis of group A (continuation)

N. crt.	Eggs' age	Groups made up of 10 eggs	N.T.G.		B.coliforme		E.coli		Pseudomonas		Micrococcus		Proteus		Salmonella		Yeasts and moulds in shell cm^2
			C/g	C/cm^2	C/g	C/cm^2	C/g	C/cm^2	C/g	C/cm^2	C/g	C/cm^2	C/g	C/cm^2	C/g	C/cm^2	
19	20 days	1	Abs.	6,1 x 10^4	Abs.	Abs.	Abs.	Abs.	Abs.	3,8 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	7
20	20 days	2	Abs.	3,4 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	1,1 x 10	Abs.	2,2 x 10^2	Abs.	Abs.	Abs.	Abs.	20
21	20 days	3	Abs.	4 ,1x 10^5	Abs.	1,3 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	30
22	20 days	4	Abs.	3,5 x 10^4	Abs.	Abs.	Abs.	Abs.	Abs.	2,5 x 10^2	Abs.	3,5 x 10^3	Abs.	Abs.	Abs.	Abs.	10
23	20 days	5	Abs.	3,1 x 10^4	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	2,5 x 10^3	Abs.	Abs.	Abs.	Abs.	12
24	20 days	6	Abs.	4,6 x 10^5	Abs.	1,3 x 10^3	Abs.	10	Abs.	1,6 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
Average			0,00	166733,33	0,00	238,33	0,00	1,67	0,00	133,50	0,00	1036,67	0,00	0,00	0,00	0,00	14,83
25	30 days	1	Abs	4,2 x 10^4	Abs.	Abs.	Abs.	Abs.	Abs.	1,5 x 10^2	Abs.	2,5 x 10^4	Abs.	Abs.	Abs.	Abs.	20
26	30 days	2	Abs	4,8 x10^5	Abs.	Abs.	Abs	Abs	Abs	1,9 x 10^3	Abs	Abs	Abs	Abs.	Abs	Abs	25
27.	30 days	3	Abs	5,9x10^4	Abs.	Abs.	Abs.	Abs.	Abs.	2,1 x 10^2	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	20
28.	30 days	4	5	5,2x10^4	Abs.	3,8 x 10^2	Abs.	Abs.	1,1 x 10	3,8 x 10^3	Abs.	1,1 x 10^4	Abs.	Abs	Abs.	Abs.	45
29.	30 days	5	Abs	4,6x10^5	Abs.	Abs.	Abs	Abs.	Abs.	4,3 x 10	Abs	4,8 x 10^3	Abs	Abs.	Abs	Abs	15
30.	30 days	6	Abs	3,9x10^5	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	20
Average			0,83	247166,67	0,00	63,33	0,00	0,00	1,83	1017,17	0,00	6800,00	0,00	0,00	0,00	0,00	24,17
31.	40 days	1	Abs	4,4x10^4	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	35
32.	40 days	2	Abs	5,2x10^5	2,9x10	2,1 x 10^2	1	1,2 x 10	1,3 x 10^2	4,9 x 10^4	Abs	2,5 x 10^5	Abs	1,1 x 10^2	Abs	Abs	30
33.	40 days	3	15	3,2x10^5	Abs.	4,3 x 10^3	Abs.	Abs.	1,1 x 10^2	2,3 x 10^4	Abs.	3,8 x 10^4	Abs.	Abs.	Abs.	Abs.	20
34.	40 days	4	Abs	5,4x10^5	Abs.	Abs.	Abs.	Abs	Abs.	2,8 x 10^3	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	20
35.	40 days	5	Abs	6,3x10^4	Abs.	Abs.	Abs	Abs.	Abs.	Abs.	Abs	Abs	Abs	Abs.	Abs	Abs	25
36.	40 days	6	25	5,4x10^5	1,1 x 10^3	7,5 x 10^3	1,1x 10	1,3 x 10^2	2,1 x 10^2	2,1 x 10^5	Abs.	Abs.	Abs.	2,5 x 10^2	Abs.	Abs.	50
Average			6,67	337833,33	23,17	2001,67	2	23,67	150,00	474667	0	48000,00	0	60,0	0,0	0,0	30,0

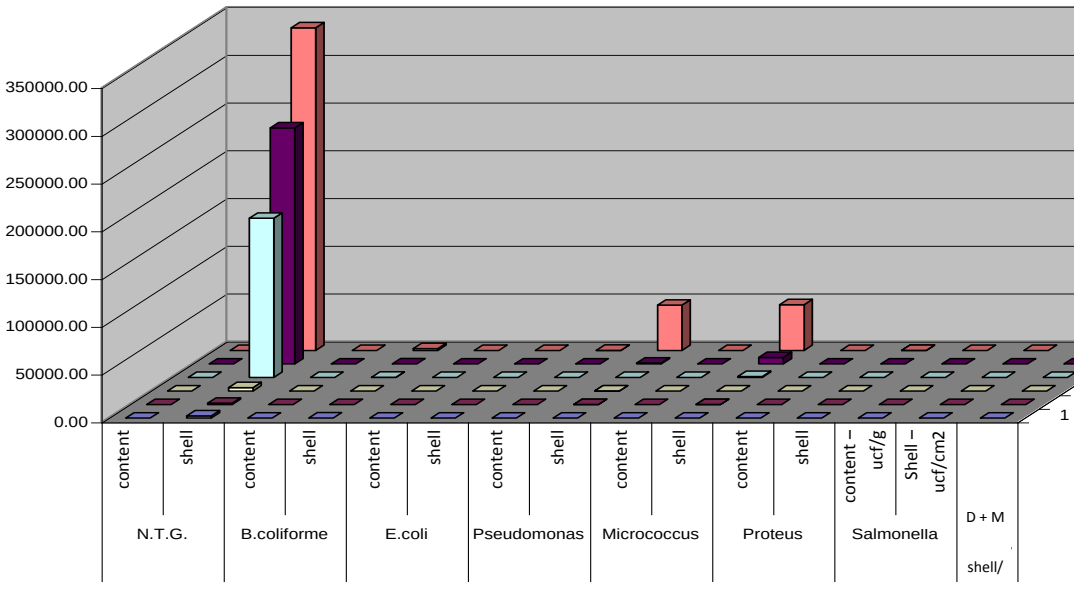

Fig.1.The dynamics of the evolution of average values of total total platecount according to the age of eggs of group A

Table 2.Results obtained following eggs' microbiological analysis of group B

Nr. crt.	Eggs'age	Groups made up of 10 eggs	N.T.G.		B.coliforme		E.coli		Pseudomonas		Micrococcus		Proteus		Salmonella		Yeasts and moulds in shells / cm^2
			ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	ucf /g	ucf /cm^2	
1	1 day	1	Abs.	2,5 x 10^3	Abs	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	1,3 x 10^2	Abs.	Abs.	Abs.	Abs.	8
2	1 day	2	Abs.	1,6 x 10^3	Abs	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	14
3	1 day	3	Abs.	3,3 x 10^3	Abs	1,7 x 10^2	Abs	Abs.	Abs.	1,3 x 10	Abs.	Abs.	Abs.	2,1 x 10	Abs.	Abs.	12
4	1 day	4	Abs.	2,1 x 10^3	Abs	10	Abs	1	Abs.	Abs.	Abs.		Abs.	Abs.	Abs.	Abs.	12
5	1 day	5	Abs.	2,7 x 10^3	Abs	Abs.	Abs	Abs.	Abs.	1,4 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	10
6	1 day	6	Abs.	2,1 x 10^3	Abs	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	4
Average			0,00	2383,33	0,00	30,00	0,00	0,17	0,00	25,50	0,00	21,67	0,00	35,00	0,00	0,00	10,00
7	6 days	1	Abs.	7,,9 x 10^2	Abs	Abs.	Abs	Abs.	Abs.	2,1 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	13
8	6 days	2	Abs.	1,2 x 10^4	Abs	Abs.	Abs	Abs.	Abs.	1,2 x 10	Abs.		Abs.	1,3 x 10	Abs.	Abs.	15
9	6 days	3	Abs.	1,5 x 10^4	Abs	Abs.	Abs	Abs.	Abs.	1,6 x 10^3	Abs.	Abs.	Abs.	1,6 x 10	Abs.	Abs.	26
10	6 days	4	Abs.	1,2 x 10^3	Abs	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	1,3 x 10^2	Abs.	Abs.	Abs.	Abs.	20
11	6 days	5	Abs.	1,5 x 10^4	Abs	Abs.	Abs	Abs.	Abs.	3,1 x 10^2	Abs.	2,2 x 10^3	Abs.	1,1 x 10	Abs.	Abs.	28
12	6 days	6	Abs.	2,4 x 10^3	Abs	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	25
			0,00	9531,67	0,00	0,00	0,00	0,00	0,00	355,33	0,00	388,33	0,00	6,67	0,00	0,00	21,17
13	10 days	1	Abs.	5.3x10^4	Abs	Abs.	Abs	Abs.	Abs.	Abs.	Abs.	2,1 x 10^3	Abs.	Abs.	Abs.	Abs.	55
14	10 days	2	Abs.	1,2 x 10^4	Abs.	Abs.	Abs.	Abs.	Abs.	1,8 x10	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	40
15	10 days	3	Abs.	2,3 x 10^5	Abs.	1,7 x 10^2	Abs.	10	Abs.	Abs.	Abs.	Abs.	Abs.	1,7 x 10^2	Abs.	Abs.	65
16	10 days	4	Abs.	3,1 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	4,3 x 10^3	Abs.	3,3 x 10^2	Abs.	Abs.	Abs.	Abs.	28
17	10 days	5	5	8,2 x 10^5	3	1,5 x 10^2	Abs.	Abs.	Abs.	4,9 x 10^2	Abs.	Abs.	Abs.	1,5 x 10^3	Abs.	Abs.	64
18	10 days	6	Abs.	2,4 x 10^4	Abs.	1,1 x 10	Abs.	5	Abs.	2,4 x 10	Abs.	3 x 10^2	Abs.	Abs.	Abs.	Abs.	70
			0,00	189885,00	0,60	55,17	0,00	2,50	0,00	805,33	0,00	455,00	0,00	278,33	0,00	0,00	53,67
19	20 days	1	5	3,1 x 10^5	Abs.	Abs.	Abs.	Abs.	Abs.	3,8 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	87
20	20 days	2	Abs.	2,4 x 10^6	5	2,1 x 10^3	Abs.	Abs.	Abs.	1,1 x 10	Abs.	2,2 x 10^2	Abs.	Abs.	Abs.	Abs.	60
21	20 days	3	15	2 ,1x 10^4	1,1 x 10	1,3 x 10^2	3	10	Abs.	Abs.	Abs.	Abs.	Abs.	1,1 x 10	Abs.	Abs.	90
22	20 days	4	Abs.	2,5 x 10^6	Abs.	Abs.	Abs.	Abs.	Abs.	2,5 x 10^2	Abs.	2,5 x 10^3	Abs.	Abs.	Abs.	Abs.	40
23	20 days	5	5.	2,1 x 10^5	Abs.	2,7 x 10^3	Abs.	1,4 x 10	Abs.	Abs.	Abs.	2,5 x 10^4	Abs.	Abs.	Abs.	Abs.	80
24	20 days	6	Abs.	3,6 x 10^5	Abs.	1,3 x 10^3	Abs.	10	Abs.	1,6 x 10^2	Abs.	Abs.	Abs.	Abs.	Abs.	Abs.	210
			4,00	966833,33	2,67	1038,33	0,50	5,67	0,00	133,50	0,00	4620,00	0,00	1,83	0,00	0,00	94,50
25	30 days	1	Abs	2,2 x 10^6	10	1,4 x 10^3	Abs.	Abs.	Abs.	2,5 x 10^3	Abs.		Abs.	Abs.	Abs.	Abs.	120
26	30 days	2	15	4,8 x10^6	Abs.	Abs.	Abs	Abs	Abs	3,9 x 10^3	Abs	Abs	Abs	Abs.	Abs	Abs	135
27.	30 days	3	Abs	4,9x10^6	5	2,3 x 10^2	Abs.	1,2 x 10	1,1 x 10	2,1 x 10^2	Abs.	Abs	1,3 x 10	2,1 x 10^3	Abs.	Abs.	140
28.	30 days	4	25	2,2x10^4	1,2 x 10	3,8 x 10^2	5	1,4 x 10	Abs.	2,8 x 10^3	Abs.	1,1 x 10^4	Abs.	1,5 x 10^2	Abs.	Abs.	45
29.	30 days	5	Abs	4,6x10^5	Abs.	Abs.	Abs	Abs.	Abs.	2,3 x 10^2	Abs	2,5 x 10^5	Abs	Abs.	Abs	Abs	85
30.	30 days	6	20	1,9x10^7	Abs.	2,5 x 10^3	Abs.	Abs.	Abs.	Abs.	Abs.	4,8 x 10^4	Abs.	2,1 x 10^2	Abs.	Abs.	120
Average			10,00	5230333,33	4,50	751,67	0,83	4,33	1,83	1606,67	0,00	61800,00	2,17	410,00	0,00	0,00	107,50
31.	40 days	1	20	2,4x10^7	Abs.	Abs.	Abs.	Abs.	1,3 x 10^2	Abs.	Abs.	1,5 x 10^5	Abs.	Abs.	Abs.	Abs.	175
32.	40 days	2	35	3,2x10^5	2,9x10	2,1 x 10^2	1	1,2 x 10	Abs.	4,9 x 10^4	Abs		Abs	1,1 x 10^2	Abs	Abs	145
33.	40 days	3	15	2,2x10^7	Abs.	4,3 x 10^3	Abs.	Abs.	1,2 x 10^2	2,3 x 10^5	Abs.	2,8 x 10^6	Abs.	Abs.	Abs.	Abs.	120
34.	40 days	4	Abs	5,4x10^6	15	2,3 x 10^4	4	1,3 x 10	Abs.	3,8 x 10^5	Abs.	Abs	1,4 x 10	1,5 x 10^3	Abs.	Abs.	230
35.	40 days	5	15	4,3x10^7	Abs.	Abs.	Abs	Abs.	Abs.	Abs.	Abs	2,3 x 10^5	Abs	Abs.	Abs	Abs	135
36.	40 days	6	25	5,4x10^6	1,1 x 10^3	7,5 x 10^3	1,1x 10	1,3 x 10^2	1,1 x 10^2	1,1 x 10^6	Abs.	Abs.	Abs.	2,5 x 10^3	Abs.	Abs.	250

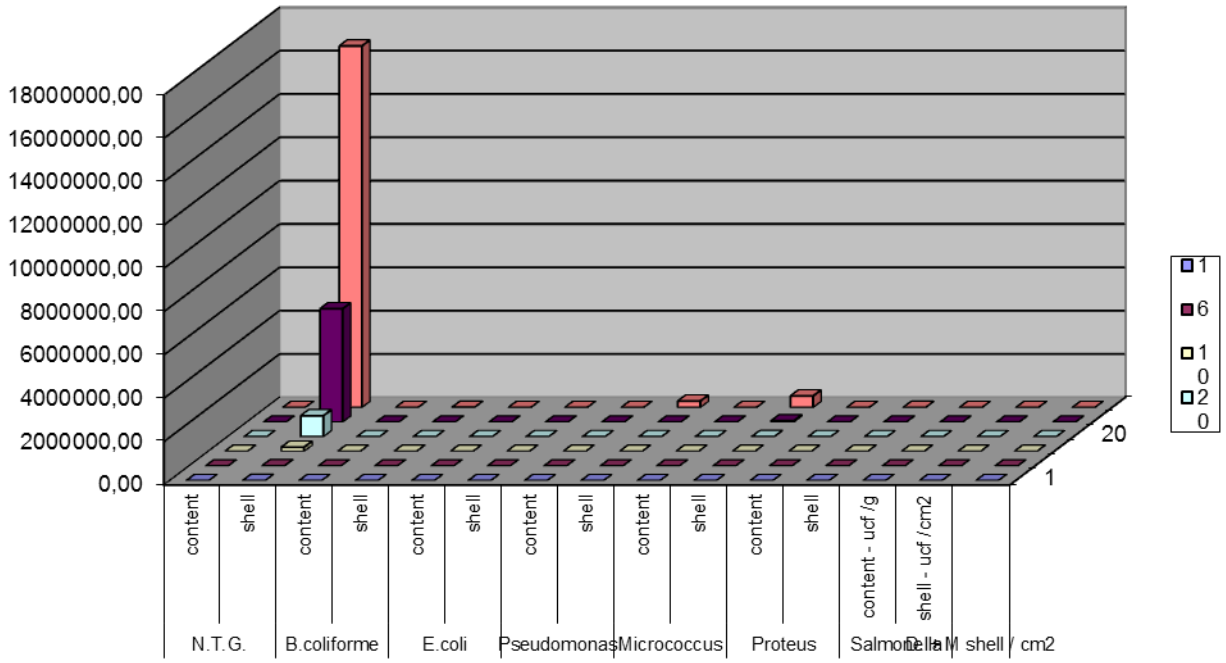

Fig.2.The dynamics of the evolution of average values of total total plate count according to the age of eggs of group B

The absence of Salmonella in the surface of all eggs is particularly important. This proves that the laying hens were free of these germs and the absence of further contamination (from other sources), proves that the keeping and handling of eggs were performed in better hygiene conditions.

Figure 1 presents the dynamics of evolution of average values of total plate count from the contents and surface of shells analysed in group A according to their age. One can notice that the total plate count on the surface of shells grows directly with the time of preservation time, being correlated as well with the NTG found out in the contents.

One can notice that the yeasts and moulds as well as the bacteria of Micrococcus type were present in a high degree, their number growing according to the preservation time.

The bacteria of Pseudomonas type were present on the surface of shells of one day eggs, this multiplying as eggs grow old and recording at the same time average values which are high enough.

In table 2 there are summarized the results obtained for group B following the microbiological analyses from which one can infer several observations.

As regards the total plate count from the contents, the results show that only in eggs older than 20 days there were identified mesophilic anerobic bacteria.

The coliform bacteria were identified in 7 groups of eggs older than 20 days, recording values ranging from 5 – 2,9 x 10 ufc / g contents.

The total plate count of aerobic bacteria detected in the contents of eggs older than 20 days varied in the range 5 - 35 ufc / g.

The largest number of plate count making up colonies was decisive for the bacteria of Pseudomonas type in eggs older than 40 days, being as well the most frequent bacteria negatively Gram determined in its contents.

If one refers to the total plate count on the surface of eggs, one can find out that its value is very different from one sample to another one. The contamination of eggs'shells was deeper for the eggs aged over 30 days, this

being 1000 higher than one day eggs. The progressive growth of NTG cannot be due to the initial pathogens available on eggs'shells, as on dry layers they cannot grow. It involves the atmospherical contamination whose intensity is proportionate with the preservation type and with the hygienic quality of the development area.

Coliform bacteria were isolated on shells in 14 groups of eggs unlike Escherichia coli which was isolated in 11 samples.

In 13 groups of eggs, Pseudomonas was not isolated and in 16, Mircococcus neither. But Proteus was present in the shells of eggs of 12 groups with an age over 40 days and the total number of yeasts and moulds ranged between 4 and 250 ufc / cm^2.

Like in the case of the first group, the bacteria of Salmonella type were neither identified in eggs' contents, nor on the external surfaces of eggs. This provides a reason for the fact that the laying hens were free of these germs and the absence of further contamination from other sources highlights that the maintenance and handling of eggs was performed under good hygiene conditions.

In figure 2, one can follow the dynamics of the evolution of average values of the total palte count from the contents and surface of eggs' shells which were analysed in group B according to their age.

On a whole analysis, the total plate count shall be assessed as being proportionate with the preservation time of eggs.

As one can notice in figure 2 in the analysis of evolution of environments of germs making up colonies / cm^2, within each age category, one can find out that the average number of total plate count is approximately 100 higher than the average recorded for the other types of bacteria.

For one day fresh eggs , the average negative Gram bacteria was not higher than 35 ufc/$cm^{2.}$

For the group of 6 days old eggs one can notice that the average of coliform bacteria was very low, while the environments for *Pseudomonas* and *Micrococcus* recorded a high growth, a tendency which was kept for the category of 10 days' old eggs.

For the eggs older than 20 days, one can notice the presence of a higher number of coliform bacteria and of Micrococcus type as compared with Pseudomonas that record a decrease of the averge in comparison with that of 10 days old eggs. As it is shown in the average values for the group of 40 days old eggs, one can settle that in the plate count of the eggs, there were found out all types of analysed bacteria.

One cand find out a significant increase of the number of moulds –filamentous fungi and of unicellular fungi in the case of eggs which were preserved under high temperatures (23-25ºC) and a relatively low humidity, in comparison with the degree of development of yeasts and moulds which were identified in the case of eggs preserved under opposite conditions (figure 3).

One can notice the fact both for group A and for group B, there were isolated and identified yeasts and moulds on the basis of cultural and morphological characters . The increased number of microscopic fungi to get developed optimally under temperatures of 20-30°C.

In this case, the isolation of filamentous fungi-moulds was most of the times difficult due to the invasive growth of colonies, which led to the cross-contamination and their superposing. The development of a low number at temperatures of 4°C could be explained by the availability of a psychotrophic that can grow as well under negative temperatures.

In comparison to other micro-organisms, they need little water in order to develop a metabolic activity and that's why, they were able to grow on eggs with a reduced water contents. It is a known fact that their growth and multiplication is favoured by a humid environment.

Coliform bacteria and microorganisms of Escherichia type identified both in the contents and on the surface of eggs'shells – situation encountered in both groups but with significant differences regarding proportions and sizes – stood for the most important sanitary veterinary indicator of eggs in the undertaken study.

Taking into account the fact that the prevalence of category of E coli –biotype 1 in the total plate count found out in the faeces of birds, one can say that the contamination of eggs could have occurred during and also after their laying (secondary contamination).

This contamination involves only the surface of eggs' shells in the beginning. One is known that the first contamination of shells takes place in the moment of laying in a low degree., by the contact with the cloacal mucosis neighbouring the opening of oviduct.

The actual contamination of shells occur by means of microflora on the surfaces and objects that come into contact with them, that explains the presence in a high number of coliform bacteria and of the total plate count on the surface of eggs. In a parallel analysis of the two groups, one can estimate the higher number of coliform bacteria and live microorganisms, both in the contents and in the shells of eggs of group B (kept under temperatures of 25°C)

This can be explained by the capacity of these bacteria to grow well under high temperatures (37°C). There was found out that the total aerobic bacterial count on the surface of shells was very different in groups and categories, according to eggs' age and preservation conditions.

The bacteria of Pseudomonas type registered higher values both in the contents and the surface of shells, in the case of eggs preserved at temperatures of 4°C, in comparison to the eggs of group B., whose preservation conditions were exemplified by temperatures of 23 - 25°C and **humidity.**

This is explained relying on the properties of bacteria of Pseudomonas type that, owing to their psychotrophyic, they can normally grow at temperatures of 4°C, being considered the main agents of alteration of eggs kept under refrigerated conditions. The isolation of pseudomonadae on the contents and shells of eggs of group B in a sufficient proportion in order to catch attention is due to the capacity of most of the species to develop under temperatures ranging between 25 - 30°C.

In the case of the two groups, one can notice a gradual growth of microorganisms from different bacteria types on both eggs' shells and contents according to the age and the preservation conditions, reaching a contamination peak of 30 days. It is well known that during eggs' preservation, the proteolitical enzymes of whites and yolks develop its activity of simplifying their specific layer.

The intensity of this activity is conditioned by a special temperature and humidity, responsible factors for the multiplying of microorganisms. Upon a whole analysis, one can make up a correlation between the microbial plate count from the surface of shells and the contents' total plate count.

The advanced contamination of eggs from both groups with an age of 30-40 days under different preservation conditions is due to proteolitical and aminoacidolitical enzymes that are available that are used by most of bacteria that penetrate eggs, resulting the liquefying of proteins of whites and yolks, and alteration of **antimicrobial structures**, such as follows:

- membrana of shells contain some bacteriolitical enzymes (eg. lisodaym and N acetil glucozaminidase / N-acetyl glucosaminidase) and other membrane components that can alter thermal resistance of pathogene bacteria- positive Gram and negative Gram (Salmonella Enteritidis, Escherichia coli 0157: H7, Listeria monocytogenes and Staphylococcus aureus).)

Nevertheless, the presence of organic matter significantly reduces the thermoresistance capacity, by reducing the capacity of membranae. A decrease of thermoresistance capacity of microorganisms may result in the use of several preparation processes (low processing temperatures, reduces operation time), with an improvement of products' quality, exposing *Salmonella Typhimurium* to

- shells' membranae under an increased organic plate count (eg.: skim milk), significantly reduced the activity of membrana against *Salmonella Typhimurium*.

A possible explanation for the presence of different bacteria speciaes of different ages of

eggs can be allotted to their pH. It is well known that immediately after laying, the whites of eggs have the pH-ul of 7,6 -7,9. as J. A. Garibaldi states, and during the storage og eggs, the pH of whites decreases by a value according to temperature to the maximum value of 9,7. Sharp and Whitaker proved that after 3 days of eggs' storage at a temperature of 3°C, the pH of whites reaches a peak of 9,18 and after 21 days, to 9,4, this being considered an explanation for the microbial plate which was found out in the eggs analysed in this study.

Besides the alacaline reaction, the most important role in antimicrobial defence is represented by lisosyme and conalbumin. The high level of negative Gram bacteria can be accounted for the antimicrobial activity of conalbumin (Valenti and col., 1983).

Ibrahim (2000) stressed the fact that the lack of ferum available at the level of membranaer and of whites blocked in conalbumin represents an intrinsic factor of utmost importance in selecting the microbial association developing in the contents of eggs. The conalbumin shall be in excess in order to inhibit the microbial growth, an action that intensifies as the concentration of hydrogen ion decreases.

The high sensitivity towards lysozym of celullar wall of some positive Gram bacteria which is rich in mucopeptides [10] may account for the reason for which the alteration of eggs occur mostly by means of Gram negative bacteria.

The results obtained in this study are in conformity with those obtained by de V. Beia and col., (2005) [8] that prove that the storage of eggs at a temperature of 4 ºC limit the multiplying of microorganisms both in the contents and shells of eggs, in comparison to the storage of eggs at a temperature of 25ºC.

The detection of the presence of Pseudomonas bacteria in both storage conditions (temperatures of 4ºC and 25ºC) in relatively similar proportions is in conformity with the data in the literature describing the proteolitical activity of different *Pseudomonas* subtypes in eggs and egg products at temperatures of 10º and 25ºC .

CONCLUSIONS

1.Following the examination of eggs' contents there has been detected the absence of aerobic mesophilic germs, of Micrococcus and Salmonella types for two analysed batches irrespective of eggs'age and preservation conditions.

2. In the case of eggs ober 30 days kept at a temperature of 4º C, besides NTG, there have been detected some germs of *Pseudomonas* type in the contents of eggs and after 40 days there have been found out coliform bacteria as well as *Escherichia coli.*

3. In the case of eggs of group B (kept at a temperature of 25ºC), the microbial plate present both in the contents and in shells was higher and of a younger age in comparison to the first groups.

4. Following the examination of eggs'surface there have been found out the following: the presence of bacteria of Proteus and Pseudomonas ttypes on the shells of eggs., the absence of Salmonellas, a very low number (under 40 ufc /cm^2) of yeasts and moulds, a progressive rise of NTG corellated with the age of eggs that can only be caused by the atmospheric contamination.

5. If one refers to the total plate count, one can notice that the average of values found out for batch A is lower than the average of values found out for batch B, a situation in which the values were more homogenous in comparison to batch B, in which the amplitude of values was higher.

For batch A, the total microbial plate count of coliform bacteria had a more intense activity, unlike group B, in which there were obtained less positive samples of the type, of lower intensity.

Pseudomonas type stands out by higher values of the units making up colonies per cm^2 of shells for group A, in comparison to group B.

The values recorded for Micrococcus type bacteria were close in similarity.

The comparative analysis of the total plate count of yeasts and moulds shows that the two batches differ significantly.

By comparing the results obtained for the two batches analysed, one can generally notice the same trend of progressive rise in the number of microorganisms as the process of eggs'growing old.

REFERENCES

[1]Abola, J.E., Wood, M.C., Chwen, A., Abraham, D., Pulsinelli P.D.,1982, In: The Biochemistry and Physiology of Iron. Saltman P and Hegenarer J (Eds). Elsevier

[2]Albright, C.D., Lui, R., Bethea, T.C., Da Costa K.A., Salganik, R.I., Zeisel, S.H., 1996, Choline deficiency induces apoptosis in SV40-immortalized CWSV-1 rathepatocytes in culture. FASEB Journal 10:510-516

[3]Al-Soudi, K.A., Al Fayadh, H.A., Al-Khazrje, A.K., Mehdi, A.W., 1988, Preliminary study effects of feeding ethyl mercury chloride on four breeds of chickens, Poul. J., 425(12):146-150

[4]Anon, 1998, Dietry referenc eintakes for folate, thiamin, riboflavin, niacin, vitamin B12,panthothenic acid, biotin and choline. Institute of Medicine and National Academy of Sciences USA. National Academy Press ,Washington DC

[5]Baker, R. C., 1983, Survival of Salmonella typhimurium and Staphylococcus aureus in Eggs Cooked by Different Methods, Poult. Sci., 62 1211-1216

[6]Baron, F., Gautier, M., Bmle, G., 1997, Factors involved in the inhibition of growth of *Salmonella enteritidis* in liquid egg white. J. Food Prot. 60: 13 18-1323

[7]Bărzoi, D, Apostu, S., 2002, Microbiology of Food, Risoprint Publisher Cluj-Napoca, ISBN 973-656-191-7

[8]Beia Violeta, Savu, C., Beia, S. I., Florea, C., Beia Daniela, 2005, The importance ofthe study on microbiological assayson eggsand egg products, International Scientific Symposium" Achievements and Perspectives in Agriculture" State Agrarian University of Moldova, Chisinau

[9]Beia Violeta, Savu, C., Petcu Carmen, Milca Irina, Beia, S. I., 2005, Study onthe microbiological quality ofeggs for consumption, USAMV Scientific Symposium, Faculty of Veterinary Medicine-Bucharest.

[10]Ibrahim, H.R., Sugimoto, Y., Aoki, T., 2000, Ovo transferin antimicrobial peptide (OTAP-92) kills bacteria through a membrane damage mechanism. Biochimica et Biophysica Acta 1523:196-205

[11]Savu, C., Georgescu Narcisa, 2004, Food safety - risks and benefits –Semne Publisher, Bucharest

[12]Savu, C., Petcu, C., 2002, Hygiene and Control of Animal Products, Semne Publisher

[13]Takahashi, K., Lou, X.F, Ishii, Y., Hattori, M., 2000, Lysozyme-glucose stearic acid monoester conjugate formed through the Maillard reaction as an antibacterial emulsifier. Journal of Agricultural and Food Chemistry 48:2044-2049

[14]Valenti, P., Antonin, G., Von Hunolstein, C., Visca, P., Ors,i N., Antonini, E., 1983, Studies of the antimicrobial activity of ovo transferrin. International Journal Tissue Reactions 1:97-105

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TOURIST MOTIVATION FOR RURAL DESTINATIONS

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Abstract

City daily overexertion impels tourists wish to travel. Rural tourism behavior is determined by a set of motivational factors that makes him appreciate favorable tourist destinations. In order to analyze and assess the opinions and attitudes of tourists in rural areas we realized a market survey, the results being presented in the article below. Future trends, the growth rate of market depend largely on the wishes and intentions of goods or services consumers. This study involves the engagement of a number of 658 respondents, which were interviewed to determine the basic motivations in choosing countryside. The working methods used were analysis, synthesis and questionnaire survey as a research method. Results refer to the following: about 59 percent, spend up to 10% of annual income for vacations and travel, for rural tourism this amount is much lower; the association of the term „rural tourism" in the local tourist mind, oscillates among „a villa" in rural areas or „active vacation" (biking, hiking, riding, swimming or hunting); customer loyalty is one of the goals of marketing activities undertaken in hostels or other travel service providers. In conclusion, we mention that the variety of motivational factors in choosing tourist destinations in rural areas drive this type of tourism.

Key words**:** *countryside holidays, respondent, rural tourism, sample, tourist motivation*

INTRODUCTION

The expansion of the tourism phenomenon in rural areas in the second half of the last century is primarily due to rural recovery and development, and secondly to an alternative form of tourism compared to mass or traditional tourism.

The whole, rural tourism includes a wide range of ways of accommodation, events, celebrations, sports, other entertainment and enjoyable party activities of leisure, all unfolded in a typical rural environment.

In the acception of the World Tourism Organization and many European organizations, rural tourism is "*a form of tourism that includes any tourist activity in rural areas organized and led by the local population, exploiting local tourism resources (natural, cultural-historical, human) and facilities, tourist structures, including hostels and agro tourism farms."*

Why rural tourism? If we start with this question, we find more responses from supporters of this type of tourism while experts have determined the following features:

- Closeness to nature;
- The absence of the multitude;
- Quietness;
- A "not mechanized" environment;
- Sense of continuity and stability, experience of living and enduring history;
- Possibility to know closely places and people of those places;
- Direct contact with local authorities, with the concerns and specific activity of the area;
- Proper knowledge of local business;
- The chance of community integration during the stay. [4]

Most tourism motivations may substantially differ in their interpretations and explanations resulting travel models. The most frequently combined reasons appear for individual or group travels. For example, for rural tourism Moldovans hospitality, the retrieval customs and traditions, habitual stress escape, natural sightseeing etc, would be some *integrated reasons* for rural tourist areas.

The tourist motivation determines the psychological dimension of rural tourism. [4] This includes a set of needs, impulses, intentions, valences and specific personal tendencies and being influenced by

geographical environment factors, the attitudes towards it and towards himself, the consciously aim as a response to respond to these needs. [5]

The famous Jost Krippendorf's list (1987), considered one of the pioneers of sustainable tourism, in his book The Holiday Makers, are listed 20 reasons, which we'll present below: 1) the attraction of the landscape; 2) the quality of meal; 3) general atmosphere; 4) curiosities of the region; 5) the environment quality towards health; 6) rest and relaxation; 7) itinerary; 8) the accommodation conditions; 9) great price; 10) language problems; 11) sympathetic contact with the indigenous population; 12) cultural attractions, 13) state of the roads; 14) day or night entertainments; 15)arrival and reception; 16) local folklore; 17)the possibilities to practice sports activities; 18) travel planning and formalities; 19) shopping opportunities; 20)other hobbies/ interests or entertainments.

In order to determine attitudes and reviews of Moldovan tourists opposite to „countryside holidays", towards defining the directions of development of this branch and the overriding motivation for this type of tourism, from March to June 2013, we have developed a study of the reasons for tourism in rural areas, the results of which will be presented below.

MATERIALS AND METHODS

We consider research as one exploratory study that will allow us to establish future research directions, some general conclusions and recommendations. [7]

The study was trained a number of 658 respondents of different ages. For its relevance we selected people with different occupations: skilled workers, business professionals, students, private entrepreneurs, teachers, we separately analysed the responses of a certain category - civil clerks whose sedentariness (office work), make them to choose trips out in the bosom of nature.

The largest share were the people aged from 21 to 30 years old. Their active rest is typical, although the age is one of essential criterion to create the tourist offer.

RESULTS AND DISCUSSIONS

The escape to the countryside vacations and travel of Moldovans abroad have gained considerable intensity in the last years, however, the share of annual income for tourism is one as insignificant one upon the whole. Approximately 386 respondents or about 59 percent, spend up to 10% of annual income for vacations and travel, for rural tourism this amount is much lower, 23 percent grant to those services between 11-20% and only 2% of respondents spend more than 40 percent for holidays, vacations, recreation.

Reading the psychologist's opinion Claire Lucques (1962), who considers the tourism as *„unnecessary expense and distress, the result of the trend towards waste and ruination of material wealth to meet pleasure, that cannot restore the individuals emotional balance"*, then, the presented figures above may be justified, however, the escape in nature may remind to people how to really live.

Rural tourism as a phenomenon has appeared in our country recently, after 2000, therefore, we still cannot talk about creating a tourism product in rural area, as proposed offers have more seasonal, sporadic and disorganized feature. The association of the term „rural tourism" in the local tourist mind, oscillates among *„a villa"* in rural areas or *„active vacation"* (biking, hiking, riding, swimming or hunting). (Fig. 1)

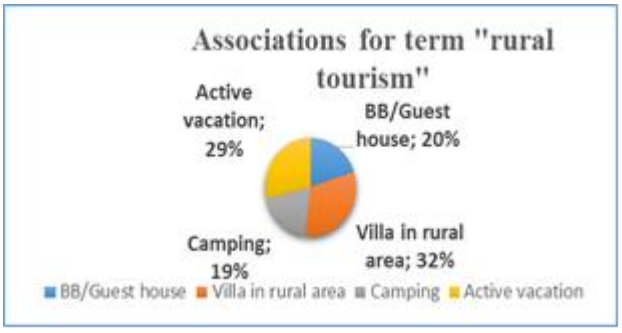

Fig.1. The opinions of respondents across the association „rural tourism" term with other notions

The consumer behaviour for specific products or services has to be often formed, in the way that consumers are suggested services and destinations they need. Of course, the „rest in

the country" is hardly the townspeople passion, the rejection being „supplied" by the lack of professionalism and the small number of those skilled in management and organization of tourism activities in rural areas. In the framework of a study, performed in Romania, the respondents have noticed some gaps including: language problems, road conditions, possibilities of practicing sport's activities etc., which are typical for domestic tourism. The passion of tourists for holidays in the countryside has been scaled in perimeter „very passionated-not passionated", so 386 of the 658 respondents said they were *very keen and passionated* (59%) those *„indifferent"* representing 14 %.

As mentioned above the main reasons for rural tourism, played by specialists, thus the respondents were asked *„What motivates you to choose the rural tourism?"* offering five possible answers. Their options were more focused on leisure, recreation and escape to nature, options justified by Graburn theoretical model based on „inversions" of travel.[2] It explains the tendency of tourists to seek temporary something else than usually. The concern is reflected in the increasing of the relaxation time, antithetical with working time.

Fig.2. Motivations in choosing rural tourism destinations

The features of tourist product or of tourist package involve their communication to potential customers. Promotion as a specific form of communication, although, it seems relatively simple, requires special skills. Firstly, promotion must be of a permanent spect, must address to potential and current clients, even more it concerns the objectives of informing nature on the natural and anthropogenic resources area, their recovery from a high level; attracting the target customers; improving the company image; creating a unique image; the harmonious development of local economic activity.

A content tourist will always share this opinions and impressions to others, so perhaps the main source of information for vacations in the countryside is the recommendation of friends or colleagues. More than half of respondents (54.7%) trust their recommendations. The list is followed by the Internet (32.9%) - considering that most of the respondents were office workers and students - personal experience, travel agencies, promotional materials, trade and fairs, tourist information offices, having a relatively small share.

Customer loyalty is one of the goals of marketing activities undertaken in hostels or other travel service providers, but in order to prosper it must be imposed and maintained certain standards of quality, which unfortunately do not exist in the local tourism structures in rural areas. Some statistics and studies in the field, show that 67% of dissatisfied customers do not come back again to the site and 96% of those dissatisfied never make complaints on the spot. [6]

If referring to the tourist way of booking for holidays in the countryside, then the preferences of respondents were largely shared between *„direct contact with landlord„* and *„without prior reservation"*, which shows the disorganized nature of this activity, the statistical data being missing or incomplete.

Table 1. Distribution of tourists' preferences for booking holidays in the countryside

Choice variants	Number of responses	Share, %
Direct contact with landlord/owner	244	37
By travel agency	155	23
Online booking	65	9
Without prior reservation	200	31
Total	664	100

Although, the Internet as a source of tourist information is in the respondents' preferences, cult of *„online reservations"* is not formed yet. Some respondents mentioned several answers, depending on the situation.

For the 2-5 days stay and more, in rural space tourists need accommodation. Whether it is a BB (Bed &Breakfast) or villa, camping or rooms for renting family houses, the tourist should have minimum comfort. About 70 % of respondents said that comfort and convenience can be enjoyed in the rural area. In their opinion this aspect would be: silence (a considerable number of respondents); cleaning; fresh air; safety food; amusement etc.

In the list of enumerations were found hospitality, infrastructure, convenience and comfort of nature as conditions in rural areas.

Regarding the most important factor in choosing accommodations, was mentioned again quiet and recreation, attractive nature, the comfort of accommodation and nearby cultural and sports attractions. Finally, as an important element in choosing accommodations were mentioned „price level", with a share of 14.6%. Meanwhile, Moldovans state that are willing to spend per day maximum up to 500 MDL for a holiday in the countryside, in the context of the rural boarding prices for day/tourist with 3 meals included are about 570 MDL (35 Euro), without additional services (boating, carriage or sleigh etc.).

If, until recently, rural areas did not provide conditions of recreational activities for tourists, at the same time with changes in consumer behaviour such services and due to increasing demands for services in rural areas are increasingly opting for an active holiday in the countryside. Hiking, fishing, equitation, hunting or visiting cultural and historical sites and landscapes are included in active recreation in the countryside. In the top 1-5 of the favourite activities during tourist rural stays, respondents gave first place visiting cultural and historical sites and admiring landscapes, the second and the third place being awarded respectively, to hiking and fishing.

Holidays in the countryside can be cut and scattered during the year, depending on the season, national and religious traditional holidays, and so fall in the average duration of 3-5 days. This is the opinion of respondents surveyed who consider the optimal duration of staying in rural areas in Moldova 3-4 days (34%).

CONCLUSIONS

In conclusion, we mention that the variety of motivational factors in choosing tourist destinations in rural areas drive this type of tourism. "Mini vacations" in rural areas are very appreciated by tourists. Tourism development in rural areas should be supported by the state, local authorities, local creativity and initiative and not at least by tourists themselves. Creating a brand of *"holidays in the country"* would promote tourist destinations *"in the shadow"* of the Republic of Moldova.

The perspectives of the development of rural tourism in our opinion concern:

- Creation and promotion of rural tourism itineraries;
- Design and substantiation of a local rural tourism product;
- Adopting a legislative framework for rural tourism;
- Creation of public-private partnerships in this area;
- Establishment of quality standards for rural tourism.

REFERENCES

[1]Belostecinic, G., 2011, Metode şi tehnici de scalare în cercetările de marketing, ASEM, Chişinău, 6-42
[2]Buga, O., 2009, Turism intern, Grafema Libris, Chişinău, 35-58
[3]Dinu, M., 2002, Geografia turismului, Editura Didactică şi Pedagogică, Bucureşti, 56-60
[4]Nistoreanu, P., Ghereş Marinela, 2010, Turism rural. Tratat, C. H. Beck, Bucureşti, 79-189
[5]Nistoreanu Puiu, Tigu Gabriela, Popescu Delia, Padurean Mihaela, Talpes Adela, Tala Madalina, Condulescu Cristina, 2003, Ecoturism şi turism rural, ASE, Bucureşti, 304
[6]Ungureanu, G., Ciurea, I. V., Mihalache, R., 2011, Ghid pentru promovarea afacerilor în turism, Terra Nostra, Iaşi, 28-35
[7]Petrovici, S., Belostecinic, Gr., 2008, Marketing, Curs universitar, ASEM, Chişinău, 61-66

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BANKING SYSTEM FRAGILITY: CASE OF THE REPUBLIC OF MOLDOVA

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Abstract

The paper studied the determinants of Moldovan banking system fragility. It underlines the existing researches into the empirical determinants of banking fragility. The analysis revealed that there are numerous channels through which weaknesses within the macroeconomic conditions and structural characteristics might increase banking system fragility. The main macroeconomic determinants which may have an impact on Moldovan banking system fragility are: excessive domestic liquidity, pro-cyclical character of the banking system, dependence on remittances, financial dollarization. There are also several banking characteristics which play a role for Moldovan banking system fragility: the undermined intermediation function, high level of bad loans, uncertainties in the ownership structure, low presence of foreign strategic investors. The paper employed a quantitative, a qualitative and a comparative analysis using the financial soundness and structural indicators of the Moldovan banking system in order to assess the impact of various determinants on Moldovan banking system fragility. The results reveal a high degree of capitalization and liquidity of Moldovan banking system, factors which contribute and maintain the general stability of the entire financial system.

Key words**:** *banking system, capitalization, concentration, fragility determinants, liquidity, nonperforming loans*

INTRODUCTION

A strong and stable banking system is considered to be „an important driver of future GDP growth" [10], which "facilitates (rather than impeding) the performance of an economy and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and *unanticipated* events" [13]. But the causal link is not unidirectional, positive performances of the economy in its turn influence the banking system situation. There are numerous channels through which weaknesses within the macroeconomic conditions and structural characteristics might increase banking system *fragility*. Low GDP growth, high real interest rates, and high inflation are significantly correlated with the banking fragility due to occurrence of different financial risks within the system. Worsening of borrowers' financial situation can damage in its turn the banking system. Usually, banking crises tend to manifest themselves during periods of weak economic growth and loss of monetary control [7]. Banking system fragility reduces when banks in the system jointly hold more liquid assets, are better capitalized, and when regional banking systems are more competitive [6].

Prudently regulating the banking system is undoubtedly a major objective for financial regulators because of the enormous cost of banking system instability. Therefore, a thorough understanding of the underlying determinants of banking system *fragility* and identification of *crises events* is a foremost challenge for a prudent financial regulator.

The financial crises of the past decade, and the IMF's initiative to build an early warning system against such crises, have stimulated a wave of research into the empirical determinants of *banking fragility*.

Various studies have proposed early warning indicators of impending turmoil in banking systems (e.g., Caprio and Klingebiel (1996), Demirguc-Kunt and Detragiache, 1998, 2002, 2005; Bordo et al. (2001), Glick and

Hutchison (2001), Gavin and Hausman (1996), Rojas Suarez 2001; Goldstein and Turner (1996), Kaminsky and Reinhardt (1996, 1999), Sundararajan (1991), Mishkin (1996) etc.

A common methodological challenge facing empirical research in this area is the so-called the *events method*, i.e. the *identification of crises events*, such as forced bank closures, mergers, runs on financial institutions and government emerging measures etc.

European Central Bank in 2012 has focused on early warning indicators for developed countries [2], which differ from the crises events in developing countries. Given large differences among emerging markets, a single set of indicators will not "fit all". The use of financial indicators that, while appropriate for industrial countries, do not work in emerging markets. Bank supervisors' records of prompt identification of banking problems in emerging markets has not been satisfactory [12].

ECB results show that the ratio of domestic private credit to GDP represents the most consistent early warning indicator of banking crises *in developed economies* across the various specifications and time horizons (warning sign al should be issued whenever the most robust indicator rises more than 2% above its long-term trend). In addition, rising FDI flows, increasing money market rates, and global economic booms (rising world GDP and inflation) are also important risk factors worth monitoring.

Weaknesses and *vulnerabilities* within the banking sector may affect the entire financial system. There are generally three characteristics of the notion of *financial vulnerability* [4]:

– significant loss of confidence of economic agents in the financial system (financial institutions and financial markets);

– inability of financial institutions to efficiently play the role of intermediation;

– spreading of financial vulnerability to the entire economy.

The weakness of the banking system could be seen as an aggregation of weaknesses of individual banks coupled with the resulting negative externalities [14].

To distinguish between fragility in general and crises in particular, and between localized crises and systemic crises, Demirgüç-Kunt and Detragiache (2005) established that for an episode of distress to be classified as a full-fledged crisis, at least one of the following four conditions had to hold [3]:

-the ratio of nonperforming assets to total assets in the banking system exceeded 10 percent;

-the cost of the rescue operation was at least 2 percent of GDP;

-banking sector problems had led to a large scale nationalization of banks;

-extensive bank runs took place or emergency measures such as deposit freezes, prolonged bank holidays, or generalized deposit guarantees were enacted by the government in response to the crisis.

Republic of Moldova is a small country with a financial sector dominated by the banking system, which accounted for 93 percent of total financial assets and 96 percent of total loans provided by the financial sector at the end of 2012 [15]. The local banking system has a low degree of connectivity to European and world banking system due to a very low presence of international banks on the market[1], which has determined *no direct contagion* within the last financial crises. The effects of the crises were felt indirectly by the banks, through the channel of remittances and foreign trade, which have diminished substantially as a result of economic decline in Europe. The decline of private consumption in the euro area has contributed to the decrease in Moldovan exports to EU and of the volume of remittances in 2012. Thus, the general effect of the financial crises on the Moldovan banking system was felt *on the banks' asset side*. The mentioned tendencies have negatively influenced creditworthiness of Moldovan borrowers and respectively the quality of local banks' loan portfolios. There

[1] There are only 4 banks with 100% foreign capital of 14 commercial banks operating in the local banking market.

are also some structural shortages which increase the fragility of the local banking system.

MATERIALS AND METHODS

The research is initiated with the goal to detect the main *determinants* of the Republic of Moldova's banking system. The methodological base of this empirical research is the so-called the *events method*, i.e. the identification of the events which could lead to fragility of the banking system. These include in particular qualitative, quantitative and comparative analysis of financial soundness and structural indicators.

RESULTS AND DISCUSSIONS

There are several *banking characteristics* which play a role for banking system fragility: system's liquidity, capitalization, competition, diversification, presence of foreign banks, and wholesale funding [4]. A higher *capital base* provides a cushion against insolvency. A better capitalized banking system helps in reducing possible contagion effects from individual bank failures in the same country or region.

The Republic of Moldova's banking system has a very high degree of capitalization and liquidity, factors which contribute and maintain the general stability of the entire financial system. The average capital adequacy ratio of the Moldova's banking system recorded for 2009-2012 (29,2 per cent) indicates a high degree of banks safety and the potential to perform risky operations without affecting the capital. Among countries from Eastern Partnership and some EU countries with similar size and economic problems, Moldova has the highest level of the capitalization and liquid reserves[2] (fig. 1).

The *liquidity* on a bank's balance sheet serves as a first line of defence against liquidity shocks. Greater banking system liquidity enhances the stability of the domestic banking system. Despite high liquidity and capitalization ratio of the Moldovan banking system, access to finance continues to be identified as one of the primary constraints for companies in Moldova [9]. Shortage of long maturities remains the main barriers in access to finance.

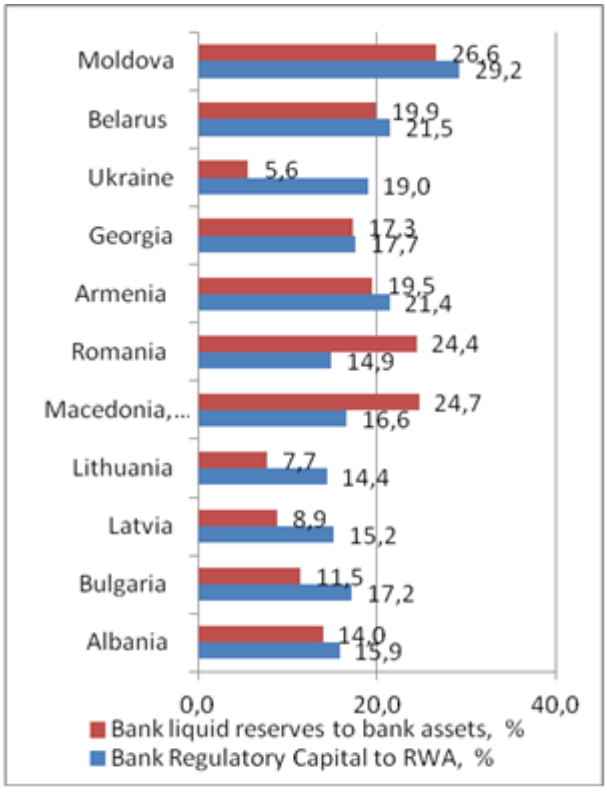

Fig.1. Bank liquid reserves to bank assets, Bank Regulatory Capital to Risk-Weighted Assets, (%) (International comparison), average rate for 2009-2012
Source: compiled on the basis of World Bank and IMF data base, Financial Soundness Indicators tables 2009-2013

The core of the fragility problem is the maturity transformation between liabilities and assets [1]. Deposits are usually demandable, while loans are long term investments. When there is a run, and a large number of depositors wish to withdraw their funds prematurely, the bank must find liquidity, either by borrowing in the interbank market or by selling assets. Both solutions to the liquidity problem on the deposit side are problematic. The interbank market may not be available if, as in the 2007 crisis, financial markets stop working properly. Selling

[2] Ratio of bank liquid reserves to bank assets is the ratio of domestic currency holdings and deposits with the monetary authorities to claims on other governments, nonfinancial public enterprises, the private sector, and other banking institutions. (World Bank)

assets to meet short-term liquidity demands risks getting prices well below the assets' intrinsic value.

The availability of long-term financial resources in the Moldovan banking system remains limited, only 17,16 per cent of all deposits have the maturity more than 1 year, while the most requested loans are those with maturity greater than one year – 74,9 per cent (fig. 2).

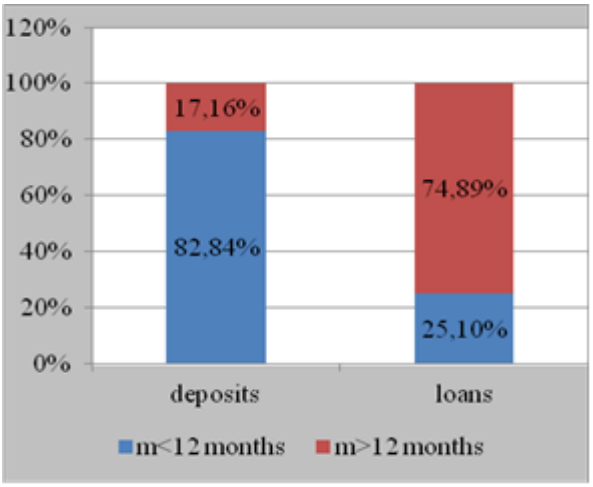

Fig.2. Maturity structure of deposits and loans within the Moldovan banking system (%), June 2013

Source: compiled on the basis of National Bank of Moldova data base, 2013

The main sources of long-term lending (for periods longer than 3 years) in the domestic banking system remain the equity capital and external sources of credit offered by international financial institutions.

Instability problems also could arise *on the banks' asset side* [11]. Their great reliance on debt and the private information that banks possess on their borrowers may induce them to take excessive risks in their investments or in granting loans. This type of risk is much more pronounced in the financial sector than in others, both because banks' assets are more leveraged and more opaque and because banks' liabilities are insensitive to asset risk, due to deposit insurance or implicit state guarantees.

An alarming feature of the domestic banking sector is the high level of bad loans (14,5 per cent in 2012). Economic contraction in 2009 caused a significant increase in non-performing loans (substandard, doubtful and loss) of the total loan portfolio from 5.9% in 2008 to 16.3% in 2009. Sudden increase of credit risk during this period led banks to restrict lending and to significantly increase the allowances for loan losses. With few exceptions, the trend of deterioration in loan quality continued to be a common feature for the European banking market in 2012 due to sovereign debt crisis (fig. 3).

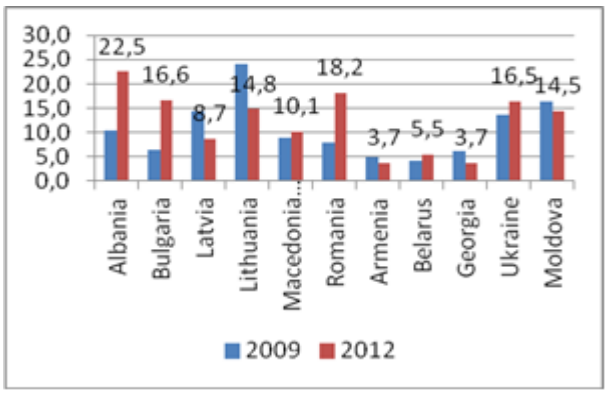

Fig.3. Nonperforming loan ratio (International comparison), 2009-2012

Source: compiled on the basis of IMF data base, Financial Soundness Indicators tables, April 2013

The recent financial crisis has shown that *banks' funding structure* is important to their resilience. Banks can finance themselves with both depository funding and *wholesale funding* (i.e. funding from other banks, money market funds, corporate treasuries and other non-bank investors) relying mostly on wholesale funding have been severely affected by the crisis. Banks in Australia and Canada, for example, have been very resilient to the crisis because they have relied mostly on depository funding, much of which came from retail sources such as households [4]. Reliance on non-core deposits as a funding source, wholesale funding, could prove to be a more volatile source of funding that may accentuate regional banking fragility.

Moldovan banks demonstrate a high level of resilience due to their *funding structure*. They finance themselves with both depository funding and wholesale funding, but they rely mostly on depository funding. Deposits to liabilities ratio reached the amount of 85,4 percent at the end of 2013, much of which came from retail sources (table 1). Table 1

suggests that banks have a strong preference for maintaining liquidity. This is mostly due to the uncertain macroeconomic outlook and the recent history of banking sector instability.

Table 1. Funding structure and liquidity indicators of the Moldova's banking system, end of the year

Indicators	2009	2010	2011	2012
Deposits/Total Liabilities, %	80,1	82,0	82,4	83,1
Liquid assets ratio[3] (%)	38,3	34,2	33,2	32,9
Long term liquidity ratio[4]	0,60	0,67	0,69	0,70

Source: compiled on the basis of National Bank of Moldova data base, 2009-2013

However, the intermediation function of Moldovan commercial banks is undermined: although the level of liquidity in the system is one of the largest in the region they are very cautious in granting loans. The central issue of undermining is the mutual crisis of confidence: of the individuals and companies towards banks, and of commercial banks towards potential borrowers. It explains the conservative approach of local banks risk management, the reluctance in their lending activity and the maintenance of a high level of liquidity. This conservative approach has become even more acute during the recent economic crisis. It reveals that the lack of resources is not the essential issue of passive lending, and the high level of liquidity may be a consequence of this reluctance to credit activity.

Existing cross-country studies focusing on systemic stability find a positive effect of both *competition and concentration* on stability. As the study suggests, the positive effect of concentration on stability is likely to depend on better possibilities for larger banks to diversify risk. Although, both the country experiences and the academic debate suggest that concentration and competition have ambiguous effects on financial stability. The main findings of the existing studies focusing on systemic stability are:

-*Bank concentration***,** is (robustly) negatively correlated with financial crises. That is, more concentrated banking systems are less likely to suffer systemic banking crises. There are suggestive evidences [8] that concentrated banking systems tend to have larger, better-diversified banks, which may help account for the positive link between concentration and stability.

-The likelihood of a financial crisis is lower in countries where regulation allows more entry, foreign ownership and a wider range of activities, and where the institutional conditions stimulate competition. The *presence of foreign banks* in a region may impact the fragility of the regional banking system in different ways. On the one hand, a greater foreign bank presence may lead to greater banking efficiency and competition in the domestic financial system. On the other hand, foreign banks may provide a channel for cross-border contagion when they transmit shocks from one region to another. Empirical studies have shown that by improving overall operating efficiency, foreign entry helps create the conditions for better financial intermediation and long-term growth [5].

Table 2. Structural indicators of the Republic of Moldova's banking system, end of the year

	2010	2011	2012
Number of commercial banks	15	15	14
Foreign bank's branches	4	4	4
Total regulatory capital of the five largest banks by capital size/total banking regulatory capital (%)	62,75	63,4	66.5
Assets of the 5 largest banks by assets size/total banking assets (%)	69,26	70,1	70.7
Share of foreign investments in banks' capital (%)	76,96	74,0	73,4
Herfindahl-Hirschman Index:			
for credits	1264,0	1218,2	1360,3
for deposits	1341,4	1295,5	1344,9
for assets	1211,1	1181,3	1210,8

Source: own calculation on the basis of National Bank of Moldova data base, 2010-2013

[3] Liquid assets ratio: (Liquid assets/ Total assets (regulator's threshold ≥ 20%)

[4] Long term liquidity ratio: (Assets with a maturity of more than 2 years / Financial resources with a maturity of more than 2 years (regulator's threshold ≤1))

Concentration ratios of the Moldovan banking system for volume of assets, deposits, and credit range between 60 and 70 per cent for the largest five banks in the system (table 2), which – together with a Herfindahl-Hirschman Index of between 1,200 and 1,350 for three variables – suggests that Moldova has a moderately competitive system with oligopoly tendencies.

However, the largest three and five banks account for 75 and 90 percent of borrowers and depositors, respectively. Out of the 14 banks operating in Moldova, only five have more than 3,000 borrowers, while the rest caters to a limited number of borrowers and has larger exposures to a few select clients.

Regarding the foreign ownership aspect, while foreign participation is considerable (share of foreign investments in banks' capital recorded at the end of 2013 was 72,2 per cent), the majority of foreign holdings belong to investors that are not internationally highly-rated financial institutions, with a significant percentage of the owners being residents in offshore centers. While those owners who have more than a 5 percent stake in a bank have been mostly found to be fit and proper, the ability and willingness of such owners to provide know-how and capital or liquidity support is not obvious.

The *structural determinants* of the Moldovan banking sector fragility are:

(i)*Uncertainties in the ownership structure* still remain vulnerability despite considerable efforts by the NBM[5]. The process of clarifying the ultimate beneficial owners has not been completed. This raises concerns not only in relation to large exposures, connected lending, and loan concentration, but also in establishing whether the owner can provide contingency funds in case of a bank run or other stress situations. This unsolved issue determined the international organizations to reduce Moldovan banks' funding for the next years, which could have a negative impact on macroeconomic indicators.

(ii)*Foreign strategic investors*[6] *own less than 20 percent of the banking sector's assets*. The investments of first-tier banks in Moldova are welcome. The main arguments for this are: the implementation of highly efficient risk management practices within the local banking system and the injection of long term financial resources in the Moldovan economy. The supervisors should continue to exert pressure on the banks to consolidate ownership in individual banks through strategic investors.

In addition to the mentioned above vulnerabilities, there are *macroeconomic determinants* which can affect Moldovan banking system fragility:

1.*Excessive domestic liquidity*. Excessive domestic liquidity that could lead to inflation pressures and the possibility of unsound credit growth are the major, interlinked sources of vulnerability in the financial system. Simultaneously with enhancing monetary policy credibility by focusing on inflation and dealing with excessive domestic liquidity, the National Bank of Moldova (NBM) should make further improvements in its liquidity management capacity and transparency of monetary policy. **2.**Moldovan banking system is *highly sensitive* to macroeconomic changes and expectations, showing a *pro-cyclical character*. Given the pro-cyclical nature of the banking system, relatively favourable macroeconomic situation in Moldova recorded in 2013 was fully reflected in increased banking credit activity (fig. 4). While this credit growth is from a very low economic base, possibly reflecting catch-up growth, a continued increase will require

[5] The threshold for significant shareholding was reduced to 5 percent from the previous 10 percent. Banks are obliged to submit information on their shareholders exceeding this limit. In case of noncompliance, the NBM limits the operations of the banks that do not support the enforcement of the regulation. In addition, the NBM requires that information be provided on shareholders with holdings between 1-5 percent. This requirement attempts to prevent connected parties from circumventing the regulation by splitting holdings into portions not exceeding 5 percent.

[6] BC „Mobiasbanca – Groupe Société Générale" S.A., B.C. "EXIMBANK-Gruppo Veneto Banca" S.A., B.C. ProCredit Bank S.A., BCR Chișinău S.A.

careful attention to pre-empt deterioration in banks' credit portfolios.

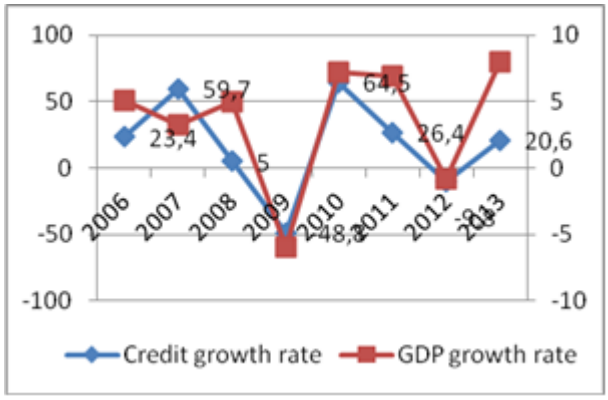

Fig.4. Credit growth rate and GDP growth rate in Republic of Moldova, %, 2006-2013

Source: compiled on the basis of National Bank of Moldova data base, 2009-2013

The danger is now that the banks' internal risk management systems are not good enough to pre-empt nonperforming lending. In this context, it would be useful for the NBM to develop an *early warning system* that would signal any emerging macro prudential risks to the financial system.

3.*Dependence on remittances* is one of the highest in the world (24,5 percent of GDP), which enhances the financial system vulnerability to potential volatility in these inflows (fig. 5). Moldova ranks 5th in the world in 2012 at this aspect.

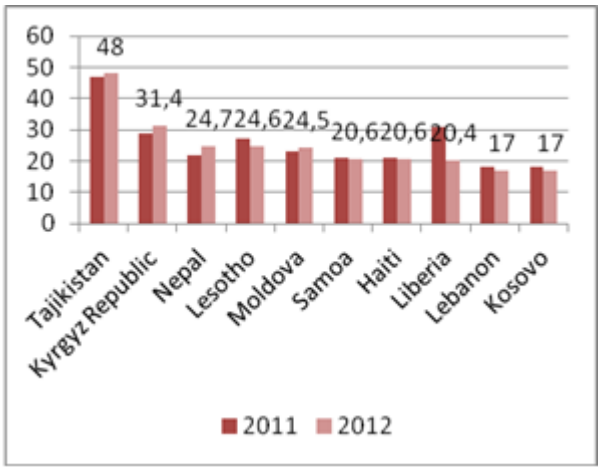

Fig.5. Top 10 recipients of migrant remittances as a share of GDP, (% of GDP)

Source: compiled on the basis of World Bank data, Migration and Development Brief, April 19, 2013

The inflow of remittances pumps liquidity into the system, fuelling inflation. The main fragility determinant is the dependence on the economic conditions of the main destinations for Moldovan emigrants (Russia and the EU). Should these conditions worsen, or enforcement of immigration and labor laws in those countries tightened, the inflow of remittances may slow down considerably. This would put the exchange rate under pressure and diminish the availability of financial resources for the financial sector. It could also increase credit risk, as part of bank lending is based on the borrowers earning/receiving remittances.

4.*Financial dollarization* increases the exposure of agents to exchange rate risk and can therefore become a potential source of macroeconomic and financial instability [15]. The driving forces for currency and asset substitution have generally been recognized economic instability and high inflation. Dollarization in Moldova has reached a high level (dollarization of deposits recorded 43,8 per cent in 2012) compared to other countries in the region. Remittances might have also induced financial dollarization Republic of Moldova as far as they are kept in foreign currency.

CONCLUSIONS

The Republic of Moldova's banking system has a high degree of capitalization and liquidity, factors which contribute and maintain the general stability of the entire financial system. Moldovan banks demonstrate a high level of resilience also due to their funding structure.

The main *determinants* of Moldovan banking sector fragility are the following:

-The intermediation function of Moldovan commercial banks is undermined: although the level of liquidity in the system is one of the largest in the region they are very cautious in granting loans.

-An alarming feature of the domestic banking sector is the high level of bad loans.

-Uncertainties in the ownership structure still remain vulnerability despite considerable efforts by the NBM.
-Foreign strategic investors own less than 20 percent of the banking sector's assets. The investments of first-tier banks in Moldova are welcome.
-Excessive domestic liquidity.
-Pro-cyclical character of the Republic of Moldova's banking system.
-Dependence on remittances is one of the highest in the world.
-Dollarization in Moldova has reached high levels.
-An appropriate institutional structure is critical to preventing banking fragility in developing countries and to reducing their undesirable effects if they should occur. NBM has made progress in developing and implementing a basic stress testing toolkit, although the lack of capacity to change stress testing scenarios to accommodate newly emerging risk factors, is vulnerability. More work is needed to identify additional risk factors and properly assess credit and liquidity risks. In this context, it would be useful for the NBM to develop an *early warning system* that would signal any emerging macro prudential risks to the financial system.

REFERENCES

[1]Allen Franklin, Babus Ana, Carletti Elena, 2009, Financial Crises: Theory and Evidence
[2] Babecký Jan, Havránek Tomáš, Matějů and others, 2012, Banking, debt, and currency crises early warning indicators for developed countries, ECB, Working Paper Series no 1485
[3]Basso Henrique S., Calvo-Gonzalez Oscar, Jurgilas Marius, 2007, Financial Dollarization: the Role of Banks and Interest Rates, ECB Working Paper Series, No 748
[4]Bhattacharyay, N., 2003, Towards a macro-prudential leading indicators framework for monitoring financial vulnerability. CESIFO WORKING PAPER No. 1015.
[5] Claessens, S., Demirguc-Kunt, A., Huizinga,H., 2001, How does foreign bank entry affect domestic banking markets?, Journal of Banking and Finance, 25
[6]Degryse Hans, Muhammad Ather Elahi, Penas María Fabiana, 2013, Determinants of Banking sytem fragility a regional Perspective, ECB, Working Paper Series no 1567
[7]Demirguc-Kunt, A., Detragiache, E., 2005, Cross-Country Empirical Studies of Systemic Bank Distress: A Survey, IMF, WP/05/96
[8]Demirguc-Kunt Asli, Levine Ross, 2005, Bank Concentration and Fragility: Impact and Mechanics
[9]Global Competitiveness Report, 2012-2013
[10]Monnin Pierre, Jokipii Terhi, 2010, The Impact of Banking Sector Stability on the Real Economy, Swiss National Bank
[11]OECD, 2010, Competition Committee, Competition, Concentration and Stability in the Banking Sector, DAF/COMP
[12]Rojas-Suarez Liliana, 2001, Rating Banks in Emerging Markets: What Credit Rating Agencies Should Learn from Financial Indicators, Institute for International Economics
[13]Schinasi Garry J., 2004, Defining Financial Stability, IMF, WP/04/187, p. 8
[14]Yves Kamgna S., Tinang, J., Nzesseu, C. Tsombou Kinfak, 2009, Proposed indicators for macro-prudential supervision of the banking system in the cemac zone, Munich Personal RePec Archive
[15]World Bank, 2013, Enterprise Access to Finance. Background Note. Vol. 2 of Moldova - Policy priorities for private sector development. Washington DC : World Bank.

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OPTIMAL SOLUTIONS FOR IMPLEMENTING THE SUPPLY-SALES CHAIN MANAGEMENT

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Abstract

The supply chain represents all physical flows , information and financial flows linking suppliers and customers. It leads on the one hand, the idea of the chain in which the various elements of an industrial production system are interrelated and secondly to a broad definition of supply (flow between plants, flow between a supplier and a customer, flow between two workstations etc.). For a number of enterprise managers, supply chain is a topic of major interest. In contrast, non-chain coordination, losses may result for the enterprise: obsolete inventory devaluation, impairment etc. Since the 1980's, several companies came together in the same service all functions dealing logistic flow from supply to distribution, through production management and resource planning. At the same time it was developed the notion of "time" to expand these flows and to increase quality and reduce inventory. 1990's promotes the trend of broadening the concept of integrated logistics to a more open organization, "supply chain" in which is contained the whole organization of the enterprise, designed around streams: sales, distribution, manufacturing, purchasing, and supply. This is the area where, through this work, I try to make a contribution towards finding practical solutions to implement an efficient supply chain that contribute to increased economic performance of companies.

Key words**:** *management, supply, sales, chain, logistics*

INTRODUCTION

The market has become increasingly competitive, and globalization, technological changes and customers are demanding more general points apply to most areas. To succeed in this competition, managers need to think and pursue business models that learn and exploit resources and lead their companies to focus on what they can do best [5]. Customers want realistic time delivery and complete information on stock availability. The ability to provide this information requires the implementation of an integrated logistics throughout the supply chain, starting from the vendor and end customer (both in terms of the flow of goods and information flow). Logistics cannot be duplicated in a short time without the considerable efforts by competitors. While competitors might try to emulate the efforts of a successful organization, those ahead will continue to be involved in continuous improvement programs, and the difference may become smaller and may be brought more easily to customers. For this reason, many managers see logistics as a marketing weapon that integrates offensive and as part of their strategy [9]. They are building partnerships with organizations in the supply chain; organizations have essential and complementary capabilities.

Also, many managers choose to invest in systems and technologies to investigate various metrics and to seek new practical ways to identify important points in order to achieve effective cooperation, inter-organizational [7]. The successful implementation of a supply-sales chain depends on the manner and degree to which logistical capacity, cost per customer, organizational structure, service delivery, cooperation between suppliers and international cooperation within each organization are taken into account.

MATERIALS AND METHODS

Supply Chain Management (SCM) is the concept for handling the production

procedures in broad sense. Supply chain management aims, on the one hand, coordination of activities and cash flow from suppliers and partners to the end user and secondly, to integrate the management of flows along the chain, particularly through automation data. Important is to ensure the rapid movement of materials and information to ensure optimal customer service and reduce the company's cash assets in stocks. It integrates upstream supply chain, as well as the information flow relative to the application [8]. This are composed of three mains information:

1. *Information about the application*: it studies the market trend, where sales should flow projections, which are transformed into production master plan, then plan and finally supply the necessary components.
2. *Ordering information*: This flow of information includes trade offer and product development and order taking, order tracking and billing end. This process is based on the exchange of information about orders and invoicing. Increasingly, more and more, these systems move information via the Internet. For example, this happens when shopping for electronics or computer data - EDI (Electronic Data Interchange). The first case is used to harmonize procedures for billing and in the second case for information exchange.
3. *Information about achieving order:* These consist of coordinating the operations of purchasing and supply components, production plans, inventory tracking components and order preparation and shipping them.

In relation to this representation of supply chains, their function specific observation shows that synchronization and adjustments between different elements involved in a chain are difficult to handle and often transposes by an increase in inventory levels to meet customer requirements.

SCM has three basic elements – supply chain business processes, supply chain management components and supply chain network structure [11],[12]. Figure 1 shows the entire elements in SCM frame and it displays the details of the whole processes from purchasing, management, production and distribution to customers. The information flow is like an individual system to link the whole supply chain from supplier and manufacturer to consumer. Unimpeded information flow could increase the operation accuracy for costs saving and promote the competitiveness of firms. The product flow proceeds through the whole production processes from material supply via manufactories till providing the finished products to consumers. The items in vertical direction show the various management tasks within the supply chain [2].

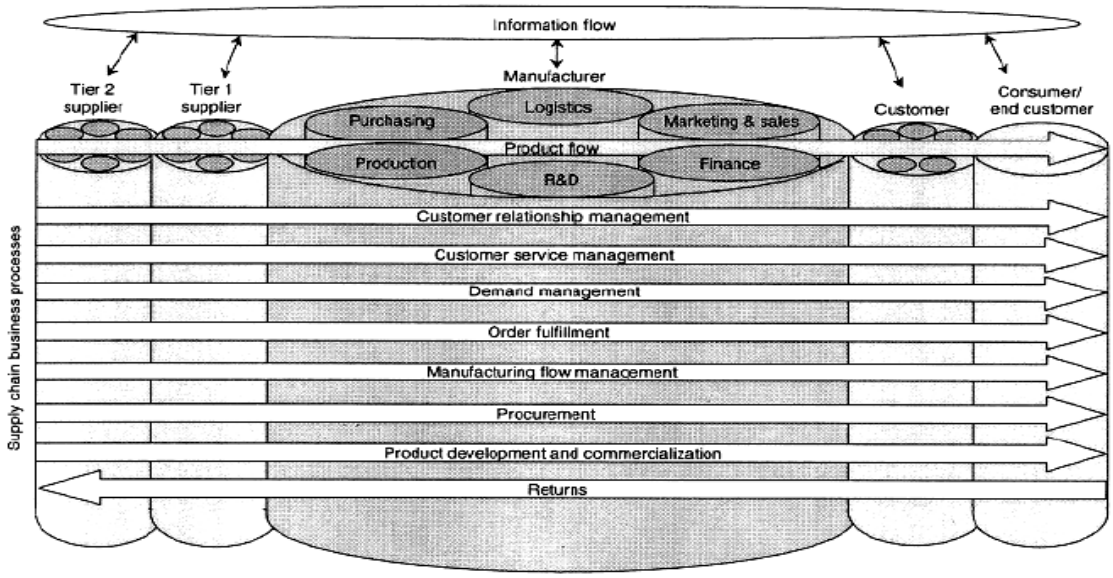

Fig. 1 Interaction of business processes and supply chain (Source: Cooper *et al.*, 1997)

Particularly, the return flow, or reverse logistic, is one of the elements in the system but with converse direction from the others.

RESULTS AND DISCUSSIONS

Supply chain management is today in a competitive market, a major strategic challenge for industrial and commercial enterprises. This represents a significant potential for value creation for the customer: quality of service, performance in terms of time and reactivity. It also represents one of the main places where the dispute part of company profitability by streamlining supply chain costs and focusing on new distribution channels. This trend is further reinforced in a context dominated by the globalization of economic exchanges, diversification and shortening product life cycles, development of partnerships between companies [6]. At the same time, new opportunities were offered by evolving technologies and methodologies, particularly information systems. Supply chain means all steps involved, directly or indirectly, in satisfaction of a specific request of the customer, from the point of origin (raw materials) to the point of consumption (finished goods purchased by customers). Supply chain can be defined as a sequence of processes and flows that combine different entities (stages) to meet customer demand for a product, producing at the same time, and profit for all participants in the economic circuit. The supply chain is a network (an interdependent) of facilities, which mainly includes the following activities:
- provide materials to suppliers;
- transforming materials into semi-finished and finished products;
-the distribution of finished products to customers.

The *benefits* of implementing a supply chain are:
-materials/products are only present where needed and minimum quantity really necessary;
-generalization to reduce stock levels and therefore the cost of storage;
-streamline transport;
-improved production scheduling.

The *disadvantages* of implementing a supply chain can occur:
-while there are a large number of small customers when implementing supply chain management is either very expensive or impossible. In this case, the quality of customer service is essential and demanding partnership agreements is impossible.
-while there are a large number of small suppliers when implementing supply chain management is impossible and huge costs for suppliers.

Performance models supply chain

The idea to formalize and evaluate the performance of a supply chain has led since the 1990's, international group of professionals consisting of large industrial groups to propose global analysis and comparative approaches to companies [4].

WCS Model (**Global Supply Chain**) developed by Michigan State University, proposes a comparison between companies based on their supply chain performance evaluation. Four dimensions are proposed to allow this assessment:
-Strategic choices in terms of structural decisions to streamline operations related to the supply chain.
-The means implemented to coordinate and synchronize the various links in the chain.
-Ability to respond to changing needs of the customer, adapting the supply chains organization.
-The means implemented for supply the chain performance measurement.

World-class supply chain model involves the following elements:

a).Strategy
- existence of financial objectives, impact on the implementation of trade and logistics;
- logistics partnership policy;
- rationalization of physical distribution network.

b).Coordination
- cooperation with other businesses through the supply chain;
- choosing appropriate information systems;
- exchange and sharing of information;

- simplification and standardization of practices in the supply chain.

c). Reactivity

- ability to remain attentive to the evolution of customer demand;
- ability to respond to urgent requirements and adapt to unforeseen events.

d). Norming

-comparison with other enterprise performance;
- implementation of performance indicators adapted: coefficient service logistics costs, inventory levels etc.

The approach that allows the preparation of this scale of analysis is based on two steps:
1.A questionnaire sent regularly various officials of the company (purchasing, production, trade, logistics) to assess the company's position in relation to these four dimensions;
2.Responses businesses, compared with the average of enterprises in the same sector as the performance results of companies with the best practices of competitors.

The objective is to identify deviations that could serve enterprises participating in these surveys to identify ways to improve.

SCOR Model (Supply Chain Reference Operations) .

It was developed in 1997, in U.S. Supply Chain Council, a nonprofit organization composed primarily of practitioners committed to making progress on systems and practices in the field of supply chain management - delivery. It is a methodology in a group composed of several large groups of americans and aims to present some standard descriptive elements and elements of assessment flows in a supply chain [3]. In a context of globalization of the economy and the diversification of distribution networks: numerous factories, warehouses, platforms scattered in several countries, SCOR model aims to facilitate communication between different participants in the same supply chain. This communication by formalizing a standard language, uniform performance indicators, tools for comparing logistics organizations. This activity enables enterprises to more easily compare between them and against the best. In addition, the model adds a significant financial: number of days of additional processing, financial cycle, asset turnover etc.

To perform this activity, SCOR model describing the organization according to four levels:

Level 1: *Type of process*. This level defines the scope and content of the model around the process: purchasing, manufacturing, distribution, return. It allows for a competitive performance bases.

Level 2: *Configuration of the supply chain*. Enterprises configure their supply chain by several models, e.g. direct or indirect distribution, manufacturing order or after predictions etc.

Level 3: *The decomposition processes*. Every great process, purchasing, manufacturing, distribution, return is decomposed into different processes incoming and outgoing information. Each of them is associated with performance indicators of best practices.

Level 4: *The decomposition process elements*. This level describes the actions to be implemented to achieve a competitive advantage and to adapt to competition. It follows four factors that allow understanding the determinants of competitive related supply chain management:

- Chain desired performance objective. It is about defining a target customer and supply value chain concerned. This offer must be differentiating relative to competitors, distribution network served by specially designed to deliver the customer value. This customer orientation is shared by all the officials of the company.
- Designing a supply schemes, physical distribution, and information system.
- Synchronize the various links in the chain in terms of these two factors receive
-Implement means of supply chain performance evaluation.

The overall objective of the model is to provide a structure linking the objectives of the organization and supply chain operations, delivery and implementation of a systematic approach to evaluation and performance monitoring. SCOR model processes are:

planning, supply, production, storage, transport - delivery and product returns (figure 2).

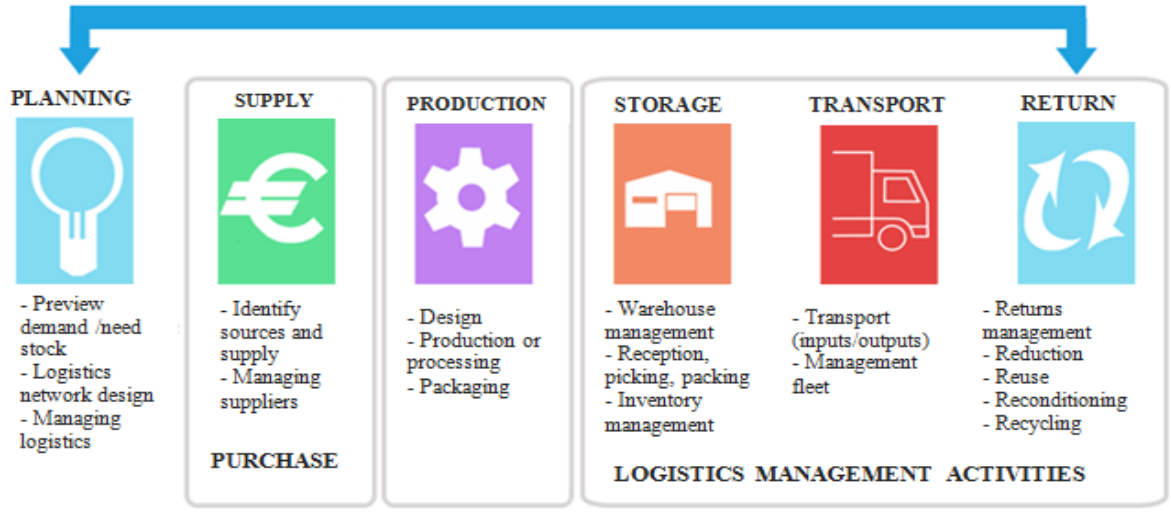

Fig. 2 Model of Supply Chain Reference Operations - SCOR (Source: Developed by the author)

This model for organizational processes aimed to correlate the description and definitions of activities and processes in the supply chain, delivery, performance measurement, best practices and requirements on software [1]. A key success factor is the use of information technologies that allow obtaining and providing real-time information in the supply-sales chain. Today, world-class organizations resort to means of IT such as extranet, EDI, common platforms CAD/CAM, software management.

Table1. Objectives of the service supply chain

Planning and flow	**Inventory management and physical distribution**	**Order management and customer service**
- Forecasts of sale - Planning the day of production lines - Tracking of finished products to generate increased margin (small amounts, deadlines guaranteed)	- Accurate inventory management (to limit the amount of stocks at a few days and quantity of old products) - Operational management of warehouses, the carrying and the transportation	- Taking full command (from planning to shipping) - Order tracking every step (command, planning, production, storage, delivery) to ensure perfect service and especially the extreme reactivity incidents during trial

Source: Developed by the author

Successful implementation of supply-sales chain depends largely on the manner and degree in which the following aspects are considered, at the level of each organisation [10]:

a. logistical capacity – namely the capacity of ensuring the effective flow of products, supply chain services and information, the capacity of ensuring a certain level of delivery requested by the customers, the capacity of internal and extern integration;

b. cost per client - the cost of serving each customer, not just the total costs arising from participation in the supply–sales chain, in order to understand customer profitability for the organization and identification of ways in which the ratio between specific services offered to the customer and the costs involved can be improved;

c. organizational structure - giving up the hierarchical and functional vision of the organizational structure based on vertical relationships and moving to a process-based perspective, which involves horizontal relationships within the organization, as well as teamwork;

d. „appropriate" service delivery - through customer segmentation and personalization of service for each important customer to the organization, thus avoiding providing a unique, standardized level of customer

services, which would affect competition in the market;

e. obtaining cooperation between suppliers – in order to develop real partnerships;

f. international cooperation - ensuring flexibility and acceptance of common goals and strategies, along with other members of the supply–retail–delivery chain which transgress borders of any single country;

CONCLUSIONS

Research findings highlighted the following issues related to concern, contribution, expansion and investment.

- *Supply-sales-delivery chain management is a concern for managers at the top level of the organization.*
- *The supply-sales chain management is a major contribution to achieving the organization's objectives*, according to which the higher level managers have the tools to support specific organizational objectives.
- *The supply-sales chain management expands as scope and purpose.*
- *Achieving continuous investment in traditional and electronic solutions in the field of the supply-sales chain*.
- *The supply-sales chain management has an interoperable task* (as a priority, logistics, finance, production and sales as key functions of the organization are actively involved in the supply-sales chain management).
- *Financial performance indicators of the supply chain are a premise for communicating the results of the supply-sales-delivery chain management to the upper management level*.

Possibilities in improving supply chain are numerous, but so are the challenges that must be overcome in order to develop an optimal process. Companies that invest in SCM tools to identify such activities can reduce and eliminate those activities that do not add value, creating what is called reducing costs to maximize profits. Such companies can deliver products and services to market faster, cheaper and better quality, gaining a compelling advantage over the competition less efficient.

According to the conducted research, it is considered that the supply-sales chain management has a major impact on the organization's strategy and its financial results. In addition, the direct involvement of managers at the top level is a premise for favourable development in this area, in order to enhance the contribution of the supply-sales chain to achieving the vision and the objectives of the organization.

REFERENCES

[1]Căpușneanu, S., Martinescu, D., 2010, „Convergence of ABC and ABM – Guarantee of a performant management", Theoretical and Applied Economics, Vol. XVII, no. 10/2010, pp. 93-102

[2]Cooper, M.C., Lambert, D.M., Pagh, J.D., 1997, Supply chain management: more than a new name for logistics, International Journal of Logistics Management, Vol. 8, No. 1, 1-13

[3]Council of Logistics Management, 1991, Definition of Logistics; http://www.cscmp.org

[4] Drucker, P.F., 2001, Management Challenges for the 21st Century, Harper Business

[5]Drucker, P.F., 1999, Realities of tomorrow, Teora Publishing, Bucharest

[6]Epplerm M., 2007, Pitfalls management: solutions for turning failure into victory, Polirom Publishing, Iasi

[7]Iorga, A., Toma, E., 2013, Assessing self-consumption importance on the income in rural areas", Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development, 13(2)/2013

[8]Moldovanu, G., 2000, Organizational analysis, Economical Publishing, Bucharesti

[9]Reynolds-Feighan, A.J., 2001, Air freight logistics, in A.M. Brewer, K.J. Button, Hensher, D.A., (eds.), "Handbook of Logistics and Supply-Chain Management". Elsevier Science Ltd., UK, 431-439

[10]Rogers, D.S., Tibben-Lembke, R.S., 1998, Going backwards: reverse logistics trends and practices", The University of Nevada, Reno.

[11]Ross, D.F., 1998, Competing through Supply Chain Management: Creating Marketwinning Strategies through Supply Chain Partnerships, Chapman and Hall, New York

[12]Thomas, D.J., Griffin, P.M., 1996, invited review coordinated supply chain management, "European Journal of Operational Research", Vol. 94, 1-15.

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SUSTAINABLE DEVELOPMENT IN PUBLIC HEALTH IN THE SOUTH MUNTENIA REGION AND SOUTH WEST OLTENIA REGION

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Abstract

The purpose of this paper is to highlight sustainable development in terms of health in two development regions of Romania, the South Muntenia region and South West Oltenia region. "Sustainable development is development which aims to meet the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable development objectives can not be achieved in conditions of ill health, and health is maintained in a functional and a healthy environment. To highlight the evolution of public health in the two regions for regional development and related counties, we used indicators of sustainable development in Romania, based on data provided by the Romanian Statistical Yearbooks for 2011, 2012 and 2013. Indicators used to assess health development in the two regions are: The mortality rate, the infant mortality rate, natural growth rate, hospital beds (per 1,000 inhabitants), population/doctor (per 1000 inhabitants). Research methods applied are clues fixed base and chain base. Factors that increase the mortality rate are represented by a larger proportion of the elderly population, origin, given that rural health services are weak comparing to urban areas.

Key words**:** *public health, South West Oltenia region, South Muntenia region, sustainable development*

INTRODUCTION

"Sustainable development is development which aims to meet the needs of the present without compromising the ability of future generations to meet their own needs", as defined in the Brundtland Report.[6] Sustainable development is a concept of balancing different human needs while striving for progress in one area of endeavour, humans should not create problems in other areas now or for future generations.[10] One of the principles of the Rio Declaration on Environment and Development states that people are at the center of concerns for sustainable development, they having the right to a healthy life in harmony with nature. [5] Sustainable development objectives are settled based on the what is desired to be achieved sustainability in a time period greater or less. [3] Sustainable development objectives can not be achieved in conditions of ill health, and health is maintained in a functional and a healthy environment.

Between economic development, environmental status, on the one hand, and human health, on the other hand, there is a strong inter-relationship. It is important that economic development to be also a social development, for positively influence the environment and, in this way, to provide support to human health. [3] Health is an integral part of the concept of sustainable development, but it was and is still regarded as a separate domain, many of those dealing with formulation, respectively, implementing sustainable development strategies and policies pursued for this purpose. [2] The health of future generations should be protected, by providing them with skills and education, by bequeathing a clean and biodiverse environment and preventing health risks from climate change and other long-term environmental threats. [9]

In 2002 at the Summit WEHAB (Water, Energy, Health, Agriculture, Biodiversity) for sustainable development, along with water, energy, agriculture and biodiversity, health was considered one of the five objectives of sustainable development.[7] National Strategy for Sustainable Development provides for the following public health objectives: for 2013 improving health system, improving quality of care, improving the health of the population. For

2020 goals are the health and quality of health services to be close the parameters of the EU countries, this being achieved by continuing the downward trend of mortality rate and infant mortality. 2030 goals are aligning with the average performance of the other EU countries, including in terms of funding. [8]

The purpose of this paper is to highlight sustainable development in terms of health in two development regions of Romania, the South Muntenia region and South West Oltenia region. These two regions as the six others were created in 1998, now not having administrative powers, but this may change in the event of a territorial administrative reforms. The South Muntenia region is made up of seven counties of Arges, Calarasi, Dâmboviţa, Giurgiu, Prahova and Teleorman, and 3136446 people. The South West Oltenia region is composed of five counties: Dolj, Gorj, Mehedinti, Olt and Valcea and have 2075642 [4]

MATERIALS AND METHODS

To highlight the evolution of public health in the two regions for regional development and related counties, we used indicators of sustainable development in Romania, based on data provided by the Romanian Statistical Yearbooks for 2011, 2012 and 2013.

Indicators used to assess health development in the two regions are:

The mortality rate indicates the number of deaths per 1000 residents.

The infant mortality rate indicates the number of children who died before the age of one year, expressed per thousand live births again.

The infant mortality rate = $\frac{\text{deaths in children under one year}}{\text{number of births}} \times 1000$

Natural growth rate, measured intensity increase / decrease in population because of a surplus or deficit of births compared to deaths.

Natural growth rate = $\frac{\text{birth rate - death rate}}{10}$

Hospital beds (per 1,000 inhabitants) indicates the population providing hospital beds, for a period of time (usually 1 year).

Hospital beds (per 1,000 inhabitants) = $\frac{\text{number of hospital beds}}{\text{total population}} \times 1000$

Population/Doctor (per 1000 inhabitants) indicates the degree of population with doctors insurance (excluding dentists), in a specified period (usually one year).

Population/Doctor (per 1000 inhabitants)= $\frac{\text{total population}}{\text{number of doctors}} \times 1000$

Research methods applied are clues fixed base and chain base.

RESULTS AND DISCUSSIONS

South-West Oltenia region has a higher percentage of the population in urban areas versus South Muntenia region.

Table 1. Evolution of mortality rate

Specification	2010	2011	2012	2011/ 2010	2012/ 2010	2012/ 2011
Soutth Muntenia region	**13,3**	**13,1**	**12,7**	**98,5**	**95,5**	**96,9**
Arges	11,7	11,8	**13,7**	100,8	117,1	116,1
Calarasi	14,1	13,8	11,9	97,9	84,4	86,2
Dambovita	12,1	11,5	14,1	95,0	116,5	122,6
Giurgiu	16,2	15,3	12,0	94,4	74,1	78,4
Ialomita	13,3	13,6	15,7	102,3	118,0	115,4
Prahova	12,2	12,1	14,0	99,2	114,7	115,7
Teleorman	17,2	17,3	13,3	100,6	77,3	76,8
South West Oltenia region	**13,2**	**12,7**	**13,6**	**96,2**	**103,0**	**107,1**
Dolj	14,3	13,7	14,4	95,8	100,7	105,1
Gorj	11,3	10,9	12,1	96,5	107,1	111,0
Mehedinţi	14,3	13,9	15,1	97,2	105,6	108,6
Olt	13,9	13,5	14,7	97,1	105,7	108,9
Valcea	11,5	10,5	11,2	91,3	97,4	106,7

Source: Statistical Yearbook of Romania 2011,2012, 2013; Own calculations based on Romanian Statistical Yearbooks 2011,2012,2013

Analysing the mortality rate in the two regions can be observed that the South Region has a decreasing trend, while in the South West Oltenia region, the trend is increasing, with the exception of 2011 when compared to 2010 there is a decrease of 3,8%. It can be seen that in the South Muntenia region highest mortality rate in 2011 a Teleorman county had about 17%, but it dropped to about 135%. In 2012 the highest mortality rate can be found in Ialomita county approximately 16%. In the South West region Oltenia in 2011 the highest rate of mortality was recorded in Dolj and Mehedinti 14.3% and in 2013 in Mehedinti County, approximately 15.1%. (table1.)

Analysing the infant mortality rate it is found that in the South Muntenia region is decreasing trend in 2011 and 2012 compared with 2010, but there was an increase in 2012 compared to 2011. The highest rate of infant mortality is observed in Calarasi County and lowest in Dâmboviţa County. Analysing the infant mortality rate in South West Oltenia region is observed an upward trend in this period. Județul Mehedinți are cea mai mare rată a mortalității infantile, ajungând la 17,3% în 2012. It can be seen that in 2011 Dolj County has the lowest infant mortality rate, but this increases to 66.4% in 2012 compared with 2010, in Valcea County is a decrease of 42.11% over the same period.(table 2)

Tabel.2 Evolution of infant mortality rate

Specification	2010	2011	2012	2011/ 2010	2012/ 2010	2012/ 2011
Soutth Muntenia region	**10,9**	**10,3**	**10,7**	**94,5**	**98,2**	**103,9**
Arges	11,2	9,1	10,1	81,2	90,1	110,9
Calarasi	15,1	10,9	15,0	72,2	99,3	137,6
Dambovita	8,2	7,8	7,5	95,1	91,5	96,2
Giurgiu	12,3	13,0	12,5	105,7	101,6	96,1
Ialomita	10,6	12,7	13,7	119,8	129,2	107,9
Prahova	9,3	10,5	9,9	112,9	106,4	94,3
Teleorman	13,5	11,0	10,1	81,5	74,8	91,8
South West Oltenia region	**9,3**	**9,3**	**11,0**	**100,0**	**118,3**	**118,3**
Dolj	5,3	8,1	8,8	152,8	166,0	108,6
Gorj	9,3	9,9	13,3	106,4	143,0	134,3
Mehedinți	11,6	16,1	17,3	138,8	149,1	107,4
Olt	10,8	6,6	11,2	61,1	103,7	169,7
Valcea	13,3	8,6	7,7	64,6	57,9	89,5

Source: Statistical Yearbook of Romania 2011,2012, 2013; Own calculations based on Romanian Statistical Yearbooks 2011,2012,2013

Given that this indicator measure the effectiveness of health services and general framework in which children are born, we can say that South West Oltenia region health services are worse than those in the South Muntenia region.

Analyzing natural increase it is found that in both regions is recorded negative values also can be observed that in the South West Oltenia region are bigger problems, negative values being higher. Since the mortality rate is higher than in the South Muntenia region South West Oltenia region, we conclude that the birth rate is lower in the South West Oltenia region, as recorded higher values compared to the South Muntenia region. In the South Muntenia region county with the highest value of negative natural increase is Teleorman, with 11.3‰ in 2012.(table 3)

Table .3 Evolution of natural increase

Specification	2010	2011	2012	2011/ 2010	2012/ 2010	2012/ 2011
Soutth Muntenia region	**-3,9**	**-4,5**	**-5,4**	**115,38**	**138,46**	**120,00**
Arges	-2,5	-3,4	-3,5	136,00	140,00	102,94
Calarasi	-3,6	-4,1	-4,9	113,89	136,11	119,51
Dambovita	-2,3	-2,6	-3,8	113,04	165,22	146,15
Giurgiu	-6,7	-5,9	-6,9	88,06	102,99	116,95
Ialomita	-2,2	-3,2	-4,7	145,45	213,64	146,88
Prahova	-3,4	-4,1	-5,1	120,59	150,00	124,39
Teleorman	-9,4	-10,1	-11,3	107,45	120,21	111,88
South West Oltenia region	**-4,8**	**-4,7**	**-5,7**	**97,92**	**118,75**	**121,28**
Dolj	-5,5	-5,0	-6,2	90,91	112,73	124,00
Gorj	-3,1	-3,2	-4,2	103,23	135,48	131,25
Mehedinți	-5,5	-5,3	-6,8	96,36	123,64	128,30
Olt	-6,2	-6,2	-7,6	100,00	122,58	122,58
Valcea	-3,2	-3,1	-3,2	96,88	100,00	103,23

Source: Statistical Yearbook of Romania 2011, 2012, 2013; Own calculations based on Romanian Statistical Yearbooks 2011,2012, 2013

Table 1.4 Evolution of the number of hospital beds per 1000 inhabitants

Specification	2010	2011	2012	2011/ 2010	2012/ 2010	2012/ 2011
Soutth Muntenia region	**4,76**	**4,48**	**4,67**	**94,12**	**98,11**	**104,24**
Arges	5,69	5,40	5,70	94,90	100,18	105,56
Calarasi	4,03	3,76	3,81	93,30	94,54	101,33
Dambovita	5,09	4,85	4,95	95,28	97,25	102,06
Giurgiu	3,10	2,93	2,87	94,52	92,58	97,95
Ialomita	3,10	2,76	2,88	89,03	92,90	104,35
Prahova	4,96	4,71	5,08	94,96	102,42	107,86
Teleorman	5,31	4,95	5,11	93,22	96,23	103,23
South West Oltenia region	**5,70**	**5,55**	**5,96**	**97,37**	**104,56**	**107,39**
Dolj	6,39	6,43	6,80	100,63	106,42	105,75
Gorj	6,14	5,87	6,44	95,60	104,89	109,71
Mehedinți	5,63	5,00	5,44	88,81	96,63	108,80
Olt	4,56	4,50	4,72	98,68	103,51	104,89
Valcea	5,45	5,33	5,82	97,80	106,79	109,19

Source: Own calculations based on Romanian Statistical Yearbooks 2011, 2012, 2013

Analysing the number of hospital beds per 1000 inhabitants is observed that the South Muntenia region is approximately 5 beds and in the South West Oltenia region is 6 beds, so higher. Number of hospital beds per 1000 inhabitants in South Muntenia region declined in 2011 and 2012 compared with 2010 and increased in 2012 compared with 2011. But in

the South West Oltenia region number of hospital beds per 1000 inhabitants declined in 2011 compared to 2010 and increased in 2012 compared to 2010 and 2011.

This decrease in the number of hospital beds per 1000 inhabitants is a consequence of desfinţării and reparcelling of hospitals in 2011. (table 4)

Analyzing the number of doctors per 1,000 inhabitants is found to be higher in South West Oltenia region compared with South Muntenia region. Analysing the number of doctors per 1,000 inhabitants in both regions is a decrease in in 2011 compared to 2010 and increased in 2012 compared to 2010 and 2011. (table 5)

Table 1.5 Evolution of the number of doctors per 1000 inhabitants

Specification	2010	2011	2012	2011/ 2010	2012/ 2010	2012/ 2011
Soutth Muntenia region	1,41	1,39	1,45	98,6	102,8	104,3
Arges	2,11	2,13	2,15	100,9	101,9	100,9
Calarasi	1,00	1,00	1,02	100,0	102,0	102,0
Dambovita	1,23	1,21	1,20	98,4	97,6	99,1
Giurgiu	1,06	1,06	1,12	100,0	105,7	105,6
Ialomita	1,01	1,01	1,09	100,0	107,9	107,9
Prahova	1,45	1,34	1,51	92,4	104,1	112,6
Teleorman	1,33	1,34	1,40	100,7	105,3	104,4
South West Oltenia region	2,09	2,08	2,25	99,5	107,6	108,1
Dolj	3,02	3,00	3,19	99,3	105,6	106,3
Gorj	1,75	1,79	1,96	102,3	112,0	109,5
Mehedinţi	1,70	1,62	1,79	95,3	105,3	110,5
Olt	1,49	1,51	1,64	101,3	110,1	108,6
Valcea	1,75	1,75	1,91	100,0	109,1	109,1

Source: Own calculations based on Romanian Statistical Yearbooks 2011, 2012, 2013

CONCLUSIONS

Mortality rate in South Muntenia region is higher in 2010 and 2011 compared to the South West Oltenia region and lowest in 2012. Factors that increase the mortality rate are represented by a larger proportion of the elderly population, origin, given that rural health services are weak comparing to urban areas.

Infant mortality rate is higher in the South Muntenia region compared to South West Oltenia region, but can see a downward trend in the first region compared to the the second. Infant mortality rate is the best indicator of socio-economic development also the factors that influence may be of socio-economic nature, environmental, and health care system. Given the above we can conclude that the highest infant mortality rate in the South West Oltenia region compared to the South Muntenia region because of economic and social factors, because in this region urban population is higher than in the South Muntenia region, the number of beds and doctors are higher.

Negative natural increase in both regions demonstrated increased mortality and decreased birth rate, given the increasing rate of emigration, especially to the young people, decreased fertility, and low number of children for a family.

Providing the population with hospital beds and doctors is better in the South West Oltenia region compared to the South Muntenia region.

Given the national strategy for sustainable development of Romania that aimes lower mortality rates, infant mortality rate, improving access to health services, urgent action is required to be met 2020 targets and 2030.

REFERENCES

[1]Beciu Silviu, 2013, Dezvoltarea rurală durabilă: Tendințe actuale și perspective ale regiuniide Nord Est a României, Editura Ceres

[2]Poenaru Maria, 2007, Sănătatea publică în strategiile de dezvoltare durabilă, Management în sănătate, 3/2007

[3]Pohoaţă Ion, Strategii si politici europene de dezvoltare durabila

[4] Anuarele Statistice ale României

[5]Health and Sustainable Development, Key Health Trends http://www.who.int/mediacentre/events/HSD_Plaq_02.2_Gb_def1.pdf).

[6]United Nations World Commission on Enviroment and Development, Brundtland Report, 1987 .

[7]United Nations, A framework for Action on Health and Environment, New York, 2002

[8]Strategia Națională de Dezvoltare durabilă a României

[9]The Technical Support Team (TST):Health And Sustainable Development http://sustainabledevelopment.un.org/content/documents/18300406tstissueshealth.pdf

[10]Thinking sustainable development acting for health,http://www.health.gov.au/internet/main/publishing.nsf/Content/1F3C498870C6E850CA257BF0001D242C/$File/sust_dev.pdf

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THE MAIN INDICATORS ANALYSIS THAT CHARACTERIZE THE CULTIVATED CROPS TECHNOLOGY IN THE AGRICULTURAL HOLDING SC TOMA SRL, VILLAGE MODELU, CALARASI COUNTY

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Abstract

The case study was conducted in the Călărași County, County cultivated mostly with cereals. The production technology study was performed in the agricultural holding SC Toma SRL, village Modelu, Calarasi County. The agricultural holding S C Toma S.R.L it is entirely a private owned company, established and operating pursuant to law 31/1990. The agricultural holding is currently operating in the area of 360 hectares of arable land. SC TOMA S.R.L., has a vegetal profile, cultivate especially cereals (wheat, maize and barley) and technical crops (sunflower, rape). We had as subject for analysis the main indicators of the holding, the data being processed using statistical formulas that emphasizes the differences between trends, and the efforts profitability made by the enterprise. This work is part of a comprehensive study conducted in the Calarasi County.

Key words**:** *agricultural holding, crop technology, production indicators*

INTRODUCTION

Călărași County is one of the youngest counties in the country, it was created in January 1981. The main richness is the natural agricultural land , which occupies over 84% of the County area. Soils, most of them are different types of chernozem and alluvial soils , they have a high fertility, which allows a large scale agriculture, predominantly being the cereal character of vegetal production[3].
Modelu Village is situated in the southern part of Călărași County on the left bank of the Borcea branch, between the municipalities Roseti at East, Dragalina and Perisoru at North, Stefan Voda and the city of Calarasi to the West and in South Constanta County.
Modelu, like most villages in Calarasi county, has an agricultural profile , the inhabitants developing activity in this area, taking advantage of the special soil conditions and climate for the development of cereal grains and technical plants.
The crops that were subject of analysis are the main crops in our country and in the world, occupying a very important place in the national and international economy.All five cultures studied are used in human and animal nutrition, biofuel and many other uses.

MATERIALS AND METHODS

In the paper we used the following indicators: arithmetic mean, standard deviation, mean square deviation, coefficient of variation, confidence limits for a given risk, average annual growth rate, the limits amplitude for a given risk towards the average and statistical significance of these indicators.
The formulas used to calculate these indicators are presented : [2] [6]
For the arithmetic mean = $\overline{x} = \frac{\sum xi}{n}$; where:
$\overline{X}$ = the arithmetical mean; Xi = The average production values for a number of years (i);
n = number of years taken into account
The annual average growth rate [5] =
$r2008-2013 = \sqrt[8]{\prod(p1/p0)-1}$; where:

r2008-2013 = average annual growth rate; ∏p1/po = entangled growth indicators

For the standard deviation =

$\partial = \sqrt{\frac{\Sigma(\bar{x}-xi)^2}{n-1}}$; where:

∂ = standard deviation; xi = the average values for a number of years

n = number of years taken into account

For mean square deviation =

$\partial x = \sqrt{\frac{\Sigma(\bar{x}-xi)^2}{n(n-1)}}$; where:

∂x = mean square deviation;

The confidence limits corresponding to a given risk X = +/-ðx * tp, in which:

X = the arithmetic average; average square deviation;

tp = tabular value for the probability of transgression (risk)[1].

Amplitude of oscillation of the limits of confidence [7] =

= ((X + ðx * tp)-(X-ðx * tp)/(X)) * 100

Coefficient of variation = $C = \frac{\delta}{\bar{X}} x100$,where:

C-coefficient of variation (expressed as a percentage)

Coefficient of variation can be: between 0-10% variation; between 10-20%-sized variation; more than 20%-large variation

The data used was source: internal database of SC Toma SRL, the data from the literature.

RESULTS AND DISCUSSIONS

1.The main indicators analysis that characterize the wheat crop technology

The main economic indicators that characterize the wheat culture technology in SC Toma SRL, are presented in the table.1, as follows:

- The average production during the analysed period registered a minimum value in 2010, 2200 kg/ha, and reached a maximum during the last year analysed, 2013, of 6300 kg per ha. The average of productions is by 4067 kg/ha, with a standard deviation of 1363 kg/ha and a large supply of scattering of variation of 33.5%. The 90% probability interval is bounded below by 2881 kg/ha and higher by the limit 5252 kg/ha. The delivery price, is situated between the values 306 (2008) and 959 (2012), the average being of 604 Ron per ton, the coefficient of variation was over the threshold of 20 %,(37.9 %), which indicates a high degree of scattering of values around the average. Calculating the confidence limits, for the probability of 90%, it is indicated a range between 405 Ron/ton and 805 Ron /ton;
- The holding's revenues made from wheat culture, shows an average of 2425 Ron/ha, with a deviation of 1182 Ron/ha and a high coefficient of variation, 48.7%.
- The Gross margin is the indicator with the highest oscillations, recording in 2010, even a negative value,-344 Ron/ha, as well as a satisfying value in 2013 of 1341 Ron/ha.

The average is of 339 Ron/ha, and the coefficient of variation demonstrate a very high degree of scattering, 164,7% .

Table 1. The main indicators evolution that characterize the wheat crop technology in SC Toma SRL, Modelu, Călăraşi County, for the period 2008-2013

Specification	Wheat crop	Years						Average	Stand. Deviation	c (%)	Mean square deviation (kg/ha)	Range for prob 90% (t = 2.13)			
	MU	2008	2009	2010	2011	2012	2013					min	max	Abs (+/-) towards average	%
Average yield	kg/ha	4200	4500	2200	3900	3300	6300	4067	1363	33,5	557	2881	5252	2371	*58,3*
Delivery price	RON/to	306	417	580	683	959	680	604	229	37,9	94	405	803	398	*65,9*
Revenue	RON/ha	1285	1877	1276	2664	3165	4284	2425	1182	48,7	482	1398	3452	2055	*84,7*
Gross margin	RON/ha	65,2	346,5	-344	253,7	368,7	1341	339	557	164,7	228	-146	823	677	*200,0*

Source: Own calculation after internal database of SC Toma SRL.[4]

2.The main indicators analysis that characterize the barley crop technology.

SC Toma SRL has the following indicators characteristics:

Table 2. The main indicators evolution that characterize the barley crop technology in SC Toma SRL, Modelu, Călărași County, for the period 2008-2013

Specification	Barley crop	Years						Average	Stand. Deviation	c (%)	Mean square deviation (kg/ha)	Range for prob 90% (t = 2.13)			
	Mu	2008	2009	2010	2011	2012	2013					min	max	Abs (+/-) average girl	%
Average yield	kg/ha	4400	4700	3900	4100	3700	7000	4633	1213	26,2	495	3579	5688	2109	*45,5*
Delivery price	RON/to	295	358	520	656	780	720	555	198	35,7	81	383	727	344	*62,0*
Revenue	RON/ha	1298	1683	2028	2690	2886	5040	2604	1335	51,3	545	1443	3765	2321	*89,1*
Gross margin	RON/ha	18	170,6	167	478,6	565	2597	666	968	145,4	395	-176	1508	1332	*200,0*

Source: Own calculation after internal database of SC Toma SRL.[4]

- The average production shows a stability until 2012, followed by an increase of almost 90% in 2013, reaching 7000 kg / ha.The average of the 6 years is 4633 kg / ha, with a large variation productions 35.7%, as shown by the coefficient of variation;
- The price of delivery has an upward trend, reaching to record in the last two years much higher values compared to the early years. On average for those 6 years, barley was sold with 555 Ron/ton, with a deviation of 198 Ron/ha, and the variation in prices of 35,7% around the average price. The confidence interval with 90% probability is lower bounded by 383 Ron/ha and higher by 727Ron/ha.
- In terms of revenue and gross margin we can affirm that 2013 was the year in which the company has registered considerable values with 5040 Ron/ha as revenue and a gross margin of 2597 Ron/ha. These values are due, of course, to the higher quantity of production.

3.The main indicators analysis that characterize the maize crop technology

Regarding the maize crop technology , its indicators are presented as follows:

Production/hectare has an averaged value over the years of 6750 kg/ha, the greatest production being obtained in the last year, 2013, 9000 kg/ha.

The delivery price has varied values throught the period considered, the year 2012 representing the year with a very good capitalization , 1047 Ron/tonne of maize.

Although , the most quantitative production was done in the year 2013, taking into account the value of the delivery price and the achieved production, the highest incomes were completed in the year 2011, 5736 Ron/ha, with 516 Ron more compared to the year 2013.

The Gross margin shows a large variation, with a coefficient of 69%, a deviation of 1282 Ron/ha and an average of 1856 Ron/ha.

Table 3. The main indicators evolution that characterize the maize crop technology in SC Toma SRL, Modelu, Călărași County, for the period 2008-2013

Specification	Maize culture	Years						Average	Stand. Deviation	c (%)	Mean square deviation (kg/ha)	Range for prob 90% (t = 2.13)			
	UM	2008	2009	2010	2011	2012	2013					min	max	Abs (+/-)- average girl	%
Average yield	kg/ha	5100	5400	7800	8000	5200	9000	6750	1713	25,4	699	5260	8240	2979	*44.1*
Delivery price	RON/to	354	408	652	717	1047	580	626	249	39,7	102	410	843	433	*69.1*
Revenue	RON/ha	1805	2203	5086	5736	5444	5220	4249	1757	41,4	717	2721	5777	3056	*71,9*
Gross margin	RON/ha	221,4	365,2	2740,6	3327	2433,4	2051	1856	1282	69,0	523	742	2971	2229	*120.1*

Source: Own calculation after internal database of SC Toma SRL.[4]

4.The main indicators analysis that characterize the rape crop technology.

The average production at the rape culture, as values between 1800 kg/ha and 3300 kg/ha, with an average /years of 2094 kg/ha. In 2012, the agricultural holding has not cultivated the rape. The delivery price is around 1638 Ron per ton, with a deviation of 379 Ron/ton, and a values variation around the mean of 23.1%.

The gross margin and the incomes have the lowest values in 2008 of 2016 lei/ha and respectively 61 Ron/ha and a significant

values in the last year 2013, of 5445 Ron/ha and 3068 Ron/ha.

Table 4. The main indicators evolution that characterize the rape crop technology in SC Toma SRL, Modelu, Călărași County, for the period 2008-2013

Specification	Rape culture	Years						Average	Stand. Deviation	c (%)	Mean square deviation (kg/ha)	Range for prob 90% (t = 2.13)			
	UM	2008	2009	2010	2011	2012	2013					min	max	Abs (+/-)-average girl	%
Average yield	kg/ha	1800	2100	2800	2565	-	3300	2094	1153	55,1	471	1092	3097	2005	*95,7*
Delivery price	RON/to	1120	1650	1350	1860	2200	1650	1638	379	23,1	155	1309	1968	658	*40,2*
Revenue	RON/ha	2016	3465	3780	4771	-	5445	3246	1977	60,9	807	1527	4965	3438	*105,9*
Gross margin	RON/ha	61	1563	1773	2551,9	-	3068	1503	1262	84,0	515	405	2600	2195	*146,1*

Source: Own calculation after internal database of SC Toma SRL.[4]

5.The main indicators analysis that characterize the sunflower crop technology

In the crop technology of sunflower , we see the following developments:

- The average production per hectare has throughout the period considered, a positive evolution, reaching in the year 2013 to record with 1900 kg/ha more than in 2008. The productions average is of 2485 kg/ha, with a deviation of 637 kg/ha and a high degree of scattering given by the coefficient of variation 25.3%;

Table 5. The main indicators evolution that characterize the sunflower crop technology in SC Toma SRL, Modelu, Călărași County, for the period 2008-2013

Specification	Sunflower crop	Years						Average	Stand. Deviation	c (%)	Mean square deviation (kg/ha)	Range for prob 90% (t = 2.13)			
	UM	2008	2009	2010	2011	2012	2013					min	max	Abs (+/-)-average girl	%
Average yield	kg/ha	1700	2300	2400	2800	2300	3600	2517	637	25,3	260	1963	3071	1108	*44,0*
Delivery price	RON/to	659	712	1337	1397	2035	1050	1198	511	42,7	209	754	1643	890	*74,2*
Revenue	RON/ha	1120	1638	3209	3912	4681	3780	3056	1391	45,5	568	1847	4266	2420	*79,2*
Gross margin	RON/ha	75,3	330,6	1553,8	1994,6	2611,5	1602	1361	977	71,8	399	512	2211	1700	*124,9*

Source: Own calculation after internal database of SC Toma SRL.[4]

- Regarding the delivery price, its value was the highest in 2012, 2226 Ron per ton, while in 2008 was the lowest, 659 Ron/ton. The average value is of 1198 Ron/ton, with a standard deviation of 511 Ron/ton.
- In light of the above data, we can determine the value of the revenues, and we see that the revenue has had an uptrend in the past three years gathering the highest incomes.
- The Gross margin thas he same uptrend, in the year 2012, being around 2611,5 Ron/ha. The average is 1361 Ron/ha and the value of deviation is very elevated of 977 Ron /ha, demonstrating the very large variation between data.

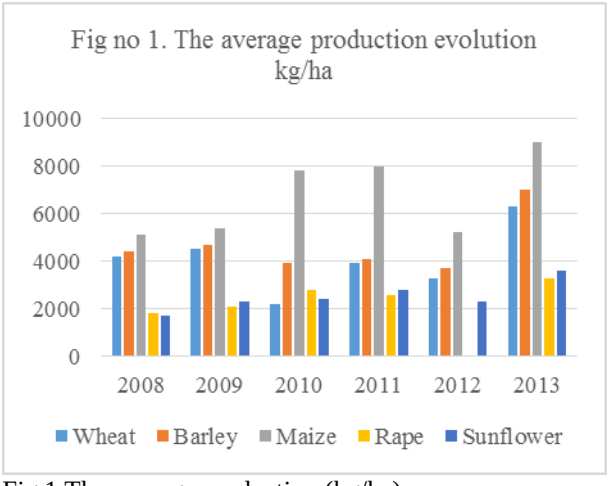

Fig.1.The average production (kg/ha)

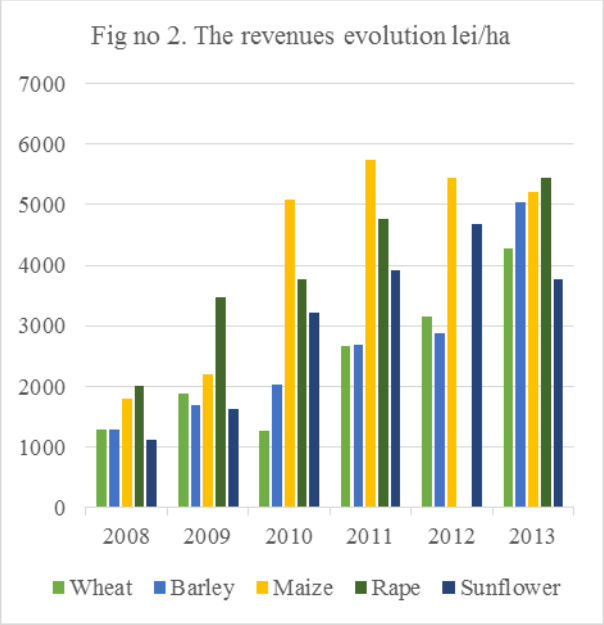

Fig.2.The revenues (lei/ha)

CONCLUSIONS

As a result of the analysis carried out in the agricultural society SC Taiga LLC, we conclude the following:

1.The year 2013 was the year in which the productions from all cultures have reached a maximum for the period studied, while the previous year has registered the smallest productions in most cultures.

2.A spectacularly evolution, in terms production performance has the corn crop, which in the last 3 years register values almost double compared to the first year.

3.These production increases are due primarily to the technological evolution of society, followed by good climate conditions from the year 2013.

4.In terms of financial indicators, corn is the culture that manages to bring to the holding's the largest revenue, followed by rape and sunflower crops.

5.In the last year studied, for most crops were recorded high incomes compared to previous years, except the maize, that had a peak in 2010 and the sunflower in 2012; but the homogeneity of revenues from the year 2013 is not common throughout the period studied.

REFERENCES

[1]Build Free Website of your own on, Tripod, http://statisticasociala.tripod.com/tabele.htm
[2]Demographic growth, http://www.dictsociologie.netfirms.com/_IndDem/IndReproducere.htm
[3]Calarasi County Council, http://www.calarasi.ro
[4]SC Toma SRL, Internal database
[5]Buhociu, L., Buhociu, C.-A., Water and agriculture in human development perspective, http://www.anif.ro/cnrid/contributii/20100322-APA% 20and% 20AGRICULTURA.pdf
[6]Ceapoiu, N., 1968, Applied statistical methods in agricultural experiments and statistical Ed.Agro-Silvica, Bucharest 1968
[7]Draghici, M., Mara, F., 2010, Statistical indicators characterizing meat animal production at the country level and the Teleorman county during 2000-2008, ICEADR Session 2010

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CONTRIBUTION OF URBAN VEGETABLE PRODUCTION TO FARMERS' LIVELIHOOD: A CASE OF THE KUMASI METROPOLIS OF ASHANTI REGION OF GHANA

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Abstract

The number of urban poor is rapidly increasing as urban population grows. Urban vegetable production is therefore a response to the available market demand and the challenges of unemployment and food insecurity resulting from the urbanisation. The study examined the contribution of urban vegetable production to farmers' livelihoods in the Kumasi Metropolis of Ashanti Region of Ghana. Descriptive survey design was used for the study. Based on a simple random sampling technique, 300 urban vegetable farmers were selected and interviewed. Cronbach alpha coefficient values showed high reliability and consistency of the farmers' livelihood subscales. The study that the contribution of urban vegetable production to farmers' livelihoods differed significantly regarding different livelihood subscales (ANOVA). Post-hoc multiple comparisons test (Dunnett's T3) result revealed that the contribution of urban vegetable production to farmers' mean livelihoods was generally 'low'. However, it contributed 'moderately high' to their natural and physical capitals. The strength of association between farmers' mean livelihood subscales also showed that urban vegetable production impacted differently and significantly on their livelihoods. It is recommended that Farmer Based Organisations (FBOs) should be formed to help empower and protect farmers' from the exploitation of prospective buyers. It would also help address common challenges confronting members including high input cost, lack of credit facilities and inadequate marketing avenues.

***Key words*:** *financial capital, human capital, information capital, livelihood assets, natural capital, physical capital, social capital, urban vegetable production*

INTRODUCTION

The number of people living in urban centres continues to grow at approximately twice the rate of rural areas. It is expected that urban population the world over will increase from 2.76 billion in 1995 to 5.34 billion in the year 2025 (UNFPA, 1996). In Sub-Saharan Africa, it is projected that by 2015, there would be 25 countries including Ghana with higher urban population than rural. It is further estimated that by 2030, this would increase to 41 countries (UNPD, 2004). Already, about 44 percent of the population in the West African sub-region is urban compared to only four percent in 1920. United Nation (1995) reported in 2000 that 38 percent of Africans lived in urban areas. This figure is expected to increase to about 55 percent by 2030.

Ghana has also witnessed increase in its urban population from 43.8 percent in 2000 to 50.9 percent in 2010 (Ghana Statistical Service, 2012). As a result, poverty is gradually concentrating in the urban areas (Baud, 2000). The United Nations Food and Agriculture Organization estimated that nearly 870 million people of the world's 7.1 billion population were suffering from chronic undernourishment in 2010-2012. Almost all the hungry people, 852 million, live in developing countries. There are 16 million people undernourished in developed countries (FAO, 2012). Urban authorities are therefore faced with challenges of creating adequate employment, providing basic services and other socially sustainable

strategies. Consequently, cities are fast becoming intervention and planning centres for strategies that aimed at eradicating hunger and poverty and improve livelihoods to enhance food security and nutrition for the urban poor and vulnerable households.

Urban agriculture is one such strategy that enhances food security, stimulates local economic development, and facilitates social inclusion and poverty alleviation (Hovorka and Keboneilwe, 2004). As a remedy to the urban poverty, an increasing number of city dwellers have resorted to all kinds of income generating activities in the urban informal sector. These include intensive irrigated agriculture; mostly vegetables for either all-year-round or dry season production (Cofie *et al.,* 2003). Irrigated urban agriculture contributes significantly to urban food supply especially leafy vegetables for low income households. Income from irrigated farming is about 2-3 times that of the traditional rain-fed agriculture (Danso *et al.,* 2002). The comparative advantages of urban over peri-urban agriculture are market proximity, needless of refrigeration and storage facilities for perishable crops and minimal transportation costs (Obuobie *et al.,* 2006). Urban agriculture in cities like Accra and Kumasi in Ghana for instance supply up to 90 percent of the most perishable vegetables (Drechsel *et al.,* 2006).

These vegetables serve as major and efficient sources of micronutrients considering both per unit of land occupied and per unit production cost compared to other crops (AVRDC, 1996). The importance of urban vegetable production to improve vitamin and micronutrient supply especially for the urban poor is recognized by international policy-makers (FAO, 1996). A minimum daily intake of 200 grams of vegetables is necessary to meet the micronutrient requirements of the human body. However, vegetable consumption in most developing countries is far below the recommended level (Gura, 1995).

Urban vegetable farming contributes substantially to the economy of Ghana in general and the Kumasi Metropolis in particular beyond the provision of livelihoods and food security. Though, extensive work has been done on urban vegetable production over the years in Ghana and Kumasi Metropolis in particular, the contribution of urban vegetable production to farmers' livelihoods has not been adequately examined. The study therefore seeks to fill in this information gap.

The objective of this study was to determine the contribution of urban vegetable production to farmers' livelihoods in the Kumasi Metropolis of Ashanti Region of Ghana.

MATERIALS AND METHODS

The study was carried out in Kumasi, the capital of the Ashanti region. It is between latitude 6.40^0 N and longitude 1.30^0- 1.35^0 W. The total land area of the region is about 24,389 Km^2 with a projected urban population **of** 1,889,934 by 2009 with an annual growth rate of 5.4 percent (KMA, 2006). The average minimum and maximum temperatures are 21.5^0C and 30.7^0C respectively. The region has bimodal rainfall regime stretching from April to July for the major season and from late August to November for the minor season. The mean annual rainfall is 214.3 mm and 165.2 mm for the major and minor seasons respectively.

The study focused on open-space vegetable growing areas in urban Kumasi. The population for the study consisted of all open-space vegetable farmers in the Kumasi Metropolis of Ashanti Region of Ghana. A simple random sampling technique was used to select a sample size of 300 vegetable farmers. A list of 408 farmers provided by the Ministry of Food and Agriculture (MoFA) helped in minimizing bias to ensure representativeness, reliability and generalisability of the results. Primary data for the study was generated through the use of interview schedule. The enumerators were trained by the researcher on the instrument administration.

Farmers' livelihoods were sub-scaled under natural, information, financial, human, social and physical capitals. The livelihood indicators were developed by asking farmers direct questions. These questions were similar to those developed by DFID (1999), Bosompim (2006) and Akaba (2008) in their measure of

livelihood. Likert-type scale was developed and used by the farmers to rate the livelihood subscale indicators. The reliability and internal consistency of the subscales were determined using Cronbach's alpha coefficient test. The test results of the livelihood subscales showed that the instrument was reliable and consistent according to Palant (2001) and Hueta and Lugo (1996). The data was analysed using Statistical Package for the Social Sciences (SPSS).

One-way analysis of variance was computed to determine whether statistically significant differences existed among the farmers' mean livelihood subscales as a result of their urban vegetable production. Levene's test was then used to determine the appropriate post-hoc multiple comparisons to be used to find where significant differences actually existed among the mean livelihood subscales. Dunnett's T3 was chosen as the appropriate post-hoc multiple comparisons test for the mean livelihood subscales. The strength of association between the farmers' mean livelihoods (Eta Squared) was also calculated to assess the importance of the significant differences by dividing the sums of square between groups by the total sums of square. The result was then interpreted using Cohen (1988) conversion guideline.

RESULTS AND DISCUSSIONS

Urban vegetable production is a major business venture in the major cities of Ghana. It contributes to the livelihoods of the urban poor.

Table 1.Analysis of Variance of Farmers' Mean Livelihood Assets

Livelihood capitals	Mean	SD	F- test	Sig.
Physical Capital	2.44	1.21	93.37	0.000
Natural Capital	2.07	1.23		
Social Capital	1.82	1.14		
Financial Capital	1.80	1.05		
Human Capital	1.35	1.06		
Information Capital	1.25	1.09		

n= 300 p<0.05 Scale: 3 = High (H); 2 = Moderately High (MH); 1= Low (L)
Source: Field Survey Data, 2010

The results showed significant differences among farmers' mean livelihood subscales at 0.05 alpha levels (Table 1). The study revealed that physical and natural capitals contributed moderately high to the livelihoods. However, social, financial human and information capitals contributed low to the livelihood assets (Table 1). This implies that urban vegetable production was responsible for the observed differences and not due to chance. This suggests that urban vegetable production contributed differently to farmers' mean livelihood subscales.

Table 2. Multiple Comparisons of Contribution of Urban Vegetable Production to Farmers' Livelihood Subscales

Livelihood Assets	Mean Difference		
A B	(A-B)	Std Error	Sig
NC IC	0.867*	0.067	0.000
NC FC	0.153	0.073	0.424
NC HC	0.207	0.073	0.068
NC SC	0.121	0.067	0.663
NC PC	- 0.488*	0.071	0.000
IC FC	- 0.715*	0.060	0.000
IC HC	- 0.660*	0.053	0.000
IC SC	- 0.746*	0.057	0.000
IC PC	-1.355*	0.066	0.000
FC HC	0.054	0.066	1.000
FC SC	- 0.031	0.059	1.000
FC PC	- 0.641*	0.064	0.000
HC SC	- 0.086	0.059	0.917
HC PC	- 0.695*	0.064	0.000
SC PC	- 0.609*	0.057	0.000
n = 300 * Mean difference is significant at p<0.05			

NC= Natural Capital; HC = Human Capital; SC = Social Capital; IF = Information Capital;
PC = Physical Capital; FC = Financial Capital

Results showed that the mean differences among farmers' natural ($\overline{X}$ =2.07; SD = 1.23), information ($\overline{X}$ = 1.25; SD = 1.09), financial ($\overline{X}$ = 1.80; SD= 1.15), human ($\overline{X}$ = 1.35; SD = 1.06), social ($\overline{X}$ = 1.82; SD = 1.14) and physical capitals ($\overline{X}$ = 2.44; SD = 1.21) were statistically significant with one another at predetermined alpha level of 0.05 (Table 2). This suggests that the significant differences among the mean livelihood subscales were as

a result of the farmers' urban vegetable production. The results also revealed that natural and physical capitals which were the most affected and recorded 'moderately high' mean livelihood subscales according to the scale of measurement, were significantly higher than information, financial, social and human capitals. The result is partly consistent with the findings of Bosompim (2006) that farmers are likely to invest profits accrued from their farms in the purchase of inputs and other equipment that will assist them maintain their farms than investing it in other aspects of their livelihoods. The findings of Akaba (2008) that urban vegetable contributed 'high' to farmers' natural capital and 'low' to their financial and human capitals are also consistent with this study result. On the contrary, his 'high' impact recorded on farmers' social capital and 'low' contribution to their physical capital are at variance with this research result.

Table 3.Strength of Association between Farmers' Mean Livelihood Subscales

Livelihoods subscales	Sum of Squares	df	Mean Square	F	Sig.
Between livelihood subscales	284.41	5	56.88	93.37	0.000
Within livelihood subscales	1092.87	1794	0.60		
Total	1377.28	1799			
Eta Squared	0.2				

The results also suggest that urban vegetable production contributed differently and significantly to farmers' livelihood subscales (Table 3). This is confirmed by the large (0.2) effect size value obtained according to Cohen (1988) convention guidelines.

Through vegetable production, farmers in the Kumasi metropolis can improve on their natural and physical capital assets more and significantly than information, financial, human and social capital assets. Multiple benefits can be generated from a single physical asset when land (natural capital) which is used for both direct productive activities may also be endowed with financial capital when used as collateral for loans. Therefore, integrated approach needs to be designed towards improving farmers' livelihoods collectively to enhance productivity and incomes for sustainable livelihood of farmers.

CONCLUSIONS

The level of contribution of urban vegetable production to the farmers' livelihood subscales in the Kumasi metropolis is generally 'low'. However, it impacted 'moderately high' on their natural and physical capitals according to the scale of measurement. Urban vegetable production contributes differently and significantly to farmers' means livelihood subscales. In conclusion, the formation of FBOs would also enhance farmers' access to information (information capital), build mutual trust among farmers and lower the cost of working together. It will further improve the effective management of common resources (social capital) and effective and efficient use of tools and equipment (physical capital) to increase farmers' productivity for more income (financial capital).

REFERENCES

[1]Akaba, S., 2008, .Household food security and perceived improvement in livelihood benefits of vegetable producers in the Ketu District of the Volta Region of Ghana.

[2]AVRDC, 1996, Combating micronutrient deficiency through vegetables. Asian Vegetable Research and Development Center, Shanhua, Tainan, R.O.C. AVRDC Centerpoint, Vol.14 (1): 4-5.

[3]Baud, I.S.A., 2000, Copping with globalization. The need for research concerning the local response to globalization in developing countries. Den Haag, RAWOO.

[4]Bosompim, M., 2006, Cocoa farmers' perceived Impart of the cocoa high technology programme on their livelihoods in the Eastern Region of Ghana.

[5]Cofie, O.O, van Veenhuizen, R., Drechsel, P., 2003, Contribution of urban and peri-urban agriculture to food security in Sub-Saharan Africa. Paper presented at the Africa Day of the 3rd WWF in Kyoto, 17-3-2003.

[6]Cohen, J., 1988, Statistical Power Analysis for the Behavioural Sciences Hillsdale.NJ: Erlbaum.
[7]Danso, G., Drechsel, P., Wiafe-Antwi, T., Gyiele, L., 2002, Comparison of farm income and tradeoffs of major urban, peri-urban and rural farming systems around Kumasi, Ghana. Urban Agriculture Magazine 7: 5-6.
[8]DFID, 1999, .Sustainable livelihoods guidance sheets. Retrieved March 30, 2010 from http://www.livelihoods.org
[9]Drechsel, P. Graefe, S., Sonou, M., Cofie, O.O., 2006, Informal Irrigation in Urban West Africa: An Overview. IWMI Research Report 102.
[10]FAO, 1996, Food for consumers-marketing, processing and distribution. Food and Agricultural Organization of the United Nations, Rome.
[11]Food and Agriculture Organization, 2012, "The State of Food Insecurity in the World 2012" http://www.fao.org/docrep/016/i3027e/i3027e00.htm
[12]Ghana Statistical Service (GSS), 2012, 2010 Population and Housing Census, summary report of final results. Accra, Ghana: Ghana Statistical Service. A publication of the Ghana Statistical Service. Accra
[13]Gura, S., 1995, egetable production - a challenge for urban and rural development. Entwicklung und Lndlicher Raum 4:3-6.
[14]Hovorka, A., Keboneilwe, D., 2004, 'Launching a policy initiative in Botswana', Urban Agriculture Magazine 13, Trees and Cities – Growing Together:p.46
[15]Huerta, J.M., Lugo, D., 1996, FCL Program Impact on Extension Volunteers and Leaders in Puerto Rico. Impact Evaluation of Family Community Leadership Conference San Juan, Puerto Rico: pp. 1-11
[16]Kumasi Metropolitan Assembly, 2006, Retrieved September, 29, 2010 from: http://kma.ghanadistricts.gov.gh/
[17]Obuobie, E., Keraita, B., Danso, G., Amoah, P., Cofie, O.O., Raschid-Sally, L., Drechsel, P., 2006, Irrigate urban vegetable production in Ghana:Characteristics, benefits and risks. IWMI-RUAF-IDRC-CPWF, Accra,Ghana: IWMI, 150 pp.p.46
[18]Pallant, J., 2001, SPSS Survival Manual: A Step-by Step Guide to Data Analysis Using [19] SPSS for Windows (version 10). Crow's Nest, New South Wales: Allen &Unwin, Autralia. Project R7 132, Report OD 144, HR Willingford, Willingford, UK, 54pp.
[20]UNFPA, 1996, The state of the world population. United Nations, Geneva.
[21]United Nations, 1995, World urbanization prospects: the 1994 revision. New York.
[22]United Nations Population Division, 2004, World Urbanization Prospects: The 2003 revision. Department of Economics and Social Affairs. New York, USA: United Nations

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BIOMETRICS SOCIETY AND THE PROGRESS OF ANIMAL SCIENCE IN ROMANIA

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Abstract

Romanian animal, agricultural and biological sciences were seriously damaged in the period 1948-1964 by the introduction of the Stalinsko- lasenko approach in the field of Genetics and by an empiric-pragmatic approach of agricultural theory. In 1965, it started the reintroduction of the real genetic science and in 1969 a small group of scientists (22, 3 animal scientists, 3 agriculturalists) registered in International Biometric Society aiming to change the scientific approach in experimental technique, genetic and animal breeding, ecological vision of animal production, education system. An international Congress of International Biometric Society was held in Romania. Some progress was achieved in all biological fields, but generally it was braked by the routine, by inertia. The number of Romanian agricultural members of Biometric Society decreased, the group disappeared after the year 1990, the biometricians were not present in research and education, but a correct approach is visible in Animal Breeding theory. It is noted that the biometric approach in biological sciences is originated from Darwin and Mendel theory, it was concretized by Galton and Pearson but the origin of Biometric Society (1946) is connected with S. Wright. Some basic scientific works of Quantitative Genetics and Evolution theory are noted.

Key words**:** *animal sciences, biometrics, ecological vision, empiric-scientific theory*

INTRODUCTION

"In any discipline on nature
it is as much real science as
Mathematics is contained in it"
Immanuel Kant, 1786

With the restoration of genetic science in Romania (Draganescu, 1965), which had been abolished in 1948 under the "pressure" of Miciurinist-Stalinist genetics causing serious damage to the Romanian zoo-agro-biological sciences, it has raised the issue of reintroducing ***a mathematical spirit*** in the field of genetics, experimental techniques, animal husbandry, agriculture and biology.

We note that, as Kant affirmed in 1786, cited by Blaga (1968), ***"In any discipline on nature it is as much real science as Mathematics is contained in it".*** (In fact I understood that it was about fundamental sciences).

MATERIALS AND METHODS

The paper presents the author opinions on the importance of Biometrics and its evolution at world level but also in Romania for the development of Genetics and Animal Breeding.

A critical approach is carried out using the analysis and synthesis methods and logical deduction method as well emphasizing on the following aspects: the appearance of Biometrics, the most representative personalities across the time, the basic scientific works, the importance of biometrics for the development of animal science, animal genetics and breeding, the need to use biometricians and mathematicians in biological sciences both in the field of research and higher education.

RESULTS AND DISCUSSIONS

An exponent at global level of such a spirit necessary for biological sciences, including animal science as well, it was the International Biometrics Society, established in its current form in 1947 under the chairmanship of the great scientist and R.A.Fisher, father of the current science of

experimental techniques, one of the founders of the Quantitative Genetics, Populations' Genetics, Modern Evolutionary Theory. As we stated, "Biometrics" has existed since the 19th century, imposed by the scientific truths specified by Darwin and Mendel.

The objective of the Society was and still is ***to promote the development and application of mathematical and statistical theory and methods in the life sciences***, including agricultural, health, ecological, environmental and forestry sciences. It accepts as members statisticians, mathematicians, biologists, and all those concerned with interdisciplinary efforts for progress, recording and interpreting the biological sciences.

In 1965, the Society had 2,739 members, in 1971, 3,229 members, and in 1986 about 6,140 members. They were divided into about ***15 scientific regions each with 52-2,528 members and about 10 national groups including 14-47 members***. Each region had a president, a secretary, a treasurer and an elected council, meetings and even its own scientific publications. The Biometrics Society organizes international conferences and symposia. ***The 8th International Conference on Biometrics was held in Romania in Constanta, Romania.***

The Society has a journal (Biometrix) with scientific papers, a newsletter, which presents the summaries of the scientific communications presented in the meetings of the regional and national groups and a newsletter informing about the society structure, activity and names of its members. All its members receive publications, the subscription being included in the membership fee.

The largest region in 1986 was the North-East American region (2,528 members), and also Germany region which had that time 600 members (+ GDR 52), Brazil 201 members.

A number of states of a less scientific importance (Tunisia, Senegal, Papua New Guinea, Burundi, Kenya, Jamaica, Ethiopia etc) had 3-5 members, which is caused by the fact that **all agricultural scientific research institutes from the Western countries had in the staff scheme at least a biometrician**, who, besides the mission to participate in planning the experimental technique in experiments and research, lad also their own biometric investigations. We note that in the UK, in addition, there is a Research Center of Biometrics, and in France, INRA has a Department of Biometrics.

"Romania Group" of the Biometrics Society was founded in 1969 with 22 members, reaching 17 members, of which 5 were working with the Institute of Internal Medicine in 1986. Most of members were mathematicians or statisticians from Bucharest Center of Mathematics and Statistics, and the group secretary was Postelnicu, T.(1971-1986). In 1986, one of the members was a human doctor and two were zootechnicians (Drăgănescu, C. 1969-1992 and Moldovan, I, 1980-1992). At the foundation of the Center in 1969, had also participated other two zootechnicians: ***A.Tacu,*** an example of scientific ethics, one of the initiators of the organization, who died later in 1978) and Mărăndici (out of country) and three agronomists, the great scientist, ***N. Ceapoiu,*** A. Canarachee and A. Mudra.

We note that Hungary (1965-1986) had 10 to 15 members, and Czechoslovakia two members. The Group of biometricians in animal husbandry, to whom other scientists joined and acted ***in 1965 - 1990*** towards ***the introduction of a mathematical statistical spirit in the genetic sciences,*** (in the years 1970 it was proposed and Prof. St. Popescu-Vifor translated the book "Animal Breeding" by J. Lush and Quantitative Genetics by Falconer) evolutionary theory, animal genetic breeding, even environmental science (by trying to upgrade the science of animal exploitation,

the calculus of ratios). Much attention was paid to experimental techniques by A. Tacu, who, beyond the attempts made before the years 1948-1965, has developed the first experimental technique for animal science and Gh. Sandu tried later to bring a new development in this area. It should be noted that the penetration of mathematical and biometrical spirit in animal science was neither simple nor easy. ***Progress, recording and interpreting the new scientific visions were not always received either by the research institutes or higher education at the global scientific competition.***

Among the research institutes, only one named "Research Institute for Cattle Growing" employed two mathematicians-biometricians (not all mathematicians are able to assimilate biology). ***After 1990,*** one of them was dispensed by the Institute and the second one, who was agronomist engineer expert in animal science, Ph.D. in animal Science, Bachelor of Science in Mathematics, appreciated in 2012 by Canadian scientists for world priorities in the field of scientific biometrics applied in bull testing and to whom a Brazilian asked him recently his Ph.D. thesis (a missing or disappeared thesis from Library), heir of the documentation of the old members of the Biometrics Society was "helped" by the Academy of Agricultural and Forestry Sciences to be early "retired". The other research institutes had at most laboratories of "experimental technique", relatively empirical laboratories, based on the mechanical recording of the existing rules.

In the field of education, Mathematical subjects were taught by mathematicians non-biometricians who have not knowledge of biology and ***the biometrics vision hardly penetrated or .. at all (as in the applied ecology).*** In fact, the subject titles was changed from "growing" into "exploitation", and some subjects such as "Sheep"-G. Sandu, "Aviculture" a.s.o.) recorded some progress.

To train professionals with the scientific background focused on fundamental sciences is a difficult problem. Given the variation of skills and desires of students and graduates some decisions have to be carefully drawn in universities and research institutes. Taking into consideration the experience of developed countries, I have insisted (1968 ... 1993 .. 1997) to introduce Optional Science Subjecst, grafted on two directions: 1. Science longer day study (5 years) and 2. Execution (3 years) and a careful attention for identifying students and graduates' skills.

Although profiles are often quite specialized, especially for science, In 1968 I affirmed that, in England, the curricula were set up in most faculties for each student based on training needs and his/her skills. *Karl Popper rightly compares science with art and music. He suggests that not all people have the same vocation for it, like for art and music. For glory or economic reasons, there are people who want to be considered "scientists", despite that they have not "vocation". Casti (2007) called them "false scientists" and their science a "pseudoscience".*

The EU recommendations led, I think formally, to such a "modernization", but the goal "to create scientist" and competent decision makers, unmistakable with the execution people, seems to be out of sight and maintains a lack of competitiveness in the field of science and decision making. We could be fear that, paraphrasing Noica, ***we can achieve science centers, but the science they produce is just a sham.***

Romanian National Group of Biometrics has led an own scientific life especially among mathematicians - statisticians dealing with animal husbandry, but without zootechnicians. In a paper written in 1985, I draw attention to this issue.

Basically Today, we remarked the scientific contact achieved by IBNA (INZ), and by Prof H. Grosu with Canadian biometric forums, materialized by a ***significant scientific synthesis in English - "History of the cattle genetic evaluation methods,"*** an interesting paper for some review of the evolution of biometric approach of this problem in Romania, and for Romanian presence in the "civilized" scientific world .

So, there is a chance of recovery and alignment of the Romanian Biometrics and o some areas of Romanian animal husbandry

as well to the advanced countries. It is not complicated task to establish a laboratory of biometrics within IBNA, but this target should be exceeded in all the fields of Romanian agricultural sciences. We said "complication", because it is not easy to find and form biometricians dedicated to animal husbandry at the moment when "the wire is cut". In 2001, Mr. Grosu tried to find support from the Faculty of Mathematics and Statistics of Bucharest University, but his attempt failed in a similar manner as failed the attempt to employ a biometrician at faculty.

The author of these lines feels guilty because after his retirement gave up its modest activity, namely his presence in the Romanian group of biometrics, whose existence is not even certain. It should be noted that at international level, the Romanian Society of Biometrics exists and has a sustained activity (in 2014, the meeting will be held in Florence, Italy, a fact which should be retained by Academy of Agricultural and Forestry Sciences and even by the Romanian Academy.

From Biometrics of Galton (1822-1911) - Pearson, to the current Biometrics-Fisher (1890-1962)

The introduction of the statistical mathematical vision in biology was not a novelty of the year 1946, but it was as we have shown the effect of major scientific advances in the 19th century. Charles Darwin was the first scientist who treated evolution as a statistical process (Fisher 1931). Mendel's methodics (a professor of Physics, with a well-defined mathematical background) is essentially statistical, and his laws of probability are laws formulated in terms of relative frequency. The statistical vision of these two great scientists was, however, largely intuitive. The merit to move from the intuitive statistical treatment to a statistical-mathematical one belongs to F. Galton. He demonstrated that the phenomena of heredity are essentially deviations from the population average, they are mathematical correlations and regressions between parents and offspring ("Typical Laws of Heredity in Man" -1877, Natural inheritance "1889).

Galton's collaborator and follower, **K. Pearson** (1856-1936), took over and developed his ideas, starting with the study of heredity and ending with mathematical foundation of the methods. In 1900, Pearson together with Weldon founded the journal ***"Biometrika" and besides Fisher and "Student" (W.S.Gosset) are among the founders of mathematical statistics,*** a branch of probability theory. Pearson's era in biometrics is known as the era of correlations and the quantitative genetics is considered its fruit. It has stimulated the entry of a certain mathematical vision in Romania in the experimental technique, in agricultural and animal husbandry (Gh.K. Constantiescu, Gh. Moldoveanu, Ionescu Siseşti, N. Săulescu etc.), a little bit abolished in 1948. In this context, it happened one of the tragic and comical episodes of the history of Genetics.

Mendelism, with statistical methods and probabilistic laws, encountered a violent opposition from statisticians, led by Pearson (Drăgănescu 1974). Their opposition went to the closing of the pages of journals "Biometrika" and "Nature" for Gr. Mendel's followers. Pearson's biographers defended him, claiming that he understood "Mendelism", but he considered it too simplistic. In this era, however, it takes place significant genetic gradual accumulation beyond Pearson's vision. In 1908, it was launched the so called "Hardy-Weinberg Law" and the idea that quantitative characters are transmitted according to the Mendelian mechanism.

The final reconciliation between the school of "Pearson's biometric" (actually English school) and the classical Mendelist school took place later around the year 1920. The cause and outcome of this reconciliation was the appearance of the Quantitative Genetics, Population Genetics and later, in 1946, of the current Society of Biometrics and its publications.

We note that the basic works establishing the Quantitative Genetics and Population Genetics are: ***S.Wright (1921) "Systems of Mating", R.A.Fisher (1918) "The Correlation between relatives in supposition***

of the existence of Mendelian heredity"., R.A.Fisher (1930) "Genetic Theory of Natural Selection", S. Wright 1931 "Evolution in Mendelian Populations" , H.B.S. Haldane (1932) "Mathematical Theory of Natural and Artificial Selection"). These are classical works which should not miss from any scientific library of animal science. We referred to them earlier (1965, 1967, 1974, 1978). They were the basis for improving animal breeding theory, outlined by S. Wright and developed by J. Lush in 1935 ..... 1947.

CONCLUSIONS

The Biometric vision in animal sciences is their approach on the basis of fundamental sciences (mathematics, chemistry, even economics, and philosophy). This is the condition of their progress and efficiency. The elimination of "Lisenko Genetics" and the registration to the International Biometric Society were a progress factor for animal science in Romania after the year 1970. A prouf of that was the World Congress of International Biometric Society organized in Romania. The old routine and inertia didn't allow to all scientific centers to produce a science competitive to the highest world centers. Some bad evolution can be noted by the absence even elimination of biometricians from scientific research or university centers, even by the retirement of the Romanian biometric group after 1990 from the Biometric Society. The recent appearance of a book on the History of Cattle testing can be a hope that the situation could be remediated. A new registration of a Romanian group (with agriculturalists members) in the Biometric Society, a presence of biometricians in all animal farm scientific centers, a correct presentation of science evolution and the presence of basic, nodal scientific papers in scientific libraries is a strong need of scientific and production evolution to an EU competitive level.

REFERENCES

[1]Blaga, L., 1969, Experimentul şi spiritul matematic. Ed.Ştiintifica.
[2]Ceapoiu, N., Manoliu, M, Drăgănescu, C., 1964, Heterozisul-mecanismul său genetic, Simpozion National de Genetica.
[3]Drăgănescu, C., 1965, Heterozisul in ameliorarea animalelor, Brosura, 205 p.
[4]Drăgănescu, C., 1974, Genetica populaţiilor şi teoria evoluţionistă, Natura 18-22
[5]The Biometric Society " Membership Directory", 1971-1986
[6]Biometric Bulletin Vol 7/1990, 1970-1990 Biometrics.

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EUROPEAN ANIMAL HUSBANDRY - THE BASIS OF WORLD ANIMAL PRODUCTION AND MODERN ANIMAL HUSBANDRY IN ROMANIA

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Abstract

The world modern animal production, like the whole actual civilization is a product of the Europe of the last five centuries. The European animal production was the effect of an territorial expansion and dispute, cultural development, urbanization and industrialization under the conditions of the market economy, and also of the direct intervention of the states, especially in the 19th century. The extension of the European civilization at world level has brought Europe a danger besides profit. The underdeveloped area of the globe has become competitive and risked the position of leader and even the security. In front of the danger, the European countries joined their forces and in order to assure their food and political security, they established a Common Agricultural Policy (Treatise of Rome, 1957). This policy offered Europe the opportunity to recover its supremacy and food security, but the strong subsidization, which was the basis of the decisions regarding institutional restructuration, and the increase of production led to non competitive production cost. As a result, it was imposed nowadays a new PAC restructuration in the sense to reduce subsidies. "The enigma and historical miracle", the Romanian nation, has reappeared as a state after a long period of historical anonymity, determined by the new masters and immigrants or natives in the ex Eastern Roman empire. The tradition, the ecological and political conditions made as the actual and ex motherland of the Romanians to become a pastoral area, extended on a large territory, marked by four sheep breeds, their creation and ownership. The Romanians have been, therefore, outside of Europe, the founder and profiteer of the new civilization created by it. The political circumstances in the last 50 years favourized a "terrorist" modernization of agriculture, a remarkable animal production, mainly in poultry and pig farming. This progress collapsed at the same time with the terror and Romania remained an underdeveloped country in the EU, disadvantaged by the new competition and PAC. At present, it is imposed:(a)revitalization and sustainable development of the intensive industrial farms;(b)revitalization of the pastoral production systems;(c)development of the organic agriculture systems and temporary maintenance of the subzistence farms; (d)rural development and the preservation of the old Romanian village civilization; (e)development of the scientific life in animal husbandry and a new antitrust system;(f)the right selection, training, promotion and use of the human values.

Key words**:** *animal production, civilization, food security, intensive farms, pastoral production, scientific life, sustainable development*

INTRODUCTION

"*Why Europe and not China?"*
Jared Diamond (1999)

World actual civilization and culture, including modern animal production, is a product of Europe during the last five centuries.

We have to mention that not Europe was the first which stepped on the way of culture and civilization development. "It was the Confucionist China which till the years 1400 was more advanced from a technological point of view than the Western Eurasia,, as mentioned by Diamond (1999, 2005) in an interesting analysis of the genesis of civilization, culture, power, living standard of the world states. The actual civilization, including the modern animal production, is a product of Europe of the last five centuries (Diamond, 1999, Draganescu, 1984.

Wondering himself „Why Europe and not China?", why some countries are rich (a GDP 10 times higher than the poor countries), strong and inventive and other countries are poor, Diamond created the fundamentals to answer a difficult question "What has to be done at this moment?" when (1)Europe is losing its leader position and (2) the actual civilization looks to start its decline.

Romania was outside of Europe most of the years while Europe established its new culture and civilization, but it is close to it at this complex moment.

MATERIALS AND METHODS

The paper presents the author opinions on the evolution of animal husbandry in Europe, mainly in the EU and in Romania. A critical approach is carried out using the analysis and synthesis methods and logical deduction method as well emphasizing on the following aspects: why the EU was a world leader in animal production and which were the reasons to start going down; Common Agricultural Policy, and its goals: farm modernization and vertical integration, farm size, the strategy to develop a sustainable and competitive animal production, organic farming versus intensive industrial animal production systems, preservation of the village civilization and traditional values, rural development.

The paper is based on the major publications on the topic but the ideas belongs to the author of the paper. The problems are approached in a critical manner.

RESULTS AND DISCUSSIONS

A background history of the ex oriental Romanity could be an interesting study of how the geographical position and political context can affect the life of a people.

"An enigma and a historical miracle", the Romanian nation reemerged as a state after a prolonged historical anonymity.

Disappeared after the year 641 (the replace of the official language in Constantinople from Latin to Greek and the massive immigration of other peoples on its territory), discrete reappeared after hundreds of years, it succeeded in a short time to regain in animal husbandry something of its underdeveloped status and offered to it a challenge about which historians will have the courage to discuss later.

The actual chance and task to go in a competitive way next and at the level of the European developed countries and load current and competitive with developed countries in Europe should be taken seriously somehow.

Approaching the problem of animal husbandry progress In Europe, more exactly in the North-Western Europe, our essay would like to give its contribution to the understanding of the EU actual actions aiming to preserve its position at the world level and assure the sustainability of the actual civilization, and explain how Romania is thinking to be integrated in a competitive way in the EU actions. In fact, it is about a problem to which the scientists should clearly answer the question: **"Why other countries are rich, have a competitive animal production and Romania does not? Technocrats and policy makers should ask and be attentive to this answer!**

I. How the European animal production has positioned as the world leader? *Partial abolition of the **„laissez-fair" ?***

In the last five centuries, Europe has increased forage production, formed new animal breeds much more productive than the previous ones, were built stables, were developed the animal sciences production and average yield, as well as profitability per head increased more. Some European countries have become major exporters of reproduction animals and animal products, making big economic benefits from it. The geographical and ecological conditions, as well as the politico-military conditions favored this development.

In the 15-19 centuries, this development was also an effect of the economic principle of free market supply and demand ("Laissez faire"). "Guns, germs and steel", as Diamond affirmed, stimulated not only the industrial technology and territorial expansion but also food production, the emergence of profitable farms. In the UK there it is said about **a first agrarian revolution (the 15-17 centuries), in which serfdom was virtually abolished**, forced labor was transformed into rent money. **A second agricultural revolution** was the complement of the first industrial revolution (1700-1880) (Draganescu, 1968,1984), often called the golden age of the British agriculture. This led to the rural economy of large landowners, tenant farmers and farm workers. ***It was, however, and the effect of some concrete***

administrative actions, not of the type of market economy, which need to be highlighted.

Practically since in the last part of the 19th century ***was abandoned the "laissez faire" principle, (Drăgănescu 1968) of "solving problems through free market competition"*** (which was not identified even today by some "experts") and began a discreet intervention or visible state in directing the economy, animal production, stimulate the development of livestock science. We note a few.

1.Animal production has practically become the backbone of agriculture. It had a major share in the agricultural income (63% in the UK, 83% in Denmark) and dairy cattle production had the highest share in the income from animal production. The share of employment in agriculture was very low (4.2 % in UK, 16% in Denmark).

2.The state often started to subsidize agriculture and protect it at the country borders. In the UK, the first **subsidies** (guarantee of price, subsidies for shares) were granted in 1925 (sugar production). In 1956, they represented 24% of agriculture revenue.

3.The state has intervened in the organization of agricultural production cooperatives, of vertical integration. Denmark has fostered since 1900 the association of farmers in cooperatives. The objective was that by supply, processing production (bacon) and wholesale delivery (= vertical integration in the cooperative), to avoid their speculation by the related industries. In the same year, Norway organized the vertical cooperative integration in dairy farming. The systems still operates today.

4.In some states, some para governmental agencies for animal production have been established. It is the case of Appropriate Milk Recovery Committee (MMB) and the Committee for the recovery of meat in the UK. Each was headed by an elected majority of breeders (12) and a minority (3) appointed by the State. They had Departments for production, the field service (consulting, production control, progeny testing) , AI and veterinary assistance, exhibitions, steers raising, scientific research and Department for collection, processing and milk marketing.

5.In some states, it was directly acted to maintain a farm sizes able to maximize its biological , mechanical and economic efficiency. A number of European countries had social or political reasons to abolish the old feudal estates, economically inefficient and socially unjust, and passing at a large scale not to profitable farms but to subzitence ineffective farms from a technological and economical point of view. Some European countries have avoided the economic decline that this type of "farm" could produce, in two ways:

- Maintain sui generis the feudal property and creation of profitable farms by renting. In England (1965), 60 % of farmers were tenants on the lands of some owners who used to rent their land (" Gentlemen Limited")

- Legal Prohibition of the division of land property by inheritance (Denmark in the years 1910, Germany in the years 1930); only the eldest son has still the right to inherit the farm nowadays, the other brothers had to look for jobs in the city, only when they are in need are supported by by brother the elder brother.

6.Professionalization of farmers. In Denmark and Germany no eldest son could not inherit the farm if he/she has not an agricultural training, at least of a vocational school; otherwise the farm would be sold to a high competence farmer.

7.Stimulation of farmers' competitiveness by conducting the customs system, namely: customs-opening for the cheaper agricultural production coming from the colonies (United Kingdom), which forced the local farmers to produce cheaper, however, leading to the bankruptcy of many farmers, but to ensure a cheaper supply for workers in industry, and higher wages and profitability in the industry.

8.Stimulating marginal and urban agricultural production by:

- encouraging the townspeople to make agricultural production batches (the hobby) in the surroundings of the cities where the land was inadequate for farming (all towns in Germany are surrounded by such plots;
- subsidizing animal production in the mountain area (Switzerland, Austria).

9.Some European countries stimulated the monopol on the delivery of breeding stock. To stimulated export demand, it was "scientifically" recommended the continue import in order to avoid " degeneration" of the races. Actually, the differences in environmental ecosystem in the world were ignored and the fact that animals must be adapted to local conditions, actually they did not degenerate, but natural selection helped them to adapt to the environment.

10.Stimulation of fodder production, which actually operated before the revolution of the European livestock production in the period 1700-1880. However, some European countries (Netherlands) had also a large part of their forage base "overseas" (Drăgănescu 1994).

11.Emergence of world scientific communities, viable and properly directed, gradually supported by states, has been a tremendous force that ensured the progress of the European culture and civilization. The modern animal sciences and education have their origins in Europe of the 19th century, and the underdeveloped countries have had difficult problems in developing such communities.

II.A double danger

...Why China and not Europe?

The peoples of the underdeveloped countries, still in demographic explosion, were aspirated and aspire to the living standard of the developed countries (the Americans, the Western Europeans). The two world wars started at the beginning of the 20th century between the European countries created not only the conditions as Europe to lose its economic and military supremacy and also it supremacy in animal production in the world, but also to be completely erased.

After the year 1920, the U.S.A. became the largest agricultural power. Imports of animal reproduction animals from Europe were stopped even from the beginning if the 20th century and gradually its level and economic competitiveness in animal production exceeded that the one of Europe.

After the Second World War many countries entered in competition, even from the third world. Despite of its unfavorable environmental conditions, Israel has the highest average milk production per cow in the world. Under the empire to ensure world peace, where food security has a paramount role, the developing countries have been helped (green revolution of the period 1940-1972, FAO programs) or have acted themselves to increase animal production and their standard of living at the level of the Western European and North American countries. Japan has reached it. South Korea, Malaysia, Singapore, Hong Kong and Mauritius succeeded to reach the Western European standard of living. India and China are still making efforts in this direction. But .. the West Europeans, the North Americans and the Japanese consume 32 times more resources of the planet per capita, for instance fossil fuels, and produce 32 times more trash than the inhabitants of the third world. Are the Earth's resources enough if all the peoples would like to reach this level?

In addition, Europe lost its military supremacy and at one point that it is in a difficult economic and military security. Clear rationale emerged, which are available for Romania too. "***There are many factors which influence the position of a nation in the modern world"***, said Bate and Healy (1980). The power and technology of its military forces, the ability of its industry, the size and capability of its workforce, the cohesion of social its structure, the quality of its political leadership, the degree in which all these collaborate. The events have drawn attention to **another vital element of power resources - food self-sufficiency**. **Agriculture, and animal production as well, is such a vital resource of the power of a nation.** It provides social cohesion ("Panem et circenses", said the Latinos) and influence all the other factors of the power. In fact, *in the context of food supply globalization, it is a condition for the world peace*, as emphasized at the establishment of FAO, the first objective of the Millennium*- **the eradication of poverty and hunger**. **There are countries (U.S.A) which provided global control by delivering or not agricultural products.** Not all the countries make progress and it started to arise a reverse question compared to the one of

Diamond: **Why China and not Europe .. is making progress?** Regaining the old forces of Europe in the 1950s had become an imperative action for it.

III.The EU Common Agricultural Policy (CAP)

Europe operates to preserve its supremacy in agriculture and animal production. "EU must become the most competitive and dynamic economy in the world, scientifically determined and able of sustainable growth with more and better jobs and a strong social cohesion" (Council from Lisbon, 2000).

Through the Treaty of Rome (1957), Europe decided to be united to prevent devastation of the internal wars, to ensure its security and restore its economic, technological and political power. **Food for its peoples, a major factor of the internal peace and external security, was uncertain.** As a result, the Treaty of Rome stated, among the other major objectives, the issue of agricultural development through a **Common Agricultural Policy (CAP)**. Common Agricultural Policy (CAP) , mentioned by the agreement of Stresa (1958), enjoyed and still enjoys a special attention. It was clear that the goals were:

• ***modernization of farms***, production system, and increase of the biological, mechanical, economic, management productivity, and agriculturists' standard of living;
• ***vertical integration***, i.e. the integration of food chain by means of which food products produced by farmers reach the citizens and **ensure reasonable prices for consumers and fair incomes for farmers.**

III.1.Farm modernization

Obviously the first issue of increasing animal production, farming, was the modernization of farms. It could not be forced, but it needed some " material incentives" and **the modernization of the EU agriculture involved enormous costs, but the EU economy was capable, had material resources to support the effort for half of a century until today**. **The main used tool was the large subsidies offered annually with over 50 % of the EU budget.** We should note that the EU's annual budget is over Euro 120 billion. *What the Soviet block tried to make by terror, the EU has made by financing.* The growth of the biological, mechanical and economic productivity of the farms requires a continuous upgrading of technology and management, which is possible only in **farms** enough large physically **(ha, number of animals), specialized and technologically equipped,** led by competent persons, susceptible to progress and owning equity. The establishment of this farm type was in fact and still remains the major objective of the CAP. "Peasant household" had to be turned into a "farm". More exactly, ***the main goal was an agriculture without peasants***, as mentioned a French work of 1965 ("Une France sans paysans " - Gervais *et al*., cited by Drăgănescu, 2000)

It is clear that: a milking machine would not be used without service and minimum 5-10 cows, and under the current technology, a farmer could take care alone of about 50-100 cows, and a cow should produce 5,000-10,000 l milk per year to be considered efficient from an economic point of view (Drăgănescu 1984, 1992,1995).

Considering all these aspects, Sykes (1963), Drăgănescu (1968) considered that **a small family farm should have at least one of the following sizes:** 100 dairy cows, 800 fattening cattle, 400 ha cereal crops, 20,000 laying hens, 40,000 chicken broilers (230 tons meat per year). This was made by the USA. A part time farmer, who has another job which occupies him 30-40 hours a week, could keep his family raising about 10,000 laying hens or 20,000 broilers-series or 150 fattening cattle.

III.2. Vertical integration

These small farms are viable family in Sykes' s opinion, only if vertical integration in large enterprises or cooperatives. More than this, he considered that the basic efficiency of agriculture is its ***industrialization***, the emergence of companies with hundreds of thousands, even millions of birds. The expectations for the year 1982 were that about ***12 companies will control all the genetic improvement of livestock in the Western world***, controlling and directing the genetic improvement of 80 % of the number of animals. The author wanted a massive British

presence in these companies, **otherwise the Americans will be considered the best in the world ... (actually what happened).**

The EU tended towards these targets, even if it did not directly confessed. **The EU Manshold Plan**, proposed in the 1960s, **aimed to replace the small farms (households) with a real efficient agricultural industry. The "farmers" (peasants) pressure avoided the implementation of the plan, but the idea has persisted, even though** many European politicians affirmed that they are promoting family farms, rejected the Manshold plan. **CAP has subtly or visibly favored the large farms, enterprises; subsidies were offered according to production volume, which was much higher in them.**

CAP subsidizing

The policy to increase agricultural production was heavily funded, as mentioned above, by:

-(a)guaranteed prices for animal and vegetable products delivered on the domestic market or exported, per animal (subsidies and border protection)

-(b)financial encouraging of endowment and increasing the farm size

- (c)subsidies for the elder peasants (over 55 years!) who are retiring, ceasing the land to the modern farms.

Animal production systems

Production system is a set of elements, subsystems which cooperate to achieve a goal: the economic achievement of products in a given ecological and economic circumstance. ***We should not discuss about animal production without analyzing and solving the problem of optimum operating systems adapted to the given eco - socio-economic conditions.***

We note that the most interesting classification of animal production systems at world level is the one made by Sere *et al.* and also the one made by environmentalists and the problem of systems should be approached in Romania too. We emphasize once again that the production system is a ***component of an ecosystem and traditions, so that production systems, especially the extensive ones, could not be simply given from a country to another. The E.U. has not standards for production systems, but call on local expertise to find the most effective solutions.*** **Incompetence which thinks that is competent is a great social danger.**

The classification of systems is a complex problem, depending on the system component used for ecological and geographical diversity where the systems exist. For the lack of space we do not insist upon classification of systems operating in Europe and in Romania, presented in other previous papers about dairy cattle and sheep (Drăgănescu, 2009)

However, we have to remind that the environmentalists noticed *10 production systems for dairy cattle in Europe*, grouped into 3 groups:**(1)Large production systems** with the highest share in EU milk production, which include the mainland about 80% of cows and 84 % of milk production, but they consider that they have a negative influence on the environment;**(2) Production systems having a neutral influence on the environment in a large extent** (12% of the cows and 13 % of produced milk); **(3)Ecological systems** (6% of Europe's milk and only 8 % of the number of cows). Perhaps the "systems" existing in Romania are ecological systems but not economic and competitive systems.

Our opinion about **pig and poultry farming** was mentioned since 1994, and about **sheep farming** we recently affirmed that if production systems adapted in Romania are not supported, the country is in danger to lose its economic and historic status.

III.3. CAP results

Intensive agriculture, stimulated according to the principles of the Treaty of Rome, led to a remarkable prosperity. A slight proportion of each country's population, *5-20 times lower than the one in Romania, produces too much food*, it is true with a price a little high compared to the world market. Analysis of the effects of the policy that led to these effects is a complex item. We note a few.

1.Agriculture infrastructure was largely modernized. As an example we give a situation in France (Table 1) and return upon the data from the ICAR (2009) concerning dairy farms and production in the member states.

From Table 1 one can notice a high share of enterprises and farms and a decrease of the traditional households. It the USA, the progress was more important (Drăgănescu 2000b) .

Table 1.An estimation of the farm types in France

Farm type	Average surface (HA)		Share in agricultural land (%)	
	1988	2000	1988	2000
Enterprises (over 100 ha, or 40 cows or 80 sows)	100*	120	35.1	52.6
Family farms	27	45	51.6	32.9
Quality agriculture (wine, armagniac, fat liver)	10	10	2.8	3.6
Agriculture to offer additional salary or before retirement	10	10.5	15	10.9

*In 1963, the farms over 50 ha owned 28 % of agricultural land.

The recent data regarding the number of cows per farm and production in the EU countries showed not only a relatively large farm size, it is true with high variability from country to another, but milk production per cow at least double compared to one recorded in Romania .....It is an explanation of the fact that **Romania imports even UHT milk at half price compared to the milk price achieved in the country.**

2.Production increased much more than needed, supplying the population at reasonable and stable prices, unaffected by fluctuations in the free market. The share of food cost has substantially decreased, accounting for 5-20% of the average wage (in Romania over 50%). **3.The social structure of the agricultural population was changed and was assured a fair standard of living. Its weight is very low. Practically, today, it is discussed only about farmers, which it is true, not about peasants** (which in the Romanian traditional vision, it sounds strange). .. **Cervais was right ... Today, it is a France without peasants, as he entitled his book in 1965.**

Table 2.Farm size and milk production (all the breeds existing in the country) the EU member states and in the ICAR evidence (ICAR Technical Series No 13, Jan 2009)

Year	Country	No. of cows	No. of farms	**No. of cows per farm**	**Milk yield/year**	% Fat	% Prot.
2007	Austria	527,421	45,847	**11.5**	**5,903**	4.12	3.35
2006	Belgium (Valonia)	223,538	5794	**38.6**	**5,678**	4.00	3.31
2007	Cyprus	23,701	245	**96.7**	**6,302**	3.66	3.34
2007	Czech Rep.	409,802			**6,725**	3.88	3.37
2007	Denmark	553,000	4,900	**112**	**8,000**	4.24	3.43
2007	Estonia	108,400	6,779	**16.0**	**6,368**	4.0	3.30
2007	Finland	293,300	13,270	**22.1**	**8,198**	4.19	3.45
2007	France	3,799,000	94,432	**40.2**	**6,067**	4.16	3.5
2007	Germany	4,087,300	99,000	**41.35**	**7,000**	4.16	3.43
2007	Ireland	1,038,520	22,042	**47.1**	**4,722**	3.78	3.31
2007	Israel		699	**141**	**11,291**	3.62	3.2o
2007	Italy	138,000	44,373	**41.41**			
2007	UK England	154940	984	**157**	**7,807**	4.09	3.32
2007	UK Northern Ireland	97,670	788	**123**	**6,803**	3.98	3.28
2007	UK Scotland	102,344	669	**154**	**7,499**	3.97	3.28

It is not possible this study and we plan to do a thorough analysis of the modernization of livestock production in the EU, but we note a few other issues.

• In 1989, the average size of family farms in poultry farming was 15, 228 laying hens, 17, 171 heads in the Netherlands and 16,897 heads in the UK.

• The size of family farms raising broilers was 36,952 heads in the UK, 35,302 heads in Germany and 28,814 heads in the Netherlands.

• In terms of poultry enterprises, in the U.S. were 156 enterprises with over 250,000 laying hens (47 % of production in 1991) , **22 enterprises having over a million hens**.

• In pig farming, the average number of sows per farm in Denmark was 117 heads. In Italy, fattening farms with over 1,000 pigs produced 20 % of the number of slaughtered pigs, and in England 43.5 % of slaughtered pigs.

CAP objectives set by the Treaty of Rome were largely fulfilled. Even before 1990, the EU has provided food self-sufficiency.

IV.A new stage of animal production in the EU:

Redefining CAP: dynamic, competitive and sustainable production

CAP has increasingly become a victim of its own success. The EU has started to produce milk, dairy products, meat, vegetable more than it needed, but expensive, uncompetitive in the international market and with a high consumption of non-renewable resources. In addition, the subsidizing for production had also to support export.

The EU budget was now subjected to high unnecessary pressure. In addition, ***in the 1990s, the world economy and daily life began to be revolutionized by three phenomena:***

(1)economic **globalization;(**2) **technological** revolution, including the internet and new information and communication technologies; (3) ***recognition of non sustainability of the current civilization***.

In such a situation, CAP had to be "redefined ", as Fontain subtle affirmed (2007).

The achieved progress created the premise for the CAP reform.

The farmers' block who rejected the **Manshold** Plan in 1960 regarding the radical elimination of small farms lost influence. Financial reasons caused by an overproduction of milk and other agricultural products led **in the 1980s to the beginning of the system reform. In 1984 it introduced quotas for subsidizing milk production (no longer subsidies for all the produced milk), and since 1988 it started the limitation of the EU expenses. CAP has remained relatively stable until 1992**, when it was radically changed under the pressure of the GATT - Uruguay Round. **Mac Sharry Reform appeared at the moment of the transition from a directed economy directed towards a free market economy, and reduced the subsidy for meat by 15%,** and included subsidies for the unused arable land, reforestation, ***keeping the subsidy for farmers at retirement leaving their farm to modern enterprises.***

Reforms continued after 1992. Agenda 2000 **reduced the subsidies for milk and milk products and meat**, and the European Commission Report of 2003 proposed to reduce the CAP budget, but leave more freedom of action for each country. We note that until 1992, CAP received about 49 % of the EU budget. **The share of CAP expenses was gradually decreased, but sharply thereafter to 32 %** (almost half) in 2013. **For the new admitted countries like Romania, it was a serious warning.** The question arising is: Will be encouraged the recovery of their agriculture ?It seems that there is still a box. For the EU regional policies, which benefited of 17 % of the budget in 1988, the allocation will be almost double by 2013 to about 36 % of the budget .

The CAP change PAC, which Romania is living at its entry, aims to:

•production slowdown;

• encouraging the use of sustainable methods destined to protect the environment and landscape, to contribute to the improving of food quality and safety, to anima "welfare";

• *protect rural areas*, ensuring a certain level

of economic activity in every rural area (actually avoiding urban population growth, a serious problem affecting sustainable development).

We note that the EU has had five environmental programs and action is currently in a program entitled "Environment 2010: Our future, our choice". We note also that the definition of FAO (1992): "Sustainable development can be considered when (1) conserves natural resources (land, water, plants, animals), (2) does not degrade the environment, (3) is economically viable and (4) is socially acceptable".

Protecting and creating a real "rural civilization", part of the European identity (Fontain, 2007), it seems to be the major objective of the current CAP. The issue is important and interesting, and needs to be carefully treated in Romania. In Bernea's opinion (2006), it will profoundly affect the old Romanian village civilization, which should not be forgotten even if the majority of the space is already "a reality coming in a strong process of disintegration".

Issues raised by **the new CAP is not simple and are "pseudo - experts", as said Cast in 2007, ready to give erroneous solutions, which adversely affect the animal production, and its competitiveness**. **We note again that of the 10 systems of milk production, 4, namely those with the highest share in production (80 % of cattle livestock, 84 % of EU milk production in 2000) were considered as having a negative influence on the environment. To leave them, means to block milk production, and, of course, the EU does not make this.** It is expected, sometimes mistakenly, the need to largely pass to organic farming, which can not provide food for the world population and it seems that the idea is not available even in Romania too. The idea was systematically criticized (Drăgănescu 1992,....2007), showing that it organic farming should be practiced only in the marginal regions. We emphasize that the EU regulations are sufficiently flexible. They allow **to take into consideration the local conditions so that not to affect animal production level**. Exaggeration of expectations, scientifically unsupported (welfare, food safety, etc.) may cause losses and difficult situations. **There is no sign that the EU envisages to give up intensive industrial animal production. It only requires to become sustainable, to protect the non-renewable resources, the environment, the landscape and simultaneously to encourage the maintenance and development of extensive livestock production in the marginal areas (local pastoral systems, pendulum transhumance)**

We note that till the year 2020 it is forecasted a strong development of animal production, a true revolution (Delgado 1999). It will, of course, affect the European agriculture, and the Romanian agriculture too. Delgado *et al*. notifies the seven characteristics of this revolution as follows:

(1) A rapid increase of demand in the global market, which will affect production methods and trade;

(2) The demand of products will move to the developing countries;

(3) Changing the status of animal production from a mixed activity local activity to a world food action;

(4) Replacement of cereals with milk and meat to feed people.

(5)The fast increase of demand for concentrated food at the world level;

(6) A particular stress for extensive resources and stimulate intensive livestock production in the proximity of the cities;

(7) An era of rapid technological progress, especially for industrial farming.

V. Some problems of a new E.U. member state-Romania

"Why not .... Romania too?"

Romania is in the EU livestock production where the EU was in the 1960s. Romania joined the EU in the year when the EU changed its agrarian policy. Now, Romania has become a major meat importer instead of an important exporter as it was before. Romania imports even liquid milk. Not all the new admitted EU countries are in this situation. Normally, we should ask ourselves

Diamond's question... Why Hungary exports animal products and Romania imports? The purpose of the question is a simple one: **what we did wrong and still mistaken and what we have to do**. The question is not simple and the answer given before (Drăgănescu 1992 ... 2008) should be completed. We return to a few issues that we suppose attention again.

V.I. The issue of a strategy to develop a competitive livestock production

The economic and social efficiency of production remains the main criterion in animal production policy in the short and medium term, adding it especially long-term conservation of non renewable resources. Romania must have a triple objective and a triple strategy to develop production systems, a double objective and double strategy in the management of animal genetic resources.

Objective and triple strategy for production systems development

a.Revitalization and sustainable development with innovations and highly productivity of the commercial **intensive industrial farms,** especially in poultry, pigs and cattle. The example of how poultry production is recovered should be followed in pig farming. In cattle, must be considered operating systems tailored to Romania's ecosystems and **follow the Norwegian cooperative system of vertical integration (production, processing, sales) of industrial firms.**

b.Revitalization, conservation and sustainable development of pastoral production systems and free grazing (pendular movement, transhumance, sedentary grazing on marginal lands around the village, free grazing). They had and still have for Romania a special economic, cultural and historical importance. The Treaty for Biodiversity Preservation, the need for sustainable development emphasizes their role now. They, a major component of the extensive agricultural systems, where Europe has numerous NGOs and government organizations, **allow meadow, landscape and biodiversity preservation, a major issue for Romania.** Stimulation of shepherds, professional sheep breeders to a vertical integration that exclude beneficiaries of processing and wholesale trade, including exports, is a major imperative, along with encouraging the small sheep owners, which are now the basis of the sector.

c.Development of organic farming systems (organic), livestock for special products (fatty liver, snails, ostrich etc), using part and medium time farms, even subsistence farms mainly on marginal land. We note that organic agriculture (farming), a certain return to the conservation agriculture in the late 19th century, is important for sustainable development, but it provides more expensive luxury food and does not ensure food security of the population, especially for the world population. These farms can play an important social and economic role, if their presence does not affect the development of commercial farms, generally located on marginal land.

V.2. Rural development and conservation of the ancient Romanian village civilization

Protecting and creating a real "rural civilization", a part of the European identity (Fontain 2007), it seems to be the major objective of the current CAP. The issue is important, and need to be carefully understood in Romania. The Romanian village is at a turning point of its evolution, as correctly mentioned Scholtz (2008). The EU offers village the opportunity of its integration into the European level, its revitalization, development of culture and civilization. It should be used, encouraged, but not to lose an important problem: to keep the charm charm and identity of the village. The old village culture, cultivated and scientifically developed by Gusti 's sociological school, is already falling. **The public bodies paid to continue the sociologists' work, have other duties**. *The zootechnicians should note a great truth.* ***The historical mission of the Romanian people, in front of which the foreign and Romanian historians are puzzled, as Bernea said (2006),*** *the persistence of its historical civilization, hidden in the Romanian village civilizations,* ***is linked to the pastoral life.*** Its conservation and development, means also the preservation

of the Romanian ancient civilizations. It is a matter of the local authorities, but also of zootechnicians. Rural development, modernization of village life, and the preservation of civilization and traditional culture, especially in marginal areas, can be helped by grazing maintaining and developing.

V.3.Scientific community. **The engine of civilization was and is science** ..... and of animal production too, and scientists, scientific communities are the creative force of science. Keeping our opinions about the characteristics of a scientist, science and pseudoscience about cultural models (Drăgănescu 2009), it is necessary to emphasize the importance of the scientific community the assembly of the scientists in the field of animal production, able to detect the new, to direct itself in order to support science and production to progress, to control itself and connect with other communities. Ziman (1981) considered that the existence of these communities is essential and, strictly necessary for the development of developing countries. A remark: their formation is very complicated, time-consuming and must be competent and consistently followed. **Simply naming scientists is not an effective and efficient community .. and the gang is not a scientific community . It is important for us to think about this problem.**

V.4. The use of human resources

The answer to the question: Why a country is rich and another one is poor is given not only by the difference between the geographical position, the past and the difference between the institutions of the states, the "Guns, Germs and Steel" as Diamond thought. The use of human resources is a major cause. A rich country does not export mathematicians but it imports. Not Spain rejoices that it can send people to pick strawberries in Romania but vice versa. **Perhaps society needs more competent people with moral responsibility, ethics, than wise people, in the sense that they know when to be quiet and when to speak, when it is for their benefit. We end this study not by accident reminding of science and education. A modern and competitive animal production could not effectively operate without being directed by professionals with a high level of scientific training.** ***Ultimately, the key to progress is the man, the fair selection, training, promotion and use of human values*** (Drăgănescu 1968)

CONCLUSIONS

Modern animal production, like the whole actual civilization, is a product of Europe of the last five centuries.

The extension of the European civilization at the world level brought Europe a danger besides profit.

The globe underdeveloped area has become more competitive and Europe risked its position of leader and even its security.

In front of this danger, the European countries joined their forced and established a new Common Agricultural Policy to assure their food and political security.

The substantial subsidization of the agriculture development increased production cost and the lack of competitiveness imposed a new and more efficient CAP.

In Romania, during the last 50 years, under the empire of political errors, animal production has become more intensive, and partially modernized, but this modernization failed at the same time with the political terror. Therefore, Romania entered into the EU in the moment when its production was at the level of the European one in the years 1960s, when the subsidies were smaller.

Under these conditions, Romania should pay attention to the following aspects:

(a)to revitalize the sustainable development of the commercial intensive industrial farms;

(b) to revitalize the development of pastoral production systems;

(c) to develop the organic agricultural systems and even to temporary maintain the subzitence farms;

(d)to assure rural development and preservation of the whole Romanian village civilization;

(e) to develop the scientific life in the field of animal husbandry and an antitrust system;

(f)to assure the correct selection, training, promotion and use of the human values.

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REFERENCES

[1]Batie Sandra S., Healy Robert G., 1980, The Future of American Agriculture as a Strategic Resource, Conservation Foundation
[2]Bernea Ernest, Pandele Rodica, 2006, Romanian village civilization, Vremea Press House, Bucharest
[3]Diamond Jared, 1999, Guns,Germs, and Steel. The Fate of Human Societies, New York, W.W.Norton
[4]Diamond Jared, 2005, Collapse: How Sciences choose to Fail or Succeed. New York. Penguin Books
[5]Draganescu, C.,1968, Aspects from the British animal husbandry
[6]Draganescu, C.,1992, 1995, Actual situation, objectives and strategy in the animal production development in Romania I,II,III,IV-Economic Tribune No. 32,33,34,35
[7]Draganescu, C., 1998, Local sheep breeds from the Central and South-eastern Europe - important points in the Romanians' history (în The Press House of the Romanian Academy -Studies of Economic History, Vol. III:77-99
[8]Draganescu, C., 1998 Romanian Sheep Production: Spectacular Past, Decline, Incertain Future.FAO REU Sheep and Goat production in CEEC:179-187
[9]Draganescu, C., 2000, About models of sustainable and competitive development of animal production in Romania, Scientific Papers Series D, Animal Science, 7o-73
[10]Draganescu, C., 2000a, West-European agricultural policies, Romanian Agriculturist, No.10, pp.11-12
[11]Draganescu, C.,2000 b, CAP-orientation for the Romanian agricultural policy, Romanian Agriculturist, No.11, pp.6-7
[12]Draganescu, C.,2001, Romanian agricultural policy and sustainable development of animal production, Annals of University of Agricultural Sciences and Veterinary Medicine Bucharest
[13]Drăgănescu C., 2001,2002, Problems of free-ranging livestock systems in Romania, In: La Canada 15:7-9
[14]Draganescu, C.,2005, The progress of animal sciences. Journal of Animal Science.
[15]Draganescu, C.,2005, Grazing and Romanian history Aromanians - a vector of an ancient pastoral culture, Journal of Animal Science 4:3
[16]Draganescu, C., 2006, For a New Paradigme in Farm Animal Taxonomy. Book of Abstracts, the 57th EAAP Annual Meeting, Antalia, Turkey
[17]Draganescu, C., 2008, Sustainable development and the problem of a national strategy for animal production. Journal of Animal Science
[18]Gervais Michel, Servolin Claude, Weil Jean, 1965, Une France sans paysans, Ed.du Seuil
[19]Fontain Pascal, 2007, Europe in 12 lessons, Of.Publ UE
[20]Harlem R.J.crom Monoculture and the Future of American Agriculture.in:The Future o Am.Agr.:117-152
[21]Klatzmann, J., 1978, L'Agriculture francaise, Inedit Econ.
[22]Mendras Henri, 1970, La fin des paysans; changement et innovations dans les sociétés rurales françaises.
[23]Ruttan, W.V.,1980, Agricultural Research and the Future of Amarican Agriculture.in:The Future of American Agriculture
[24]Seré, C, Steinfeld, H., 1996, World livestock production systems: current status, issues and trends, FAO Animal Production and Health Paper 127. Rome, Food and Agriculture Organization of the United Nations (FAO), Animal Production and Health Division
[25]Scholtz Bela, 2008, Structural funds accession by Measure 121, Economic Tribune No.9, pp.78
[26]Vavra, M., 1996, Sustainability of animal production systems. An ecological perspective. J.Anim.Sci.74:1418 –1423
[27]Ziman, J., 1981 Puzles, Problems and Enigms, Cambridge University Press

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THE LIVESTOCK EVOLUTION ANALYSIS FOR THE MAIN ANIMAL SPECIES IN THE EUROPEAN UNION AND IN ROMANIA

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Abstract

The livestock problems were permanent in the national and community ensemble attention of agricultural production. These issues were inextricably linked to the evolution of the number of animals. These issues were analyzed in the period 2005-2012 dynamic, effectivelly being taken under consideration the animals number/100 ha, but also the territorial structure of Romania developing regions. For the period analyzed, we took into account the changes in the level of animal numbers from the previous year, and compared to the base year, which defined the meaning of a certain rhythm. Presentations were made for the main animal species based on evolutionary trends for cattle, pigs and sheeps.

Key words*: cattle, coefficient of variation, evolution, growth rate, livestock, pigs, sheep*

INTRODUCTION

Along with the vegetal sector, the livestock sector represents an important sector of the national economy in general and for agriculture in particular, providing raw material for food industry and food for population.
Revitalizing the agriculture is difficult or even impossible without the development of the livestock sector, but it can be made by reconsidering the role and place that this sector have to occupy in the national economy.
The cattle swine and sheep breeding is a traditional activity of rural population.
The variety of products it produces, the low power consumption and the feed nature they capitalize, confers their growth and exploitation a sustainable and perspective activity character. It provides the possibility of achieving the requirement production for domestic and export of meat, bringing high source of income for the producers. It is a commercial exchange source. It ensures labor stability in the countryside [5].

MATERIALS AND METHODS

To highlight the evolution of livestocks during the review period, a number of statistical indicators was used, namely [1]:

For arithmetic mean = $\bar{x} = \frac{\sum xi}{n}$, where:
$\overline{X}$ = arithmetic mobile mean; Xi = average production values on a number of year (i);
n = the number of years taken into account.
Average annual growth rate[4]:
$= r2005-2012 = \sqrt[8]{\prod (p1/p0) - 1}$; in which:
r2005-2012 = average annual growth rate; ∏p1/po = chained growth indicators
For standard deviation = $\partial = \sqrt{\frac{\sum(\bar{x}-xi)^2}{n-1}}$;
where: ∂ = standard deviation ; xi = average production values over a number of years,
n = the number of years taken into account.
For the variation coefficient = $C = \frac{\delta}{\bar{X}} x100$,
where:
C – the variation coefficient (expressed in percent)
The coefficient of variation can be: between 0-10% - low variation, between 10-20% - middle variation, over 20% - large variation.
The data used have had as source: Statistical Yearbook of Romania, Eurostat statistics, the National Strategic Framework for sustainable development of the Agri-Food Sector and Romanian Rural Areas in 2014-2020, data from the specialized literature.

RESULTS AND DISCUSSIONS

The cattle livestock

Table 1.- The cattle number evolution in European countries for 2005-2012 (thousand heads)

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Avergage/ Rhythm*	Stand Dev. (th.Hd.))	Coef var(%)
Germany	Th. Hd.	12918.6	12676.70	12707.30	12987.50	12897.20	12706.20	12527.80	12506.80	12741.0	167	*1.31*
	% in chain		*0.98*	*1.00*	*1.02*	*0.99*	*0.99*	*0.99*	*1.00*	*-0.46*	X	X
Bulgaria	Th. Hd.	630	636.50	611.00	574.10	547.90	553.70	567.50	535.30	582.0	36	*6.23*
	% in chain		1.01	0.96	0.94	0.95	1.01	1.02	0.94	*-2.30*	X	X
France	Th. Hd.	18930	18902.00	19124.00	20028.00	19842.00	19599.00	19129.00	19052.00	19325.8	407	*2.11*
	% in chain		1.00	1.01	1.05	0.99	0.99	0.98	1.00	*0.09*	X	X
Hungary	Th. Hd.	708	702.00	705.00	701.00	700.00	686.00	694.00	753.00	706.1	19	*2.67*
	% in chain		0.99	1.00	0.99	1.00	0.98	1.01	1.09	*0.88*	X	X
Italy	Th. Hd.	6459.9	6340.20	6577.00	6486.30	6446.70	5832.50	5897.50	6091.50	6266.5	268	*4.28*
	% in chain		0.98	1.04	0.99	0.99	0.90	1.01	1.03	*-0.84*	X	X
Portugal	Th. Hd.	1494.7	1451.70	1491.50	1495.30	1446.50	1502.80	1519.10	1497.50	1487.4	24	*1.58*
	% in chain		0.97	1.03	1.00	0.97	1.04	1.01	0.99	*0.03*	X	X
Romania	Th. Hd.	2861.1	2933.60	2819.00	2683.60	2512.30	2001.10	1988.90	2009.10	2476.1	387	*15.65*
	% in chain		1.03	0.96	0.95	0.94	0.80	0.99	1.01	*-4.92*	X	X
EU -27	Th. Hd.	89893.2	88846.10	89431.50	89954.10	89381.70	87391.20	86250.30	86649.50	88474.7	1393	*1.57*
	% in chain		0.99	1.01	1.01	0.99	0.98	0.99	1.00	*-0.52*	X	X

*2012 - Provisional data, Source: Eurostat, June 2013, National Strategic Framework for sustainable development of the agri-food sector and Romanian rural areas 2014-2020 (Rural National Strategic Framework) CRPCIS, 2012 [3]

For the bovine specie, regarding the livestock evolution in some European countries in the period 2005-2012, it can be found differentiated trends. The comparisons in years succession, signifies for the total EU, Germany, Bulgaria, Italy and Romania reductions in number, and for the other countries are recorded stagnation or growth. For this rhythms both for total EU as well as most countries are negative, the oscillations being between -0.52 for the total EU and -4.92 for Romania (except France and Hungary).

Further, the appreciation levels of the variation coefficient means a small variation (0-10%) both for the entire EU and for most countries (oscillations being between 1.31 for Germany and 6.23 Bulgaria). Only Romania joins the group with middle variation (10-20%) with a significant degree of variation coefficient of 15.65. It appears that from this point of view, Romania ranks last, recording the most significant rate of decline. Hungary and the Netherlands are countries where cattle have marked an increase of 6.4% in 2012 compared to 2005 [6].

In Romania, during 2005-2012, the cattle number variation showed significant amplitudes, which is why further this situation is analyzed territorial. In Table 2 through the indicator bovine number / 100 ha is presented this situation at national and regional level , both comparisons being made compared to 2007 and subsequently in years of the analized period.

By comparison of the 2012 trends with year 2007, it is declining, but in the years successiveness there is a recovery in the number (this meaning being certain, especially for the last years of the period).

For the bovine territorial structures and at the national ensemble, the rhythm is negative, which means that for the period analyzed (2007-2012) still exhibit a strong tendency of decrease in the number of cattle.

For the swine livestock analysis, was pursued both for all European countries but also in the structure of the main countries. According to the data in Table 3, it can be found differences by comparing in time together with statistical significance.

The pig livestock

Table 3.- The pig livestock evolution in EU countries, for the period 2005-2012(thousands heads)

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Avergage/ rhythm*	Stand Dev. (th.Hd.))	Coef of var %
Germany	Th. Hd.	26989	26821	27113	26719	26841	26901	27403	28331	27139.6	492	*1.81*
	% in chain		0.99	1.01	0.99	1.00	1.00	1.02	1.03	*0.70*	X	X
Bulgaria	Th. Hd.	932.70	1012.70	888.60	783.70	729.80	664.00	608.30	530.90	768.8	156	*20.35*
	% in chain		1.09	0.88	0.88	0.93	0.91	0.92	0.87	*-7.73*	X	X
France	Th. Hd.	15123.0	15009.0	14969.0	14810.0	14552.0	14279.0	13967.0	13778.0	14560.9	473	*3.25*
	% in chain		0.99	1.00	0.99	0.98	0.98	0.98	0.99	*-1.32*	X	X
Hungary	Th. Hd.	3853.00	3987.00	3871.00	3383.00	3247.00	3169.00	3025.00	2956.00	3436.4	383	*11.16*
	% in chain		1.03	0.97	0.87	0.96	0.98	0.95	0.98	*-3.72*	X	X
Italy	Th. Hd.	9200.00	9281.10	9273.00	9252.40	9157.10	9321.10	9350.80	8661.50	9187.1	207	*2.25*
	% in chain		1.01	1.00	1.00	0.99	1.02	1.00	0.93	*-0.86*	X	X
Portugal	Th. Hd.	1955.00	1916.80	1978.20	1954.60	1944.60	1917.30	1985.00	2024.10	1959.5	34	*1.72*
	% in chain		0.98	1.03	0.99	0.99	0.99	1.04	1.02	*0.50*	X	X
Romania	Th. Hd.	6603.80	6814.60	6564.90	6173.70	5793.40	5428.30	5363.80	5234.30	5997.1	585	*9.75*
	% in chain		1.0	1.0	0.9	0.9	0.9	1.0	1.0	*-3.27*	X	X
EU -27	Th. Hd.	158719	161550	159570	152603	151569	151130	148557	145829	153691	5268	*3.43*
	% in chain		1.02	0.99	0.96	0.99	1.00	0.98	0.98	*-1.20*	X	X

Sursa: Eurostat, june 2013, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database [2]

Comparison in the period 2005-2012, shows an increase only in the situation of Germany and Portugal, and in the EU ensemble and the rest reductions in livestock. Under this situation, the rhythm remains positive at only two countries (Germany and Portugal) and , for the EU and the other countries we found a downward level, the values being negative.

Table 4. The swine stock/100 ha, at the country level, in the development regions, 2007-2012.

Region/ county	MU	2007	2008	2009	2010	2011	2012	*Average/ Rhythm*
TOTAL	No/100ha	75.7	70.8	65.9	59.3	59.6	58.2	*64.9*
	% compared to 2007	*100.0*	*93.5*	*87.1*	*78.3*	*78.7*	*76.9*	*x*
	% in chain		*0.935*	*0.931*	*0.900*	*1.005*	*0.977*	*-5.1*
Reg. NORTHWEST	No/100ha	92	92.3	85.9	69.5	71.4	71.1	*80.4*
	% compared to 2007	*100.0*	*100.3*	*93.4*	*75.5*	*77.6*	*77.3*	*x*
	% in chain		*1.003*	*0.931*	*0.809*	*1.027*	*0.996*	*-5.0*
Reg CENTRE	No/100ha	111.1	96.1	83.8	70.1	74.7	71.7	*84.6*
	% compared to 2007	*100.0*	*86.5*	*75.4*	*63.1*	*67.2*	*64.5*	*x*
	% in chain		*0.865*	*0.872*	*0.837*	*1.066*	*0.960*	*-8.4*
Reg NORTH EAST	No/100ha	62.4	60.3	55.8	44.7	47.3	44.9	*52.6*
	% compared to 2007	*100.0*	*96.6*	*89.4*	*71.6*	*75.8*	*72.0*	*x*
	% in chain		*0.966*	*0.925*	*0.801*	*1.058*	*0.949*	*-6.37*
Reg SOUTH EAST	No/100ha	52.2	48.4	48.1	49	47	45.1	*48.3*
	% compared to 2007	*100.0*	*92.7*	*92.1*	*93.9*	*90.0*	*86.4*	*x*
	% in chain		*0.927*	*0.994*	*1.019*	*0.959*	*0.960*	*-2.9*
Reg SOUTH-MUNTENIA	No/100ha	60.4	55.2	50.1	50	49.1	48	*52.1*
	% compared to 2007	*100.0*	*91.4*	*82.9*	*82.8*	*81.3*	*79.5*	*x*
	% in chain		*0.914*	*0.908*	*0.998*	*0.982*	*0.978*	*-4*
Reg BUCHAREST - ILFOV	No/100ha	214.4	210.6	183.4	143.8	135.5	112.2	*167*
	% compared to 2007	*100.0*	*98.2*	*85.5*	*67.1*	*63.2*	*52.3*	*x*
	% in chain		*0.982*	*0.871*	*0.784*	*0.942*	*0.828*	*-12.1*
Reg WEST	No/100ha	101.4	95.4	99.5	88.9	89.9	92.1	*94.5*
	% compared to 2007	*100.0*	*94.1*	*98.1*	*87.7*	*88.7*	*90.8*	*x*
	% in chain		*0.941*	*1.043*	*0.893*	*1.011*	*1.024*	*-1.9*

Sursa: Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database [3]

Former communist countries, Bulgaria, Hungary and Romania record the lowest level, the values amplitude being between -3.27 (Romania) and -7.73 (Bulgaria). The annual change in the number is a feature that is maintained also at swine in the countries analyzed. According to the values of the coefficient of variation is established a little variation (0-10%) for all EU and most countries, a middle variation (10-20%) for Hungary and a large variation (over 20%) for Bulgaria. Thus, the former communist states are represented by the most unfavorable values in statistical assessments.

For the Romanian national level, the swine number evolution was further analyzed by the same indicator (pigs/100 ha) in territorial structure of the development regions.

In Table 4 is shown the situation where, compared towards year 2007 are established a total decrease. The comparison in the initial period analyzed signifies the same decreases, followed by a stagnation and a partial recovery (overall national and in most development regions). This level of annual declines analyzed by dispersion values determined a negative rate for all territorial structures (Bucharest-Ilfov lowest score of -12.1).

The sheep livestock

Table 5. The sheep livestock evolution in EU countries, for the period 2005-2012(thousands heads)

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Avergage/ rhythm*	Stand Dev. (th.Hd.))	Coef of var %
Germany	Th. Hd.	2036	2017	1925.7	1919.9	1851.7	1799.7	1657.8	1641	1856.1	140	*7.52*
	% in chain		*1.01*	*1.05*	*1.00*	*1.04*	*1.03*	*1.09*	*1.01*	*3.13*	x	X
Bulgaria	Th. Hd.	1602.3	1635.4	1526.4	1474.8	1400.3	1368	1454.6	1361.5	1477.9	97	*6.54*
	% in chain		*0.98*	*1.07*	*1.03*	*1.05*	*1.02*	*0.94*	*1.07*	*2.35*	x	X
France	Th. Hd.	8759.9	8494.2	8284.5	7715.2	7528	7955	7621	7453	7976.4	454	*5.69*
	% in chain		*1.03*	*1.03*	*1.07*	*1.02*	*0.95*	*1.04*	*1.02*	*2.33*	x	X
Hungary	Th. Hd.	1405	1298	1232	1236	1223	1181	1081	1147	1225.4	91	*7.45*
	% in chain		*1.08*	*1.05*	*1.00*	*1.01*	*1.04*	*1.09*	*0.94*	*2.94*	x	X
Italy	Th. Hd.	7954	8227.2	8237	8175.2	8012.6	7900	7942.6	7015.7	7933.0	369	*4.65*
	% in chain		*0.97*	*1.00*	*1.01*	*1.02*	*1.01*	*0.99*	*1.13*	*1.81*	x	X
Portugal	Th. Hd.	3582.7	3549	2703.1	2558.2	2367.9	2226.3	2169.9	2091.7	2656.1	558	*21.01*
	% in chain		*1.01*	*1.31*	*1.06*	*1.08*	*1.06*	*1.03*	*1.04*	*7.99*	x	X
Romania	Th. Hd.	7608.4	7678.2	8469.2	8881.6	9141.5	8417.4	8533.4	8833.8	8445.4	515	*6.10*
	% in chain		*0.99*	*0.91*	*0.95*	*0.97*	*1.09*	*0.99*	*0.97*	*-2.11*	x	X
EU -27	Th. Hd.	-	-	-	-	-	-	-	-	-	-	-

Source: Eurostat, June 2013, National Strategic Framework for sustainable development of the agri-food sector and Romanian rural areas 2014-2020 (Rural National Strategic Framework) CRPCIS, 2012 [3] [5]

Concerning the sheep livestock, it can be shown that natural resources, enhanced possibilities for providing food, environmental characteristics, the biological and physiological requirements, tradition and economic and social transformation developed in some areas of the EU, were all means to influence the spread and growth of this species. From the livestock analysis, present in each of the EU countries, shown in Table 5, it can be seen that the largest as a share , that is growing and is in exploitation we fiind in Romania, followed by France and Italy. But comparisons of successive annual variations in the analyzed period highlights differences.

For most countries regarding these livestocks, reference can be made on the permanent annual stagnation tendencies , at which Romania in the period dynamics scored a decrease. Annual variations in the number of animals, play rates ranging from 2.33 (France) and 7.99 (Portugal) level which for Romania is -2.11. The coefficient of variation given below completes the picture of homogeneity, annually analyzed in terms of sheep flocks. Thus, all countries frames a small variation (0-10%), except Portugal where this

coefficient is 21.01, considered a large variation (over 20%).

Table 6. The growth rate of the sheep and goats stock per 100 ha, at the country level, in the development regions, 2007-2012

Region/ county	MU	2007	2008	2009	2010	2011	2012	*Average/rhythm*
TOTAL	No/100ha	70.9	74.3	76.4	70.5	72.2	74.6	*73.2*
	% compared to 2007	*100.0*	*104.8*	*107.8*	*99.4*	*101.8*	*105.2*	*x*
	% in chain		*1.048*	*1.028*	*0.923*	*1.024*	*1.033*	*1.0*
Reg. NORTHWEST	No/100ha	66.8	74.3	81.1	75.9	75.5	77.7	*75.2*
	% compared to 2007	*100.0*	*111.2*	*121.4*	*113.6*	*113.0*	*116.3*	*x*
	% in chain		*1.112*	*1.092*	*0.936*	*0.995*	*1.029*	*3.1*
Reg CENTRE	No/100ha	103	105.5	106.6	109	112.5	116.1	*108.8*
	% compared to 2007	*100.0*	*102.4*	*103.5*	*105.8*	*109.2*	*112.7*	*x*
	% in chain		*1.024*	*1.010*	*1.023*	*1.032*	*1.032*	*2.4*
Reg NORTH EAST	No/100ha	78.2	86.7	89.1	71.8	76.9	79.2	*80.3*
	% compared to 2007	*100.0*	*110.9*	*113.9*	*91.8*	*98.3*	*101.3*	*x*
	% in chain		*1.109*	*1.028*	*0.806*	*1.071*	*1.030*	*0.25*
Reg SOUTH EAST	No/100ha	81.6	79.4	79.1	71.4	72.4	75	*76.5*
	% compared to 2007	*100.0*	*97.3*	*96.9*	*87.5*	*88.7*	*91.9*	*x*
	% in chain		*0.973*	*0.996*	*0.903*	*1.014*	*1.036*	*-1.7*
Reg SOUTH-MUNTENIA	No/100ha	43.1	46.2	46.7	44.7	44.9	45.8	*45.2*
	% compared to 2007	*100.0*	*107.2*	*108.4*	*103.7*	*104.2*	*106.3*	*x*
	% in chain		*1.072*	*1.011*	*0.957*	*1.004*	*1.020*	*1*
Reg BUCHAREST - ILFOV	No/100ha	35.9	40.7	34.7	32.4	36	40.7	*37*
	% compared to 2007	*100.0*	*113.4*	*96.7*	*90.3*	*100.3*	*113.4*	*x*
	% in chain		*1.134*	*0.853*	*0.934*	*1.111*	*1.131*	*2.5*
Reg WEST	No/100ha	72.8	77	84.3	75.7	78.8	83.3	*78.7*
	% compared to 2007	*100.0*	*105.8*	*115.8*	*104.0*	*108.2*	*114.4*	*x*
	% in chain		*1.058*	*1.095*	*0.898*	*1.041*	*1.057*	*2.7*

Sursa: Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database [2]

Because Romania is the country with a significant number of ovines, further is performed a study of the dynamics of this species to which are added the goats livestock, in the 2007-2012dynamics, played into the regions territorial structure. The values shown in Table 6, based on number heads/100 ha indicator, shows an annual increase on total country. The increase phenomenon is similar also for the development regions structure, except the South-East region, where there is a decrease. Annual variations in the amplitude bounds the growth rate between 1.0 and 3.1, noting that for South East where the value of this rate, due to livestock decreases is negative (-1.7).

CONCLUSIONS

1. Regarding the cattle herds, their evolution has been done differently for European Union countries. Over the analyzed period it outlines the decreases for EU total, mainly in Germany, Bulgaria, Italy and Romania. Our country, unfortunately, ranks last, recording the most significant rate of decline.
2. For the swine livestock, also, at the total EU level , as well as for the other countries we find a negative trend. Again, our country records a bad value, ranking alongside Bulgaria and Hungary among the countries with the most unfavorable values in statistical assessments for both livestock and for its decreases.
3. The situation is different regarding the sheep livestock, which in Romania has the largest number in exploitation, followed by France and Italy. Even though our country recorded a higher number in this species livestock , in the period dynamic we see decline.
4. We conclude that the main species of animal livestock are declining in the whole European Union, raising an important issue in the debate. The regression livestock sector it is absolutely necessary, and should be taken measures to increase the number of animals, in particular the number of cattle.

REFERENCES

[1]Buhociu Liviu, Buhociu Catalin-Adrian, Water and agriculture in human development perspective, http://www.anif.ro/cnrid/contributii/20100322-APA% 20and% 20AGRICULTURA pdf

[2]Ceapoiu, N.,1968, Applied statistical methods in agricultural and statistical experiments Ed.Agro-SilvICa, Bucharest

[3]Eurostat, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database
[4]Ministry of Agriculture and Rural Development http://www.madr.ro/ro/cresterea-animalelor
[5]The national strategy for sustainable development of the Romanian agri-food and rural areas in the period 2014 - 2020 (National Strategic Rural Framework) CRPCIS 2012

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PHYSICAL AND CHEMICAL PROPERTIES OF PSAMOSOIL, PRELUVOSOIL AND CHERNOZEM IN THE MEHEDINTI COUNTY

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Abstract

The area is 4,993 km2 Mehedinti, representing 2.1% of the country. Mehedinti County due to its potential, diversity of terrain and geographical location, has a well-defined economic landscape, being one of the few counties with the smooth articulation of agricultural use, featuring a whole range agrochemical and pedological, which requires a scientific approach permanently and agricultural phenomenon. Structural changes in agriculture, the existence of conflicting properties with optimal criteria, economic and biological, agricultural farms, impose a number of restrictions that require us to promote research priorities and objectives able to rehabilitate agricultural infrastructure around. Knowing in detail yielding and technological features, favouring and restricting factors of agricultural production on each land portion both from the point of view of present response and of real possibilities of turning them into better ones can be, for the decision-maker a precious tool in achieving the most suited practical measures of producing plant biomass in a dynamics well correlated with environmental ecological requirements.

Key words**:** *characteristics, profile, physical – chemica, soil*

INTRODUCTION

Soil has many roles, as natural resource, as support and place for many activities, but what is the most important it is its role as main way of vegetal production.[4]
Soil conditions, understanding this soil as factors holding vegetation, [2] water and food items, is a complex of traits that act directly and indirectly on plant growth and fruitfulness.[1]
Soil fertility in accordance with climatic allows farmers to obtain crop-specific parameters individually. [5]
The influence of natural conditions through land reclamation works or agro - pedo - improvement leads in all cases, the change characteristics of environmental factors, which generally are favorable for plant growth.[3]

MATERIALS AND METHODS

The samples were processed and the following analyses were made using the following methods:

Physical proprieties determination:
The texture of the soil was determined through the Cernikova method (dropping method has the following principle: different speed sedimentation of the liquid particles, in conformity with their size and the Stokes law).
The stability of the granule-like fractions in weight percents was made following the formulas:
-Brutish sand (2 – 0.2 mm in diameter)% = m_1 x 100/m_0 x F;
-Fine sand (0.2 – 0.02 mm in diameter)% = 100 x m_2/m';
-Dust (0.02 – 0.002 mm in diameter)% = (m_2 – m_3) x V x 100 / (v x m_0) x F;
-Clay (with the diameter < 0.002 mm)% = m_3 x (V x 100 / V x m_0 - d) x F in which:
-m_0 – the soil quantity in g;
-m1 – the brutish sand quantity in g;
-m2 – the quantity of particles extracted at the first dropping (P+A) in g;
-m3 – the quantity of particles extracted at the second dropping (A);

-V – the volume of the suspension in the sedimentation cylinder in cm^3;
-v – the dropper volume in cm^3;
-d – correction factor that depends of the nature of the dispersant used to treat the samples and that has the value:
-1.6 – when using sodium hydroxide;
-10.2 – when using sodium hexa-meta-phosphate;
-m' – the mass of dry and carbonate free soil (g);
-100 – perceptual report factor.
-Determining the chemical proprieties:
-Determining the humus content of the soil was made through titration methods – the Tiurin method.
The method consists of oxidation of the humus carbonate with a chromium anhydride or potassium bi-chromate in the presence of sulfuric acid.
Equipment and materials: 100 ml conic pot; 300 ml conic pot; 20 – 25 ml and 50 ml burette; glass pear, analytical balance and heating installation.
Reagents: silver sulfate (mercury or aluminum); oxidative substance; orto-phosphoric acid 85%; di-phenyl-amine solution 0.5%; Mohr salt 0.1 n.
The humus content of a soil sample was calculated with the following formula:
Where:
-V_1 – is the volume of Mohr salt solution 0.1 n consumed at titration of the witness sample (m1);
-V_2 – is the volume of Mohr salt solution 0.1 n consumed at titration of the chromic acid excess from the analyzed soil (m1);
-F – is the factor of the Mohr salt;
-0.0005181 – is the humus content in g oxidizing 1ml chromic acid 0.1 n;
-M – is the weight of the analyzed soil sample (g);
-K – is the coefficient calculated for the referred result regarding the completely dried soil.
Soil reaction (pH) was determined through the potentiometric method with pH sensitive glass electrode, at a soil : water report of 1 : 2.5;
Phosphor and mobile potassium determination, extraction of ammonium acetate lactate, at a pH of 3.75 and the calorimetric dosage of phosphor with molybdenum – tin chloride – ascorbic acid after the Muphy method, respectively flam-photometry of potassium.
Determination of the total capacity of cationic exchange (T) was made after the Bower method through the saturation of the soil with sodium from sodium acetate 1 N at a pH of 8.2.
In the case of saturated soils with base ions $T = S_B$.
In the case of the soils that absorbed both base positive ions and hydrogen ions, $T = S_B + S_H$.
The degree of base saturation (V) – defines the proportion in which the colloidal complex is saturated by base positive ions and was calculated with the formula:
The high values of V% express a weak elutriation, neutral to alkaline reaction and a series of favorable proprieties the exception being the saturated solutions that have V = 100% but present positive sodium ions that give unfavorable proprieties.
The low value of v% expresses a strong elutriation, debasing and an acid reaction and less favorable soil proprieties for the growth and development of crops.
The exchange base capacity (exchange base sum) (S_B) – is measured in m.e. / 100g completely dried soil at 105^0C and results from the total of basic positive ions Ca^{2+} + Mg^2 + K^+ + Na^+ absorbed in the colloidal complex of the soil.
The exchange capacity for hydrogen (absorbed hydrogen) (S_H) – is measured in m.e. / 100 g soil and represents the total amount of positive hydrogen ions absorbed in the colloidal complex of the soil.
S_H determination was made through the leaching of the soil until exhaustion with a tampon solution of potassium 1 N at a pH of 8.3.
And the hierarchy methodology.
To make the assessment calculus we have chosen from the multitude of environmental conditions that characterise each land unit within the District of Mehedinţi only those considered most important, easier and more

accurate to measure, that can usually be found in soil study works, called assessment indices.
In assessing lands for natural conditions each of the indices mentioned except for index number 69 that intervenes directly participate in the establishing of assessment grade for an assessment coefficient that oscillates between 0 and 1, depending on the total unfavourableness or favourableness of the grade for the requirements of the use to take into account.

RESULTS AND DISCUSSIONS

This coarse sand has values oscillating between 42.0-46.3, the minimal value being in the Ao horizon, and maximal value being in the C horizon.
Fine sand has values that decrease from the soil surface to lower horizons, maximal value being in the Ao horizon.
Dust has values oscillating between 3.5 and 2.1.

Table 1. Physical – chemical properties of the soil: Psamosoil

Horizon Horizon depth	MU cm	Ao 0-35	C 35-120
Coarse sand 2.0-0.2 mm	%	42.0	46.3
Fine sand 0.2-0.02 mm	%	47.9	43.4
Dust 0.02-0.002 mm	%	3.5	2.1
Argile 0.002 mm	%	6.6	8.2
Humus	%	0.58	0.31
I.N.	%	0.45	0.29
pH in H_2O	%	5.6	6.35
S.B.	me/100g	6.56	6.56
H. sch.	me/100g	1.80	0.42
T	me/100g	8.36	6.98
V	%	7.5	93.9
P mobil	ppm	23.6	17.1

The most important component part of the granulo-metrical fraction (clay) has the maximum value in the last horizon (C – 8,2), its value being lower in the first horizon (Ao – 6.6).
After having analysed and after having consulted the triangular diagramme of the texture we measured the texture of the psamosoil which is a sandy-clayish texture, undifferentiated on the profile.
Soil reaction is with no significant differences whatsoever per profile, with values between 5.6-6.35.
The sum of changeable bases is low for the whole profile.
The humus percentage being 0.58-0.31, it shows a low content in humus in the soil.
Potassium (K) supply is low towards the lower horizon, having a value of 66.

Table 2. Physical – chemical properties of the soil: Chernozem

Horizon Horizon depth	MU cm	Am 0-51	AC 51-80	C 80-135
Coarse sand 2.0-0.2 mm	%	15.5	9.1	9.9
Fine sand 0.2-0.02 mm	%	49.5	55.8	54.8
Dust 0.02-0.002 mm	%	17.1	17.1	16.3
Argile 0.002 mm	%	17.9	18.0	19.0
Humus	%	2.11	1.33	1.20
I.N.	%	2.11	1.33	1.20
pH in H_2O	%	7.40	7.98	8.10
V	%	100	100	100
P mobile	ppm	62.6	81.3	23.8
K mobile	ppm	140	88	55

Coarse sand has values oscillating between 15.5-9.1, the maximal value being in the Ao horizon, and minimal value being in the AC horizon.
Fine sand has values that crease from the soil surface to lower horizons, maximal value being in the Ao horizon. Dust has values oscillating between 17.1 and 16.3.
The most important component part of the granulo-metrical fraction (clay) has the maximum value in the last horizon (C – 19,0), its value being lower in the first horizon (Ao – 17.9). After having analysed and after having consulted the triangular diagramme of the texture we measured the texture of the chernozem which is a sandy-clayish texture, undifferentiated on the profile. Soil reaction is

with no significant differences whatsoever per profile, with values between 7,40-8,10.The sum of changeable bases is low for the whole profile. The humus percentage being 2,11-1,20, it shows a low content in humus in the soil. Potassium (K) supply is low towards the lower horizon, having a value of 23,8. Coarse sand has values oscillating between 10.5-7.0, the maximal value being in the Ao horizon, and minimal value being in the C horizon. Fine sand has values that crease from the soil surface to lower horizons, maximal value being in the C horizon. Dust has values oscillating between 11.8and 14.2. The most important component part of the granulo-metrical fraction (clay) has the maximum value in the last horizon (C – 19,0), its value being lower in the first horizon (Ao – 19.6).

Table 3. Physical – chemical properties of the soil: Preluvosoil

Horizon Horizon depth	UM cm	Ap 0-19	Ao 19-36	Bt_1 50-94	Bt_2 94-128	C 128-160
Coarse sand 2.0-0.2 mm	%	10.5	6.5	8.5	8.0	7.0
Fine sand 0.2-0.02 mm	%	58.1	56.1	55.1	58.7	59.8
Dust 0.02-0.002 mm	%	11.8	13.2	13.6	12.7	14.2
Argile 0.002 mm	%	19.6	24.2	22.8	20.6	19.0
Humus	%	1.16	6.92	4.24	2.35	1.24
I.N.	%	0.91	6.29	4.01	2.20	1.24
pH în H_2O	%	6.42	6.64	6.88	6.85	8,18
S.B.	me/ 100g	9.95	16.76	18.86	17.81	-
H.sch.	me/ 100g	2.70	1.65	1.07	1.15	-
T	me/ 100g	12.65	18.41	19.93	18.96	-
V	%	78.7	91,0	94.6	93.9	100
P mobil	ppm	8,0	6,6	22.0	12.7	19.5
K mobil	ppm	108	100	74.0	116	62

After having analysed and after having consulted the triangular diagramme of the texture we measured the texture of the chernozem which is a sandy-clayish texture, undifferentiated on the profile. Soil reaction is with no significant differences whatsoever per profile, with values between 6,42-8,18. The sum of changeable bases is low for the whole profile. The humus percentage being 1,16-1,24, it shows a low content in humus in the soil. Potassium (K) supply is low towards the lower horizon, having a value of 62.

CONCLUSIONS

After calculating the note class for all cultures and plantations taken in consideration, there has been observed that the most fertile soils are: typical chernozeom and cambic chernozeom.

From these studies valuable information result regarding the lands soith restruction for variants uses, their characteristic localization and their surface stowing the sources-soil deposits for many resources, especially for the enlargement of the arable surface and the placement of the different agricultural regions.

REFERENCES

[1]Blaga, G., Rusu, I., Vasile, D., Udrescu, S., 1990, Fizica solurilor agricole, Editura Ceres, Bucureşti.

[2]Duma Copcea, A., 2006, Solurile judeţului Mehedinţi şi favorabilitatea lor pentru culturi agricole, Editura Eurobit, Timişoara.

[3]Duma Copcea, A., Stroia, M.S., 2007, Ştiinţele solului. Editura Agroprint, Timişoara.

[4]Duma Copcea, A., 2012, Pedologie, Editura Agroprint, Timişoara.

[5]Rusu I., 2001, Pedologie, partea I, Editura Solness, Timişoara.

[6]Ghidul excursiilor aplicative – Consfătuire ştiinţifică "Implementarea noului sistem de clasificare a solurilor în Mehedinţi şi Gorj".

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SOIL PRODUCTION CAPACITY FROM PESAC, TIMIŞ COUNTY FOR DIFFERENT CROPS AND AGRICULTURAL USE

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Abstract

For soil production capacity appreciation of agricultural fields from Pesac, Timiş County we selected from the entire weather conditions a number of 17 more significant indicators that can be precisely determined. Relying on these indicators and on the scales we extracted from tables, annexes 3 – 1 to 3 – 18, (in conformity with the elaboration methodology of soil studies, second part) hierarchy coefficients that express de favorability degree of an indicator for every crop and usage category of agricultural field. Agricultural production, especially the plant directly influenced by environmental factors and conditions, which are in constant stability, and different degrees of relation to human intent and decision to change it, is a decisive factor in the economic development of society.
Naturally, every manifestation of climate characteristics is determined by the geographical location of the place looked, especially in terms of latitude. These two factors determine, along with the exhibition, the ratio of land area to sun and heat reception mode by default, and to a large extent and manifestation rainfall.

Key words: *capacity, physical and chemical feature, soil*

INTRODUCTION

Being an area with a good drainage we find chernozem soils that are specific to the north–west area.[2]We can separate this type of soil in many subtypes, and the dominant subtype is the wet water table chernozem. [4] Due to the physic, chemical and biological proprieties these types of soils have a higher natural fertility. [1] On this type of soil we have good cereal, technical plants and fodder cultures.[3] In depression areas we have gley-soils that appear due to the risen water table rich in potassium.[6]
Land evaluation under natural conditions is a complex operation knowledge of the natural resources for growth and fruiting plants and determines the suitability of the conditions imposed for each use and culture in part, through a system of indices of evaluation techniques and notes.[7]

MATERIALS AND METHODS

Assessing agricultural lands is a complex operation aiming at the deep knowledge of the plants' growth and development conditions and at determining the suitability degree of these conditions for each use and crop (given that a land can be suitable for certain uses and crops, but unsuitable for others) through a system of technical indices and land assessment grades. As such, land assessment determines how much better a land is compared to other ones taking into account its fertility as shown by the vegetal production.
The object of land assessment is land that is to be divided so that each area taken into account is as homogeneous as possible from the point of view of all environmental conditions and vegetation factors. These land parcels are called land units (LU) or homogeneous ecological lands (HEL), and they represent the basic units of the land with their specific features, distinct from the neighbouring areas.
For the calculus of land assessment grades we have chosen, from the multitude of environmental conditions, only those that characterise each land unit in our soil study, the most important ones for us, the easiest and the most accurate to measure, and the ones

that are usually mentioned in literature (e.g., those that are mentioned in the research carried out by the OSPA – Timis starting with 1976); these land assessment indices are: index 3. C – mean annual temperatures – corrected values; index 4. C – mean annual rainfalls – corrected values; index 14. – gleysation; index 15. – pseudo-gleysation; index 16 or 17 – salinisation or alkalinisation; index 23. A – texture of Ap in the first 20 cm; index 29 – pollution; index 33 – slope; index 38 – land gliding; index 39 – depth of water table; index 40 – liability to inundation; index 44 – total porosity in the restrictive horizon; index 61 – contents of total $CaCO_3$ within 0-50 cm; index 63 – Ap reaction in the first 20 cm; index 69 – base saturation level in the Ap or within 0-20 cm; index 133 – edaphic volume; index 144 – humus supply within 0-50 cm; index 181 – stagnant (surface) moisture excess.

In land assessment for natural conditions, each of these indices – except for index 69, which cooperates indirectly – contributes to the land assessment grade through a land assessment coefficient ranging between 0 and 1, depending on the feature (totally unsuitable or optimal) for the use of crop taken into account).

For each index, depending on its scale of use or crop, we designed tables containing their values.

RESULTS AND DISCUSSIONS

Table 1. Soil favorability from Pesac, Timis County for wheat, barley, corn and sun flower crops

Nr.	Soil type	Wheat		Barley		Corn		Sun Flower	
		HN	DF	HN	DF	HN	DF	HN	DF
1	Chernozem	90	II	90	II	90	II	90	II
2	Typical chernozem	80	III	80	III	80	III	80	III
3	Black gley-soil	46	VI	46	VI	45	VI	48	VI
4	Typical gley-soil	39	VII	43	VI	44	VI	48	VI

*HN = hierarchy note
*DF = degree of fertilization

From the hierarchy notes analysis for the straw-like crops (autumn wheat and barley) we can observe an accentuated difference of the soil units in what concerns the conditions that are created for the plants. The biggest notes are obtained by the typical chernozem with a degree of fertilization of II, respectively III.

Table 2. Soil favorability from Pesac, Timis Couny for potatoes and beet crops

Nr.	Soil type	Potatoes		Beet	
		HN	DF	HN	DF
1	Chernozem	90	II	90	II
2	Typical chernozem	90	II	90	II
3	Black gley-soil	53	V	46	VI
4	Typical gley-soil	53	V	58	V

*HN = hierarchy note
*DF = degree of fertilization

For the potato and sugar beet crops we obtained high values in chernozems and lower values in gley-soils.

The low values of gley-soils are explained by the exigency that these crops manifest towards the climate conditions and the physical and chemical proprieties in which the root system develops and from where the main production is obtained – roots and tubers.

Table 3. Soil favorability from Pesac, Timis County for linseed oil, flax bundle and hemp crops

Nr.	Soil type	Linseed oil		Flax bundle		Hemp	
		HN	DF	HN	DF	HN	DF
1	Chernozem	90	II	90	II	90	II
2	Typical chernozem	70	IV	70	IV	70	IV
3	Black gley-soil	46	VI	33	VII	39	VII
4	Typical gley-soil	46	VI	33	VII	33	VII

*HN = hierarchy notes
*DF = degree of fertilization

Linseed oil, flax bundle and hemp find less favorable conditions in black gley-soil and typical gley-soil.

Table 4. Soil favorability from Pesac, Timis County for pastures and hay-fields

Nr.	Soil type	Pastures		Hay-fields	
		HN	DF	HN	DF
1	Chernozem	90	II	90	II
2	Typical chernozem	80	III	80	III
3	Black gley-soil	65	IV	56	V
4	Typical gley-soil	47	VI	41	VI

*HN = hierarchy notes
*DF = degree of fertilization

Hay-fields manifest an exigency towards the physical and chemical proprieties of the selected soils which leads to the drop of hierarchy notes at the following soils: black gley-soil and typical gley-soil.

Table 5. Soil favorability from Pesac, Timis County for apple, pear and plum trees

Nr.	Soil type	Apple tree		Pear tree		Plum tree	
		HN	DF	HN	DF	HN	DF
1	Chernozem	80	III	70	IV	90	II
2	Typical chernozem	80	III	80	III	90	II
3	Black gley-soil	14	IX	14	IX	14	IX
4	Typical gley-soil	12	IX	12	IX	12	IX

*HN = hierarchy notes
*DF = degree of fertilization

The trees present an exigency especially regarding the gleizare and alkalization processes. The presence of small depth mineralized water table expels the placement of apple, pear and plum cultures on black gley-soil and typical gley-soil.

Table 6. Soil favorability from Pesac, Timis County for grape vine and table vine

Nr.	Soil type	Grape vine		Table vine	
		HN	DF	HN	DF
1	Chernozem	90	II	90	II
2	Typical chernozem	80	III	80	III
3	Black gley-soil	17	IX	17	IX
4	Typical gley-soil	18	IX	21	VIII

*HN = hierarchy notes
*DF = degree of fertilization

Unfavorable or less favorable conditions for these soils are given by the following types of soils: black gley-soil and typical gley-soil.

Table .7 Soil favorability from Pesac, Timis County for vegetables

Nr.	Soil type	Vegetables	
		HN	DF
1	Chernozem	90	II
2	Typical chernozem	80	III
3	Black gley-soil	14	IX
4	Typical gley-soil	12	IX

*HN = hierarchy notes
*DF = degree of fertilization

Vegetables can be easily cultivated on soils with a secure water source for irrigation purposes and a series of other favorable elements.

Favorable conditions are given by the following types of soils:

-Chernozem with a score of 90 and a fertility degree of II;

-Typical chernozem with a score of 80 and a fertility degree of III.

Unfavorable conditions for this type of crop due to short horizons, erosion and surface calcium carbonate are given by the following types of soils:

-Black gley-soil and typical gley-soil have bonus notes which are framed in the IX fertility degree.

CONCLUSIONS

Chernozems are soils that have the best physical and chemical proprieties, and that is why they have a high production potential.

Chernozems are good for every type of crop.

We obtained good results in: wheat, barley, corn, beet, sun flower and potatoes.

Good results are obtained in vine and fruit trees.

To grow chernozem fertility it is recommended:

-Agro-technical works that will lead to accumulation and maintenance of water in the soil;

-Periodic appliance of organic fertilizers and moderate fertilization with NPK;

-Monoculture avoidance and rigorous appliance of a crop rotation;

-Completion of the humidity deficit through irrigations in case of sugar beet, corn etc.;

-On the gley-soils, due to the periodical oscillations of the water table that influences negatively the physical and chemical parameters and the fertility, the crops hardly bear the lack and the excess of humidity.

The gley-soils that developed on more permeable rocks that have a better drainage are more productive, being covered with pastures or medium quality forests.

After amelioration we can cultivate: wheat, corn, barley, sun flower.

Gley-soils are not recommended for vine or fruit trees cultivation.

For the fertility growth of the gley-soils it is recommended:
-Organic and mineral fertilization;
-Application of calcareous amendments.

REFERENCES

[1]Mihut Casiana, Isidora Radulov, 2012, Stiintele solului, Editura Eurobit, Timisoara.
[2]Duma Copcea, A., Stroia, M.S., 2007, Ştiinţele solului. Editura Agroprint, Timişoara.
[3]Duma Copcea, A., 2012, Pedologie, Editura Agroprint, Timişoara.
[4] Rusu, I., 2001, Pedologie, partea I, Editura Solness, Timişoara.
[5]Ianoş, G., Ţimbota, I., 1987, Metodologia elaborării studiilor pedologice, vol III,Bucureşti.
[6]Rusu, I., 2001, Pedologie partea I, Editura Solness, Timişoara.
[7]Teaci, D., 1970, Bonitarea terenurilor agricole, Editura Ceres, Bucureşti.

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STUDIES CONCERNING THE UTILISATION OF DIGESTATE IN BIOGAS PLANTS

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Abstract

This paper aims to expose the many possibilities of using digestate in biogas plants and the advantages of its using. In agricultural animal farms is produced a big quantity of animal manure, which must be adequate managed, mainly as fertiliser. The most advantageous solution of using animal manure and slurry is using it in biogas plants, where, due to degradation of organic matter, digestate is easier to pump and easier to apply as fertiliser, with reduced need of stirring, compared to untreated slurry. The researches made showes that digestate has lower C/N ratio, compared to raw manure. This property means that digestate has a better effect in fertilisation with Nitrogen on short term. The paper also shows the effects of digestate application on soil, compared to compost application of digestate as fertiliser, must be done on the basis of a fertiliser plan. The fertiliser plan with digestate is elaborated for each agricultural farm, according to the type of crop.

***Key words*:** *biogas plant, digestate, fertiliser*

INTRODUCTION

In modern EU agriculture, in which we want to be integrated, biogas production is an integrated element of modern, holistic agriculture, which takes into consideration not only economic costs and benefits of agricultural activities, but also socio-economic and environmental benefits, especially in rural areas. Agricultural biogas production provides agricultural, economic and environmental benefits and for this reason, the promoters of the biogas development in Europe, after the oil crisis, were the organic farmers, interested in anaerobe digestion not only for renewable energy generation, but as a way to improve fertiliser quality of their animal manure.

On the other hand, animal production is known also for producing large amounts of animal manure. There are frequent situations where the animal farms do not own enough agricultural land for using optimally the produced manure and slurries as fertiliser. The excess of animal manure requires adequate manure management measures, in order to prevent serious consequences of excessive fertilisation with animal manure in these areas, such as:

- Pollution of ground and surface water through leakage
- Damage of soil structure and soil microbiology
- Damage of specific grassland vegetation populations and formation of typical "slurry vegetation"
- Increased risks of methane and ammonia emissions
- Odour and fly nuisance, from manure storage and application
- Increased risk of contamination and of spreading pathogens

Anaerobe digestion of animal manure and slurries can be the solution to the above situation, allowing environmental friendly agricultural practices.

MATERIALS AND METHODS

Biodegradation of organic matter

Treatment of animal manure and slurries in biogas plants results in biodegradation of organic matter to inorganic compounds and methane. In practice, the anaerobic

degradation rate of organic matter from animal manure and slurries is about 40% for cattle slurry and of 65% for pig slurry. The degradation rate depends at large on feedstock type (Table 1) and process temperature. Due to degradation of organic matter, digestate is easier to pump and easier to apply as fertiliser, with reduced need of stirring, compared to untreated slurry.

Table 1. Nutrient distribution in digestate, compared to cattle and pig slurry

	Dry matter %	**Total N Kg /ton**	**NH_4 - N kg/ ton**	**P Kg /ton**	**K kg/ ton**	**pH**
Cattle slurry	6,0	5,0	2,8	0,8	3,5	6,5
Pig slurry	4,0	5,0	3,8	1,0	2,0	7,0
Digested slurry	2,8	5,0	4,0	0,9	2,8	7,5

Source: [1]

One of the important positive changes which take place through anaerobe digestion of manure is the significant reduction of odoriferous substances (volatile acids, phenol and phenol derivatives).

Experience shows that up to 80% of odours in feedstock substrates can be reduced by anaerobe digestion. It is not only a reduction of the intensity and persistence of odours (Figure 1), but also a positive change in the composition of odours, as digestate no longer has the unpleasant slurry smell, but smells more like ammonia. Even if stored for longer periods of time, digestate shows no increase in emission of odours. Figure 1 shows that, 12 hours after the application of digestate, the odour has almost disappeared.

The anaerobe digestion process is able to inactivate viruses, bacteria and parasites in the treated feedstock substrates, an effect which is usually called sanitation.

The sanitation efficiency of anaerobe digestion depends on the actual retention time of the feedstock inside the digester, the process temperature, the stirring technique and digester type.

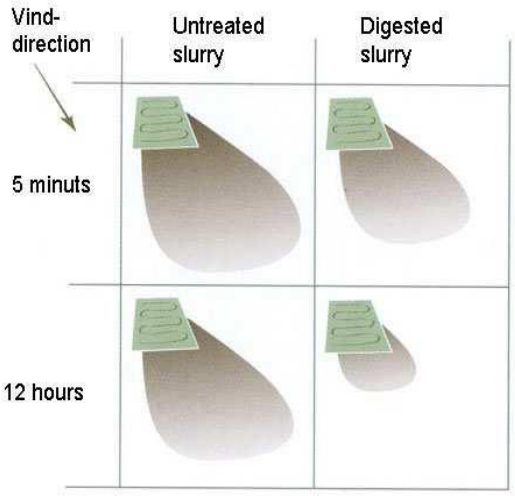

Fig. 1 Area affected and persistence of odour nuisance, after application of digestate and of untreated slurry, on a field with northwest wind (BIRKMOSE 2002)

The best sanitation is obtained at thermophilic temperatures (50-55°C) in an elongated plug flow reactor, with the appropriate retention time. In this digester type no mixing of digestate with fresh feedstock occurs, allowing up to 99% of all pathogens to be destroyed.

In order to ensure veterinary safe recycling of digestate as fertiliser, European legislation requires specific sanitation measures in the case of feedstock types of animal origin. Depending on the type of feedstock pre-sanitation by pasteurisation or by pressure sterilisation is required before supplying the substrate to digester. A considerable reduction of germination capacity of weed seeds occurs throughout the anaerobe digestion (AD) process. This way, biogas production contributes to ecological weed reduction.

Application of raw slurry as fertiliser can cause burning of plant leaves, which is the effect of low-density fatty acids, such as acetic acid. When fertilising with digestate, plant burns are avoided, as most fatty acids have been broken down by the AD process. Digestate flows more easily off the plants vegetable parts compared to raw slurry, which reduces the time of direct contact between digestate and the aerial parts of the plants, reducing the risk of leaf damage.

RESULTS AND DISCUSSIONS

In this paper we will show the superiority of using digestate over using animal manure or untreated slurry.

Through the anaerobe process, most organically bound nutrients, in particular nitrogen, are mineralised and become easily available to the plants. Figure 2 shows nitrogen utilisation from digested slurry, applied to winter wheat and spring barley, compared to nitrogen utilisation from untreated slurry. Because of the increased availability of nitrogen, digestate can be integrated in the fertilisation plant of the farm, as it is possible to calculate its fertiliser effects in the same way as for mineral fertilisers.

Digestate has lower C/N ratio, compared to raw manure. Lower C/N ratio means that digestate has a better short term N-fertilisation effect. When the value of the C/N ratio is too high, micro-organisms take hold in the soil, as they successfully compete with the plant roots for the available nitrogen.

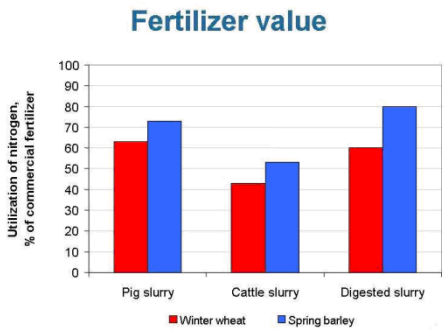

Fig. 2. Application of digestate as fertiliser

Digestate is more homogenous, compared to raw slurry, with an improved N-P balance. It has a declared content of plant nutrients, allowing accurate dosage and integration in fertilisation plans of farms. Digestate contains more inorganic nitrogen, easier accessible to the plants, than untreated slurry. N-efficiency will increase considerably and nutrient losses by leaching and evaporation will be minimised if digestate is used as fertiliser in conformity with good agricultural practice.

Due to its higher homogeneity and flow properties, digestate penetrates in soil faster than raw slurry. Nevertheless, application of digestate as fertiliser involves risks of nitrogen losses through ammonia emissions and nitrate leaking. In order to minimise these risks, some simple rules of good agricultural practice must be respected:

- Avoid too much stirring of digestate before application
- Application of cooled digestate, from the post storage tank
- Application with dragging pipes, dragging hoses, direct injection in soil or disk injectors
- Immediate incorporation in soil, if applied on the surface of soil
- Application at the start of the growing season or during vegetative growth
- Application to winter crops should be started with 1/3 of the total N requirement
- Optimum weather conditions for application of digestate are: rainy, high humidity and no wind. Dry, sunny and windy weather reduces the N-efficiency considerably.

Depending on the crop, experience shows that, in Europe, the best time for digestate application is during vigorous vegetative growth. Application as top-fertiliser on crops in full vegetation offers little concern about loss of e.g. nitrogen as nitrate into ground water, since the main part is absorbed immediately by the plants.

Effects of digestate application on soil

Degradation of organic matter, which occurs through AD process, includes degradation of carbon bounds, organic acids as well as odoriferous and caustic substances. For this reason, when applied on soil, digestate creates less stress and more suitable environment for soil organisms, compared to application of raw slurry. Direct measurements of biological oxygen demand of digested cattle and pig slurry showed ten times less oxygen demand than in the case of undigested slurry. As oxygen consumption is reduced, so is the tendency to form anoxic soil areas, such as oxygen free, nitrogen containing zones. The capability to build up new soil and the humus reproduction through supplied organic matter is also higher, when compared to fertilisation

with raw slurry. In Figure 3 it is shown an example of vehicle used for digestate application.

Fig. 3. Vehicles for application of digestate as fertiliser, using dragging hoses (AGRINZ 2008)

Compared to compost and to untreated slurry application, digestate supplies larger portions of carbon, available for the reproduction of organic substances in soils. During anaerobe digestion, decomposable organic bounds such as cellulose and fatty acids are broken down. The lignin bounds, valuable for formation of humus, remain. Methane bacteria themselves produce a whole series of amino acids, which are available for plants and other living organisms in the soil. German studies made with digested pig slurry showed an increase in humus production efficiency index from 0,82 to 1,04.

Table 2. Separated fractions by decanter centrifuge (AL SEADI and MOELLER, 2003)

	Amounts %	**DM %**	**N %**	**NH4-N %**	**P %**	**K %**
Raw slurry	100	100	100	100	100	100
		(6,4%)	(5,7%)	(4,2%)	(1,6%)	(2,6 %)
Solid fraction	14	65	25	15	75	17
		(30%)	(10,1%)	(4,5%)	(8,7%)	(3,1 %)
Liquid fraction	86	35	75	65	25	83
		(2,6%)	(4,9%)	(4,2%)	(0,5%)	(2,5 %)

Source: [1]

In Table 2 is presented a comparison between the separation fractions of solid fraction, liquid fraction and raw slurry, showing their superiority over raw slurry.

Complete conditioning separates digestate in three refined end products: pure water, concentrated nutrients and organic fibres. All nutrients (nitrogen, phosphorus, and potassium) and organic bounds are separated from the main stream in a low volume, concentrated form.

The remaining purified water can be disposed into the surface water system or used as process water. The complete conditioning is particularly suitable for agricultural areas containing nitrogen in excess.

In both cases (partial or complete conditioning), the first step is the separation of liquid and fibre fractions, which divides the digestate into a concentrated carbon and phosphorus enriched solid fraction and a nitrogen rich, fluid fraction. Depending on the plant configuration and the type of conditioning, the complete conditioning further concentrates or separates the NPK nutrients. The most used processes include membrane separation technologies, sorption or stripping of ammonia and evaporation or biological treatment.

The fibre separation is done by separators or spiral sieves, decanters and occasionally by ribbon-sieve presses (Figure 4). 15-20% of the solids are separated by spiral sieves and more than 60% by decanter centrifuges. Most of nitrogen (up to 90%) is separated with the liquid fraction, while phosphorus is only partially removed, as bonded to the fibre fraction/particles of solid matter.

Fig. 4. Fibers collection wagon with distribution screw (ANGELIDAKI, 2004)

Membrane Separation Technology

A membrane is a filter with very fine pores, which can separate particles and solutes from most of the liquids on a molecular scale. The decision to use micro-, ultra-, or nano-filtration or soluble reverse osmosis depends on the size of the particles to be separated. The process is based on the difference of pressure between the two sides of the membrane, i.e. water, as well as minute particles, passing the membrane under pressure. Several conditioning steps are often connected, in successive series, in order to achieve the desired separation. For example, larger particles are removed from a decanter filtrate, through a first step of ultra-filtration and then the solubles are removed in a second step by reverse osmosis. Besides purified water, the membrane separation produces a nutrient rich concentrate, which can be sold either directly as liquid fertiliser, or further processed for volume reduction through evaporation.

Through evaporation, the liquid is further refined and separated into nutrients and purified water. Evaporation units require high energy consumption.

Conditioning technologies (especially the complete conditioning) require high energy consumption in order to create the pressure used in membrane technologies, or for the production of heat, used in evaporation processes. Up to 50% of the biogas produced electricity is necessary for the complete conditioning of the produced digestate, using membrane technology. Partial conditioning is less energy demanding, cheaper and, in regions where there is a surplus of phosphorus, it is the most economical conditioning technology.

In all the cases, the conditioning technology is chosen according to the chemical and physical characteristics of digestate, herewith the tendency of the digestate to layer formation. If complete conditioning is aimed, it is important that most of the digestible dry matter is removed through complete separation of liquid and fibres, followed by ultra filtration (< 0,2 mm), so that the remaining liquid fraction has almost the quality of pure water. If the separated fractions do not reach the necessary level of purity, or if the chosen membranes and processes are not suitable for digestate, the expenditures for energy, labour, maintenance and cleaning of the system can increase considerably.

Nutrient management in digestate

One of the important aspects regarding recycling of digestate is the load of nutrients on farmland. Nitrate leaching or phosphorus overloading can occur due to inappropriate handling, storage and application of digestate as fertiliser.

In Europe, the Nitrate Directive (91/676/EEC) restricts the input of nitrogen on farmland, aiming to protect the ground and surface water from nitrate pollution and allows maximum 170 kg N/ha/year. Nutrient loading on farmland is regulated by national legislation in most European countries (Table 3).

Table 3. Example of national regulations of the nutrient loading on farmland (NORDBERG, 1999)

	Maximum nutrient load	**Required storage capacity**	**Compulsory season for spreading**
Austria	170 kg N/ha/year	6 months	28/2-25/10
Denmark	170 kg N/ha /year (cattle) 140 kg N/ha/year (pig)	9 months	1/2-harvest
Italy	170-500 kg N/ha /year	90-180 days	1/2- 1/12
Sweden	Based on livestock units	6-10 months	1/2- 1/12

Source: [1]

Application of digestate as fertiliser must be done on the basis of a fertiliser plan. The fertiliser plan is elaborated for each agricultural field, according to the type of crop, the planned crop yield, the anticipated utilisation percentage of nutrients in digestate, the type of soil (texture, structure, quality, pH), the existing reserve of macro and micro nutrients in the soil, the pre-crop and the irrigation conditions and the geographic area.

Experience from Denmark indicates that the most economic and environmental friendly

strategy of application of digestate as fertiliser is by fulfilling the phosphorus requirement of the crops with phosphorus from digestate. Application of digestate to fulfil the phosphorus requirement implies also a partial fulfilment of nitrogen requirement of the crops. The remaining nitrogen requirement can thus be completed by application of mineral fertiliser.

CONCLUSIONS

Using digestate in biogas plant is very usefull from many points of views.

Compared to compost and to untreated slurry application, digestate supplies larger portions of carbon, available for the reproduction of organic substances in soils. During anaerobe digestion, decomposable organic bounds such as cellulose and fatty acids are broken down.

Methane bacteria produce a whole series of amino acids, which are available for plants and other living organisms in the soil.

On the other hand, complete conditioning separates digestate in three refined end products: pure water, concentrated nutrients and organic fibres.

This paper also emphasizes the importance of nutrient management in digestate.

In EU there are directives that restricts the input of nitrogen on farmland, aiming to protect the ground and surface water from nitrate pollution. Application of digestate as fertiliser must be done on the basis of a fertiliser plan.

REFERENCES

[1]Teodorita Al Seadi, Dominik Rutz, Heinz Prassl, Michael Köttner, Tobias Finsterwalder, Silke Volk, Rainer Janssen, 2008, Biogas handbook, University of Southern Denmark Esbjerg, Denmark

[2]Al Seadi, T., 2001, Good practice in quality management of AD residues from biogas production. Report made for the International Energy Agency, Task 24- Energy from Biological Conversion of Organic Waste. Published by IEA Bioenergy and AEA Technology Environment, Oxfordshire, United Kingdom

[3]Dumitru, M., 2012, The advantages of using biogas as an alternative fuel in rural areas, Bulletin UASVM Agriculture, 69(1)/2012, Print ISSN 1843-5246; Electronic ISSN 1843-5386

[4]Dumitru, M., Moise, G., Bibu, M., 2013, Obtaining bioethanol used as biofuel for auto-vehicles using a self pressured bioreactor**,** Simpozionul ştiinţific internaţional „Managementul dezvoltării rurale durabile, Timisoara "Lucrări Ştiinţifice Management AGRICOL" Seria I, vol. XV - ISSN:1453-1410, E-ISSN: 2069-2307

[5]Jönsson, O. *et al.*, 2001, Adding gas from biomass to the gas grid, Swedish Gas Center Report, SGC 118.ISSN 1102-7371

[6]Meynell, P.J., 1976, Methane, Planning a Digester, Prism Press, Dorset, England

[7]Moller, H. *et al*., 2004, Methane productivity of manure, straw and solid fractions of manure, Biomass & Bioenergy 26, pp 485-495

[8]Persson, M., 2007, Biogas-a renewablefuel for the transport sector for the present and the future, SGC, www.sgc.se

[9]Preißler, D., 2007, Anaerobic digestition of energy crops without manure addition, 35.Symposium "Actual Tasks of Agricultural Engineering", Opatija, Croatia, S. 363-370.

[10]Boukis, I., Sioulas, K., Chatziathanassiou, A., Kakaniaris, A., Mavrogiorgos, D., 2002, Development of networking and synergies for Anaerobic Digestion energy schemes based on agro-industrial wastes in Southern Europe, The citrus-processing industries case study. "Energy Efficiency and Agricultural Engineering" Proceedings of the Union of Scientists, Rousse-Bulgaria Volume I, 255-263

[11]Chatziathanassiou, A., Sioulas, K., Mavrogiorgos, D., Veneti, A., Boukis, I., 2002, Stakeholders' perceptions for Anaerobic Digestion Energy Schemes in Greece, 12th European Conference and Technology Exhibition on biomass for Energy, Industry and Climate Protection, Amsterdam, The Netherlands

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CONSIDERATIONS OVER A BIOGAS PLANT COMPONENTS

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Abstract

This paper starts from the conviction that one of the main environmental problems of today's society is the continuously increasing production of organic wastes. In many countries, sustainable waste management have become major political priorities in order to reduce pollution and greenhouse gas emissions and to avoid, as much as possible, global climate changes. This problem becomes more and more present in our country too. Production of biogas through anaerobic digestion of animal manure and slurries as well as of a wide range of digestible organic wastes, converts these substrates into renewable energy and offers a natural fertiliser for agriculture. That is why we consider that biogas plants will be more and more used in the future. In this paper we show the different stages which must be operated in a biogas plant and the problems which can be met in each of them.

Key words**:** *biogas plant, digestate, feedstock, fertiliser*

INTRODUCTION

In the recent years, our country begins to use more and more the biogas plants, due the advantages which these plants provides.

A biogas plant is a complex installation, consisting of a variety of elements. The layout of such a plant depends to a large extent on the types and amounts of feedstock supplied. As there are many different feedstock types suitable for digestion in biogas plants, there are, correspondingly, various techniques for treating these feedstock types and different digester constructions and systems of operation. Furthermore, depending on the type, size and operational conditions of each biogas plant, various technologies for conditioning, storage and utilisation of biogas are possible to implement. As for storage and utilisation of digestate, this is primarily oriented towards its utilisation as fertiliser and the necessary environmental protection measures related to it.

MATERIALS AND METHODS

The main process steps in a biogas plant are presented in Figure 1. The differentiation in wet and dry anaerobe digestion is only theoretical, since microbiological processes always take place in fluid media. The limit between wet and dry digestion is determined by the "pumpability" of the feedstock. Direct supply of relatively dry feedstock into the digester increases the DM content of the feedstock mixture.

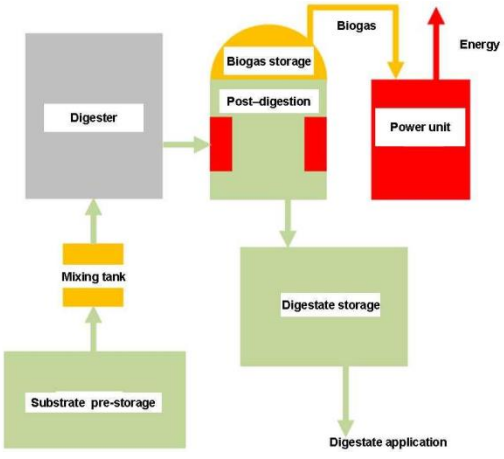

Fig. 1. Main components and general process flow of biogas production (PRAßL 2008)

Agricultural biogas plants operate with four different process stages:

1.Transport, delivery, storage and pre-treatment of feedstock

2. Biogas production
3. Storage of digestate, eventual conditioning and utilisation
4. Storage of biogas, conditioning and utilisation

The process stages shown in Figure 2 are showing a simplified representation of a typical agricultural co-digestion plant.

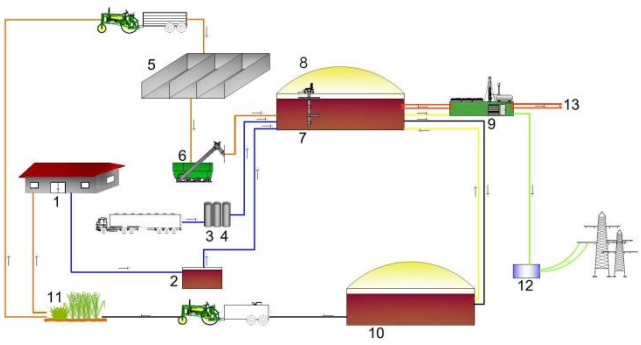

Fig. 2. Agricultural co-digestion biogas plant using manure and maize silage (LORENZ, 2008)
1 Stalls
2 Liquid manure tanks
3 Collection bins for biowaste (co-substrate)
4 Sanitation tank
5 Drive-in storage tanks
6 Solid feedstock feed-in system
7 Digester (Biogas reactor)
8 Biogas storage tank
9 CHP plant
10 Digestate storage
11 Agricultural fields
12 Transformer/ Power to greed

1.The first process stage (storage, conditioning, transport and insertion of feedstock) includes the storage tank for manure (2), the collection bins (3), the sanitation tank (4), the drive-in storage tanks (5) and the solid feedstock feeding system (6).
2.The second process stage includes the biogas production in the biogas reactor (7), also referred to as the digester.
3.The third process stage is represented by the storage tank for digestate (10) and the utilisation of digestate as fertiliser on the fields (11).
4.The fourth process stage (biogas storage, conditioning and utilisation) consists of the gas storage tank (8) and the CHP- unit (9).
These four process stages are closely linked to each other.

When building a biogas plant, the choice of type and the design of the plant are mainly determined by the amount and type of available feedstock. The amount of feedstock determines the dimensioning of the digester size, storage capacities and CHP unit. The feedstock types and quality determines the process technology.
Depending on the composition of the feedstock, it may be necessary to separate problematic materials, to mash the feedstock or even to add water, in order to convert it into a pumpable mixture. If the supplied feedstock is prone to contamination it is necessary to include a pre-sanitation step in the overall design of the future plant.
In the case of wet digestion, single-stage anaerobe digestion (AD) plants, operating with flow-through process are usually used. In the two-stage process, apre-digester is placed before the main digester.The pre-digester creates the optimal conditions for the first two process steps of the AD process (hydrolysis and acid formation). After pre-digester, the feedstock enters the main digester, where the subsequent AD steps take place.
The digested substrate (digestate) is pumped out of the digester and stored in storage tanks. These storage tanks should be provided with covers of gas proof membranes, to facilitate collection of the biogas production which can take place inside these tanks, at ambient temperature (post-digestion). Alternatively, digestate can be stored in open digestate containers, with natural or artificial floating layer, aimed to minimise surface emissions.
The produced biogas is stored, conditioned and used for energy generation.

Feedstock receiving unit

Transport and supply of feedstock plays an important role in the operation of a biogas plant. It is thus important to ensure a stable and continuous supply of feedstock, of suitable quality and quantities. If the biogas plant operator is at the same time the feedstock producer, then the high quality feedstock supply can be easily guaranteed. In many cases, the biogas plants receive additional feedstock (co-substrates), produced by neighbouring farms, industries or

households. In these cases, management of feedstock quality is necessary, in order to check, account and verify the supplied material. In a first step, it is absolutely necessary to make visual control of each feedstock load. Then, the delivery weight and all feedstock data (supplier, date, quantity, type of feedstock, processes of origin and quality) should be recorded. Particular attention is needed for feedstock types classified as wastes, for which it may be necessary to fulfil regulatory obligations (depending on the waste category), as well as legal and administrative conditions.

Feedstock storage and conditioning

Feedstock storage serves primarily to compensate the seasonal fluctuations of feedstock supply. It also facilitates mixing different co-substrates for continuous feeding of the digester.

The type of storage facilities depends on the feedstock used. Storage facilities can be mainly classified into bunker silos for solid feedstock (e.g. maize silage) and storage tanks for liquid feedstock (e.g. liquid manure and slurries). Usually, bunker silos have the capacity to store feedstock more than one year and storage tanks for manure have the capacity to store feedstock several days. In some cases, also vertical cylinder silos can be used as well. The dimensioning of the storage facilities is determined by the quantities to be stored, delivery intervals and the daily amounts fed into the digester.

Bunker silos for energy crops

Bunker silos were originally developed to store silage as animal fodder and thus to balance its seasonal availability. Nowadays this type of storage is frequently used for storing the energy crops used as feedstock for biogas production.

Silage must be made from plant material with suitable moisture content (55-70%, depending on the means of storage, degree of compression and water content that will be lost during storage).

In the case of bunker silos, it must always be considered that the fermentation process of the silage releases liquids which can contaminate water courses, unless precautions are taken.

The high nutrient content can lead to eutrophication of surface waters (growth of algaeblooms). Silo effluent contains nitric acid (HNO), which is a corrosive compound.

Storage tanks for pumpable feedstock

Pumpable feedstock is generally stored in sealed, water-tight and reinforced concrete tanks in or above the ground. These tanks, similar to the ones used in agriculture, for storage of liquid manure, usually have a storage capacity sufficient for one to two days. To prevent emissions,all storage tanks should be covered. The chosen solution for cover must ensure easy opening and removal of settled sediments. If storage tanks are placed on a higher level compared to the digester (sloping topography), the hydraulic incline eliminates the need for transport equipment (pumps) and saves energy.

Storage tanks for pumpable feedstock require limited maintenance, this including removal of sediment layers of sand and stones, which reduce the storage capacity of the tanks. Sediments are removed using scrape floors, conveyor screws, sump pumps, collection tanks or countersink aggregates.

Feedstock types of industrial origin can require sanitation measures and must therefore always be handled and stored strictly separated from the delivery station for agricultural feedstock, in order to prevent mixing critical feedstock with non-critical feedstock, before processing in the sanitation equipment.

Feeding system

After storage and pre-treatment, AD feedstock is fed into the digester. The feeding technique depends on the feedstock type and its pumpability. Pumpable feedstock is transferred from storage tanks to the digester by pumps. The pumpable feedstock category includes animal slurries and a large number of liquid organic wastes (e.g. flotation sludge, dairy wastes, fish oil). Feedstock types which are non-pumpable (fibrous materials, grass, maize silage, manure with high straw content) can be tipped/ poured by a loader into the feeding system and then fed into the digester

(e.g. by a screw pipe system). Both feedstock types (pumpable and non-pumpable) can be simultaneously fed into the digester. In this case it is preferable to feed the non-pumpable feedstock through by-passes.

From a microbiological point of view, the ideal situation for a stable AD process is a continuous flow of feedstock through the digester. In practice, the feedstock is added quasi-continuously to the digester, in several batches during the day. This saves energy as feeding aggregates are not in continuous operation. There are various feeding systems and their selection depends again on feedstock quality, herewith their pumpability and on feeding intervals.

RESULTS AND DISCUSSIONS

Special attention must be paid to the temperature of the feedstock which is fed into the digester. Large differences between the temperature of the new feedstock and the operation temperature of the digester can occur if the feedstock has been sanitised (up to 130°C) or during winter season (below 0°C). Temperature differences disturb the process microbiology, causing losses of gas yield and must therefore be avoided. There are several technical solutions to this problem, such as using heat pumps or heat exchangers to pre-heat /cool the feedstock before insertion in the digester.

Table 1. Nutrient distribution in digestate, compared to cattle and pig slurry

	Dry matter %	**Total N Kg /ton**	**NH_4 - N kg/ ton**	**P Kg /ton**	**K kg/ ton**	**pH**
Cattle slurry	6,0	5,0	2,8	0,8	3,5	6,5
Pig slurry	4,0	5,0	3,8	1,0	2,0	7,0
Digested slurry	2,8	5,0	4,0	0,9	2,8	7,5

Source: [1]

In Table 1 it is shown the superiority of using digested slurry over other organic slurry, concerning the content of n, P and K. One of the noticeable positive changes which take place through anaerobe digestion of manure is the significant reduction of odoriferous substances (volatile acids, phenol and phenol derivatives).

Experience shows that up to 80% of odours in feedstock substrates can be reduced by anaerobe digestion. It is not only a reduction of the intensity and persistence of odours (Figure 1), but also a positive change in the composition of odours, as digestate no longer has the unpleasant slurry smell, but smells more like ammonia. Even if stored for longer periods of time, digestate shows no increase in emission of odours. Figure 1 shows that, 12 hours after the application of digestate, the odour has almost disappeared.

The anaerobe digestion process is able to inactivate viruses, bacteria and parasites in the treated feedstock substrates, an effect which is usually called sanitation.

The sanitation efficiency of anaerobe digestion depends on the actual retention time of the feedstock inside the digester, the process temperature, the stirring technique and digester type.

The best sanitation is obtained at thermophilic temperatures (50-55°C) in e.g. an elongated plug flow reactor, with the appropriate retention time. In this digester type no mixing of digestate with fresh feedstock occurs, allowing up to 99% of all pathogens to be destroyed.

In order to ensure veterinary safe recycling of digestate as fertiliser, European legislation requires specific sanitation measures in the case of feedstock types of animal origin. Depending on the type of feedstock pre-sanitation by pasteurisation or by pressure sterilisation is required before supplying the substrate to digester. A considerable reduction of germination capacity of weed seeds occurs throughout the AD process. This way, biogas production contributes to ecological weed reduction.

Application of raw slurry as fertiliser can cause burning of plant leaves, which is the effect of low-density fatty acids, such as acetic acid. When fertilising with digestate, plant burns are avoided, as most fatty acids have been broken down by the AD process. Digestate flows more easily off the plants

vegetable parts compared to raw slurry, which reduces the time of direct contact between digestate and the aerial parts of the plants, reducing the risk of leaf damage.

Pumps for transport of pumpable feedstock

The transfer of pumpable feedstock substrate from the storage tank into the digester is done by pumps. Two types of pumps are frequently used: the centrifugal and the displacement pumps. Centrifugal (rotating) pumps are often submerged, but they can also be positioned in a dry shaft, next to the digester. For special applications, cutting pumps are available, which are used for materials with long fibres (straw, feed leftovers, grass cuttings). Displacement pumps (turning piston pumps, eccentric screw pumps) are more resistant to pressure than rotating pumps. They are self-sucking, work in two directions and reach relatively high pressures, with a diminished conveying capacity. However through their lower price, rotating pumps are more frequently chosen than displacement pumps.

Centrifugal pumps

A centrifugal pump is a roto-dynamic pump, using a rotating impeller to increase the velocity of a fluid. The fluid enters the pump impeller along or near the rotating axis and is accelerated by the impeller, flowing radially outward into a diffuser or volute chamber, from where it exits into the downstream piping system. Centrifugal pumps are commonly used to move liquids through a piping system and are therefore frequently used for handling liquid manure and slurries.

Pressure displacement pumps

For the transport of thick liquid feedstock, with high dry matter content, pressure displacement pumps (which are rotary piston and eccentric screw pumps) are often used. The quantity of transported material depends on the rotation speed, which enables better control of the pump and precise dosing of the pumped feedstock. Displacement pumps are self-sucking and more pressure stable than centrifugal pumps. For this reason, the piping performance is less dependent on difference in height. As pressure displacement pumps are relatively prone to problems caused by high fibre content in pumped materials, it makes sense to equip them with cutters and separators, to protect them from large particle size and fibrous materials.

The function of pumps, and by this the transport of pumpable substrate, is controlled automatically, using process computers and timers. In many cases the entire feedstock transport within the biogas plant is realised by one or two pumps, located in a pumping station, as it is shown in figure 3.

Fig. 3. Pumping systems (AGRINZ 2008)

In figure 4 it is shown that feeding solids to the digester through wash-in shafts or sluices is made by using front or wheel loaders, which allows large quantities of solids to be delivered any time, directly to the digester.

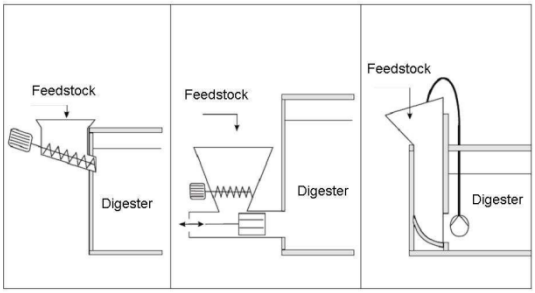

Fig. 4 Wash-in shaft, feed pistons and feed conveyors system for feedstock insertion into the digester (FAL 2006)

Heating system - digester heating

Constant process temperature inside the digester is one of the most important conditions for stable operation and high biogas yield. Temperature fluctuations,

including fluctuations determined by season and weather conditions as well as local fluctuations, in different areas of the digester, must be kept as low as possible. Large fluctuations of temperature lead to imbalance of the AD process, and in worst cases to complete process failure.

CONCLUSIONS

Through this paper, we wanted to show that biogas plants represent a viable alternative for energy in agricultural farms, considering our apartenance to EU. That is why we considered usefull to present the necessary steps which must be done in order to make a biogas plant. Thus, the first process stage is storage, conditioning, transport and insertion of feedstock, followed by biogas production in the biogas reactor. The third stage consists of storage of digestate, and, finally,the last stage is the storage of biogas.

The first thing to consider when we want to start a biogas plant is mainly determined by the amount and type of available feedstock. depending on the type, size and operational conditions of each biogas plant, various technologies for conditioning, storage and utilisation of biogas are possible to implement. As for storage and utilisation of digestate, this is primarily oriented towards its utilisation as fertiliser and the necessary environmental protection measures related to it.

Every stage presented in the paper has its particularities and things which must be considered. For example, constant process temperature inside the digester is one of the most important conditions for stable operation and high biogas yield.

It is a fact that a biogas plant is a complex enterprise, but it is worthy, in the conditions of a large agricultural farm.

REFERENCES

[1] Teodorita Al Seadi, Dominik Rutz, Heinz Prassl, Michael Köttner, Tobias Finsterwalder, Silke Volk, Rainer Janssen, 2008, Biogas handbook, University of Southern Denmark Esbjerg, Denmark

[2]Al Seadi,T., 2001, Good practice in quality management of AD residues from biogas production. Report made for the International Energy Agency, Task 24- Energy from Biological Conversion of Organic Waste. Published by IEA Bioenergy and AEA Technology Environment, Oxfordshire, United Kingdom

[3]Meynell, P.J., 1976, Methane, Planning a Digester, Prism Press, Dorset, England

[4]Moller, H. *et al*., 2004, Methane productivity of manure, straw and solid fractions of manure, Biomass & Bioenergy 26, pp 485-495

[5]Persson, M., 2007, Biogas-a renewable fuel for the transport sector for the present and the future, SGC, www.sgc.se

[6]Preißler, D., 2007, Anaerobic digestition of energy crops without manure addition, 35.Symposium "Actual Tasks of Agricultural Engineering", Opatija, Croatia, S. 363-370.

[7]Boukis I., Sioulas, K.,. Chatziathanassiou, A., Kakaniaris, A., Mavrogiorgos, D., 2002, Development of networking and synergies for Anaerobic Digestion energy schemes based on agro-industrial wastes in Southern Europe, The citrus-processing industries case study. "Energy Efficiency and Agricultural Engineering" Proceedings of the Union of Scientists, Rousse-Bulgaria Volume I, 255-263

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CASSAVA ENTREPRENEURSHIP AND GENDER PARTICIPATION IN UDI LOCAL GOVERNMENT AREA OF ENUGU STATE, NIGERIA

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Abstract

This Study on cassava entrepreneurship and gender participation was carried out in Udi local Government Area of Enugu State, Nigeria. Quarterly data from a panel of thirty male-headed and thirty female-headed cassava-based farm households randomly selected followings a multistage sampling of ten out of 24 autonomous communities of the study area was subjected to descriptive and inferential statistical analyses. Both male and female entrepreneurs engaged more on three of cassava products namely Garri, Fufu and Tapioca on account of relatively better profits from them. Segregating male from female entrepreneurs, participation of males in cassava enterprise was negatively influenced by adult number of males, time spent on housework, and daily non-farm wage while participation of females in the enterprise was influenced by adult number of females in household, daily non-farm wage, time spent on housework and frequency of contact with extension agency with challenges of high operational costs, and poor packaging on the enterprise in the area. To bring male and female entrepreneurs at par in terms of resource needs, all social and cultural constraints on female access to arable land and credit should be addressed by law such that that there will be prohibition against any discrimination on women. We recommended provision of financial credit and grants for SMEs development to enable entrepreneurs (especially women) purchase fertilizers and automated machines for processing, and packaging of the products to attract better prices.

Key words**:** *Entrepreneurship, Farm household, Gender participation, Udi, Cassava Value-chain*

INTRODUCTION

Cassava (*Manihot esculenta*) has remained one root crop widely cultivated, traded on and consumed in sub-Saharan Africa including Nigeria [1]. Production of this crop has remained in the hands of small-scale entrepreneurs who have taken advantage of fact that the crop is drought tolerant and can be grown on poor marginal soils, intercropped with other crops, can successfully store in the ground/soil for many months, and is highly marketed in tubers, granulated roasted (garri), in fermented pesta (fufu) and as cassava flours [2] to grow it and guarantee security in food with great wealth from the crop.

A cassava-based entrepreneur is that farmer or processor who had initiated, organized, and manages risks associated with cassava crop and/or its associated products and activities. The entrepreneur here is interested in innovations (new products, new production methods, new markets, and new forms of organizations) that create demand and ultimately wealth in appreciable quantity and speed. In agriculture, men and women have performed many and different gender roles in different farm enterprises either as planners, or owners, hired processors, or traders. In Nigeria, there has been serious call to develop cassava as not only a cash crop with local benefits but as an export crop [3, 4, 5]. How participatory have performance of these roles been on matters of product development and how much of the entrepreneurial functions are performed by males relative to that performed

by women are questions that prompted this investigation.

Women headship of households, especially lone mothers have often been associated with vulnerability to poverty, and are accused of being symptomatic to easy 'family breakdown' [6]. However, gender inequity exists as a pernicious obstacle to participation in development of females in developing economies [7]. A good product development approach must embrace gender participation to ensure that men and women in competition are 'equally involved' in meeting challenges of growth and development of the farm commodity, its involvement in creation of more jobs, and removal of distortions, and discriminations in labour markets [8]. This aptly applies to a choice crop like cassava where harvest and post-harvest value chain elements require gender decisions to reduce inefficiencies and improve profit. Commercial profitability of cassava should therefore reject the unitary household model and recognize other models that emphasize households as sites of bargaining, 'cooperative-conflict' and intra-household inequalities along gender lines whenever we consider resource generation and distribution [9]. In pursuing this line of reasoning therefore, the specific objectives of this study are, to (i) describe socio-economic characteristics of cassava - based farm entrepreneurs; (ii) determine profitability of entrepreneurship and challenges to cassava value chain activities, and (iii) segregate factors that influenced participation of male and female heads of farm households in cassava entrepreneurship in Udi.

MATERIALS AND METHODS

Area of Study

This study was carried out in Udi Local Government Area (LGA) of Enugu State, Nigeria. Udi LGA is one the seventeen LGAs of the state and shares boundaries in the East with Enugu North LGA, in the west with Ezeagu LGA, in the South with Oji-River LGA and in the North with Igbo Etiti LGA of the State. Udi is located between Latitudes 6^0 $12^/$ N and 10^0 $42^/$N of the Equator and between Longitudes 7^0 $10^/$E and 7^0 $28^/$E of the Greenwich Meridian. Udi LGA occupies an area of 973.80Km^2 and is situated within high populated Igbo eastern heartland with 234,002 inhabitants made up of 115,579 males and 118,423 females [10] [FRN, 2007]. Udi LGA has 24 autonomous communities namely Umuagu, Umuabi, Obinagu, Nachi, Amokwe, Agbudu, Abia, Udi, Obioma, Nsude, Ngwo, Eke, Ebe, Abor, Ukana, Awhum, Okpatu, Egede, Affa, Umulumgbe, Umuoka, Akpakwume, Nze and Oghu. The topography of these communities varies with some areas hilly and others rolling lands and mean annual rainfall of about 1700mm. The soil is fertile and supports agricultural production of tree crops like oil palm, raffia palms and Cashew. Food crops grown in the state are Cassava, sweet potatoes, Plantain, Banana, cowpeas, vegetables, melon, pineapples and maize. The commonest cropping system in Udi LGA is mixed cropping with most farmers operating in smallholder scales.

Sampling Technique and Data collection

Multi-stage random sampling technique was used to select households from which socioeconomic, cassava production, processing and marketing activities is carried out in the study area. In the first stage, ten autonomous communities were randomly selected from the twenty four autonomous communities that make up Udi LGA. In the second stage, one village was selected from each of the chosen communities. In the third stage, six entrepreneurs' taking decisions for cassava-based farm households were randomly chosen: three male-headed and three-female headed households were chosen from each of the villages. This gave a sample of sixty cassava-based entrepreneurs consisted of thirty male-heads and thirty female heads of farm households involved in this study. Socioeconomic data collected included, marital status of farm head, educational attainment of farm head, farm size, farm inputs, cassava harvests, unit selling price, health status, annual farm income, daily farm wage, daily non-farm wage, time spent on cassava activities, time spent on other

household works, and frequency of extension contact.

Data Analytical Technique

A combination of statistical tools including frequency distribution, percentages, and means was used in analyzing the data collected for this study. While frequency, percentages and means were used to describe the socio-economic characteristics of the farm households profitability of cassava enterprises was determined using farm partial budget analysis. The Net Farm Income (NFI) was computed by subtracting production cost from gross production value [11, 12]. When Gross income is computed, and fixed cost is estimated, the net profit level of an enterprise or a farm is easily determined. In this study, the fixed costs included depreciation of knives for peeling tubers, sifters processing shed, grating machines, sieving machine, toaster and packaging machines. Mathematically, the NFI for a cassava entrepreneur was stated as follows:

$$NFI = \sum_{=1}^{n} PiYi - \sum XxiXj - \sum Zk \quad \text{...[Eq-1]}$$

Where

NFI = Net annual income of a cassava entrepreneur (₦'000);

Yi = The handled jth tonne of cassava or cassava product, for i = 1,2, 3…n entrepreneur;

Pi = Unit Price of the handled jth tonne of cassava or cassava product (₦);

Xj = Inputs used in producing or processing jth tonne of cassava or cassava product, for i=1,2,3…n;

Pxj = Unit price of the jth variable inputs (₦);

Zk = Depreciation value of the kth fixed inputs (₦), fork=1,2,3,….k);

∑ = Summation sign.

The annual depreciation value of the fixed inputs was computed following a straight line method that assumed zero scrap value at expiration of the lifespan: 3 years for implements and 5 years for machines. Thus:

Annual depreciation = Current Value of Cassava Enterprise Fixed cost item

Expected lifespan of Cassava Enterprise fixed cost items … [Eq-2]

Limited response dependent variable multiple regression probit model was used in analyzing factors that determined gender participation in cassava entrepreneurship. The model of limited dependent variable used was as introduced by [13] and as applied by [14] and corrected for bias [15] in selection of respondents. This probit model was stated as follows:

$$Y_{ij} = \alpha_j + \beta_j \sum_{k=1}^{s} H_{ijs} + \varepsilon_{ij} \ldots \quad \text{[Eq-3]}$$

Where the H_{ijs} are vectors of s explanatory variables of the jth farm household; Y_{ij} is a vector of binary variables such that Y_{ij} =1 if the jth household is investigated gender that participated in cassava enterprise, and 0 otherwise. Since Y_{ij} can only assume two different values for the condition, 1 or 0 .The expected probability was defined as follows:

$$E(Y_{ij}) = E\left[\alpha_j + \beta_j \sum_{k=1}^{s} H_{ijs} + \varepsilon_{ij}\right]$$

$$= \alpha_j + \beta_j \sum_{k=1}^{s} H_{ij} E(H_{ij}) \quad \text{[Eq-4]}$$

[Equation -3] defines the proportion of households with characteristics (H_{ij}) likely explain gender participation in cassava entrepreneurship. The empirical model was specified for farm household participation is thus:

$$EXP_{ij} = \beta_0 + \beta_1 \ln(FS_{ij}) + \beta 2 \ln(AN_{ij}) + \beta 3 \ln(TC_{ij}) + \beta 4 \ln(TW_{ij}) + \beta 5 \ln(DW_{ij}) + \beta 6 \ln(MS_{ij}) + \beta 7 \ln(HT_{ij}) + \beta 8 \ln(EC_{ij}) + \beta 9 \ln(ED_{ij}) + \beta 10 \ln(SF_{ij}) + \varepsilon_{ij} \ldots \quad \text{[Eq-5]}$$

Where explanatory variables (continuous, discrete and binary) are as defined in Table [1]. The dependent variable for equation [-5] is anticipated gender participating as defined in equation [-3]. It was hypothesized that (i) male-headed farm households participation would positively be determined by: FSij; TCij; MSij; HTij; SFij and (ii) that female-headed farm households participation would positively be determined by: FSij; TCij; MSij;

SFij and (iii) that male-headed farm households participation in cassava entrepreneurship would negatively be determined by: ANij; TWij; DWij; ECij; SFij and (iv) that female-headed farm households participation in cassava entrepreneurship would negatively be determined by: ANij; DWij; TWij; ECij; EDij; SFij.

Table 1.Description of Variables analized by Probit Regression Model

Variable	Variable Type	Expected Sign Eqn.4	Description of Variable
EXPij	Binary		1 if the anticipated male or female head participated in Cassava entrepreneur ; 0 if otherwise Eqn. (4);
FSij	Binary	+	1 if size of farmland is at least 3.0 hectares; 0 if otherwise;
ANij	Discrete	-/+	Adult number of male or females in household;
TCij	Continuous	+	Time Spent on cassava activities in a week;
TWij	Continuous	-	Time Spent on other housework activities in a week;
DWij	Continuous	-	Daily non-farm wage (₦);
MSij	Binary	+/-	Marital status (1 if Married; 0 if otherwise)
HTij	Binary	+/-	Health status of household members;
ECij	Discrete	+	Frequency of monthly extension contact ie Number of times in contact with extension agency;
EDij	Continuous	-	Number of years of formal Education of head of household;
SFij	Binary	+/-	Status of engagement: Full time=1;Part-time=0

RESULTS AND DISCUSSIONS

Household Characteristics

Table 2 shows the general characteristics of male- and female- headed cassava-based entrepreneurs involved in this study. The Table showed that cassava entrepreneurship in the study area included growing of cassava for tubers and stems. All male-headed and female-headed households investigated (100.0%) grew cassava; and different proportions processed the tubers into different products. Quite reasonable proportions, 33.3% of male-headed households and 20.0% of female-headed households processed cassava tubers to garri. Equally some good proportions, 26.6% of male-headed households and 43.3% of female-headed households processed cassava tubers into fufu; and 30.0% of male-headed and 46.7% of female-headed households processed the tubers into garri and fufu. Relatively low proportions: 13.3% of male-headed households and 36.7% of female-headed households processed cassava tubers into garri, fufu, and Tapioca; and yet lower proportions, 6.7% of male-headed households and 16.7% of female-headed households processed cassava tubers to tapioca. These showed that apart from processing cassava tubers into garri alone, more women-headed households processed cassava tubers to other products especially garri and fufu , fufu, garri, fufu, and tapioca. However, some potential products with industrial demands such as starch and cassava chips have not been ventured into by cassava entrepreneurs in the studied area, on account of partly unawareness and no demonstrated affordable technology.

In terms of marital status, 80.0% of male household heads and 90.0% of female household heads were married. The figures further revealed that only 13.3% of male household heads and 6.7% of the female household heads were single. In male headed households, 6.7% had lost their spouses while in female headed households 3.3% were widows. Majority of cassava entrepreneurs being married suggest that activities involved in the enterprise on one side requires support of household labour and on the other side, the enterprise generates attractive returns enough to help households cushion effects of food and financial insecurity associated with married life. In Nigeria, with the Presidential initiative on cassava has pushed up the value of the crop such that cassava has been tagged a food security crop attracting relatively higher income [5].

The proportion of heads of households that had formal education was high in both the male and female headship of households but

relatively higher amongst female headed households. The female household heads with no formal education was only 6.7% as against 33.3 for the male household heads with no formal education.

Table 3.Characteristics of Cassava Entreprenors in Udi LGA of Enugu State Nigeria, 2012

Variable	Male-Headed Households N=30		Female-Headed Households N=30	
	Number	Percentage	Number	Percentage
Cassava Entrepreneurship*				
Cassava growing (Tubers)	30	100.0	30	100.0
Processing Garri	10	33.3	6	20.0
Processing Fufu	8	26.6	13	43.3
Processing Tapioca	2	6.7	5	16.7
Processing Garri & Fufu	9	30.0	14	46.7
Processing Garri, Fufu & Tapioca	4	13.3	11	36.7
Marital Status of household head				
Married	24	80.0	27	90.0
Single	4	13.3	2	6.7
Widower	2	6.7	n.a.	n.a.
Widow	n.a.	n.a.	1	3.3
Highest Formal Education of house head				
No formal Education	10	33.3	2	6.7
Primary Education	5	16.7	4	13.3
Secondary Education	9	30.0	4	13.3
Tertiary Education	6	20.0	20	66.7
Farm Size (Ha)				
<1.0	8	26.6	16	53.3
1.0-3.0	14	46.8	11	36.7
>3.0	8	26.6	3	10.0
Adult number of male/female in Households				
1-4	21	70.0	16	53.3
5-8	7	23.3	10	33.3
Over 8	2	6.7	4	13.4
Household weekly use of Time (Hours)				
Time on Cassava activities	117	51.5	102	47.7
Time on other household activities	110	48.5	112	52.3
Daily Nonfarm Wage (₦'000)				
0.6-1.0	14	46.7	20	66.7
1.1-1.5	14	46.7	8	26.7
>1.5	2	6.6	2	6.6
Mean: M= 1.5 ; F= 0.8				

Source: Field survey: 2012; n.a= Not applicable; *= Multiple response observed.
₦150.00 ≈ US $1.00

Cumulatively therefore, 66.7% of the male household heads had formal education and was lower than cumulative 93.3% of the households headed by females. House heads who had enough formal education stood to be better informed in all business issues associated with cassava as a commodity for both local and foreign transactions. Farm sizes skewed in favour of male-headed cassava entrepreneurs. Cumulatively, 63.4% of male-headed households each cultivated cassava on at least 1.0 hectare of arable land, with the rest (26.6%) having their enterprise each on less than 1.0 Ha of arable land. The situation was comparatively lower with female-headed farm households. More women-headed households (53.3%) cultivated cassava each on less than 1.0Ha of arable land with another fairly large proportion (36.7%) that cultivated cassava each on between 1.0 and 3.0 Ha of arable land. [16] revealed that small sizes of farms amongst smallholders in southeastern Nigeria call for some form of land integration policy.

In terms of adult males and adult females in cassava-based households, 70.0% of the male-headed households had at most 4 adult male members with only 6.7% of them having at least 8 adult male members. Amongst the female-headed households, the table showed that relatively less proportion (53.4%) had at most 4 adult female members with 13.3% of the households having at least 8 adult female members. Adult members of a household will responsibly be engaged in production, processing and marketing of cassava and its products. Children aged between 7 and 17 years however, have been recognized to contribute their labour to household cassava farm activities after school hours and on weekends [17].

Male-headed cassava-based households spend relatively more of their weekly time (117 of 227 hours) or (51.5%) on cassava-based activities while female-headed cassava-based households spend relatively more of their weekly time (112 of 214 hours) or (52.3%) on other household work activities. Gender headships of these entrepreneurs were such that relatively more female heads (66.7%) than male heads (46.7%) earned each a daily nonfarm wage of at most ₦1, 000.00. Earning relatively lower wage off-farm might compel many of them to remain glued to their enterprise.

Estimation Of Profitability Of Cassava/Product(S) Sales

Table 3 is a summary of annual costs and returns from cassava enterprises to entrepreneurs in Udi LGA of Nigeria. The income-yielding parts/products of cassava consumed and traded by the entrepreneurs included the tubers, stem cuttings, and the following products: garri, fufu, and tapioca. Annual total of 270.0MT of tubers and 945.0 bundles of stem cuttings of cassava were produced by the sampled male-headed entrepreneurs using 6.0MT of fertilizers, hired and household labour. The female-headed cassava households sampled on their part produced an annual 220MT of tubers and 770 bundles of cassava cuttings using 4.5MT of fertilizer. Each cassava bundle contained 50 healthy stem cuttings meant for propagation of the crop. The average of minimum farm gate sales prices of the products (fresh cassava tubers, toasted sieved cassava (Garri), fermented cassava paste (fufu), sliced and treated cassava tubers (tapioca) was ₦91, 000.00 per Metric Tonne. The annual variable costs incurred by the male-headed cassava entrepreneurs were ₦1, 584,400.00 (1,015.4 US$) and that by female-headed farm households was ₦1, 490,500.00 (9,554.5 US$).

Break down of some of these variable items of costs are for high value items in male-headed households: weeding labour ₦238, 200.0 (1,526.9 US$) or 15.0% of variable costs; in female-headed households: weeding labour ₦238, 200.00 (1526.9 US$) or 15.9% of the variable costs. The least value item for male-headed and female headed households was water, ₦5, 000.00 (32.1 US$) accounting for 0.3% of variable costs to each gender group. Water was needed in the value-chain product processes for washing, soaking, and boiling. The annual fixed costs (value of depreciation of implements, machines and processing/marketing stalls) for the male-headed households were ₦764, 700.00 and that for the female-headed household was ₦787, 300.00. The highest depreciation of fixed cost items in male-headed households was processing/marking stalls ₦120, 500.00 (772.4 US$) and in the female households was toasting trough ₦120, 300.00 (771.2US$); while the least depreciated fixed cost items was in male-headed households steering/toasting spoons (₦11,200.00) (71.8 US$) or 1.5% of fixed costs. In the female headed households, two items depreciated very lowly: steering/toasting spoons, and Mats ₦15, 700.00 (100.6 US$) or 1.9% of fixed costs items.

The returns to the entrepreneurs were high especially to the male-headed households and to both groups quite encouraging. The enterprises gave an annual cumulative gross margin of ₦109, 526,600.00 (702,093.6 US$) to the male-headed households and ₦88, 221,700.00 (565523.7 US$) to the female-headed farm households. The mean net profit was ₦3, 625,400.00 for male headed households and ₦2, 940,700.00 for female-headed households.

Table 3. Summary of Annual Produced and Marketed Cassava Quantities, Costs and Returns By Male and Female Entrepreneurs in Udi LGA of Enugu State, Nigeria.

S/N	Description	Male Household Headed Cassava Entrepreneurs (n=30) Total		Female Household Headed Cassava Entrepreneurs (n=30) Total	
1.	Quantity of Tubers harvested/processed (Metric Tons)	270.0		220.0	
	Quantity of Stem Cuttings harvested (Bundles)	945.0		770.0	
	Quantity of Fertilizers used (Metric Tons)	6.0		4.5	
2.	Minimum Sales price per metric ton (₦'000)				
	(i) Fresh Cassava tubers	80		80	
	(ii) Garri	110		110	
	(iii) Fufu	130		130	
	(iv) Tapioca	75		75	
	(v) Stem Cuttings	60		60	
3.	Average Products Sales price per ton (₦'000)	91		91	
4.	**Variable Costs (VC)** (₦'000)		**Percentage of Costs**		**Percentage of Costs**
	Land preparation labour (hired + household)	234.1	14.8	234.1	15.7
	Planting labour (hired + household)	110.2	6.9	110.2	7.4
	Weeding labour (hired + household)	238.2	15.0	238.2	15.9
	Fertilizer	180.0	11.4	135.0	9.1
5.	Harvesting labour (hired+ household)	234.1	14.8	221.1	14.8
6.	Transportation	107.6	6.8	117.6	7.9
7.	Tuber Processing labour (hired)	156.3	9.9	128.3	8.6
8.	Firewood	50.4	3.2	50.4	3.4
9	Palm oil	15.0	0.9	15.0	1.0
10	Water	5.0	0.3	5.0	0.3
11.	Product Packaging materials	22.3	1.4	17.3	1.2
12.	Implement Maintenance/Repairs	12.7	0.8	12.7	0.9
13.	Interest on Operating Capital [§]	218.5	13.8	205.6	13.8
14.	**Total Variable Costs (TVC)**	**1,584.4**	**100.0**	**1,490.5**	**100.0**
15	**Fixed Costs (FC_1) (₦'000) Depreciated over three years**				
16.	Wheel barrows	75.0	9.8	75.0	9.5
17.	Baskets	30.1	3.9	30.1	3.8
18.	Basins	60.2	7.9	60.2	7.6
19.	Jute/Polythene bags for storage	42.6	5.6	32.6	4.1
20.	Mats	25.4	3.3	15.4	1.9
21.	Fufu Boiler pots	42.4	5.5	82.4	10.5
22.	Steering/toasting Spoons	11.2	1.5	15.7	1.9
23.	Peel knives	20.0	2.6	20.0	2.5
24	**TFC_1**	**306.9**	**40.1**	**331.4**	**42.1**
25.	**Fixed Costs (Machines) (FC_2) (₦'000) Depreciated over five years**				
26.	Grating Machines	111.5	14.6	111.5	14.2
27.	Toasting trough	120.3	15.7	120.3	15.3
28..	Processing/ Marketing Stalls	120.5	15.8	115.5	14.7
29	Interest on Investment Capital [§]	105.5	13.8	108.6	13.8
30	**TFC_2**	**457.8**	**59.9**	**455.9**	**57.9**
31.	**Total Fixed Costs (TFC)= (TFC_1 + TFC_2)**	764.7	**100.0**	**787.3**	**100.0**
32.	**Total Costs : (TFC_1 + TFC_2) + (TVC)**	**2,349.1**		**2,277.8**	
33.	Revenue (₦'000) ∑(1)x(3)	111,111.0		90,499.5	
34.	Gross margin (33) – (14)	109,526.6		89,009	
35.	Mean Gross margin (34)/n	3,650.9		2,967.0	
36.	Net Return (Profit) (34) – (31)	108,761.9		88,221.7	
37.	Mean Net Profit (36)/n	3,625.4		2,940.7	
38.	Return Per Naira invested in Cassava enterprise (36)/(31)	142.2		112.1	

[§] Mean Interest rate for agriculture and petty trading loans =16.0%; 1.0 US$ = 156.0 NGN Source: Field Survey, 2012

Each naira invested by the male-headed household yielded an annual value of ₦142, 200.00 (911.5 US$) and same amount invested by women led household yielded ₦112, 100.00 (718.6US$). These differences in performance between male and female household headship in cassava enterprises may not be attributable to management but to issues associated with resource inaccessibility (land, labour, and capital) linked with gender social and cultural differences.

Gender Leadership and Participation in Household cassava Enterprises

Table 4. Determinants of Participation of Gender Leadership in Household cassava Enterprises in Udi, Nigeria

Variables	Male-Headed Cassava Household		Female-Headed Cassava Household	
	Coefficients	t-Ratio	Coefficients	t-Ratio
Constant	45.71***	11.30	-18.34***	-2.99
Farm size	1.29***	12.17	3.08	1.65
Farming Status	0.005	0.34	1.12	1.03
Marital Status	-2.53**	-2.03	-0.05***	-3.1
Adult number in household	-0.44***	-4.18	-0.06***	-4.01
Frequency of Extension contact	2.72***	3.31	2.74***	3.61
Health status of members	-0.15**	-2.44	0.02**	2.07
Daily nonfarm wage	0.00003	0.36	0.004	1.32
Time spent on cassava activities	-3.66**	2.97	-4.21**	2.89
Time spent on other housework activities	-2.87*	2.78	-3.42***	5.11
Level of Formal Education	-0.57	-0.31	-0.015	-0.12
Annual net enterprise profit	0.54***	3.99	0.62**	2.96
Likelihood ratio	-89.03		-76.31	
LR-Chi^2	0.572***		0.415***	
Correctly predicted	81.7%		72.3%	

Dependent variable (D) = Takes active part in activities of Cassava Enterprise
*significant at 10.0%; ** significant at 5.0%; *** Significant at 1.0%.
Source: Field Survey, 2012

Table 4 showed segregated factors that influenced male and female headship participation in own cassava enterprises in Udi, Nigeria. Farm size, adult number of males in households, frequency of contact with extension agency, and annual net enterprise profit influenced very highly (P< 0.001) the participation male household heads in own cassava enterprises. In addition, marital status, health status of household members, and time spent cassava activities had moderate (P<0.05) influence, and time spent on other house works influenced very mildly (P<0.10) the participation of male household heads in own cassava enterprises. While farm size, frequency of contact with extension agency, and annual net enterprise profit had positive influences, the other significant factors had negative influences on participation of male household heads on cassava enterprise activities. Positive influence meant that as each of the factors increased, the participation increased while negative influence means that as each of the factors increased the participation declined.

Amongst the female-headed households, marital status, adult number of females in the households, and frequency of extension contact had very highly (P< 0.001) influence on the participation female household heads in own cassava enterprises. In addition, status of health of household members, weekly time spent on cassava activities and annual net enterprise profit had moderate (P<0.05) influences on participation of female heads of cassava enterprise households. Comparing

male household headship with female household headship, differences in critical factors that require some policy attention are farm size, and time spent on other housework activities. Culturally, women in the study area have difficulties in accessing farmland, farm credit, and other inputs [18] and do many of the house works with little or no assistance.

Challenges with Growing, Processing and Sales of Cassava and Products

Commercial activities associated with cassava enterprises are not quite easy as they are fraught with difficulties and setbacks. These challenges as observed by the respondents are shown in Table 5. The Table revealed that stakeholders in cassava enterprises observed decline in tuber yield, high marketing operating cost, difficulties in transportation and communication as obstacles to growing, processing and marketing of cassava and its products in Udi area.

Table 5. Entrepreneurs Perceived Challenges with Growing, Processing and Sales of Cassava and its products in Udi, Enugu State, Nigeria 2012

Challenge	Cassava Growing (n=60)	Number (%)	Cassava Processing (n=60)	Number (%)	Cassava tuber/product Sales (n=60)	Number (%)
Decline in tuber harvests	Decrease in fertility of the soil and high cost of procuring fertilizers	46 (76.7)	Limited availability of central processing units with machines for high quality products	33 (55.0)	Selling bulk of the harvests in tubers	37 (61.7)
High marketing operating cost.	Extensive use of manual labour in land preparation, planting, weeding and harvesting	52 (86.7)	Frequent failure of processing machines	40 (66.7)	High transport cost incurred in moving tubers to processing centers	34 (56.7)
Transportation/ Communication difficulties.	Heavy as head loads except with wheel barrows and pickup vans	51 (85.0)	Non-standardized transport charges as entrepreneurs bargain for charges	27 (45.0)	Rural roads in deplorable states especially during the rain season	56 (93.3)

Source: Field Survey, 2012; Figures in parentheses are percentages

With respect to decline in tuber harvests it was observed that there was decrease in soil fertility (76.7%), few units for centrally processing of the tubers (55.0%) forcing many of the entrepreneurs to sell off their fresh tubers (61.7%). Entrepreneurs reported that marketing operating costs were high on account of drudgery associated with the growing of the crop (86.7%), and incessant break down of processing machines (66.7%), and high costs of transporting the products within and between the communities and markets (56.7%). Majority of the entrepreneurs (93.3%) agreed that rural roads in the area are in deplorable state such that transporters charged arbitrary prices (45.0%) to convey cassava stems, tubers and products to desired destinations.

CONCLUSIONS

This study concluded that:

1.Male and female headed households involved in production, processing and

marketing of cassava and its products are rewarded with reasonably high returns in Udi area.

2.Relatively more male-headed cassava households processed their fresh tubers into garri. Toasted cassava (garri) stores relatively longer than fresh tubers and cassava paste (fufu).

3.Female-headed cassava-based households sell fresh cassava tubers and process the ones not sold into fufu, and tapioca.

4.Low awareness and unavailability of affordable processing machines are obstacles to processing cassava tubers into high quality flours, starch and chips that have industrial values.

5.Farm size, adult number of males in households, frequency of contact with extension agency, and annual net enterprise profit are factors that very highly influenced the participation of male household heads in own cassava enterprises.

6.Other important determinants of participation of male-headed households in cassava enterprises are marital status, health status of household members, time spent on cassava activities and time spent on other house works.

7.Female-headed cassava-based households are highly influenced to be involved in cassava enterprises by marital status, adult number of females in the households, and frequency of extension contact.

8.Other important factors that influenced participation of female-headed households in cassava enterprises are status of health of household members, weekly time spent on cassava activities and annual net enterprise profit.

9.Obstacles to cassava value chain activities amongst entrepreneurs in Udi area included decline in tuber yields, high marketing operating cost, difficulties in transportation/ communication in the area.

Policy Implications

Cassava is a crop that offers security to household food needs and holds potential to alleviating poverty amongst entrepreneurs in Udi area and wider areas of sub-Saharan Africa. To bring male and female entrepreneurs at par in terms of resource needs, all social and cultural constraints on female access to arable land and credit should be addressed by law such that any of such discrimination against women is prohibited.

Cheap and affordable high quality chips and flour producing machines should be demonstrated and extended to male and female farmers investing in cassava to facilitate adoption of such in the area. Rural roads and reliable vehicles should be maintained by local government councils and transporters under some public-private partnership agreements. We equally recommended provision of credit support to investors in cassava not only as agricultural loans but as part of Small and Medium Scale Enterprise (SMEs) development grant. This will enable investors (especially the women) have enough funds to purchase fertilizers, hire labour, and purchase automated machines for processing, and packaging of the products to attract better prices.

REFERENCES

[1]Nweke, F., Tollens, E., 2002, Contributions of Men and Women to Food Crop Production in Africa: Information from COSCA. Outlook on Agriculture 31 (4): 259-265.

[2]Meridian Institute, (n.d). Innovations for Agricultural Value-Chains in Africa: Applying Science and Technology to Enhance Cassava, Dairy, and Maize value Chains. Cassava_Value_Chain_Overview 090527 Final.pdf.

[3]USAID/MARKETS(n.d). Cassava at a Glance-The MARKETS Perspective.

[4]Nigeria Cassava Action Plan (n.d) Action Plan For a Cassava Transformation in Nigeria-The Precidency.

[5]Awoyinka, Y. A., 2009, Cassava Marketing: Option for Sustainable Agricultural Development in Nigeria. Ozean Journal of Applied Science 2(2): 175-183.

[6]Chant, S, 2002, 'Whose Crisis? Public and Popular Reactions to Family Change in Costa Rica 'In Abel, C and Lewis C. (eds). *Exclusion and Engagement: Social Policy in Latin*
America (London: Institute of Latin American Studies) 349-77.

[7]Panda, T.K.., 2002, Rural Participation and Community Development through Microcredit Financing-Case studies Among Fishermen Community around Chilika lake Indian Institute of Management, Lucknow India.

[8]Elborgh-Woytek. K, Newaik, M, Kochhar, K. Fabrizio, S. Kpodar, K., Wingender, P.,Clements, B., Schwartz, D., 2013, Women, Work, and Economy.: Macroeconomic Gains from Gender Equity. IMF Staff Discussion Note SDN/13/10.

[9]Chant, S., 2002, Female Household Headship and the Feminization of Poverty: Facts, Fiction, and forward Strategies. London School of Economics; Gender Institute. *New Working*
Paper Series, ISSN No. 1470-8515, Issue 9, 1- 65.

[10]FRN, 2007,. Federal Republic of Nigeria Official Gazette. Legal Notice on Public Gazette Details of the Breakdown of National and State Provisional 2006 Census, Abuja No. 24. vol.9 pp. 1-7.

[11]Soto, Y.A., 2006, Profitability Analysis of the Investment in Beam Trawlers for Cuban Shrimps fisheries. Final Project Document, University of Iceland. With the Support of United Nations University Fisheries Training Programme.

[12]Okoruwa, V.O., Obadia, F.O., Ibrahim, G., 2005, Profitability of Beef Cattle Fattening in Cosmopolitan City of Ibadan, Oyo State. Moor Journal of Agricultural Research 6(1): 45-51.

[13] Tobin, J., 1958, Estimation of Relationships For Limited Dependent Variables. *Econometrica* (26):24-36.

[14]Amamiya, T., 1981, Qualitative Response Models: A Survey. Journal of Economic Literature (19):1483-1536.

[15]Heckman, I.J. ,1976, The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimation for such models. *Ann. Eco. Soc. Measure* (5): 475-492.

[16]Ugwumba, C.O.A, Okoh, R.N., Ike. P.C., Nnabuife, E.L.C., Orji, E.C., 2010, Integrated Farming System and its Effect on Farm Cash Income in Awka South Agricultural zone of Anambra State, Nigeria. American-Eurasian J. of Agric. & Environ. Sci. 8 (1): 01-06, 2010.

[17]Emerole, C.O., Chinaka, C.C., Ekpe, E.O., Ezeh, C.I., 2001, Cost Effectiveness of Weed Control Alternatives in Cassava (TMS 30572) Intercropped with Maize and Egusi. *Niger. Agric. J*. 32:212-219.

[18]Emerole, C.O., Ndu, I. C., 2011, Gender Factors in Capital Sourcing and Accessibility By Arable Crop Farmers in Owerri North Local Government Area of Imo State, Nigeria. *Global Approaches to Extension Practice (GAEP)* 7(2); 68-77.

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STUDIES ON THE AGRICULTURE SYSTEMS PRACTICED IN ROMANIA

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Abstract

Currently in Romania there are farming systems very complex. The complexity of systems is determined by the natural and socio-economic conditions, the development level of the science and technology with the evolution of human society. The literature contains a large number of farming systems and their name is made by one of the specific measures (specific work) that these includes. The Systems Agriculture widely used and those dominated are: the conventional farming systems, biodynamic, biological and sustainable farming system, that has emerged in the last decade. The need to create sustainable agriculture , that is stable and sustainable and a clean environment has emerged due to the danger caused by the negative effects of chemicalization agriculture. The creating implications of a sustainable agriculture system will allow of the agricultural activities to maintain the natural environment clean and to protect the fragile areas.

Key words: *agriculture, ecological, sustainable, system*

INTRODUCTION

Agriculture has been and will continue to be a vital activity, it depends on the food security of the population and balance of local and regional ecosystems.
The way of working in agriculture is continuously changing. The request to use the latest technologies in order to help at increasing productivity and incomes is greater than ever.

MATERIALS AND METHODS

The paper presents the authors' opinion on agricultural systems practiced in Romania based on information collected from literature in the field.

RESULTS AND DISCUSSIONS

Agricultural system represents a set of sectors, technologies, machineries and technological aggregates, in which soil is used as the main resource of production for agricultural crops such as orchards, vineyards, vegetable, flower, but as well for livestock breeding. The structure of sectors may differ from farm to farm. In Europe, within the agriculture field, there are practiced different farming systems: conventional, organic, biologic, biodynamic, sustainable, of precision, depending on the used technologies, on their level of intensification, specialization, quantity and quality of biomass, relations with the environment, and so on.

Conventional agriculture. As a consequence of industry development, based on science and technology achievements, as well as due to increased demands for agricultural products, in 1950, the system of extensive became intense. This resulted in the use of productive varieties, hybrids introduction, first on corn crops, followed by sunflower and sugar bee; as well is resulted in expanding the use of chemical fertilizers, of pesticides, irrigation etc. This system, based on the use of mechanization of a large number of soil tillages, on the use of large amounts of chemical fertilizers and pesticides, etc. has been known as conventional agricultural system.
Conventional agriculture is intensively mechanized with competitive products, but relies particularly on the concentration and specialization of production. The various components of the technologic process are widely applied.

Thus, loosening of soil is regularly performed only by plowing with furrow turned over, followed by numerous secondary works of seedbed preparation and maintenance during the vegetation period.

Mineral fertilization is practiced with large and very large doses, monoculture or at most short rotation within two, three years, intensive chemical treatments to control weeds, diseases and pests. This type of agriculture was widespread in Romania until 1989.

Today, it is widely accepted that this type of agriculture can affect the environment, especially if the various components of the agricultural technology system are applied without taking into account local factors: climate, soil, relief, social and economic conditions which define the level of vulnerability or susceptibility towards various processes of chemical, biological and physical degradation of environment (Code of Good Agricultural Practice, 2002).

The concept of **biologic (organic) farming** emerged after World War II, being developed by Lamaire and Boucger (France). The content of biologic agriculture is very similar to that of biodynamic agriculture, since this system also involves the use of organic fertilizers, of crop rotation, biological methods of combining pests and diseases and the total giving up to the use of chemicals (fertilizers, pesticides etc) obtained industrially.

One of the solutions is developing ecological agriculture ECOTEHNIC that JY Cousteau defines in the broadest sense as a "philosophy", the concept that productive activities (technical, technological, economic) can not be broken with consistent relief natural values, environmental and landscape. In a rural area, agriculture ecocompatible organization would also be beneficial for social and cultural modernization of the rural population. An agricultural production activity is carried out by numerous interdependent processes and technical links that take place within an ecosystem, being ordered in a well defined in relation to the structure of finished products and environmental conditions.

Organic farming is medium intensive and thus less aggressive in relation to environmental factors, to agricultural results (products) less economically competitive in the short term, but which are considered superior in terms of quality.

In relation to the environment, this type of system is better harmonized, the treatments applied to control diseases and pests are biological preference, though there are accepted also low doses of fertilizers and pesticides. Concerning quality control of products, there is necessary a certification of used technologies. The products are offered on a special market.

Organic farming is a dynamic system in Romania, with a medium weighted rate of annual growth of 23%.

In the year 2007, the total cultivated area by organic production was of 131,448 ha of which 46, 865 area in conversion and 84,585 certified organic area.

In the year 2012, the area cultivated in organic system was of 450,000 ha, while the spontaneous flora cultures were collected from an area of approx. 520,000 ha.

In the year 2012, the areas of ecological system increased by 45 % compared to the year 2011, representing around 3.38 % of the total utilized agricultural area of Romania.

Organic agriculture has an important role in world food production, but this can not be a substitute for agro -chemical substances, given that the world population is on the increase. Organic farming is a management system of production which promotes and enhances agricultural system health, biodiversity, biological cycles and soil biological activity. It emphasizes the deeper use of management practices towards extra-farm investments, taking into account that regional conditions require locally adapted systems. To fulfill any specific function of the system there are used, where possible, agronomic, biological and mechanical methods without the use of synthetic materials.

Organic farming: differs from the biological one by the exclusive use of organic fertilizers in relatively high doses, applied according to local specific most commonly on the purpose of crops fertilization and long-term restoring of structural state of soils, degraded by intensive human activities and /or due to natural processes.

Biodynamic agriculture emerged in the twentieth century as a result of concerns to contact the danger caused by the negative effects of agriculture chemicalization on the various components of biosphere. The beginnings were made by Rudolf Steiner, which has developed since 1924 a coherent system, combining efficient practices met by peasant household, with specific technologies that together can contribute to the harmonization of terrestrial and cosmic factors (P. Papacostea, 1994).

Biodynamic agriculture is based on the following fundamentals:

- Cosmic rhythms: rhythms of sun, moon, plants and stars influence plants growth. By planning over time plowing, sowing and harvesting activities, the farmer can influence crops in his advantage.
- Vitality: in addition to physical and chemical characteristics, the material has a vital quality that affects organisms. Thus, farmers and gardeners who practice biodynamic agriculture aimed not only at quantity, but as well at quality.
- Biodynamic formulas: some plants which are naturally emerged and certain animal materials are combined in specific preparations and are applied in very diluted forms over the compost piles, on soil or directly on plants. The forces of these preparations will organize elements inside plants and animals.
- The body of farm: the farm is considered as an unified body that integrates plants, animals and humans. There must be an appropriate number of animals to provide sufficient manure for fertilization and these animals must be fed with forages from the farm.

Biodynamic agriculture is an agricultural production system advanced, which has gained a high attention due to its emphasis on food quality and soil health. Therefore, there was developed a new approach to this situation, which leads at the association of producers and consumers in the view of their mutual benefit..

Sustainable agriculture involves the harmonious scientific use, of all specific technological components: soil tillage, crop rotation, fertilization, irrigation, pest and disease control, including biological methods, animal greeding, storage, processing and use of residues from agricultural activities, etc. in the view of achieving high yields and stable, without affecting the environment. For agricultural lands affected by periodic droughts is indicated to maintain forestry production curtains which represent braking element of erosion. Sustainable use of soil involves maintaining the three ecological functions of this: biomass production; filtering, buffering, transforming of matter and water entered in the soil, to ensure their circuit in nature; habitat for organisms. Environment status and efficient use of natural resources influence economic growth conditions, the level and quality of life.

Sustainable agriculture is a broad concept which provides the complexity of the production system, the biological stability of plants and cultivated plants, conservation and protection of natural resources, and the introduction of modern technologies and then generalize as productive. Course, has a particular interest issues profitability of family farming, practiced on small plots, which produce more subsistence. These farms can promote technical and economic solutions profitable because of fragmentation of agricultural land and lack of machinery systems . And it is costly and ineffective in such circumstances.

Sustainable agriculture involves technologies economically viable over a long period of time with high yields , obtained with reduced costs. Any agricultural system must have long-term productivity as high as possible , which is conditioned not only by the quality of the resource base, but also the social and economic .

Characteristics of sustainable agriculture

The characteristics of sustainable agriculture are the followings: Productivity; Profitability; Protection and improvement; Health; Safety; Environment.

Precision agriculture is the most advanced form of agriculture that is practiced even in most developed countries of the European Union and the U.S.A on smaller areas, based on the most modern methods of quality status control of various environmental resources, is also based on optimal application of all technological components and thus a rigorous control over the potential factors which would determine the environmental degradation.

CONCLUSIONS

As the impact of conventional agriculture manifests by its action on various resources of the environment such as: soil, water, air, flora and fauna, there were emerged as well other farming systems to protect the soil and environment.

Choosing the farming system is conditioned by the technical equipment level, the level of professional knowledge, but also by the mentality, education in general, but also by the respect for nature, for the environment of all those working in this field.

Agricultural systems are closely related to economic, social and environmental conditions. Solving them is the most important condition for the introduction and promotion of sustainable agriculture (Code of Good Agricultural Practice, 2002).

Biological, organic and precision agriculture, although have developed followers, these are not widely applied, and not approved by specialists. They are still regarded with great caution, though some ideas are interesting and worthy of attention. Opponents of these agricultural systems find it impossible at present and in the future to produce enough food without the use of fertilizers. They support a sustainable agriculture and of balanced development to favor an integrated production, where the inflow of resources to be used more economically and efficiently.

REFERENCES

[1]Guş, P., Rusu, T., Bogdan Ileana, 2004, Agrotehnica, Editura Risoprint, Cluj Napoca

[2]Ionescu Alexandru, Godeanu Stoica, Barabas Neculai, 1994, Ecologie şi protecţia mediului, Al 11-lea Simpozion de protectia mediului înconjurator si combaterea integrata a buruienilor, 26-28 mai 1994, Constanta

[3]Ionescu, A., 1997, Ecologie şi agricultură – Probleme ale agriculturii contemporane, EdituraCeres, Bucureşti

[4] Onisie, T., Jităreanu, G., 2000, Agrotehnica, Editura Ion Ionescu de la Brad, Iaşi

[5]www.regielive.ro

[6]www.biblioteca-digitala.ro

[7]www.contabilizat.ro

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NEW TRENDS IN AGRICULTURE - CROP SYSTEMS WITHOUT SOIL

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Abstract

The paper studied new system of agriculture - crop systems without soil. The culture systems without soil can be called also the hydroponic systems and now in Romania are not used only sporadically. In other countries (USA, Japan, the Netherlands, France, UK, Denmark, Israel, Australia, etc..) they represent the modern crop technology, widely applied to vegetables, fruits, fodder, medicinal plants and flowers by the experts in this area. In the world, today there are millions of hectares hydroponics, most of the vegetables, herbs, fruits of hypermarkets are coming from the culture systems without soil. The process consists of growing plants in nutrient solutions (not in the ground), resorting to an complex equipment, depending on the specifics of each crop, so that the system can be applied only in the large farms, in the greenhouses, and not in the individual households. These types of culture systems have a number of advantages and disadvantages also. Even if today's culture systems without soil seem to be the most modern and surprising technology applied in plant growth, the principle is very old. Based on him were built The Suspended Gardens of the Semiramis from Babylon, in the seventh century BC, thanks to him, the population from the Peru"s highlands cultivates vegetables on surfaces covered with water or mud. The peasant households in China, even today use the millenary techniques of the crops on gravel. .This hydroponic agriculture system is a way of followed for Romanian agriculture too, despite its high cost, because it is very productive, ecological, can cover, by products, all market demands and it answer, increasingly, constraints of urban life. The concept of hydroponics agriculture is known and appreciated in Romania also, but more at the theory level.

Key words: *agriculture, culture, hydroponics, soil*

INTRODUCTION

During this period, the world population is forced to find solutions to one of its biggest problems, namely nutrition. Providing the needed feeding for a population of over 6 billion people represents a priority with wide implications of economic, social and cultural nature.

Biological material has an important role in achieving crop production. There were created varieties and hybrids with yield potential increasingly high and more closely correlated with this, there were developed and promoted appropriate crop technologies.

MATERIALS AND METHODS

Given that culture hydroponic plant systems, is a relatively new field of research in our country material is used in making the papers is quite low. Most of the information and knowledge on these plant culture systems we have obtained and acquired in the course of activity in agriculture in Spain, the country where the plant culture systems are known only to us. Working methods used for this research is the analysis and observation.

RESULTS AND DISCUSSIONS

High growth rate of world population requires of a more efficient exploitation of existing opportunities, identifying and promoting new solutions which are more efficient to increase crop production.

This requirement of the tendency to achieve the highest possible productions per unit area as conventional soil culture systems are limited in terms of production. However, these new systems require as well to solve technical and economic issues, in order to deal with competition increasingly fierce. The most commonly used conventional culture systems worldwide are: the mineral wool based culture system and wool crop system and nutrient film based culture system.

Extending these culture systems have some drawbacks such as: the wool culture based system involves enormous quantities of this material, which is subsequently back into circulation with high difficulty, and the system.

The nutrient film culture based system implies rearranging the production spaces by installing gutters, this process being highly expensive financially [1].

Given the issues mentioned above, there is necessary to develop some technologies that are not expensive, that can be done with inexpensive and handy materials, but at the same time to ensure a high productivity both quantitatively and qualitatively.

In the view of meeting the desiderata presented and adapting them to the economic potential of farmers which are part of an underdeveloped economy, there is an increasingly requiest for the application of the crop on organic substrates. This culture system has two main advantages: it is very accessible from economically point of view and it suits the global trend, which is toward to a more organic culture[3].

The procedure used in hydroponic cultures consists of growing plants in nutrient solutions (and not in the ground), resorting to a complex devices that automatically adjusts nutrient concentration and distribution of liquid nutrients, depending on the specifics of each crop, and this is the reason for which the system can not be applied but in large farms, in greenhouses, and not in individual households.

Fig. 1. Hydroponic plant culture system

Hydroponics is the art of growing plants directly in water. The term comes from the Greek words "hidros" which means water, and "ponos", meaning work. This concept has been rediscovered in the 30's of last century, within the University Berkeley of California, by Dr. Gericke; we mention "rediscovered" because, in reality, this method of cultivation has existed since the earliest times [4].

Fig. 2 Culture of lettuce in hydroponic system

Hydroponic culture systems involve building a plant rooting medium other than soil, which can be mineral wool (very used lately), gravel, sand, quartz, perlite (a sponge material, made from volcanic rock) expanded clay, polyurethane, etc. The used materials for supporting substrates, whether natural, whether industrially produced, should allow the roots to breathe, to have the ability to retain the solution (but provide a good drainage too), not to interact with the various components of nutrient substances. The materials are wetted at regular intervals with nutritional solution which must contain, in certain proportions, all elements (minerals and trace elements) which the plant normally extract them from the soil: calcium, magnesium, sodium, potassium, iron, etc. The water containing nutrients is spread by an ultrasound device, with ceramic membrane and having the ability to vibrate at a certain frequency (1.65 MHz), which means more than 1.5 million vibrations per second. When water passes over this membrane, it is sprayed so soft that resembles a kind of fog, fueling plant roots in a favorable growth rate. This fog is permanently ventilated, stimulating its uptake by the plant that is growing more

quickly under these conditions. Those who practice this type of hydroponic cultures have developed solutions recipes depending on species (for tomatoes, cucumbers, carrots, mushrooms, etc.) of a certain phase of vegetation and in accordance with the ambient temperature and humidity, which are held under automated control.

That between the volume of water in the basin, the density of fish per m3 of water, the amount of food taken daily, the amount of manure produced by the fish and the size of hydroponic cultivation can provide effluent treatment there is a strong correlation, we decided to classify different systems known currently on volume criterion for fish breeding ponds so:

- small capacity systems with a smaller volume of 3000 l;
- medium capacity systems with volume ranges from 3,000 to 10,000 l l;
- high capacity systems, or commercial, whose volume exceeds 10,000 l.

This classification refers to a single module system, and by installing a larger number of modules can increase system capacity thus created directly proportional.

Small capacity systems: These systems can be used as a hobby or for subsistence. In general hydroponics is performed on solid substrate (gravel, granite ede clay, etc..) Construction is simple and the investment cost varies between 100 and 500 EUR.

Medium capacity systems: they were designed to produce a quantity of fish and plants to ensure family consumption in a rural household and a small surplus for marketing.

High capacity systems: These systems were designed to produce greater quantities of fish and plants than systems above so that it becomes a source of income for those who implement them. The system that opened the series this category and has been replicated in different versions worldwide, was conducted by Professor James Rakocy the University of the Virgin Islands (UVI) in the Virgin Islands, USA. With this system were carried out, for years, the average production of 4.5 tons of fish (Tilapia species) and 70 tons of vegetable products (lettuce, basil, okra, tomatoes, cucumbers, melons, flowers, etc.), which produced revenues of approx. 100.000 USD / year from the sale of plant and about. 35.000 USD / year from selling fish.

One embodiment of soil- free culture systems is aeroponic, it consists in the introduction of plant roots inside some plastic tubes, in which nutrient solution is sprayed. There can be grown plants based on nutrient film as well, more exactlly in containers placed in some conduits at the base of which the solution circulates in the form of very fine pellicles. Also, for accelerating the ripening process of vegetables and fruits, "ultraponie" is increasingly used, being a process based on the follow-up of cyclical variations of some plants biological functions within a period of 24 hours, in order to stimulate them through various processes.

The advantages of hydroponic culture systems

Higher productivity compared to traditional systems. Superior quality of agricultural products obtained. The yields are not dependent on weather conditions, neighter on natural light, due to the fact that the adequate artificial light can replace the former one. There are not used chemical fertilizers nor pesticides. It provides rapid growth of the plants (plants grow twice as fast in hydroponic culture than in soil). There are obtained more harvests per year. There are made substantial savings in water consumption (90% less water than crops with soil) and some performing systems even allow used water recycling. It eliminates the phenomenon of "fatigue" of the soil, the same culture can be repeated on the same carrier, more than once per year (for example, about 20 salad crops can be obtained per year). Maximum hygiene conditions. The specific facilities of these hydroponic culture systems do not pollute [7].

The disadvantages of hydroponic culture systems

The high costs of electricity improvements. Depreciation is done during a long time. Using of some large amounts of plastic materials for substrate, which usually are not recyclable. Plants are very sensitive to

temperature variations, Auto Adjustment is no longer interfering as when roots grow in the soil, which requires sophisticated systems of ventilation and temperature control. Even though today, hydroponic culture systems seem to be the most modern and surprising technology applied in plants growth, the principle is as old as mankind. Based on its principle, Hanging Gardens of Babylon were raised in the seventh century BC, due to it, the population of the highlands of Peru is cultivating its vegetables on surfaces covered with water or mud. Peasant households from China, even today are using the millenary techniques of gravel cultures [7].

Antipodal, in the early third millennium, keeping the ancient idea for thousands of years of soil -free cultures, a hypostasis of the Hanging Gardens of Babylon could represent the "vertical farms," the boldest idea of contemporary agriculture, a concept launched in 1999, in the United States. With a large horizontal area saving, there farms located in or near cities, turning to bunk hydroponic culture systems could be the answer to the increased needs of food in the world, and would bring an additional quality[8].

CONCLUSIONS

Hydroponic farming is a way to follow as well by business in Romanian agriculture, despite its high cost, because it is very productive, can cover, by its products, all market requirements and increasingly meets the constraints of urban life. Hydroponics farming concept is known and appreciated in our country likewise, but at a theoretical level.

REFERENCES

[1]George Van Patten, Gardening Indoors with Soil & Hydroponics The Fifth Edition
[2]George Van Patten, Beginning Hydroponics Soilless Gardening
[3]Howard M. Resh, Hobby Hydroponics
[4]Howard M. Resh, Hydroponic Home Food Gardens
[5]Howard M. Resh, Hydroponic Questions & Answers
[6]How To Hydroponics, Articol din Daily Mail, 3 iunie 2009
[7]http://www.aqua-ponics.ro/despre-aquaponics.php
[8]http://agrointel.ro/14002/aquaponics-tehnologia-in-care-plantele-nu-cresc-pe-sol-ci-in-apa/

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ANALYSIS OF TOURISM DEMAND AND SUPPLY - ONE OF THE ESSENTIAL ELEMENTS OF AN AREA IN TOURISM PLANNING

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Abstract

To achieve the best possible activities of interest is required in addition to natural and human resources and material resources to be able to satisfy the needs of tourists. These resource materials are known as "material technical base". This is represented by: accommodation and food , transportation , treatment and leisure facilities and is mainly conditioned by the development and modernization of existing material and technical base . Thus, a highly attractive tourist area can not be on offer before receiving the necessary facilities of receipt and retention of potential tourists . In order to take a tourist development zone is an analysis of tourist traffic to the existing tourist bases . This will do a study on tourism supply and demand analysis to one of tourist accommodation in the resort Logs . In order to accomplish this study will calculate and interpret tourism indicators most representative and most commonly used to express the tourist traffic are: The number of tourists, the daily average number of tourists , the number days / tourist , average length of stay , number total accommodation places , tourist traffic density , the total number of overnight stays , occupancy of accommodation , and tourists the relative preference.

Key words**:** *average length of stay, distribution of global tourism demand, occupancy of hotels and hostel, tourist traffic analysis, tourist traffic density*

INTRODUCTION

Tourism-environment relationship is of great importance, protection and conservation of the environment being important condition for development and tourism development [4]. This relationship is complex, it manifesting in both directions. Natural environment through its components are based tourism resources and tourism activity on the other hand has influence both positive and negative ecological environment, modifying the components.

The environment is defined as quality of life, living conditions of the people and the natural habitats suitable for animals and plants. Quality of life is determined by the long-term availability in sufficient quantity and of appropriate quality resources such as water, air, earth and space in general and raw materials [2].

As full of natural factors and those created by human activities and, especially, its quality is essential motivation of travel, forming "raw material" of tourism. Therefore, maintaining a high quality of natural resources is a prerequisite for continuation and further development of tourism consumption [10].

Tourism is an important contribution to maintaining and improving environmental quality, manifesting itself as an active factor of sustainable development is in the interest or involvement in this matter and to work in cooperation with other industries in the quality of the resource base and survival it [9].

The volume of tourist flows is determined by demand and its factors, and the degree of technical equipment territories.

This explains, in large measure, the attraction of different areas, with potentially sensitive close but differentiated technically equipped.

MATERIALS AND METHODS

In order to analyze the area's tourism traffic travel logs, and for better organization and planning tourism will calculate the most representative indicators of tourist traffic as follows: average daily number of tourists, no. overnight stays, average length of stay, tourist traffic density and capacity utilization coefficient of accommodation. Data were

collected from INSSE, Prahova, Bucharest. and data provided by pension "HOUSE MAIA" which were statistically processed and interpreted.

RESULTS AND DISCUSSIONS

Buşteni is a small mountain town in the north of the county Prahova, Muntenia, in central Romania. It is located in the Prahova Valley, at the foot of Bucegi Mountains, with a maximum altitude of 2505 m has a population of 10,374 inhabitants [1].

The average altitude is 850 m Busteni is one of the most popular mountain resorts, offering spectacular views, lots of opportunities and holiday activities, from skiing to hiking. Located 135 km from Bucharest, covers an area of 8.517 km along the valley between "Vadul Cerbului" and tunnel dug in the mountain spur "Muchia Lungă" ("Long Edge") [3].

Busteni includes Poiana Ţapului is dominated by steep Bucegi and has a great starting point for ascents, but is also a true spa, is indicated not only for leisure but also for the treatment of debilitating illnesses, physical exhaustion and intellectual and disorders of the digestive tract and glands.

An interesting point on Prahova County is the geological reserve "Salt Mountain" from Slănic massive salt karst forms of carving and anthropogenic lake. Located on 1.8 hectares of salt mountain appeared to crash the Baia Baciului pit, pit which in the eighteenth century salt is extracted [5]. The collapse caused a landslide on the slope above, which resulted in massive denudation. Subsequent collapse of the ceiling in the middle of the mountain opened a pit 50 m deep, 20 m were filled with water, forming Lake Bride. Monument of rare beauty "Salt Mountain" is unique to our country [7].

Analysi of turist traffic to the *"House MAIA".*

House "Maia" is located in the resort Logs, Prahova County station 100 m and 300 Kalinderu Logs. Pension is entirely new construction, conducted according to the highest standards of comfort and safety, properly equipped to offer moments of tranquillity and relaxation.

Photo.1. "MAIA House"-External view

The pension has a capacity of 24 beds and are distributed as follows:

- Accommodation in 2 bedrooms with 2 beds;
-Accommodation in 6 rooms with double beds;
- Accommodation in 2 bedroom apartment accommodation.

Rooms have cable TV, hot shower, fridge, mini-bar, new furniture and very good quality and also very spacious. On each floor, there's a kitchen equipped with coffee maker, microwave, etc.. Guests have access to the floor. In the courtyard, guests have access to barbecue. The pension also has 2 parking spaces.

Rates per night:

- For the 8 rooms price is 40 lei per night
- For the 2 apartment with 2 rooms price is 80 lei per night.

The cost of rooms will vary depending on season, duration of stay and group size.

Photo 2. "MAIA House"-Living room


Photo 3. "MAIA House"-Bar room


Photo 4. "MAIA House"-Bedroom

Proposals to improve

- Opening a restaurant with about 100 seats a pleasant, traditional and international tourists affordable stay at the guest house and more.
- Installation unerase wireless networks.
- Building a playground for children.

-Purchase of ATV rides in the slope Kalinderu.

- Organizing sports activities that people of all ages can participate with various awards.

The benchmark tourist traffic analysis for the tourist "HOUSE MAIA"

The indicators reflects the distribution and evolution of tourism supply and demand.

Table 1. Tourism supply and demand indicators in "House Maia"

Indicators	2009	2010	2011
Number of nights	2904	3496	3920
Number of Romanian tourists	960	1152	1284
Number of foreign tourists	12	20	34
Total tourists (Romanian + foreign)	972	1172	1318
Total number beds in hostels	80	108	111
Seats on board	24	24	24
The average stay	3.02	3.03	3.05

Source: Pension Administrator "House Maia"

They also reflect the behaviour of the application on the use of vehicles and equipment for receiving and can be used for studying the origin and destination of tourism demand, the average stay and fidelity to a particular destination

To calculate these indicators is necessary to know the indicators and they are presented in Table 1.

Of the most important tourism indicators look:

a.Index of global tourist demand change

$$\Delta CG_{0-i} = \frac{CG_i}{CG_0} \cdot 100$$

where: CG_i -global tourism demand in year "i"

CG_o -global tourism demand in "0".

$\Delta C_{t2009\text{-}2010}$ = (1172 / 972) * 100 = 120.57 %

$\Delta C_{t2010\text{-}2011}$ = (1318 / 1172) * 100 = 112.45 %

Global tourism demand fell in 2011 by 8.12% compared to 2010. In 2010 was an increase of 20.57% from 100%.

b.Index distribution of global tourism demand

$$\Delta CI_{0-i} = \frac{CI}{CG} \cdot 100 \; ; \; \Delta CE_{0-i} = \frac{CE}{CG} \cdot 100$$

where: *CI - domestic tourism demand;*

CE - foreign tourism demand.

CG - global tourism demand

I_{i2009} = (960 / 972) * 100 = 98.76 %

I_{e2009} = (12 / 972) * 100 = 1.23 %

I_{i2010} = (1152 / 1172) * 100 = 98.29 %

I_{e2010} = (20 / 1172) * 100 = 1.70 %

I_{i2011} = (1284 / 1318) * 100 = 97.42 %

I_{e2011} = (34 / 1318) * 100 = 2.57 %

From the above analysis we can see that the highest number of tourists who come to "House Maia" is Romanian, while the number of foreigners is very low, mainly thanks to the fact that they do not prefer hotels and pensions.

c.Index of (domestic and foreign) demand variation in time

$$ICE_{0-i} = \frac{CE_i}{CE_0} \cdot 100 \, , \; ICI_{0-i} = \frac{CI_i}{CI_0} \cdot 100$$

where: *$ICE_{o\text{-}i}$ - index variation in external demand;*

ICI_{o-i} - index of variation in domestic demand.

ICI $_{2010}$ = (1152 / 960) * 100 = 120 %
ICE $_{2010}$ = (20 / 12) * 100 = 166.66 %
ICI $_{2011}$ = (1284 / 1152) * 100 = 111.45 %
ICE $_{2011}$ = (34 / 20) * 100 = 170 %

Changes in domestic and foreign tourism demand has been growing because the number of Romanian and foreign tourists had a slight increase. Index of demand variation tourism is reflected in the assessment of service quality tourists to this board.

d.The monthly concentration coefficient **(No. tourists per month / No. tourists for the year 2011)**

$$C_c = \frac{LM}{A_t}$$

For this we consider the year 2011 and the number of tourists every month is as follows: January 137, February 128, March 104, April 116, mai88, June 151, July 145, august 166, September 78, October 54, November 146 In December 105, ***A_t = 1318 tourists***.

C $_{c\ ian}$ = (137 / 1318) * 100 = 10.39 %
C $_{c\ feb}$ = (128 / 1318) * 100 = 9.71 %
C $_{c\ mart}$ = (104 / 1318) * 100 = 7.89 %
C $_{c\ apr}$ = (116/ 1318) * 100 = 8.80 %
C $_{c\ mai}$ = (88 / 1318) * 100 = 6.67 %
C $_{c\ iun}$ = (151 / 1318) * 100 = 11.45 %
C $_{c\ iul}$ = (145 / 1318) * 100 = 11 %
C $_{c\ aug}$ = (166 / 1318) * 100 = 12.59 %
C $_{c\ sept}$ = (78 / 1318) * 100 = 5.91 %
C $_{c\ oct}$ = (54 / 1318) * 100 = 4.09 %
C $_{c\ nov}$ = (46 / 1318) * 100 = 3.49 %
C $_{c\ dec}$ = (105 / 1318) * 100 = 7.96 %

Tourist highest concentration, calculation year 2011 was recorded in June with a percentage of 11.45%, and the lowest monthly tourist concentration was recorded in November at a rate of 3.49%.

e.Indicator development board accommodation capacity**: (*No. of seats*)**

$$\Delta LC_{0-i} = \frac{LC_i}{LC_0} \cdot 100$$

$\Delta C_{t\ 2010}$ = (24 / 24) * 100 = 100%

Due to the fact that the number of beds in rooms has not changed in the period under review, this touristic indicator did not change.

f.Structure of the total accommodation capacity in pension

- the weight capacity of the hostel) in total accommodation capacity in hostel

$$Icc = \frac{LC}{LH} \cdot 100$$

where: LH - the board seats;

LC - total accommodation capacity in pensions;

S $_{cp\ 2009}$ = (80 / 24) * 100 = 333.3 %
S $_{cp\ 2010}$ = (108 / 24) * 100 = 450 %
S $_{cp\ 2011}$ = (111 / 24) * 100 = 462.5 %

"House Maia" is analyzed from an accommodation capacity of 24 seats, while the total number of beds in hostels varies from year to year. Proportion of the pension is the total beds in hostels is increasing in 2009-2011.

g.Pension clients during development index "0 - i" **[(No. of Romanian tourists + No. foreign tourists) current year / (No. of Romanian tourists + No. foreign tourists) last year] ***

$$\Delta T = \frac{TP_i}{TP_0} \cdot 100$$

Where: TP_i - Tourists on board in "i";
TP_o - Tourists on board in "0".

ΔTp_{2010} = (1172 / 972) * 100 = 120.57 %
ΔTp_{2011} = (1318 / 1172) * 100 = 112.45 %

In 2010-2011, tourists come to "House Maia" has seen growth year on year. The largest increase recorded in the number of tourists is increasing in 2010 being 20.57%.

h.Development index overnight stays **(No. overnights 2010/2009 and 2011/2010)**

$$\Delta N = \frac{NH_i}{NH_0} \cdot 100$$

where: *N - no. nights (current year and previous year).*

ΔNp_{2010} = (3496 / 2904) * 100 = 120.38 %
ΔNp_{2011} = (3920 / 3496) * 100 = 112.12 %

Number of overnight stays has grown increasing every year knowing maximum growth in 2010 increased by 20.38% when.

i.Progress indicator average length of stay in hostel

$$\Delta\overline{S} = \frac{\overline{S_i}}{\overline{S_o}} \cdot 100$$

where: S_i - *average length of stay in a given period (month, quarter, year) when "i";*
S_o - *the average length of stay at the time of "0" (month, quarter, year).*
$\Delta S_{m\ 2010}$ = (3,03 / 3,02) * 100 = 100.33 %
$\Delta S_{m\ 2011}$ = (3,05 / 3,03) * 100 = 100.66 %
The average stay in the analyzed period was stable trend, showing growth.

j.Pension occupancy indicator (employment)

$$G_o = \frac{NH \cdot 100}{LH \cdot Z} = \frac{NT \cdot S}{LH \cdot Z} \cdot 100$$

where:
G_o - *occupancy percentages;*
NH - number of nights;
LH - number of seats in the board;
Z - the number of days of supply pension;
NT - number of tourists,.
S - average length of stay,
G_{2009} = [2904 / (24 x 365)] * 100 = 33.15 %
G_{2010} = [3496 / (24 x 365)] * 100 = 39.90 %
G_{2011} = [3920 / (24 x 365)] * 100 = 44.74 %
Occupancy indicator increased pension in the period under review with a percentage of 11.59% in 2011 compared to 2009.

k. Indicator in relation to population density tourism

$$D_{t_{i-0}} = \frac{T_{t_{i-0}}}{Population} \text{ (tourists/ no. inhabitants)}$$

where:
T_{i-0} – *total Romanian tourists + total foreign tourists;*
Pop - population

Table 2. Tourist flow, 2009-2011

Years	2009	2010	2011
No. total tourists	972	1172	1318
Local people	10783	10548	10327

Source:Statistical Yearbooks of Prahova County

$D_{t\ 2009}$ = (972 / 10783) = 0.09
$D_{t\ 2010}$ = (1172 / 10548) = 0.11
D_{t2011} = (1318 / 10327) = 0.18
The number of tourists has increased in the period under review, compared to its population has been declining.

l. Tourist density indicator in relation to surface

$$D_{t_{i-0}} = \frac{T_{t_{i-0}}}{Surface} \text{ (tourists/km}^2\text{)}$$

where:
T_{i-0} - *total Romanian + total foreign tourists;*
S - area city = 8,517 km^2
$D_{ts\ 2009}$ = (972 / 8517) = 0.11
$D_{ts\ 2010}$ = (1172 / 8517) = 0.13
$D_{ts\ 2011}$ = (1318 / 8517) = 0.15
Because the number of tourists increased in 2009-2011, and the area of the village is the same, this indicator was insignificant variations.

CONCLUSIONS

Economic and social development is combined with tourism development in that specific tourism activities by their complexity, contributing to the overall development of the area, while this development will in turn cause an increase in tourist traffic.
Locals and local authorities are trying to diversify the rural tourism supply and demand after the tourist market trends. Farmhouses built or which provide features that outside countries. That appeared competition between tourism and agro pensions due to the low number of tourists who choose to accommodate the agro pensions. Therefore pensions are growing agro touristic pensions face facing a serious decline.
The national tourism be tried removing the insulation and Romanian village development, allowing its use. To help create the purpose and existence of funds in their direction.
The European Union is willing to allocate some lend for rural development. Some people accept the responsibility for long-term development taking into account the national interest and international requirements
Endowed with great tourism potential varied, diversified and focused by the existence of landforms combined throughout, a favourable climate for tourism for most of the year, a potentially rich fauna and flora species and ecosystems single in Europe spa treatment with natural factors, with cultural heritage -

historical and global reference architecture, Prahova county may fall among attractive tourist destinations in Romania and even Europe.

The main measures that should be applied to achieve tourism development activities and tourism development in the locality Logs could be: the creation of programs and funds to co-finance regional development projects, linking with the national programs of local and regional expansion communications in tourist areas, modern and efficient transport, promote regional tourism potential through participation in tourism fairs, the execution of advertising campaigns, preparation of brochures with information about the area's tourism potential and suggestive images in this sense, media hostels and agrotourism farms.

Tourism is an important contribution to maintaining and improving environmental quality, manifesting as an active factor of sustainable development is in his interest to get involved in this issue and to work in cooperation with other industries in the quality of the resource base and survival it.

REFERENCES

[1]Creţu Romeo Cătălin, 2005, Agrotouristical Resources, University Publishing House, Bucharest
[2]Honţuş Adelaida C., 2005, Spatial touristic and agrotouristic planning, CERES Publishing House, Bucharest
[3]Honţuş Adelaida C., 2005, 2009, Touristic and agrotouristic Geography of Romania, CERES Publishing House , Bucharest
[4] Ielenicz Mihai, Comănescu Laura. 2006, Romania tourism potential, University Publishing House, Bucharest
[5]Ielenicz Mihai, Grigoropol, F., 1984, Slănic, Publishing Sport- Tourism , Bucharest
[6]Ielenicz Mihai, 1992, Tourism potential of Romania, Publishing Sport- Tourism, Bucharest
[7]Minciu Rodica, 2000, The tourism economy, Uranus Publishing House , Bucharest
[9]Mohan. G., Ardelean, A., Georgescu, M., 1996, reserves and natural monuments in Romania , Ed Velcro, Oradea
[8]Mohan, G., Ielenicz, M., Pătroescu Maria, 1987, Reserves and Natural Monuments Publishing Sport-Tourism Bucharest
[10]Petrea Rodica, Petros, D., 1984, Rural Tourism, Cluj University Press, Cluj Napoca
[11] www.incdt.ro
[12]www.infopensiuni.ro
[13]http://www.insse.ro/cms/files/Web_IDD_BD_ro/index.htm
[14] Statistical Yearbooks Prahova , NIS, Bucharest
[15] Law on approving national spatial plan, section III, protected areas, I. Areas protected by national and natural monuments (Official Monitor, 2000)

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SUSTAINABLE MANAGEMENT PERMANENT GRASSLANDS

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Abstract

The Natural complete ecosystem, the original form of development of human society has changed due to the adoption of diversified development options, mainly oriented towards production systems designed to erode the harmony between man and nature. As a consequence of these changes, we are witnessing today an increase of the probability of manifestation of nuisance factors, namely harmful and the vulnerability of human society to their action. The global reaction to this situation, though delayed, is notable and oriented towards the adoption of specific actions intended to produce change towards a environmentally friendly economy. This change, called sustainable development, is a topical issue of maturity and depth and this paper highlights the necessity to successful management of resources for grassland agro ecosystems in order to meet people's changing needs, while maintaining or improving the quality of the environment and conserve natural resources.

Key words**:** *agroecosystem, development, environment, resources, sustainable*

INTRODUCTION

Sustainable agriculture aims to increase production capacity while maintaining the natural resource base, which requires the adoption of a management oriented towards the changing needs of people, while maintaining or enhancing environmental quality and conservation of natural resources [2].

The adoption of such management has as a basis the fact that the agricultural economic organization operates in an artificial ecosystem, which requires monitoring and management by well-defined rules, so that it's bioproductivity remain constant or increases [4].

It is about the agricultural ecosystem composed of specific subsystems, our attention being focused on grassland agro ecosystem and its object of study presenting features of its sustainable management. To develop sustainable grassland agro ecosystem supposes to design and implement economically viable measures over a long period of time, able to provide both high yields and conserve resources and protect the environment.

Design and implementation of such measures is supported by the adoption of sustainable management of land use, i.e. inclusion of activities in addition to those specific to the agricultural management dedicated to the stimulation of local biodiversity, rural development and its integration into a harmonious environment, a friendly ambient. The development of such a management process is achieved by the implementation of many operations, grouped into stages, characterized by specific content whose study requires understanding how to influence the majority of the workforce in achieving the targets in line with the skills acquired by them and the job requirements [6], and in order to avoid pollution and environmental degradation. The sustainable management of grassland agro ecosystem provides the organization, management and administration, as opposed to natural ecosystems that automatically organize, because they can not be maintained without human action, that intervenes with external energy called energy crops under two forms: necessary biological

energy (human labor and its animals) and technological (interference machinery, equipment, etc) depending on the amount of shares in the meadow extensive grasslands (pastures and permanent grassland) and intensive (sown pastures)[8].

MATERIALS AND METHODS

The study conducted and presented in summary in this paper is based on observations and analyzes conducted during 2010 - 2012 in terms offered by the Area Mountains of Cindrel, Sibiu County. The study shows that permanent mountain meadows are an important forage resource for maintaining sheep, horses and other domestic animals during the growing season [1].

Observations were made on the fields located within the locality Sălişte, a Town of Sibiu Borders pennant, area where livestock is the basic concern of residents. Diagnosis grasslands mentioned in the area indicates the existence of a process of pollution and damage to them as a result of human activities and natural phenomena such as excess of moisture, drought, salinization, erosion, etc.. Thus, we face an alarming situation that requires action accordingly, aimed at restoring permanent grassland in order to introduce the economic cycle and to ensure continuity of environmental, technological and economic aspects for the agro ecosystem. For permanent grassland restoration it is required a very good knowledge of the phenomena underlying the erosion and the organization of a sustainable management, using a series of actions to change the situation. Depending on the state of degradation of the grassland agro ecosystem, we can recommend two approaches: the radical approach and the one of the reconstruction [8]. In the following lines we will refer only to the reconstruction of the permanent grassland.

The objectives of the study undertaken are: grassland agro ecosystem management integration of sustainability principles, namely the life cycle of management of the grassland agro ecosystem and the products obtained should be consistent with the objectives of sustainable management of grasslands [3]. Achieving the objectives is based on the organization of fundamental elements of management because it provides a good relationship between biocenosis and biotope, judicious distribution of species and their protection as well as ensuring continuity of environmental, technological and economic elements as aspects of the agro ecosystem. Another fundamental element of management is controlling (checking) the way in which the activities compare with the standards and programs, detecting and measuring the deviations from them, followed by a description of the causes and remedies for their removal or promoting the positive aspects [5].

RESULTS AND DISCUSSIONS

The permanent grassland considered is located in the commune Sălişte, in the Cindrel Mountains at an altitude of between 1200 - 1300 m, from the point of view of climate being characterized by temperatures ranging from 0.5 to 4.60 C, rainfall of 1000-1150 mm, with brown feriiluviale soils. The grassland fall in the series *Festuca rubra, Festuca rubra ssp comutata* type, *Nardus stricta, Juniperus comunis* subtype, where we can see different associations of dominant species as: *Nardus stricta, Deschamsia caespitosa, Agrostis stolonifera,* and the invasive species are represented by *Pinus mugo, Juniperus comunis, Vaccinium mirtilus, Pteridium aquillinum* and nitrophos species, *Urtica dioica* and *Rumex crispus*.

The meadow analyzed is influenced by ecological factors comprising in two groups: the abiotic factors, represented by light, temperature, air, water (climate factors) soil and orography of the terrain (altitude and landforms) and the biotic group represented by all populations encountered in a meadow and interactions that are established between them. Another factor playing a decisive role in the sustainable development of grassland is the human factor. This occurs through repeated harvesting above-ground parts (hay) or by grazing, changing structural and

functional characteristics of the grassland [7]. For these interventions to determine a positive effect, it is necessary for humans to have sufficient knowledge. Human intervention occurs at the level of producers where there is a change in the state of fertility (fertilizer application), favoring the development of vegetables, i.e. a certain intensity of grazing, as well as at the level of consumers (by the species of animals placed on the lawn).

In summary, to revitalize areas of permanent grassland of Sălişte studied, there were applied specific works of combating fern, of removal of woody species present, both mechanically and manually, autumn and spring fertilization, because it is known that the "mountain meadows fertilization increases the proportion of grass such as exploitation by grazing and mowing, and the vegetables increase in the variant of exploitation by mowing. In experience, it was chosen to use low doses of chemical fertilizers and a widespread use of the organic ones.

Weed control works undertaken were based on the degree of weed, species biology or how to use the meadow focusing on preventive measures, but there were applied some curative measures as well. Preventive measures were aimed at specific cultural hygiene where, with a rational use of pastures, there were applied measures for a current maintenance of meadows among which we mention clearing away uneaten residues, including here weeds, thus preventing their spreading, also allocating animal manure which leads to the annulment of favorable conditions for azofites and ensuring a proper rotation of grassland use. Curative measures were aimed at destroying weeds generally in a mechanical manner and only on small areas it was chosen a chemically way, adopting the "no herbicides" rule in general.

Over seeding followed, in order to achieve a mixture of forage that is suitable for mixed operation, because in this way, a considerable reduce of losses by leaching is acomplished [9].

This was done both to cover the areas remaining without vegetation because of the removal and destruction of fern, the destruction of shrub or grassy bushes, so that a mixture of the following species can be made: *Lolium perenne, Poa pratensis, Festuca pratensis, Trifolium repens, Lotus corniculatus.* Applying these strategies affects the operating mode, so in the first year areas are operated by mowing and only the last part the vegetation can be grazed rationally, then it is recommended that a cleaning sew of vegetal residues to be realized, at the end of each grazing cycle, and also a work undertaken with weeding for spreading manure.

The impact of such actions on the researched lawn's performance highlight an improvement in production and forage quality, motivaded by: if in the initial phase the production of green mass calculated for alternative grazing operation ranged from 10 to 12 mv t / ha, which corresponds to an emissions volume and efficiency of economic activity [11], the number of animals of 1.5 UVM after the execution of the mentioned works, the level of production ranged between 34-38 mv t / ha, which means an increase of the load of animals of 4.8 UVM / ha. The measures and works undertaken should ensure a positive relationship between the economic and ecological balance, measured from a perspective of consumption of natural resources.

CONCLUSIONS

The sustainable development of grassland agro ecosystem is complex and time that can not be provided without the application, in an organized manner, of a set of measures and works to ensure soil protection and sustainable reconstruction of degraded lands. To develop sustainable grassland agro ecosystem supposes a design and a implementation of measures that are economically viable over a long period of time, meaning the adoption of a sustainable management of land use, i.e. inclusion of activities that come in addition to those specific in agricultural management dedicated to the stimulation of local biodiversity, to a harmonious rural development and its

integration in an environmental friendly ambient.

The activity developed by the economic agricultural organization in grassland agro ecosystem is a custom one by the fact that it is usually an artificial type, which requires monitoring and management by well-defined rules so that bio-productivity can remain steady or rise while ensuring environmentally friendly ambient. Reconstruction of permanent grassland area is considered necessary due to the condition of degradation and is achieved by implementing specific measures capable of producing change in the soil fertility status, promote legumes in the plant structure and environmental protection.

The operating mode grassland exploiting contributes to sustainable development thereof, for which it is recommended a prerequisites operation combined with a mixture of forage plants that are suitable for mixed operation, which will determine and reduction of nutrient losses by leaching. All measures and reconstruction works carried on grassland agro ecosystems can be filled with a permanent analysis of the impact on three of its features: structural feature, functional feature and environmental feature.

Implementing measures and reconstruction of permanent grasslands, depending on their condition, can ensure a growth of 2 to 3 times the production capacity, i.e. grazing capacity (10 t mv / ha to 30 t mv / ha, respectively to 1.5 LU / ha to 4.6 LU / ha).

REFERENCES

[1]Bărbulescu, C., Motcă G., 1983, Grasslands high mountains. Ceres Publishing House, Bucharest.

[2]Haverkort, B., Waters, A., 1993, *An Introduction to ow External – Imput and Sustainable Agriculture*, Coen Reijntjes,

[3]Manea, G., 1993, Ecomanagement industrial enterprises in IDCM - PMM no. 7, Bucharest, OID - ICM.

[4]Mănescu, B., Ştefan Marcela. 2005, Engineering agricultural ecosystems. ASE, Bucharest, p 18, 146.

[5]Nica, P., Iftimescu, A., 2008, Management. Concepts and applications. Sedcom Libris Publishing, Iaşi, 17.

[6]Petrescu, I., 1991, Management. Report Publisher Holding, Brasov, p 108.

[7]Pârvu C. 2001, General Ecology. Bucharest, Romania, Technical Publishing House.

[8]Samfira, I., Moisuc, A., 2007, Ecopratotehnica. Eurobit Publishing, Timişoara, p. 19, 137.

[9]Simon, J.C., Vertès, F., Decau, M.L., LeCorré, L., 1997, N flows in grazed pastures. I Balances farm scale and nitrate leaching under pastures. Fourrages 151:249-262.

[10]Soran, V., Şerban, M., 1998, Bioeconomy new science border, Scientific and Encyclopedic Publishing House, Bucharest, p 16 – 20.

[11]Zahiu Letitia, Năstase, M., 1996, Practical textbook. Case studies, ASE Press, Bucharest.

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DEVELOPMENT AND ADOPTION OF STRATEGIC OPTIONS FOR RURAL DEVELOPMENT

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Abstract

The particularly complex and timeless issue of rural development, of rural community respectively, is based on two fundamental elements which are in close interdependence: the source that can generate sustainable resource development and rural residents representing both the action and the consume factor, being the beneficiaries of development. To identify the potential problems of sustainable resources and human cells in order to develop policy options to guide the development and diversification of agricultural and non-agricultural activities in rural areas, there were used strategic analysis methods, recommended by the literature in the domain. Thus, the results obtained are summarized in this paper that contributes to a better targeting of rural development policy measures to flattening economic and social disparities manifested in the rural areas in different regions, and between urban areas and rural areas of a country, generated by the varying endowment with natural resources, physical, human, financial capital.

***Key words*:** complex, comunity, current, development, resources, rural, strategy

INTRODUCTION

The theoretical study undertaken situates, at the heart of its self, the structural and functional changes of the rural area as a result of the evolution of human society, generated by the emergence and development of non-agricultural activities and the general trend of urbanization. These threaten the rural authenticity, which requires, in the process of rural development, paying attention to the elements that characterize the authentic rural environment and give the following: individuality, specificity and authenticity, which symbolize stability and sustainability features which make up the golden triangle of protection and rural development. Rural development and the preservation of these features unaltered are one of the most complex issues of our contemporary time [8], which can be achieved by ensuring a balance between the development of rural life and modernism and the need to preserve and promote the traditions of rural environment. The success of this approach is provided only through the knowledge, development and improvement of rural issues, which require development of complex activities, vital to the community, whose solutions can not be resolved in a short term basis, requiring successively integrated programs with lasting effects that need to be completed by improving human and institutional conditions.
The facts are consistent with the point of view of the distinguished sociologist Dimitrie Gusti on Romanian rural research, expressed in 1938 current even nowadays, after more than 70 years [3]: " In the current era of intense organization of our nation, particularly research upon Romanian reality is needed. Effective actions require thorough documentation ... I'm sure that only diagnoses based on research of the kind undertaken by teams can provide the documentation required for drawing a total plan of the organization of the national life ". The context in which rural development is to be achieved is the one of need "to achieve a global economy that can sustain economic progress" because "our future depends on reducing the spread of

hunger and the growing number of failed states" [1].

Therefore, concerns about finding solutions and rural development methods require a modern approach, which takes account of the variety of local resources and superior capitalization based on sustainability [6].

MATERIALS AND METHODS

The many problems needed to be addressed when discussing about the research in rural areas require a methodology able to adapt to regional specificities. This includes methods, both quantitative and qualitative, such as statistical research and literature in the field (reports, strategies, studies, monographs), semi-structured interviews with key local stakeholders and structured interviews to collect data on successful initiatives and SWOT analysis [5]. Thus, to identify strategic options to promote the development and adapt to concrete needs, we should start from a more complete characterization of the rural area studied, in order to connect to this dynamic rural economy. Specifically, we proceeded to grouping dimensions of the size of the living area, in a set of six criteria for rural macro analysis for which we used the model PESTEL (political, economic, social, technological, and legal and environmental criteria), (fig. 1).[2].

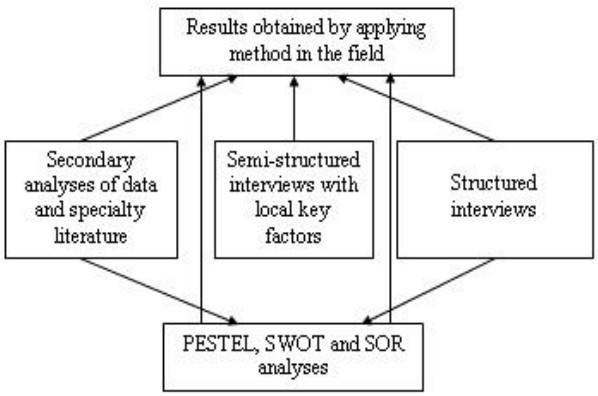

Fig. 1. The methodological structure of the field research

Subsequently for each of the six criteria of analysis of rural space with the PESTEL model, there were identified a series of criteria of which were sub-selected those with high degree of relevance and correspondence for the study. A Selection and Assessment of sub-criteria analysis was carried out by groups constituted for this purpose, whose members were within the area analyzed (local factors), consumer groups, i.e. groups of experts. In order to characterize the rural fullest of Sibiu depression, we have chosen to use the SWOT analysis because it combines the method of audit findings with those of endogenous potential with non-endogen potential, but also enables identification of the problems and help to solve them. Analysis and understanding of the internal environment is the first step in the formulation of the strategy [9].

RESULTS AND DISCUSSIONS

The socioeconomic diagnosis held in the rural area of Sibiu Depression, regarding the development and diversification of economic activities, revealed a number of specific issues. The study on the characteristics defining these points highlights some conclusions. The villages in the depression express, at the level of population, a relatively sharp distinction both quantitatively and qualitatively, which influences the objective regarding the development and diversification of economic activities. Activities taking place in rural areas of Sibiu Depression are relatively less diversified and its economic life is still dominated by agriculture. Agriculture is a traditional activity in Sibiu Depression, and is generally the main occupation and source of income for rural inhabitants. Rural non-agricultural activities conducted in Sibiu Depression recorded an appreciable number however, and include both production and services belonging to handicraft cooperatives and companies, etc. and to private producers.

To a better knowledge and more complete socio-economic view on characteristics of the rural area studied, a SWOT analysis method was used, which led to the identification of strengths and weaknesses, opportunities and

threats of the territorial unit studied. Thus were identified, as strengths of the development and diversification of rural economic activities, sustainable tourism potential and great agricultural potential. Together they are referred to the two industrial parks, forestry and related industries, respectively - branded local settings is an important statement in Sibiu Depression, representing rural resources that can be used to obtain a strategic advantage [4]. Weaknesses identified concerns about the lack of knowledge on attracting European funds by most of the farmers and entrepreneurs, lack of sustainable development strategies and visions, a large number of young people with higher education without jobs and not finally, poor educational infrastructure in small villages. These weak points must be neutralized or mitigated because they can lead to failure to achieve the established objectives [7].

Threats to development and economic diversification are due to the lack of support actions of the business environment in rural areas, failure of local stakeholders to create partnerships in order to attract funds, low interest of the association of farmers hence the low power of bargaining which makes the price of their products to be reduced, the economic crisis that causes a number of companies to cease trading, and others to make layoffs, lack of policies and strategies to promote and support their products in rural areas.

What could bring more to the development and diversification of the rural economy is a good use of the opportunities manifested in the rural area of Sibiu Depression. Among those on which we should focus all our attention are: the development of rural tourism and agro-tourism, food industry development, better services to the population, agricultural production and infrastructure. Development of public services and the development of tourist infrastructure are two opportunities that fit well with current international trends aimed at increasing the share of non-agricultural activities in rural areas, given that tourism has become an essential part of the rural economy [10].

Based on the diagnosis of the countryside in Sibiu Depression, we can formulate the following strategic options for development and diversification of economic activities in rural areas:

Attracting investment in physical infrastructure and information and communication technology to increase the efficiency of use of natural resources, energy, materials and information specific noting the countryside.

Improving educational infrastructure and adapt educational programs to market needs to develop entrepreneurial skills, which leads to catalyzing the process of development and diversification of the rural economy.

Promote actions to support businesses in rural areas both in terms of business creation as well as in the self-financing field;

Support the implementation and development of rural tourism activities, agro tourism, cultural tourism and eco-tourism.

Promote the implementation and development of agricultural production and marketing activities of agricultural products.

Promoting rational implementation and development activities in forestry and wood processing;

Support the development, promotion and better use of specific products, rural traditions of Sibiu Depression for a sustainable development.

Development and promotion of information and advice to staff situated in the rural area and to local government in order to access funds for rural development.

Development and promotion of public services in rural areas is one of the major concerns of local key factors regarding people in rural zones.

CONCLUSIONS

To identify specific territory on the potential of sustainable resources and human cells in order to develop policy options to guide the development and diversification of agricultural and non-agricultural activities in

rural areas, there were used strategic analysis methods recommended by literature.

Conducting development and diversification of activities in rural areas is done according to the territorial specific and supported by the rural community who gives life and maintains the rural Sibiu Depression.

Activities taking place in the rural areas of Sibiu Depression are relatively less diversified, reflecting a positive image in the SME-oriented development and diversification with increased tourism and agro tourism, without succeeding a better use of the important touristic potential of the depression.

To identify strategic options to promote the development and adapt to concrete needs, it is necessary to start from a more complete characterization of the rural area studied, in order to connect to it to dynamics of the rural economy.

Better awareness and opportunities manifested in the rural areas of Sibiu Depression can lead to the development and diversification of the rural economy.

REFERENCES

[1]Brown, L., 2011, Plan B 4,0: General mobility for salvaging the civilazation, reviewed edition, Press Expert Publishing, Bucureşti, p. 244.

[2]Garrette, B., Dussauge, P., Durand, R., 2009, Toute la Stratégie d'entreprise. Strategor, 5e édition, Dunod, Paris.

[3]Gusti, D. 1938, *Today condition of the Romanian village* anul III, nr. 10-12, Bucureşti

[4]Hiriyappa, B., 2008, Strategic Management for Chertered Accountants, Newq Age Internaţional Publisher, New Delhi, India, p. 16.

[5]Iagăru, R., 2012, Strategic management of human resources. Lucian Blaga University Press of Sibiu, p. 160.

[6]Iagăru, R., 2011, Romanian rural space. Tradition and development, International scientific symposium Sustenable Rural Development, vol. XIII, Seria 1,Timisoara, p. 531-538.

[7]Katsioloudes, M., 2006, Strategic Management – Global Cultural Perspectives for Profit and Non-Profit Organizations, Butterworth Heinemann Publisher, Oxford, UK.

[8]Mateoc-Sârb Nicoleta, Ungureanu, G., 2010, Regional and rural development and tendences. Mirton Press, Timişoara, pp. 59,.

[9]Nistorescu, T., Sitnikov, C., 2009, Strategic management, Sitech Press, Craiova, p. 102.

[10]Pender, L., Sharpley, R., 2005, The Management of Tourism, SAGE Publications Ltd., p. 187.

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ANALYSIS OF ECONOMIC MODELS OF POTATO PRODUCTION IN MONTENEGRO

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Abstract

The northern region of Montenegro represents a very important resource for agricultural production. However, the depopulation of the analysed area, pronounced in-kind character of production without significant participation of market producers, lack of market research, stronger vertical and horizontal connection between primary production and processing sectors have significant impacts causing the low level of competitiveness of agricultural production. Potato production in the analysed area has recorded positive trends in last ten years. This paper presents economic models of agriculture households on the analysed area from the potatoes production point of view.

Key words**:** *competitiveness, economic models, market, production*

INTRODUCTION

Potato production in Montenegro has great importance. Potato arrived to Montenegro and was introduced into production three hundred years after its transfer from South America – end of 18 century, during the rule of Petar I Petrovic Njegos. At that time it was very little known or almost unknown to other Balkan and Dunav countries. Nowadays, large number of citizens of the Northern area of Montenegro gains income from potato production. In such context, the following locations are particularly significant: Rovačko Trebaljevo (Kolašin municipality) and Lubnice (Berane municipality). Thanks to the natural conditions, potato production in the before mentioned areas is significantly competitive in comparison to other productions, such as: wheat and winter barley production. Increase of area under potato at households represents an important line of market production, where increased volumes contribute to the higher financial results of the household as a whole. Objective of this paper is to indicate significance of the organization-economic conditions for potato production in the area of Kolasin and Berane municipality.

The research subject was production-economic models, which show changes in economic results of production depending on the conditions for the conduct of production.

On the basis of obtained results and analyses, the conclusions can be derived regarding the production-economic conditions and results of potato production and also the results and their impact to the increase of yield at the observed area can be assessed.

Tica, N., Zoranovic ,T., (1991-93) performed economic assessment of potato production results in comparison to other crops on one private household. Measuring of results shows that in comparison to other crops, potato production realizes the most favourable measuring ratios regarding the production value and financial results per area unit, as well as financial results per labour hour.

Munćan, P., Živković, D., and cooperatives (1994) tried to measure the level of achieved work productivity in potato production at two large households in Srem area and compare it with other significant crops. Labour productivity in potato production and production of other relevant crops can be increased only with the increase of yield and reduction of live and materialized labour. With the desire to reduce participation of human labour in production, the efforts of experts are focused on better application of contemporary production means, technologic

procedures and in general, fast development of techniques and technologies.

Živković, D., Minćan, P., Broćić, Z., Sredojević, Z., Tomić, R. (2002) determined that from the economic point of view and as measured by the indicators of production cost-effectiveness and profitability, potato production is resembled by high competitiveness in comparison to other agriculture crop cultures.

Despotović Aleksandra (2005), analysing the influence that the increased household agricultural area and higher potato share in the planting structure have to the achieved household results, indicates that their increase contributes to the increase of profit of the household as a whole and per hectare of arable area. As a result of increased agricultural areas and potato share in the planting structure, the level of labour force utilization increases.

MATERIALS AND METHODS

Considering that the research topics are of organization-economic nature, the general method that was applied in the paper is the method of models. Data used for the paper were gathered in the field, respectively were obtained on the basis of interviews with individual producers from the analysed area. Moreover, the data based on the authors' assessment are also shown. Tables and graphs are also used for the purpose of displaying analyses of the paper.

RESULTS AND DISCUSSIONS

1.

The paper analyses two production-economic models, which are the following: a) production-economic model of conventional production without irrigation system and b) production-economic model of conventional production with irrigation system.

Characteristics of the production-economic model of conventional production without irrigation system

Regarding the analysed household and taking into consideration the agro-economic conditions, the following potato varieties were determined as the most favourable: Kennebec, Jerla, Desiree and Agria. The analysis was performed on the area of 1 ha. Obtained products are planned for placement to the national and local markets. Number of permanent employees is 1, while the maximum number of workers employed in the season period during a year amounts to 10. Number of days when the season workers are engaged is 6 and price per day is 25.00€. Planned planting distance is from 0.75m x 0.30m. Planned purchase price is at the level of around 0.25 €/kg. Packaging (packaging sacks for 12 kg), price 0.10 €/pieces. Households with required facilities exist in the proposed locations. In cases which require construction of facilities, price per m^2 of constructed area varies from 150-250 €/m^2. Price of tractor with basic connected machines, suitable for operations on the analysed locations, should not exceed 17,000 €. For around 44000 potato plants, average investment per plant amounts to around 0.13 €. Investment per m^2 amounts to around 0.60 € per m^2. Expected yield per plant amounts to around 0.68 kg.

Table 1. Total planned annual yield on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	**2**	**3**	**4**	**5(3x4)**
1.	Mercantile potato	kg	30,000	0.25	7,500.00
	Total				**7,500.00**

Source: Own calculation

Table 2. Annual production costs on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	**2**	**3**	**(4)**	**5(3x4)**
1	Seed	kg/ha	3000	0.70	2100.00
2	Fuel	l	350	1.00	350.00
3	Mineral fertilizer	kg	1000	0.50	500.00
4	Protective agents	kg	50	6.00	300.00
5	Seasonal labor	No of workers	10	150.00	1500.00
6	Packaging	piece	2500	0.10	250.00
	Total				**5,000.00**

Source: Own calculation

Table 3. Business results - model „A“

Productivity of the project	net profit/no of workers =250.00 €
Coefficient of cost-efficiency	Total income/ total cost =1.50
	profit/total income=0,33

The performed analysis indicates that the achieved cost-efficiency coefficient is higher than 1, which means that potato production in the given conditions is cost-efficient. Obtained result is in accordance with the previous researches, (Živković, D., and coop. 2002), which indicated high level of cost-efficiency in potato production. As regards to the cost structure, the highest share is for seed costs (42%). In addition to the expected incomes from placement of products to the market, measures of the agrarian policy of Montenegro also envisage incentives of 130 € per ha of area under potatoes or contribution for the procurement of production means and investments with the share of 30% of the invoiced value of the equipment – machinery and irrigation system.

Taking into consideration the fact that agricultural areas of Montenegro are mainly uncultivated, therefore excellent conditions for starting the potato production exist. Main advantage of Montenegrin producers is that there is higher demand during the tourism seasons - winter and summer. Thanks to the possibility of so called invisible export, potato production, as the core or supplementary business activity, can be deemed as an important income source for local citizens. If we presume organizing potato production on for example 20 selected farms, on the area of 20 ha, the expected income at the annual level would be around 50,000 €. Moreover, we have to take into consideration the fact that this region covers the areas which are on the lower altitude therefore there are possibilities for diversified plant production.

Characteristics of the production-economic model of conventional production with irrigation system

Characteristics of the production-economic model B are similar to the model A, except that this production model includes irrigation system and due to that the planned potato sale price is higher. The used varieties are: Kennebec, Jerla, Desiree and Agria. Analysis was performed on the area of 1 ha. Obtained products are planned for placement to the national and local markets. Number of permanent employees is 1, while the maximum number of workers employed in the season period during a year amounts to 10. Number of days when the seasonal workers are engaged is 6 and price per day is 25.00€. Planned planting distance is from 0.75m x 0.30m. Planned purchase price is at the level of around 0.30 €/kg. Packaging (packaging sacks for 12 kg), price 0.10 €/piece. Irrigation system costs per ha do not exceed 500 €. For around 44000 potato plants, average investment per plant amounts to around 0.13 €. Investment per m^2 amounts to around 0.60 € per m^2. Expected yield per plant amounts to around 0.8 kg.

Table 4. Total planned annual yield on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/kg	Value (Euro)
	1	**2**	**3**	**4**	**5(3x4)**
1.	Mercantile potato	kg	35,200	0.30	10,560.0
	Total				**10,560.0**

Source: Own calculation

Table 5. Annual production costs on the area of 1 ha

	Type of product	Measuring unit	Amount	Sale Euro/ kg	Value (Euro)
	1	**2**	**3**	**(4)**	**5(3x4)**
1	Seed	kg/ha	3000	0.70	2100.0
2	Fuel	L	350	1.00	350.00
3	Fertilizer	Kg	1000	0.50	500.00
4	Protective agents	Kg	50	6.00	300.00
5	Seasonal labour	no of workers	10	150.00	1500.0
6	Packaging	piece	2933	0.10	293.0
7	Irrigation system	Ha	-	-	500.0
	Total				**5,543.0**

Source: Own calculation

Overview of the Model B business results is given in the Table 6.

Table 6. Business results – model “B“

Productivity of the project	net profit/no of workers = 502.00 €
Coefficient of cost-efficiency	Total income/ total cost = 1.90
	profit/total income = 0.47

Performed analysis indicates that better economic results were achieved in the model B than in the model A (Fig.1).

Cost-efficiency coefficient amounts to 1.90 and the net profit per worker is at the level of 502.00 €.

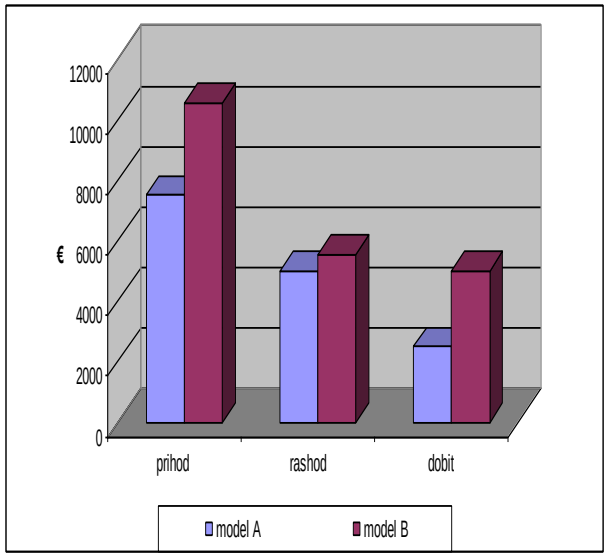

Fig. 1.Comparative analysis of financial results

Achieved economic results are complementary with the previous researches which indicate that with application of irrigation the potato yield can be increased even for 35-40%, (Broćić, Z., and coop., 2002). Moreover, (Egumenovski, P. and coop. 1990) determined that irrigation achieves important effects on the Desiree and Resy varieties. The largest effects of irrigation were achieved at the watering norm of 400 m^3 per ha.

CONCLUSIONS

In Montenegro, especially in its Northern part, there are significant uncultivated areas and there are outstanding agro-ecological conditions for potato production. Particular advantage is possibility for placement of agricultural products from the analysed area to the tourism capacities at the local and national level. Under the conditions of potato production on the area of 1 ha, higher revenues than expenditures can be expected for around 2,500.00 € without any significant investments (***model A***). Expected economic effects are higher if the production manner is changed and irrigation system is introduced (***model B***). Moreover, changes occur with the increase of arable areas planted with this culture, better storage conditions, application of more appropriate packaging, introduction of new sale channels, etc. Higher revenues than expenditures were obtained in the model B for around 5,017.00 €. If we compare levels of achieved revenues, it can be concluded that revenues of model B are higher for 50% in comparison to the model A. If the number of potato production farms increases and if such number is at the level of 20 farms a year in the area of Kolašin and Berane municipalities, it would have significant influence to the increase of revenues and improvement of life in the analysed area.

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REFERENCES

[1]Broćić, Z., Živković, D., Munćan, P., Stefanović, R., 2002, Proizvodnja hrane-činilac regionalne integracije na Balkanu, Zbornik radova, 273-282

[2]Despotović Aleksandra, 2005, Međuzavisnost organizaciono-ekonomskih činilaca i rezultata u proizvodnji krompira u Crnoj Gori", doktorska disertacija, Poljoprivredni fakultet, Beograd, p.24-25

[3]Egumenovski, P. i sar.,1990, Navodnjavanje kao faktor povećanja prinosa krompira sorte Desiree i Resy, Savremena poljoprivreda, Novi Sad, p. 467-471

[4]Jovanović, M., Despotović Aleksandra, 2010, Market as a factor in the development of mountain region in Montenegro", Economics of agriculture, 2010. Vol Cb/SI-2, Belgrade, 90-99.

[5]Munćan, P., Živković, D., Jevtić,S., 1994, Produktivnost rada u proizvodnji krompir, Savremena poljoprivreda, Novi Sad, p. 568-573.

[6]Tica, N., Zoranović, T., 1993, Ekonomski aspekti proizvodnje krompira na jednom privatnom poljoprivrednom gazdinstvu, Savremena poljoprivreda, Novi Sad, p.562-573

[7]Živković, D., Munćan, P., Rajić, Z., 1992, Mogućnosti i ekonomski položaj proizvodnje krompira u brdsko-planinskom području Srbije, Zbornik radova, Uslovi, mogućnosti, prerada i tržište krompira, Guča, p. 131-136.

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ECOLOGICAL STABILITY AS A DETERMINANT OF NITRA REGION DEVELOPMENT IN SLOVAKIA

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Abstract

Nitra region is evaluated based on the analysis of land use ecological stability in the present article, which is significant for its development, particularly in terms of increasing potential for tourism. The coefficient of ecological stability (C_{ES}) was used to evaluate the ecological stability of the region as a relatively simple ecological indicator for quality of life determination in the region. Three basic methods were used of calculating C_{ES} according to the methodology Míchal (1982), Löw et al. (1984) and Miklós (1986). The districts of Nitra region differs by natural conditions from each other. There are represented three types of natural areas: foothill (Zlaté Moravce), upland (Nitra, Levice, Topoľčany) and lowland area (Šaľa, Nové Zámky, Komárom). The highest value of C_{ES} was in the district of Zlaté Moravce. A higher value of C_{ES} was in the district of Topoľčany. The lowest value of C_{ES} was evaluated in the district of Šaľa, where do absent ecologically stable elements. Nitra region is classifies as an area of low to median ecological stability, which is critical to the improvement and development of the region need to make eco-stabilizing elements and eco-stabilizing management measures. On the basis of country originality can be expressed the impact of human activity on the landscape and its features. Originality coefficient of the cultural landscape for individual districts of Nitra region is following: Komárno and Levice - 0.16; Nitra - 0.17; Nové Zámky - 0.15; Šaľa - 0.07; Topoľčany - 0.56; Zlaté Moravce - 1.49. Slovakia is in terms of the authenticity of cultural landscapes evaluated coefficient of 2.01. Based on the analysis it can be concluded heterogeneity in the origin of cultural landscapes in the Nitra region.

Key words**:** *anthropogenic activity, ecological stability, Nitra region, tourism*

INTRODUCTION

Evaluation of all the conditions and prerequisites for sustainable land use is considered evaluation of the ecological stability of the landscape. Evaluation of ecological stability is an important part of several land use and landscape ecological documentation.

The concept of spatial ecological stability was introduced by [3]. This concept includes dynamic ability of the landscape structure to retain spatial ecological relationships between individual ecosystems (to ensure the exchange of matter, energy and information) for the dynamic variability of the conditions and forms of life, even assuming that the country is made up of local ecosystems with different (and low) degree internal ecological stability. For stable country can be considered such a country where it is permanently ensured the possibility of using production and non-production functions, in which there is irreversible disruption of the functional potential of the country resulting from human activities.

Assessment and evaluation of the degree of ecological landscape is realized in different ways. Often takes place following the review only real vegetation, or the current landscape structure and tertiary landscape structure [9]. Another more complex method is based on a comparison of natural conditions and the type of land use [5], or the assessment of landscape support, protecting and reducing its ecological stability, and evaluating information on

hazards abiocomplexes stability, the current state of land use and pollution load [7].

The basic importance for assurance ecological stability of area has ecologically important segments of the country, which are ecologically important: landscape elements, landscape units, landscape area and line communities. These segments are local, regional, trans-regional bio geographical significance, respectively biosphere importance.

The Nitra region is one of the most productive agricultural regions of Slovakia with a total farmland area of 468 669 ha, which is the highest in Slovakia and the share of agricultural land in Slovakia (19.3%). The Nitra region, according the National Strategy of Regional Development 2007-2013, is predominantly rural, slow-growing region of the Slovak Republic, with reasonable attractiveness and position, average degree of readiness for innovation, competitive on average outside of the canter of EU development activities and the possibility of cross-border cooperation with Hungary.

The term "territorial development" is not precisely defined, but can be seen as purposeful recovery area [8]. The issue of regional policy is closely linked to spatial planning, which may, through its essential function in the long term contribute to increase the potential of the region.

The aim of this paper is based on an analysis of land use to assess the ecological stability of the region, which is essential for region development particularly in terms of increasing potential for tourism. Only under favourable natural environment is conducive to the development of all activities in the region.

MATERIALS AND METHODS

Definition of area

The Nitra region is the object of analysis. It is located in the southern part of Slovakia. It is a heterogeneous region of Slovakia in terms of ethnic structure. In Nitra region is 7 districts (15 towns and 354 villages). Nitra region occupies 12.8% of the Slovak Republic of the total area of Slovakia. Overall, there are more than 700 thousand inhabitants and population density represents 111 inhabitants/km^{-2}. In the Nitra region is 12.7% from the total population live in Slovakia. In Figure 1 are shown area of Nitra region districts and the number of inhabitants.

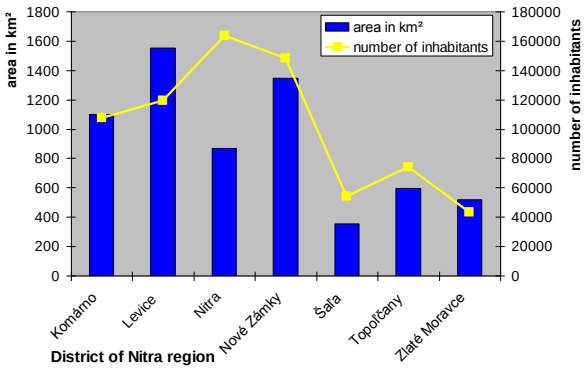

Fig. 1. The area and number of inhabitants of the Nitra region

Source: Own calculation on the basis of data from Statistic Office of The Slovak Republic (2014)

Methodology for evaluating of ecological stability

Data on the area of land resources for the period 2003 - 2013 were obtained from the RegDat Statistical Office of the Slovak Republic. The obtained data were processed by the methods of analysis and synthesis. Interpretation of results is compiled in the form of tables and graphs using MS Office. Characteristics of the current (secondary) landscape structure studied area based on the methodology LANDEP [6]. The coefficient of ecological stability (C_{ES}) was used to assess the ecological stability of the country as a relatively simple indicator determinant ecological quality of life in the region. The three basic methods of calculating C_{ES} based on the work by [2], [1] and [4] were used.

Calculation of the coefficient ecological stability of the landscape according to [2] is the following:

$$C_{ES} = S / U$$

where: C_{ES} – coefficient of ecological stability; S – the area of elements with stable or positive influence; L – the area of elements with unstable and negative influence.

[4] considers the highest quality areas the greatest proportion of high-value elements of

landscape significance from an ecological point. The formula was used to calculate:

$$C_{ES} = (\sum p_i \,.\, k_i) \,.\, P^{-1}$$

where: C_{ES} – coefficient of ecological stability; p_i – the area of individual elements (our land cover classes); k_i – coefficient of the eco-stabilizing capacity of individual elements; P – the area of elements in hectare.

Calculation of the coefficient of ecological stability under [1]:

$$C_{ES} = (1{,}5A + B + 0{,}5C) / (0{,}2D + 0{,}8E)$$

where: C_{ES} – coefficient of ecological stability; A – percentage of surfaces with 5 degree of environmental quality (forests, water elements); B – percentage of surfaces with 4 degree of EQ (riparian vegetation, game refuges); C – percentage of surfaces with 3 degree of EQ (meadows and grazing elements); D – percentage of surfaces with 2 degree of EQ (arable land); E – percentage of surfaces with 1 degree of EQ (built-up areas).

Several methods are used to measure human interventions into the original landscape structure, which affect its ecological stability. The coefficient of natural cultural landscape is one of them [10]. Originality coefficient of the cultural landscape has a simple formulation:

$$C_{OCL} = (FL + PG) / AL$$

where: C_{OCL} – coefficient originality of the cultural landscape; FL – forest land; PG – permanent grassland; AL – arable land.

RESULTS AND DISCUSSIONS

The districts of the Nitra region differ by natural conditions from each other. They consist of three types of natural areas: foothill (Zlaté Moravce), upland (Nitra, Levice, Topoľčany) and lowland area (Šaľa, Nové Zámky, Komárom). Based on the analysis of land resources of selected areas (Table 1), which determines land use, we can conclude the diversity represented by individual elements (ecosystems) in the region.

Forest elements, meadows and grazing elements and water elements are considered as ecologically stable elements. For the unstable elements in the region are considered built-up areas, other areas (eg transport infrastructure) and arable land is used for intensive agricultural. The arable land ranged from 78.22% (Šaľa) to 36.00% (Zlaté Moravce) of the total area of the district is dominant in the monitored districts of the Nitra region (Figure 2). Forest elements, environmentally stable elements, have the largest acreage in the district of Zlaté Moravce (43.58%) and Topoľčany (28.41%) and lowest in Šaľa (4.09%), Komárno (6.35%) and Nové Zámky (7.71%). The meadows and grazing elements, as environmentally stable elements, dominate in the Zlaté Moravce (10.02%) and Levice (7.92%). In all the districts of Nitra region are located a few water elements, which contribute significantly to the ecological stability of the area. The highest spatial representation of water elements is in Komárno (5.10%) and the lowest in Zlaté Moravce (0.81%).

Ecological stability of the landscape is conditional gene pool conservation of important species and sites, as well as diversity and an acceptable level of activities in the region. The stability of the country in terms of possibilities of the region used in tourism and environmental quality discusses the number and area of ecologically important landscape (protected areas, NATURA 2000 sites).

The excessively intense human rights are threat to the ecological stability, which act as pressure tension. These are primarily claims arising from economic activities, construction and occupation of areas and also the pollution of the individual elements of the environment. In Table 2 is treated analysis of protected areas. The three protected landscape areas (PLA) – PLA Ponitrie (District of Nitra, Topoľčany and Zlaté Moravce), PLA Štiavnické vrchy (Levice) and PLA Dunajské luhy (Komárno) extend to Nitra region. The total area of the PLA in the territory of the Nitra region is 4.65 % of the total area. Number of small protected areas is 119, representing 0.66% of the area of the region, of which 14 National natural reservations (NNR), 46 Natural reservations (NR), 18 Natural landmarks (NL) and 41 Protected areas (PA).

Table 1. Comparison of land resources used in the districts of Nitra region in Slovakia in hectares in year 2003 and 2013

District of Nitra region	Year	Type of land use									
		ploughland	hopyard	vineyard	Garden	orchard	meadows and grazing land	forest lands	water areas	built-up areas	other areas
	2003	75743.9	0	2398.2	2179.1	1598.7	4679.2	6921.1	5624.6	6338.8	4543.4
Komárno	2013	93485.5	0	2986.7	2815.9	465.2	12754.8	29043.3	2306.5	7711.2	3544.9
	2003	61590.5	0	2162.7	2697.1	283.5	1771.5	8840.2	1365.0	6528.5	1834.0
Levice	2013	95174.4	0.1	3575.1	3109.3	2069.0	4309.7	10345.8	4221.9	9031.7	2913.8
	2003	27866.8	0	235.9	855.7	219.0	507.4	1453.2	987.7	2742.1	722.2
Nitra	2013	33925.5	32.8	281.7	1504.6	275.9	1923.6	16894.7	829.6	2772.7	1327.4
	2003	19217.8	0	496.6	1155.4	168.6	5208.0	22627.7	428.3	2148.9	666.2
Nové Zámky	2013	75982.0	0	2206.5	2172.2	1411.3	4800.9	6980.7	5614.0	6500.9	4345.4
	2003	93577.1	0.1	2958.9	2771.5	468.3	12280.6	29236.1	2318.8	7828.9	3673.6
Šaľa	2013	60926.3	0	2136.4	2663.6	259.8	1628.6	8868.3	1367.9	6745.2	2476.9
	2003	94919.7	0.01	3583.2	3053.2	2075.7	4152.6	10381.8	4210.0	9104.5	3325.8
Topoľčany	2013	27838.3	0	207.9	836.5	233.0	387.0	1457.1	967.5	2843.5	819.1
	2003	33574.9	34.0	280.6	1482.1	266.8	1899.2	16977.3	832.6	2899.9	1516.1
Zlaté Moravce	2013	18760.0	2.4	540.2	1128.5	184.8	5220.5	22711.2	423.8	2175.8	970.5

Source: Own calculation on the basis of data from Statistic Office of The Slovak Republic - RegDat (2014)

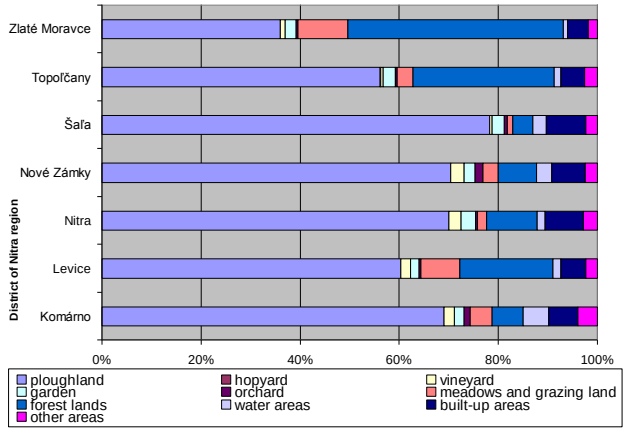

Fig. 2 Percentage share landscape elements in the districts of Nitra region in Year 2013

In the district of Komárno and Nové Zámky is the biggest area representation of small protected areas of the districts of Nitra region. The district of Komárno is considered to ecological the most stable area in terms of the number and area of protected areas. On the territory of the Nitra region is 58 Special Areas of Conservation (SACs) and 8 Special Protection Areas (SPAs) that are part of NATURA 2000. Nitra region represents 21.1% (SPAs) and 12.2% (SACs) of the total number of NATURA 2000 areas in Slovakia. Also, these areas contribute to an increase of ecological stability of the region.

Table 2. Protected areas in the Nitra region, as significant areas of ecological stability

District of Nitra region	NNR		NR		NL		PA	
	A	B	A	B	A	B	A	B
Komárno	2	165.8	20	418.1	0	0	10	951.3
Levice	2	339.9	7	220.5	2	1.2	6	113.8
Nitra	2	53.5	2	89.3	2	1.3	9	5.4
Nové Zámky	6	864.9	11	190.5	6	59.8	7	185.8
Šaľa	0	0	0	0	6	29.1	1	5.9
Topoľčany	1	30.1	5	110.9	2	5.5	4	45.6
Zlaté Moravce	1	8.8	0	0	1	8.4	4	215.9

Legend: NNP – National natural reservation; NR – Natural reservation; NL – Natural landmark; PA – Protected area; A – number of areas; B – area in hectare

Based on the analysis of landscape elements occurring in the districts of Nitra region the ecological stability of the area was assessed by using the coefficient of ecological stability. From a methodological point of view is the evaluation of ecological stability based on three different approaches for evaluating of landscape elements. Methodology of C_{ES} calculating of the authors [2], [1] and [4]

include Slovakia and the Czech Republic among the most commonly used. Comparison of ecological stability coefficients for districts Nitra region are interpreted in Table 3 and Figure 3.

Table 3. Ecological stability coefficients for districts of Nitra region

District of Nitra region	Ecological stability index by		
	[2]	[1]	[3]
Komárno	0.14	0.89	0.25
Levice	0.14	0.89	0.25
Nitra	0.15	0.83	0.25
Nové Zámky	0.14	0.83	0.25
Šaľa	0.06	0.45	0.20
Topoľčany	0.50	2.70	0.41
Zlaté Moravce	1.28	5.95	0.57

The highest values of C_{ES} are in the district of Zlaté Moravce. This district shall be assigned to the area with the prevailing natural elements, intermediate and high stability. Higher values of C_{ES} are also in the district Topoľčany. Lowest values of C_{ES} were evaluated in the district of Šaľa, where absent ecologically stable elements. It is a territory dominated by intensive agricultural use. In terms of ecological stability Nitra region belongs to the area of low to moderate ecological stability.

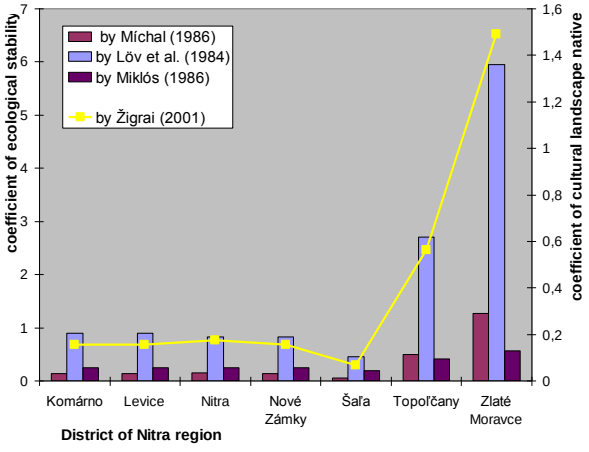

Fig. 3. Comparison of ecological stability coefficients and coefficients authenticity of cultural landscapes in the districts of Nitra region in Slovakia to 2013

There is requirement to make eco-stabilizing elements and eco-stabilizing management measures to the improvement and development of the region.

Human intervention in natural conditions in the Nitra region is very significant. Area of interest is among the regions of Slovakia, which man altered with his activity, his interventions in the original natural landscape structures, particularly agricultural use and the associated removal of forest ecosystems in the past, changed the face of the country (region). Impact of human activity on the land and its elements can be expressed in terms of the originality of the cultural landscape.

Coefficient of originality of the cultural landscape for each districts of Nitra region is following: district Komárno and Levice - 0.16; district Nitra - 0.17; District of Nové Zámky - 0.15; district Šaľa - 0.07; Topoľčany - 0.56; district Zlaté Moravce - 1.49. Slovakia is rated coefficient of 2.01 in terms of originality cultural landscapes. Based on the analysis it can be concluded heterogeneity in of originality of cultural landscapes in the Nitra region. Foothill areas exhibit higher originality (Zlaté Moravce), because there is high share of forest ecosystems, lower agricultural use and a higher degree of ecological stability. Lowland area is evaluated lower degree of originality landscape, where dominates agricultural land use and low ecological stability (southern districts of Nitra region, particularly Šaľa).

C_{ES} is a key element for design measures within the formation and development of the country at present. Calculation of C_{ES} is normally used in the processing of various landscape-ecological studies in spatial assessment of the country and under. In practice, C_{ES} apply within the territorial systems of ecological stability as documentation of nature and landscape protection.

CONCLUSIONS

Nitra region represents a heterogeneous environment in terms of representation of eco-stabilizing elements. The highest values of the coefficient of ecological stability are in the district of Zlaté Moravce and lowest in the district of Šaľa. In the region do absent in particular water elements. In Komárno district

is the highest spatial representation of water elements. In the use of land resources in Nitra region are no significant differences in the span of ten years.

The agriculture is significant factor intervening in the natural environment. It is an important element in the employment of the population predominantly rural areas in some districts of Nitra region. Toward the practice is necessary to give priority to intensive production methods that will have minimal negative impacts on environmental elements. According the evaluation of number of protected areas, it is also important to ensure their practical protection, which is the result of the need to protect the elements of nature and landscape. A common problem in Nitra region is a conflict of interest socio-economic activity of man and nature and landscape protection.

Nitra region can be rated as an area of low to moderate ecological stability despite interventions in the natural structures in each district. Occurrence and diversity of protected areas can make a significant contribution to maintaining the total stability of the country despite the increasing intensity of the socio-economic activities of the region's inhabitants. The region has the opportunity to develop activities in the field of tourism with a focus on agro-tourism. In the region occurring natural protected elements do allows the development of ecotourism, which combines the activities of tourism and environmental education and environmental awareness of the population.

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REFERENCES

[1]Löw, J. *et al*., 1986. Zásady pro vymezování a navrhování územních systémů ekologické stability. Metodická pomůcka. Agroprojekt Brno.

[2]Míchal, I., 1982. Principy krajinářského hodnocení území. Architektúra a urbanizmus, XVI/Z, Bratislava: VEDA SAV. pp. 65–87.

[3]Miklós, L., 1994, Ecologická stabilita. Brno : MŽP ČR. 244 p.

[4]Miklós, L., 1986, Stabilita krajiny v ekologickom genereli SSR. In Životné prostredie, vol. 20, č. 2, pp. 87–93.

[5]Minár, J. *et al*., 2001, Geoekologický (komplexný fyzickogeografický) výskum a mapovanie vo veľkých mierkach. Bratislava : Geo-grafika Bratislava. 209 p. ISBN 80-968146-3-X.

[6]Ružička, M., 2000, Krajinnoekologické plánovanie - LANDEP I. Edícia BIOSFÉRA. A. Séria vedeckej literatúry. Bratislava : ŠEVT, Bratislava. 119 p. ISBN 80-968030-2-6.

[7]Tremboš, P., 1998, Územný systém ekologickej stability 1. časť. In Geografia, vol. 6, no. 1, pp. 15-19. ISSN 1335-9258.

[8]Wokoun R. *et al.,* 2008, Regionální rozvoj (Východiska regionálního rozvoje, regionální politika, teorie, strategie a programování). Praha : Linde Praha a.s. 480 p. ISBN 978-80-7201-699-0.

[9] Law No. 543/2002 Z.z. o ochrane prírody a krajiny

[10]Žigrai, F., 2001, Interpretácia historických máp pre štúdium využitia zeme a krajinno-ekologický výskum. In Historické mapy (zborník z konferencie). Bratislava: Kartografická spoločnosť SR. pp. 35-40.

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MODERNIZATION OF AGRICULTURE VS SUSTAINABLE AGRICULTURE

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Abstract

The paper shows the correlation between the need to modernise agriculture and sustainable development. Modernisation of agriculture aiming only at increasing the efficiency of production, if implemented in accordance with the principles of sustainable development, enabled reduction in the negative external effects. Modernisation of agriculture is supposed to ensure productivity growth without imposing any threats to the natural environment and the well-being of animals, reduced impoverishment in rural areas as well as to ensure food security, growth in the profitability of farms, improvement to the efficiency of use of natural resources. Therefore, in the near future, the agriculture – environment relation will be subject to change taking into account, on the one hand, concern about the natural environment, and, on the other, pressure on increasing the efficiency of production. The above challenges will be addressed by the need to implement efficient and, at the same time, environmentally-friendly production technologies and relevant legal instruments which oblige agricultural producers to protect the natural environment.

Key words : *modernisation of agriculture, production technologies, sustainable development*

INTRODUCTION

Modernisation of agriculture is a process of transforming agriculture from traditional labour-based agriculture to technology-based agriculture [25]. It is one of the fundamental issues in agricultural policies, particularly in countries, where agriculture is less developed. We can see that in many countries agriculture is a sector of economy which keeps a greater distance than the remaining sectors from modern solutions in the areas of: production technology and organisation, implementation of modern technological and IT solutions as well as management methods, but also with regard to the utilisation of the institutional setting. The speed and the scope of the creation and implementation of modernisation of farms ensure their permanent competitive edge. We can also see that low-income countries are burdened with primitive technologies, which is both a reason for, and a consequence of low incomes [3]. Therefore, the modernisation process and technological change are regarded as the driving force behind economic growth. As a result of an appropriately implemented process of modernisation of farms, the effectiveness of management improves, the working conditions improve and, finally, the level of satisfaction from the performed work increases. However, inappropriately designed or inappropriately implemented modernisation may bring unfavourable effects.

MATERIALS AND METHODS

The aim of this study is to demonstrate the correlation between modernisation of agriculture and sustainable agriculture.
The research was based on mass statistical data from the World Bank and the Main Statistics Office in Poland. In the study, the following research methods were applied:
1. 1. critical and cognitive analysis of the theoretical frameworks found in the literature,
2. analysis of mass statistical data.

RESULTS AND DISCUSSIONS

Modernisation of agriculture is a continuing process and it is the essence of progress in

agriculture and in rural areas. Constant creation and implementation of new technologies is used as a standard reference in differentiating modern agriculture from traditional agriculture [23]. Agriculture in economically developed countries has changed significantly thanks to broadly understood progress. Implementation of new solutions in the organisation of farms and of new production technologies has increased production volumes, decreased employment levels in agriculture and lessened the burdensomeness of work as well as has brought a better quality of products and has decreased the environmental nuisance of agriculture. Beside the increase in the effectiveness of management in agriculture, technological progress contributes to the reduction in the level of risk of management [16].

Modernisation of production methodology in agriculture through implementation of new technological solutions follows from the presence of the so-called "technology treadmill" [3, 8, 10]. This results in a constant need to keep up with technological progress, or even the need to spearhead this race. When new technology is being implemented in agricultural practice, the first farmers – innovators are those who benefit most. The advantages of being "the first" are related to the possibility of increasing agricultural income. This is a consequence of decreasing individual costs of production with the market price typical of the old technology. With time, the economic gains obtained by innovators attract new farmers who hope to achieve similar effects. However, when most farmers introduce new technological solutions, supply of a given product increases. The low flexibility of food demand and the higher price flexibility of supply often lead to price reductions. A case in point is the data describing real prices of selected agricultural products in Poland in the period 1990 – 2011. During the restructuring and modernisation of Polish agriculture, a decrease in real prices was observed (Fig. 1). Similarly, J.P. Chavas [7], analysing the evolution of real prices of agricultural products on the maize, milk and wheat market in the USA over the past 100 years, reported a persistent downward trend.

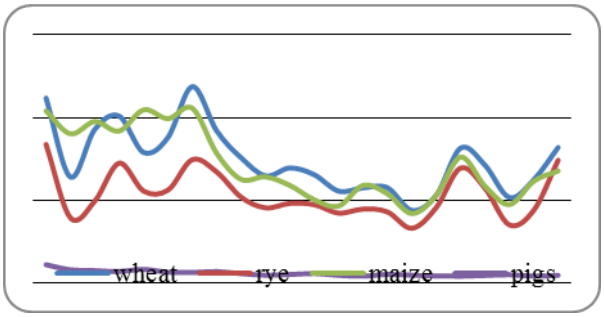
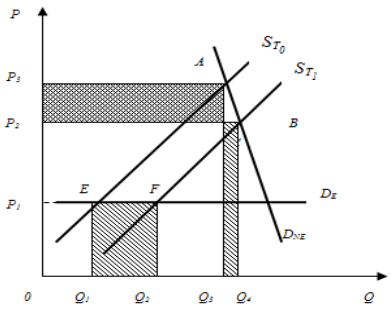


Fig. 1. Real prices (PLN) on the wheat, rye and maize market in Poland in the period 1990 – 2010 (constant prices in 2010)
Source: author's own data based on statistics from the Main Statistics Office in Poland

As a result, the main beneficiaries of the modernisation of agriculture are consumers and not agricultural producers (Fig. 2). The area of field Q_3Q_4BC indicating the advantages of the growth in production when new technology is being used is smaller than the area of field P_2P_3AC indicating reduction in the advantages on the part of producers resulting from price decreases. Only in the case of producers who experience endlessly elastic demand are higher profits arising from technological change wholly attributable to producers (Fig. 2).



ST_0 – aggregate supply in the case of old technology; ST_1 – aggregate supply in the case of new technology; D_E – perfectly elastic demand; D_{NE} – inelastic demand

Fig. 2. Technological change vs. producers' gains in the case of inelastic and perfectly elastic demand
Source: author's own data

The majority of agricultural products show low price flexibility of demand and it is for this reason that in the long run agricultural producers seem not to benefit from technological progress. Agricultural producers adapting new technologies which reduce

individual costs, and increase productivity. New technologies cause a transfer of aggregate supply, as a result of which prices go down. In the end, farmers may face a situation which is worse than that existing prior to the technological change [3, 8, 10, 12]. Empirical data suggest that an increase in well-being resulting from technological progress in agriculture is captured" as consumer surplus resulting from lower prices and not as producer surplus [1, 12, 20].

The importance of agricultural progress results from its effects, including, above all: (i) quantitative increase in production, (ii) reduction in individual costs of production and (iii) increase in production potential. The benefits of farms arising from the modernisation of production methods consisting in the implementation of broadly understood technological progress in the short term lead to an increase in agricultural income and/or a decrease in demand for factors of production. However, in the long run, due to the technology treadmill mentioned above, the benefits are difficult to maintain. Because of the low flexibility of demand for agricultural products, the benefits are obtained mainly by food consumers. In the long run, technological progress does not always lead to an increase in agricultural income. After a certain kind of innovation is commonly introduced, all farms may have lower profitability than prior to this change. Despite this effect, however, farms are doomed to permanent modernisation. Ignoring this process may result in an even greater reduction in income than in the case of continuous implementation of modernisation.

Industrialisation and modernisation have significantly changed agriculture, shifting it towards new technologies which enable production of a substantial number of products in the most effective way possible. This has caused a substantial increase in the concentration and specialisation of production, changed the structure of factors of production, caused a reconstruction of agrarian structures as well as has created a new organisation of production processes. Over the past few decades, modernised agriculture, thanks to an increase in the volume of agricultural production, has brought the possibility of feeding an increasingly greater number of people worldwide as well as famine reduction [2, 3, 5, 6, 7, 18, 19, 24, 26]. However, the industrialisation and modernisation processes have upset, in many respects, the ecological balance. Industrialised agriculture has caused a radical decrease in the number of farms and employment levels in agriculture, reflected in greater migration from the countryside and the growing problem of overt and covert unemployment. Modernisation of agriculture may also equal a greater threat to the natural environment, lowering of the quality of food products and increased social costs of production [4]. In connection with the above, apart from the many benefits related to the modernisation of agriculture, we may witness undesirable ecological as well as social and cultural effects, and those related to food consumption, particularly in the case of an inappropriately implemented modernisation of agricultural production (Fig. 3).

The direction of the development of agriculture which has been pursued so far and which has been based on the criterion of microeconomic effectiveness (aimed at maximising economic gains) has been subject to criticism.

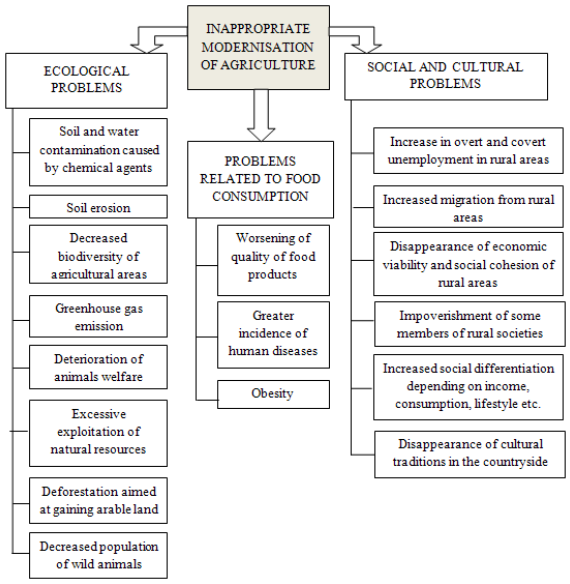


Fig. 3. Inappropriate modernisation of agriculture vs. social and cultural as well as environmental problems
Source: author's own data

The dominance of economic goals, including the pursuit of the maximisation of profit, leads to an upset ecological and social balance. Private and economic understanding of the rationality of conduct usually does not correspond to general social (global) rationality. What is beneficial to individual entities, i.e. on the microeconomic scale, is not always beneficial to all, that is on the macroeconomic scale. For this reason, it is necessary for one to seek a compromise, taking into account both the producer's interests and the interests of society. Figure 4 shows a theoretical model which enables the determination of a social optimum. This model entails a comparison of economic gains with the costs of environmental nuisance. The producer's optimum is at N_2, where the volume of production results in the maximum profit (marginal profit equals zero). At the same time, social costs, such as, for instance, soil erosion, elution of nitrates, disappearance of species, poorer product quality, deterioration of the well-being of animals and growing environmental pollution. The social optimum N_1 is found at the intersection of the marginal gains and the marginal social costs. Thus, it is the optimal level of intensity of production, taking into account not only the producer's interests, but also ecological and ethical goals. The goal of sustainable agriculture is to ensure the possibility of attaining the greatest gains possible, both private and ecological. At the same time, the level of the achievable private goods in the case of sustainable agriculture is lower, but it allows one to achieve social benefits (public goods).

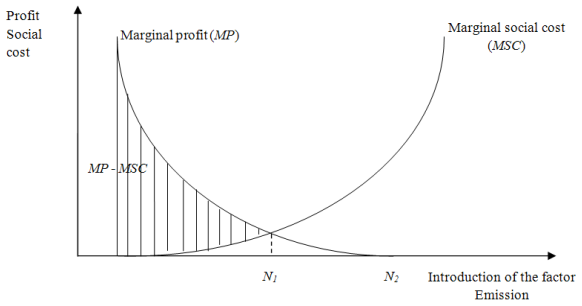


Fig. 4. Determination of the social optimum from the point of view of an individual producer depending on environmental nuisance

Source: author's own data based on: [17, 22]

An essential question arises here: do the regulations and restrictions related to environmental protection or the well-being of animals lead to increased individual production costs, decreased individual efficiency, reduced agricultural income and, as a consequence, reduced effectiveness of management? The idea of constant conflict between environmental goals and economic goals stems from the static view on environmental regulations, where products, technologies, processes and consumers' needs are constant. In this static vision economic entities minimise individual production costs, while environmental protection regulations inevitably increase these costs. However, over the past few decades, the competitiveness paradigm has been shifted from the static model towards the dynamic one. In the dynamic model, the new paradigm is based on innovativeness. Appropriately designed environmental protection regulations may lead to innovations which can balance the costs related to compliance with these regulations. Environmental protection regulations should aim at improving the effectiveness of the management of resources, rather than focus on limiting pollution. Such a policy promotes both ecology and competitiveness of economic entities [21].

The necessity of sustainable development in agriculture is motivated by the dissatisfaction with the present state of affairs, but it also follows from the benefits arising from the implementation of modern, environmentally-friendly technological solutions. Drastic changes which have occurred in agriculture over the past 100 years have resulted from external stimuli and they have been a response to social needs. It is difficult to agree with the claim that science and technology are by nature anti-environmental [26]. Studies by Y. Hayami and V.M. Ruttan [13] as well as Z. Griliches [11] have demonstrated that technologies have evolved and have been adopted in response to external stimuli. In situations, where new production technologies harmed the natural environment, this was

often a result of the absence of legal regulations or the lack of incentives promoting harm prevention. The reasons behind this state of affairs can be found in misguided policies, dysfunctional institutions and a dysfunctional control and management system. An exceptionally high number of negative external effects related to the modernisation of agriculture can be seen in developing countries, particularly in the south [9].

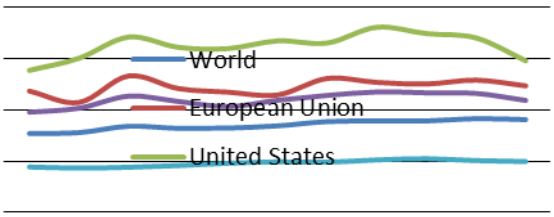


Fig. 5. Global grain crops in the period 2002 – 20012 (Hg/ha)
Source: author's own data based on statistics of The World Bank

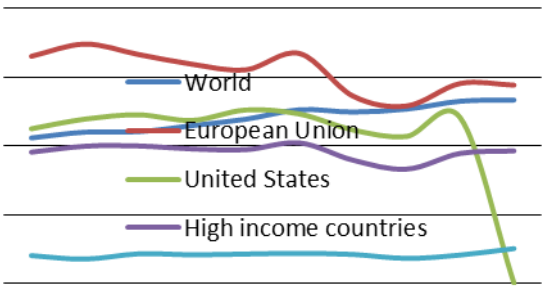


Fig. 6. Consumption of mineral fertilisers [kg/ha of arable land] in the period 2002 – 2009
Source: author's own data based on statistics of The World Bank

A vital role in ensuring sustainable development of agriculture is played by present-day research which enables mitigation of many unfavourable external effects related to modern agriculture. A case in point is that of grain crops in the period 2002 – 2012 (Fig. 5), which show an upward trend both globally and in individual regions (global growth by 17.7%, EU 4.3%, USA 6.8%, high-income countries 11.7%, low-income countries 12.0%). At the same time, consumption of mineral fertilisers showed varied trends (Fig. 6). Worldwide, an increase by 26.1% in the consumption of fertilisers was reported; however, a significant rise in the consumption of mineral fertilisers was observed in low-income countries (25.2%). On the other hand, in countries like the USA, consumption of mineral fertilisers grew by 7.8%, while high-income countries recorded a mere figure of 0.9%. In the EU, consumption of mineral fertilisers decreased during the period under analysis by 12.7%, with an increase in the level of crops by 4.3%. This may indicate that, especially in rich countries witnessing social pressure on environmental protection, one implements production technologies which enable reduction in the negative effect on the natural environment and maintenance of high production efficiency. Concern about the natural environment should lead to technological change oriented both towards "repairing" the environment and preventing the negative impact that agriculture has on the natural environment. Priority should be given to production technologies which ensure increased efficiency and sustainable use of natural resources.

What is also significant is the search for optimal technological solutions taking into account local conditions of agricultural production. The variety of environmental and climate conditions as well as social and economic conditions suggests that technological solutions must be diversified in space and time as well as adjusted to the specific conditions of a given location. Uniform solutions to production problems which occur in agriculture are impossible. Development of strategies which promote initiative and enterprise among farmers, facilitate adaptation of new technologies and, further, facilitate farmers' application of knowledge and practical skills in the development of new technological solutions is a key challenge for scientists, political decision-makers and local activists.

One of the ways in which problems related to the modernisation of agriculture can be solved, consisting in the need to combine an increase in the effectiveness of production with the reduction in the harmful effect of agricultural production on the natural environment, is the application of high-precision technologies. They are technologies

which enable the application, from the very beginning, of the exact number of means of production according to the real needs of animals and plants, taking into account variable environmental conditions. Comparing the profitability of different production technologies in agriculture, M. Khanna and D. Zilberman [15] demonstrated that high-precision technologies lead to an increase in income, reduction in variable costs and less environmental nuisance, but, at the same time, that they also contribute to an increase in constant costs. The possibility of using these technologies depends on whether an increase in efficiency, reduction in the use of means of production and reduction in environmental pollution are greater than the increase in constant costs. Whether net positive results are obtained depends on the level of acceptance of high- precision technologies. One of the reasons why these technologies are not so commonly adopted, which is socially optimal, is the fact that environmental pollution does not affect directly the farms that generate it. The main reason for environmental protection problems in agriculture is the fact that producers do not take into account in their economic calculations the social costs related to their production choices. This, in turn, results in the lack of interest in investments in production technologies limiting the negative impact on the environment as well as excessive use of means of production in the applied technologies (e.g. excessive irrigation, excessive use of chemicals) [26]. In this situation, it is necessary to implement legal solutions which enforce environmental protection as well as an increase in prices of agricultural products or an increase in prices of means of production, thus contributing to greater economic effectiveness of investments in high-precision technologies. An additional factor which brings about the need to take into account ecological aspects in decisions related to production is the growing ecological awareness of consumers. Obtaining information about the pro-environmental activity of economic entities may increase demand for its products and, at the same time, force these entities to take initiatives aimed at self-regulation and limitation of activities which harm the natural environment [14].

CONCLUSIONS

What matters in the development of agriculture is the search for sustainable agricultural systems taking into account not only economic and social goals, but also ecological ones. This task is a difficult enterprise because the goals often exclude each other. On the one hand, one strives to achieve a high rate of production efficiency growth, but on the other, there is a need to ensure just distribution of income and to take into account environmental aspects when making economic decisions. Identification of potential areas of conflict enables one to seek a compromise as well as to pursue a relevant development policy and design its instruments. One should also reject the notion that economic growth is permanently linked to degradation of natural resources, while the lack of growth equals preservation of these resources.

Modernisation of agriculture which aims only at increasing production efficiency, if it is implemented in accordance with the principles of sustainable development, will enable one to limit the unfavourable external effects. Development of agriculture based on the industrial model encounters obstacles related to the finiteness of natural resources and the capacity of the environment in terms of the consequences of the anthropogenic impact. Another factor which limits the industrial development model is the pressure to include external effects in the economic calculations in agriculture alongside the "rights" of farm animals as well as the social and cultural consequences, such as those related to the viability of rural areas.

REFERENCES

[1]Baland, J.M., Kotwal, A., 1998, The political economy of underinvestment in agriculture. Journal of Development Economics, Vol. 55, pp. 233 – 247

[2]Ball, V.E., Bureau, J.Ch., Nehring, R., Somwaru, A., 1997, Agricultural Productivity Revisited. American

Journal of Agricultural Economics 79 (November 1997), pp. 1045 – 1063
[3]Barrett, C.B., Carter, M.R., Timmer, C.P., 2010, A Century–Long Perspective on Agricultural Development. American Journal of Agricultural Economics 92 (2), pp. 447 – 468
[4]Batie, S.S., 1989, Sustainable development: challenges to the profession of agricultural economics. American Journal of Agricultural Economics, Vol. 71, no. 5, pp. 1083 – 1101
[5]Brennan, J.P., 1984, Measuring the contribution of new varieties to increasing wheat yields. Review of Marketing and Agricultural Economics 52 (December), pp. 175 – 195
[6]Byerlee, D., 1996, . Modern varieties, productivity and sustainability: recent experience and emerging challenges. World Development 24 (April), pp. 697–718
[7]Chavas, J.P., 2011, Agricultural Policy in a uncertain world. European Review of Agricultural Economics, Vol 38(3), pp. 383 – 407
[8]Cochrane, W.W., 1958, Farm Prices: Myth and Reality. Minneapolis, University of Minnesota Press
[9]Davis, C.G., Langham, M.R., 1995, Agricultural Industrialization and Sustainable Development: A Global Perspective. Journal of Agricultural & Applied Economics No. 27 (1), July, Southern Agricultural Economics Association, pp. 21 – 34
[10]Gardner, B.L, 2002, American Agriculture in the Twentieth Century: How it Flourished and What it Cost. Cambridge, MA: Harvard University Press
[11]Griliches, Z., 1957, Hybrid corn: an exploration in the economics of technological change. Econometrica, Vol. 25, No. 4, pp. 501 – 522
[12]Hardaker, J.B., Anderson, J.R., Dillon, J.L., 1984, Perspectives on assessing the impacts of improved agricultural technologies in developing countries. Australian Journal of Agricultural Economics, Vol. 28, Nos 2 and 3 (August/December), pp. 87 – 108
[13]Hayami, Y., Ruttan, V.M., 1985, Agricultural Development: An International Perspective. Johns Hopkins University Press, Baltimore
[14]Khanna, M. , 2001, Non-Mandatory Approaches to Environmental Protection. Journal of Economic Surveys, Vol. 15, Issue 3, pp. 291 – 324
[15]Khanna, M., Zilberman, D., 1996, Incentives, precision technology and environmental protection. Ecological Economics, Vol. 23, Issue 1, pp. 25 – 43
[16]Kim, K., Chavas, J.P., 2003, Technological change and risk management: an application to the economics of corn production. Agricultural Economics, No. 29, pp. 125 – 142
[17]Marks – Bielska, R., 2011, Chosen aspects of sustainable development in Poland with particular focus on agriculture. Management theory and studies for rural business and infrastructure development. 2011. Nr. 2 (26). Research papers, pp. 160 – 168
[18]Master, W.A., Bedingar, T., Oehmke, J.F., 1998, The impact of agricultural research in Africa: aggregate and case study evidence. Agricultural Economics 19 (September), pp. 81 – 86
[19]Matejková, E., Qineti, A., Serenčéš, R., 2008, Macroeconomic aspects of the development of Slovak regions in the post-accession period. Agricultural Economics – Czech, nr 54 (8), pp. 367 – 375
[20]Minten, B., Barrett, C.B., 2008, Agricultural Technology, Productivity and Poverty in Madagascar. Word Development Volume 36, Issue 5, pp. 797 – 822
[21]Porter, M.E., van der Linde, C., 1995, Toward a New Conception of the Environment-Competitiveness Relationship. The Journal of Economic Perspectives, Vol. 9, No. 4, pp. 97 – 118
[22]Reisch, E., Zeddies, J., 1983, Einführung in die landwirtschaftliche Betriebslehre. Volume 2, 2nd Edition, Stuttgart: Verlag Eugen Ulmer
[23]Schultz, T.W., 1964, Transforming Traditional Agriculture. Yale University Press, New Haven
[24]Solow, R.M., 1957, Technical Change and the Aggregate Production Function. Review of Economics and Statistic 39, pp. 312 – 320
[25]Wu, Z.-I., 2011, Research on Harmony between Agricultural Modernization and regional Economy Developmentin China. Asian Agricultural Research, 3(3), pp. 6 – 10
[26]Zilberman, D., Khanna, M., Lipper, L., 1997, Economics of new technologies for sustainable agriculture. The Australian Journal of Agricultural and Resources Economics, 41:1, pp. 63 – 80

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THE ROLE OF SUBSIDIES IN THE RURAL DEVELOPMENT OF SOUTH-MUNTENIA REGION

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Abstract

South-Muntenia Region has a surface of 34,453 square kms and represents 14.45% of Romania surface. Spouth-Muntenia Region is formed of 7 counties: Argeş (6,826 square kms), Călăraşi (5,088 square kms), Dâmboviţa (4,054 square kms), Ialomiţa (4,453 square kms), Giurgiu (3,526 square kms), Prahova (4,716 square kms) and Teleorman (5,790square kms), with 16 municipalieis, 32 towns and 519 communes. South-Muntenia Region borders to the North with Center Region, to the North-East with South-East Region, to the South with Bulgaria, the limit being given by the natural border – the Danube river, and to the West with South-West Region. The presence in the South part of the region of the Danube river provides it the possibility to have communications with the 8 countries near the river, and by means of the Danube-Black Sea channel, to have access to the Black Sea and to the Constanta Harbour. Being included within the country capital – Bucharest inside the region, constitutes, by the existent infrastructure, including Henri Coandă International Airport, provides social and economic advantage. The present paper presents an analysis of the subsidies and their role in the rural development of South-Muntenia Region.

Key words**:** *development, funds, program, region, subsidy*

INTRODUCTION

Romania, as integral part of the European Union, applies the unitary strategic lines elaborated for all member states of the European Union, which take into consideration the structural and economic discrepancies, characteristic to our country. For the agriculture, the mechanisms of the Common Agricultural Policy (PAC) apply, which are combined with other policies of structural adaptation, to the community exigencies, taking into consideration the national particularities. [2]. The Common Agricultural Policy is among the first common policies adopted by the European Union. The agricultural policy of the European Union is built around two pylons: Pylon I to support the common market organisations and Pylon II, regarding the development of the rural area.

The subsidy is defined as the financial support provided under the Common Agricultural Policy, respectively The National Plan of Rural Development, natural persons and legal entities, which develop their activity in the rural area, having as main purpose, the rural development, the improvement of the life quality, the reduction of the discrepancies at local, regional and national level.

Highlighting the role of the subsidies provided under the projects of SAPARD Program, until the end of 2011, was made based on the statistical data collected for South-Muntenia Region, which can be interpreted in correlation with the economic indicators.

MATERIALS AND METHODS

In this paper, the data were collected from the Statistical Yearbook of Romania, and also from the Divisions of Agricultural and Rural Development.

They were statistically processed acccoreding to the well known modern methods.

The experiment was organized in the South-Muntenia region.

The main aspects taken into consideration have been the following ones; region composition, infrastructure, programs for the development of the rural area.

RESULTS AND DISCUSSIONS

At present the Common Agricultural Policy (PAC) is supported by two pylons: The European Fund for Agricultural Guarantee (FEGA) and the European Agricultural Fund for Rural Development (FEADR).
The creation of a complex mechanism of subsidies and guarantees of process for the farmers allowed the continuous increase of the productivity and agricultural production. [1]

The influence of Measure 2.1 *„Development and improvement of the rural infrastructure”*, regarding the county and commune traffic roads, the network of drinking water supply and the sewerage network in the rural area in South-Muntenia Region. Under this measure, in South-Muntenia, a number of 147 projects were approved, in the amount of 115,334,036.41 euro, with a funding level of 85.34 %, in the period 2006-2008.

Table 1. Measure 2.1 Subsidies impact on road infrastructure from rural areas South Muntenia Region during 2006 to 2011

Region/county	County, commune roads, km			
	2006	2008	2010	2011
South - Muntenia	9317	9788	*9880*	**9916**
Argeş	2459	2798	*2861*	2891
Călăraşi	797	820	*820*	820
Dâmboviţa	1398	1504	*1504*	1507
Giurgiu	829	832	*832*	848
Ialomiţa	803	803	*803*	803
Prahova	1896	1896	*1903*	1912
Teleorman	1135	1135	*1135*	1135

Processed according to*: the Statistic Yearbook of Romania 2007,2009,2011,2012* INS

The data in table no. 1, highlight the fact that projects were accessed under the measure 2.1 for the road infrastructure in the rural area, in Argeş, Dâmboviţa and Călăraşi counties, where it is recorded an increase of the length of the commune and county roads of 432 km, 109 km and respectively 23 km, recording an increase of the length of these roads at the regional level of 599 km. Calculating the coefficient of variation of the roads density, on counties, in South-Muntenia Region, it is found out that there are very high, significant values, and this means that the roads density is very different between the region counties. This increase is highlighted also for the indicator regarding the density of the public roads on 100 square kms, for the counties Argeş, Dâmboviţa and Călăraşi. It is found out that, for the studied period, the coefficient variation has an increasing value, being high as significance [3].

This proves that the differences between the counties in South Region accentuated in this period. The increase of the road infrastructure will contribute on long and medium term, to the intensification of the economic activities, by the increase of agricultural products mobility in the rural area and to the urban area, inside and outside the region.

Table 2. Measure 2.1 subsidies Impact on water distribution infrastructure network from rural areas South Muntenia Region during 2006 to 2011

Region/county	Localities with drinking water supply installations in the rural area, number				Differences 2011 compared to 2006	
	2006	2008	2010	2011	nr	%
South - Muntenia	289	307	378	**385**	96	*24,9*
Argeş	69	71	*75*	83	14	*16,9*
Călăraşi	34	35	*50*	47	13	*27,7*
Dâmboviţa	46	51	*82*	62	16	*25,8*
Giurgiu	15	16	*15*	17	2	*11,8*
Ialomiţa	41	43	*59*	57	16	*28,1*
Prahova	64	67	*69*	84	20	*23,8*
Teleorman	20	24	*28*	35	15	*42,9*

Processed according to*: The Statistic Yearbook of Romania, 2007,2009,2011,* INS

The data of table 2 highlights for the year 2011 an increase of 33.21% of the number of localities with installations of drinking water supply in the rural area. At the level of the

region, from 289 localities in 2006, to 307 localities in 2008, 378 localities in 2010 and 385 localities in 2011, that is, an increase with 96 localities which benefit by drinking water supply network, thus increasing the living standard at the level of the urban area and complying with the funding purpose.

The highest number of localities with which the activity of drinking water supply increased, recorded in 2011 in Prahova county, with 20 localities, followed by Teleorman county with 15 localities and Argeş county with 14 localities.

Tabel 3. Measure 2.1 subsidies Impact on sewerage network from rural areas South Muntenia Region during 2006 to 2011

Region/county	Localities with public sewerage installations in the rural area – number				Differences 2011 compared to 2006	
	2006	2008	2010	2011	no	%
South - Muntenia	40	42	47	96	56	58,3
Argeş	11	12	13	23	12	52,2
Călăraşi	1	1	2	6	5	83,3
Dâmboviţa	4	4	5	13	9	69,2
Giurgiu	1	1	1	3	2	66,7
Ialomiţa	0	0	0	7	7	100,0
Prahova	22	23	23	36	14	38,9
Teleorman	1	1	3	8	7	87,5

Processed according to*: The Statistic Yearbook of Romania 2007,2009,2011,* INS

At the level of South-Muntenia Region the subsidies regarding the sewerage network infrastructure in the rural area (table no. 3), caused the increase of the number of localities with sewerage network, from 40 localities, in 2006, to 96 localities, in 2011, thus in Argeş county increase with 12 localities, in Călăraşi county with 5 localities, in Dâmboviţa county with 11 localities, in Giurgiu county with 2 localities, Prahova county with 14 localities and Teleorman county with 7 localities in 2011 compared to 2006. And in Ialomiţa county until the year 2010, there were no localities with sewerage network, in 2011 there are 7 localities, thus contributing to the increase of the living standard of the inhabitants in the respective rural localities.

The influence of the subsidies provided under the measure 3.1 *„Investments in agricultural farms"* regarding the activities of the agricultural farms.

This measure shows the following distribution of the subsidies and projects finalised in the vegetal and animal sectors: Filed crops–1,197 projects, from which 27 projects were damaged; Horticulture–76 projects; Viticulture – 62 projects; Fruit crops –71 projects; Greenhouses –42 projects; Animals for milk –163 projects, from which 3 projects were damaged; Increase and fattening of cattle –13 projects; sheep/goats breeding –15 projects; Lamb fattening – 8 projects; Pigs–73 projects; Poultry –73 projects; Other types of vegetal, animal farms, and poultry –14 projects, from which 1 project was damaged [4].

Referring to South-Muntenia Region, measure 3.1 recorded a number of 366 projects approved from a total of 1,921 projects submitted, with a share of 19.05% with a total value of 191.34 million lei, representing 23.08% of the total value of the measure [5] From the 366 projects contracted until 31st December 2008, 354 projects were contracted on 31st December 2006, that is a share of 96,72%, with a funding with a total value of 185.06 million lei. These projects influenced directly the activity of the agricultural farms, on specialization sectors in which the projects were submitted, respectively the cultivated surfaces, agricultural productions, animal stocks. A direct quantification of the influence of the subsidies on the activity of the agricultural farms, which are beneficiary of funding, cannot be mentioned.

CONCLUSIONS

The rural development of the South-Muntenia Region expressed the result of the interaction between the material, human and financial resources, on the one hand, and the factors which act in the rural area, at the level of the economic processes, on the other hand;

the development imbalances and discrepancies between the South and North part of the region must be diminished, until they are eliminated, by applying some corrective measures, contained in an integrated way, in the Sustainable Development Strategy of South-Muntenia Region, which included also the Rural Development Strategy of the region.

The subsidies, which were ensured from the funds from the national budget and from the European funds, contributed to the improvement of the reference indicators for the objectives under the developed projects.

REFERENCES

[1]Aksoy, M.A., Beghin, J.C., 2005, Global Agricultural Trade and Developing Countries (The World Bank, Washington D.C.)

[2]Brăiloiu, C., 2007, Rural development in South-Muntenia Region and its implication in the conditions of the European Community accession. InȘ The National Symposium "Impact of Romania integration to the European Union on Agriculture Development", 27 apr.2007

[3]Regional study on agriculture and rural development in Center Region

[4]Lascar Elena, 2013, Condition and specific forms for the development of the rural area in South-Muntenia Region, International Conference "Agriculture for life. Life for agriculture , 5-7 June 2013, USAMV Bucureşti, Vol. 13/issue 2/2013

[5]Processed according to the Yearly Report on SAPARD program in Romania in 2008, Source: http://www.madr.ro/pages/dezvoltare_rurala/Raport-anual-SAPARD-2007-ro.pdf

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LENDING PROJECT IMPACT ON AGRICULTURAL INDIVIDUAL SECTOR DEVELOPMENT IN MOLDOVA

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Abstract

Economic development within rural areas of the Republic of Moldova is affected by multiple issues which cross the agricultural individual sector development. One of the main factors that would influence positively the development of agriculture is investment. Investment plays an important role on the country's economy, representing the material support of its economic and social development. It ensures the permanent capital increase, advances the technical and economic efficiency of existing ones and creates new places of employment. In this context, investment is the decisive element of economic growth, of the intensive, qualitative and effective factors promotion.

***Key words**: agricultural individual sector, investments, projects, rural environment*

INTRODUCTION

In any economic field, investments are associated with development idea. Logically, at the level of the national economy, manufacturing device development and funding advancement of economic activities are depending directly of investment funds that the company can afford to allocate in a certain period. But the economic growth does not dependent on the volume of investments. It is the result of how the available funds are distributed in specific areas of development, of the way of its management. The last decade had scored a great increase of foreign investments, so that they have become one of the main components of the global economic circuit.

Opportunities of a profitable investments making in the agricultural sector of Moldova are in a run-on growing. Bureaucratic and regulatory obligations are gradually overcome by investment's simplifying procedures and increase transparency.

Currently, the Government distinguishes the growth potential of rural agricultural sector as a solution of poverty reducing and as a live standards enhancing in rural areas.

MATERIALS AND METHODS

The reflected researches were achieved on informational materials of the National Bureau of Statistics of the Republic, the National Bank, etc. There were used following research methods: monographs, comparison, analysis, inference.

RESULTS AND DISCUSSIONS

Investment is fundamental in economic activity, both in the production of goods and services and the scope of consumption, being the factor which simultaneously influences the supply and the demand. This statement's ratiocination is given by the processes of training and multiplying the effects which they generate any investment project, regardless of the sector in which it is implemented.

An investment projects achievement within agricultural sector has the effect of supply increasing and diversification and therefore if it is validated by the market, the income's growth of the businesses. Simultaneously, however, the increasing employment of labor will be directly influenced or by a carry effect. But employees increasing number are conducting ultimately to increased demand for goods and services. On the other hand, there will be an increase of population's economy and of the available funds of economic agencies which expect a more perform structures, according to investment options.

So we can say that within national economic circuit, investment activity plays a double role:

• First, the economical traders that implement various investment projects increase their goods or services supply by increasing their productive capacity, making additional income;

• Second, any investment project will generate additional needs or requests within connected upstream sectors (raw materials supplier, materials, utilities, etc.) or in oval way (goods and services distributors or consumers). Implicitly there will be in series increasing of all involved economic traders' income.

Investment projects and programs achievement leads primarily to increase permanent capital stock. Investment are the main instrument for achieving economic modernization by creating new, more efficient structures according to society's future strategic options.

The role of foreign investment in a country's economy is indisputable: the effects chain which they generate reflects both on the production of goods and services, as well as on consumption, grounding simultaneously the supply and the demand. Investment mobility of resources is one of the elements of the economic equation which favor and anticipate the fruition of strategic objectives of any country development. This process contributes to production increasing, to complex national economy improving, to settle issues related to enterprises upgrading, but also to a sustainable cities development, thus solving social problems.

Macroeconomic context which brigs forward investment appealing, is generically called "investment climate", is a very complex title being determined by a mix of inter-dependent elements, which are including, with any limited to political stability and the long-term macroeconomic stability, the law stability and supremacy, justice independency in order to ensure the investors' rights, non-discriminatory and clear rules on economic activity (thus the investment one), business infrastructure development, including financial, legal and so on services, and other items, including no less important being access to markets and resources, and transparency in government activity of regulatory and control functions, trust within business environment etc.

The role of foreign investment is quite important for developing countries, including Moldova, where internal resources are insufficient to reach a development and prosperity level which now days modern countries posses. FDI's influence on the domestic economy is twofold. On the one hand, there are credits, loans and investments through which, the foreign capital can fill national financial resources for implementing programs of macro stabilization. On the other hand, foreign capital plays a fundamental role in the restructuring and modernization of the national economy.

Along with capital invested with the corresponding effects on economic growth, foreign investment capital stimulates the transfer of modern technology, they help the country's balance of payments which are implanted.

Table 1.3. The dynamic of foreign direct investments in R. Moldova during 2002-2011, mln USD

	Yearly					
	2002	2007	2008	2009	2010	2011
FID total	84,1	541,3	711,5	145,3	197,41	274,0
Social capital	60,1	227,4	441,7	161,6	156,98	143,9
Reinvestments	-27,4	112,8	99,7	-11,6	14,6	94,4
Another capital	51,4	201,1	171,1	-4,7	25,9	35,7
FID/GDP,%	*	12,29	11,75	2,67	3,40	3,91

Source: elaborated on the data presented by National Bank of R. Moldova

According to the table above we can mention that Moldova has been able to attract foreign investments just only after credible economic recovery. A considerable growth of FDI in Moldova's economy has been until 2007, when they amounted to 539.3 million USD. In 2009 we have a strong decrease in the country's economy FDI volume. This can be explained by the political and economic country instability. As a result, foreign investor has chosen to invest in far-off countries from geographically point of view, but constant economically and politically.

Regarding the FDI in GDP share we can mention that during the analyzed period the index was stable and in 2009 because of the global crisis, this index decreased to 2.67%. The main sources of foreign capital are from Netherlands - 18.2%. It is followed by Cyprus - 12.4%, Italy - 12.3%, Russia - 7.8%, Germany - 6.1% etc. A considerable amount of investment in the structured capital in Moldovan enterprises came from the European Union (EU).

Next we will focus on investments in agriculture. According to the legislation in force, foreign investors can lease agricultural land for up to 30 years, which is widely used by investors from Germany, Bulgaria and others countries. Moldovan agrarian economy has four big advantages common recognized:

• First: because of its geographical position and favorable climate, can be grown forward vegetables, providing to Moldova a significant competitive advantage.

• Secondly, Moldova has rich humus land and sufficient water resources.

• Third, the population of Moldova has acquired a rich experience and knowledge in such areas as: fruit, vegetables, tobacco, grapes growing and wine production.

• Fourth, the research institutions of the R. Moldova have solid knowledge and experience to contribute to agriculture development.

In agriculture, funding opportunities are in endless growing. During 2009-2012 most funds from external assistance was granted for investment projects in agriculture, or 24% of total funding of these years.

Thus, in Moldova there were more projects of economic development, especially in agricultural sector, funded by various foreign structures.

1. Agro-business Development Project of CNFA, funded by USAID;
2. The Rural Finance and Small Enterprise Development (International Fund for Agricultural Development);
3. Agriculture Recovery Project (IFAD);
4. Moldovan-Lithuanian project "Strengthening the system of veterinary and food safety control of Moldova";
5. Increasing Food Production Project of 2KR Program (Government of Japan);
6. Pollution Control Project in Agriculture (World Bank);
7. Rural Investment and Services Project (Phase II, 2006-2010);
8. Agrian lands replotting Project (August 2007 - February 2009);
9. Project of the extension of the quantity and the quality the of agricultural products for export at the level of individual enterprises (July 2007 - March 2009);
10. Project "Support to the Development of Rural Capacities by Strengthening the Extension" (October 2006 - December 2009);
11. Program-pilot for Attracting Remittances in Economics, “PARE 1+1” for 2010-2014;
12. Rural Investment and Services Project (RISP II);
13. National Program for Youth Economic Empowerment (NPYEE). This program aims to foster and to develop the entrepreneurial skills of young people (18-30 years) in rural and co-starting a business.
14. Rural Business Development Program (IFAD IV, IFAD V).

These programs and projects, mobilize resources, providing opportunities to rural entrepreneurs to start and to manage an own business. Also these projects assist in business registration, business plan and financing procure.

During 2012, from credit lines of investment projects funded by external granters, as well as from refinancing working capital cumulated from the principal amounts and repaid interests by local commercial banks have been re-credited 408.11 million MLD,. $17,390,000 and 13.61 million Euros, hence:

(a)direct re-credited resource from foreign loans of the World Bank, the European Investment Bank and IFAD (IFAD-CPIU data) – 100. 590 mln. MLD, $ 6.22 million and 10.13 million Euro, including:

- Agriculture Recovery Project (IFAD II, PRA) -1.61 mln MLD and $ 0.24 mln,
- Rural Financial Services and Marketing Program (IFAD 4) - 13.12 mln. MLD and $ 0.86 mln;

- Rural Financial Services and Agricultural Business Development Program (IFAD 5) – 69.30 mln MLD, $ 1.30 mln and 0.34 mln Euro;
- Rural Investments and Services Project, phase II (RISP II) –16.56 mln MLD, $ 3.83 mln;
- Filiere du Vin Project – 9.79 mln Euro.

(b)re-credited resource from assets acquired means - 307 530 000 MLD, $ 11.17 mln and 3.47 mln Euro, including:
- Rural Investments and Services Project, phase I, (RISP I) – 36.25 mln MLD, $ 1.22 mln and 0.18 mln Euro;
- Rural Financing and Development of Small Enterprises Project. (IFAD I) – 46.26 mln MLD and $ 2.00 mln and 0.35 mln Euro,
- Agricultural Recovery Project IFAD II, PRA) – 45.46 mln MLD and $ 0.76 mln,
- Rural Investments and Services Project, phase II (RISP II) – 46.34 mln MLD and $ 2.52 mln and 0.26 mln Euro;
- Rural Business Development Program (FIDA III, PDAR) – 27.53 mln MLD, $ 1.21 mln and 0.12 mln Euro;
- Rural Financing Services and Marketing Program. (IFAD 4) – 4.90 mln MLD and $ 0.25 mln,
- National Program for Youth Economic Empowerment (NPYEE RISP I, IFAD 1 resources) – 83.42 mln MLD,
- Competitiveness Enhancement Project (CAP) - 3.00 million, $ 2.28 mln and 0.84 mln Euro;

Assets means constitute about 59.58% of the total re-credited amount in 2012.
At December 31, 2012 balance of the principal amount of loans to the PFI (Participating Financial Institutions - local commercial eligible banks.), excluding grants balance, it consists of is 1.1016 billion MDL, $ 38.6 mln and 23.56 mln Euro (working capital loans re-credited sources and external sources via Credit Line Directorate, Consolidated Units of Agriculture Project Implementation (CAPMU) and Consolidated Units Implementation Projects within Ministry of Agriculture (UNICE-IFAD) taken in service).

CONCLUSIONS

Agriculture is a strategic sector for the country, which has potential for development and we can contribute to get back the slow agriculture position which was lost in recent decades. In coming years, the villages of Moldova will turn into oases of prosperity, because credit projects in agriculture will be a chance to increase individual incomes in the agricultural sector and to facilitate agricultural products exports.
Almost 13 billion MLD will be invested in agriculture. At least that is what strategy of agriculture and rural development in the Republic of Moldova predicts.
Moldovan agriculture has a future, it has become the national economic recovery driver. The agricultural sector continues to be a significant source of potential employment for citizens of Moldova and it is an important part of both the national economy and national exports.

REFERENCES

[1] Invitationnal guide
[2]Androniceanu Armenia et al., 2004, The Management of foreign financing projects.Ed. Univeritară, Bucharest, pag.11.
[3] Stanley E. Portny, 2001, Project Management for Dummies, Wiley Publishing, Inc., p.2
[4] www.aipa.md
[4] http: www mec.gov.md

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SOME IMPORTANT FACTORS AFFECTING EVOLUTION OF ACTIVITY BASED COSTING (ABC) SYSTEM IN EGYPTIAN MANUFACTURING FIRMS

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Abstract

The present investigation aims to determine the factors affecting evolution of Activity Based Costing (ABC) system in Egyptian case. The study used the survey method to describe and analyze these factors in some Egyptian firms. The population of the study is Egyptian manufacturing firms. Accordingly, the number of received questionnaires was 392 (23 Egyptian manufacturing firms) in the first half of 2013. Finally, the study stated some influencing factors for evolution this system (ABC) in Egyptian manufacturing firms.

Key words**:** *Activity Based Costing, affecting factors, Egyptian firms, manufacturing , profitability management*

INTRODUCTION

Research on Activity-Based Costing and its applications has mainly been focused on organizations in developed countries. Little has been learnt as to whether ABC techniques can be implemented successfully in organizations in developing countries (Liu and Pan, 2007). Although ,Activity-Based Costing (ABC) is developed to improve the accuracy of product cost data derived from the Activity Based Costing (ABC) is developed to improve the accuracy of product cost data derived from the traditional cost system (Tsai,1996). This helps manufacturing firms in developing countries to improve their competitive position, it has many applications until it became a tool to manage the integrated performance and to support the economical units.

The main objective of the research is determining factors affecting evolution of Activity Based Costing (ABC) system in Egyptian manufacturing firms.

MATERIALS AND METHODS

The authors used the survey method to describe and analyze the factors affecting evolution of Activity Based Costing (ABC) system in Egyptian firms. The population of the study was Egyptian manufacturing firms.

The Activity-Based Costing (ABC) system has passed through many stages of development. Several researchers studied the changes required to implement these systems. Aiyathurai et al. (1991) showed that the Activity Based Costing (ABC) systems has passed through three stages to reach the currently familiar form:

First Stage: The Activity Management (AM): The concentration on the concept of value chain was greater than the financial analysis, where the object from activity management was to specify the activities that do not contribute to this chain to discard them through transforming to use the buying method for just in time selling which results in expelling the activity which keeps the stock. This Stage aimed also to support and improve the contributions of the remainder through quality and speed of response to the customers' requirements.

Second Stage: The Activity Cost Accounting (ACA): This stage was to ensure that all costs were minimized through specifying the cost drivers and their links with the activities and follow up their reactions with other activities.

Third Stage: Activity-Based Costing System (ABC): This system gives great importance to analyze the costs to specify accurately the costs of supplied products or services which enable the decision-makers to take wise pricing decisions. In addition that this system is considered the best one in analyzing and estimating the costs for special objectives.

Turney and Stratton (1992) stated two dimension model for the Activity Based Costing (ABC) system (Fig.1).

They added process views to the view related to the costs i.e. cost view where the costs view concentrates on allocating the costs which occurs through the following two stages:

First Stage: The resources costs are allocated to the activities through cost drivers which are linked to these resources.

Second Stage: The activities costs are loaded on the cost target regardless if it was a product or a service.

The process view concentrates on continuous improvement of performance through providing non-financial information about the cost drivers, which in turn added a strategic view to these activities.

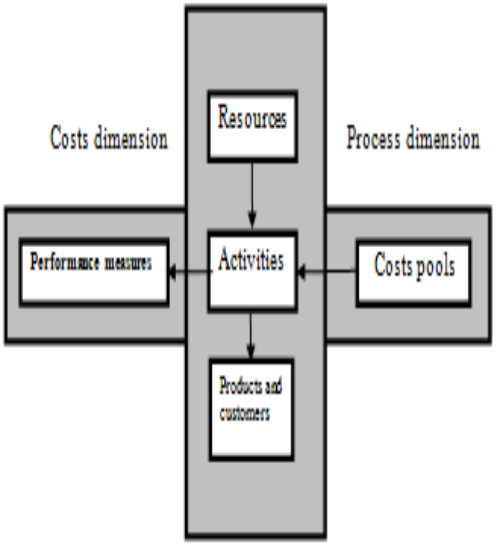

Fig.1. Two dimension model for Activity Based Costing (ABC) system.
Source: Turney and Stratton (1992).

Attempts to develop Activity Based Costing (ABC) system continued. Kaplan and Anderson(2004) gave a modernization of Activity Based Costing (ABC) systems which is Time-Driven Activity-Based Costing (TDABC). They used the modern concept to overcome the difficulties which appeared when implementing ABC systems widely.

On the same subject, Namazi (2009) stated that the important differences between the well-known Activity Based Costing (ABC) systems which were called the Traditional ABC systems and between the new system called the Time-Driven Activity Based Costing (TDABC) system which takes the following forms:

a.Using the Time-Driven Activity Based Costing (TDABC) for the targets of costs(Departments, deals, products, services, customers).

b.The new system cancels the first step of the traditional system steps (Design various activities) where according to this new system, the activities are not specified.

The new system shows the costing process without relying on allocating the cost of resources on the activities before allocating them to various costs targets.

c.The new system determines the un-exploited energy through determining the general costs in advance through estimating them on basis of the practical capacity and determining the costs based on average use of the activities.

d.The new system can deal with the complications of production or services and determining the distribution the exploitation of the various resources.

On a related subject, Everaert and Bruggeman (2007) showed that the new concept can be implemented to the Activities Based Costing (ABC) system by depending on Time-Driven Activity Based Costing(TDABC) system and by using the following steps:

-Determining the various resources collections required to perform the activities.

-Estimating the costs for each group of resources.

-Estimating the practical capacity for each group of the resources.

-Collecting the cost of the producing unit for each group of resources so that the total costing can be divided for each group of resources based on the practical capacity.

-Determining the time required for each of the activity events based on various time pools.
-Calculating the cost for the cost target through multiplying the Unit Cost (Step D) by the required time (Step E).

Turney (2010) studied the stages of development of Activities Based Costing (ABC) system. He showed that the beginning of ABC was during the period from 1984 until 1987 as an attempt to face the severe competition imposed buy the Japanese Companies on the Western Companies. These accounting systems passed through four generations during the Period of 1987 – 2010. He also added that these systems gained additional values and features with the successive generations which may be explained as follows:

1)**The period (1987 – 1991): The first generation:** During this period, the concentration was in an attempt to reach an accurate costing for the products and maximizing the profitability through determining reasons to increase the costs and reduce profitability or losses. The cost measure in this stage was extended to cover customer costing measure and cost of the activity.

2)**The period (1991 – 1995): Appearance of criticisms:** Appeared many criticisms to these systems because of change of attention to some other administrative methods such as: Re-engineering the processes, Enterprise Resource Planning (ERP), Balanced Scorecard (BSC), Theory of Constraints (TOC). The study also showed that this subject led to confusion on the Activity Based Costing (ABC) systems.

3)**The period (1995–2000): The second generation:** The concentration in this stage was on correcting the overhead costs and customer profitability analysis. Also, attention was transformed to utilizing from these systems to various other scopes on costs accounting systems such as: administration, sales, marketing, research and development, supply chain and logistics. During this time period, predictive modeling was built to calculate the costing of resources, capacity planning and opportunities for costs reduction.

4)**The period (2000 – 2006): The third generation:** During this period, the rates of implementing these systems in the economical units were increased and many methods appeared to reduce the efforts and costs related to implementing these systems. This period showed the use of following system such as: enterprise ABC solutions because the Enterprise Resource Planning (ERP) systems were not able to direct the managements of economical units towards the products or services to improve the financial performance of these units. The Activities Based Costing (ABC) systems performed this role well. Many improvements on the above mentioned systems appeared such as sharing in building models to services pricing models and determining target costing for product design and other uses.

5)**The period (2006 – 2010) : The fourth generation:** During this period, Activity Based Costing (ABC) systems were used as an integrated system to manage the performance in the economical units which included profitability management, performance management, financial management and Human Capital Management (HCM).

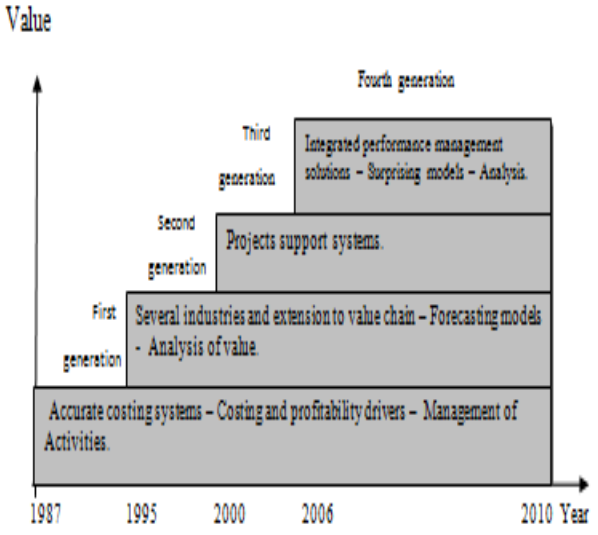

Fig.2. The four generations of Activity Based Costing (ABC) system.
Source: Turney(2010).

These system played an important role in the financial planning, capacity planning, implementing the strategies, supporting the products, markets and targeted customers through analytical models which were built Fig.2 shows the four generations of Activity Based Costing (ABC) system.

It may be noticed that Activity Based Costing (ABC) systems passed through many developments during period of 1987 – 2010.

It was directed towards accounting the costs; but it passed through stages and developments made it has many applications until it became a tool to manage the integrated performance and support to the economical units.

The authors used the questionnaire instrument in addition to the test approach to confirm the correctness of views collected. The number of questionnaire instruments sent was 478 and the number of the received questionnaires was 392 with a response percentage of 82%.

The study used a Statistical Package for the Social Sciences (SPSS) for application of reliability, descriptive and inferential statistics.

RESULTS AND DISCUSSIONS

Reliability

The correlation coefficient between the dimensions (factors) was significant (at level 1%) and the Cronbach - Alpha Coefficient was 79.83.

Descriptive

Table 1 shows values of mean and Standard Deviation (S.D.) of survey dimensions (affecting factors).

Table 1.Descriptive statistics values.

No.	Dimension (Factor)	Mean	Std. Deviation
1	Profitability management	4.658	0.568
2	Performance management	3.408	0.492
3	Human capital management	2.699	0.777
4	Financial planning	4.209	0.680
5	The strategies planning	3.612	0.804

Source: SPSS output.

The descriptive statistics analysis of dimensions effect (affecting factors) showed that the mean values for profitability management (4.658) > financial planning (4.209) > the strategies planning (3.612) > performance management (3.408) > human capital management > (2.699).

Also, the Standard deviation (S.D.) values for the effect of factors mentioned above were 0.568, 0.680, 0.804, 0.492 and 0.777 respectively.

Inferential statistics

Table 2 shows output of Friedman Test values.

Table 2.Output of Kendall's W Test (Ranks and test statistics)

a. Ranks

Rank	Mean Rank
Financial planning	3.875
Human capital management	1.340
Performance management	2.400
Profitability management	4.549
The strategies planning	2.834

b. Test statistics

Test Statistics

N	392
Kendall's W[a]	.764
Chi-Square	1197.968
df	4
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Source: SPSS output.

From Table 2, it may be observed that there are significant differences between the factors affecting evolution of Activity Based Costing (ABC) system in Egyptian firms.

CONCLUSIONS

Activity-Based Costing (ABC) has many applications even it became a tool to manage the integrated performance and support to Egyptian manufacturing firms.

But in Egypt, there were significant differences among some important factors affecting evolution of ABC system.

These factors may be arranged , in descending order, according to effect severity on evolution of ABC system in Egyptian firms as follows:

a)Profitability management,
b)Financial planning,
c)The strategies planning,
d)Performance management and
e) Human capital management.

REFERENCES

[1]Aiyathurai, G., Cooper, W. W., Sinha, K.K., 1991, Note of activity accounting. Accounting Horizons, 5(4):60- 88

[2]Everaert, P., Bruggeman, W., 2007, Time - Driven Activity Based Costing : Exploring the underlying model. Cost Management.Boston, 21(2):16-20

[3]Kaplan, R., Anderson, S.R., 2004, Time-Driven Activity -Based Costing. Harvard Business Review. Boston, 82 (11):131-138

[4]Liu L.Y.J., Pan, F., 2007, The implementation of Activity-Based Costing in China:An innovation action research approach. British Accounting Review, 39: 249–264.

[5]Namazi, M., 2009, Performance -focused ABC: A third generation of Activity Based Costing system. Cost Management. Boston, 23 (5) :34-46.

[6]Tsai, W., 1996, Activity-Based Costing model for joint products. Computers and Industrial Engineering, 31(3/4): 725 – 729.

[7]Turney, P. B., 2010, Activity Based Costing : An emerging foundation for performance management. Cost Management. Boston, 24(4):33-42.

[8]Turney, P. B., Stratton, A.J., 1992, Using Activity Based Costing to support continuous improvement. Management Accounting,74(3):46-50.

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RESEARCHES REGARDING THE DEVELOPMENT STRATEGY OF TIMIŞ COUNTY

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Abstract

In this paper, the authors conducted a study on the economic development of Timiş County, as well as its SWOT analysis. The paper concludes with the Development Strategy of Timiş County, the main conclusions drawn from the conducted researches and bibliographical references. Within the paper, there are presented theoretical aspects related to rural area concept, followed by the physical- geographical characteristics of Timiş County. Throughout the paper, there are analyzed the existing demographic aspects found in Timiş County. The end part of the paper represents a translation in statistical terms of the main economic phenomena which are recorded in Timiş County. There are references made towards agriculture, forestry, industry, services, trade, tourism, as economic activities carried out in Timis County. Following these researches, at the end part of the paper, the authors have compiled a SWOT analysis of Timiş County, proposing in the same time a strategy for its development.

Key words: *county, development, economic, strategy*

INTRODUCTION

The paper aimed to analyze the economic development of Timis County based on conducted research and deep documentation. Theoretical aspects related to rural area concept, followed by the physical- geographical characteristics of Timiş County have been presented. Also, the existing demographic aspects have been also approached. At the end of the paper, the main economic phenomena were statistically characterized regarding the following aspects: agriculture, forestry, industry, services, trade, tourism, as economic activities carried out in Timis County.

MATERIALS AND METHODS

In order identify a development strategy of Timis County, the authors of this paper have conducted a multi-criteria analysis of its level (physical-geographical, demographic, economic and social), where upon they have prepared a SWOT analysis.

RESULTS AND DISCUSSIONS

Geographical location of Timis County gives it a privileged position as the westernmost county of Romania. Timis County is bordered by: to the west by Serbia and Montenegro and Hungary, to the north is bordered by Arad County, to the east by Hunedoara County, to the south by Caras-Severin County.

The county is crossed by rivers Timis and Bega, and pleasant climate is temperate continental with Mediterranean influences.

In Timis County meet three major landforms, arranged gradually from the plain to the west (75 m) mountain in the east (1374 m).

Plain occupies over 50% of the county and is part of the Western Plain, the basic unit of Romania's relief. He altitudes ranging between 80 m and 200 m.

Western Hills is about 20% of the Timis County. Just as fields are characterized by their penetration in height above the relief forming depressions so-called "course", the particular landscape. Largest peaks correspond to the heights northwest of Poiana Rusca massif (800 - 1300 m), culminating with the tip Fades (1380 m).

The administrative organization of the county includes two cities (Timisoara and Lugoj), 8 cities (Buziaş Ciacova, Deta, Faget, Gataia, Jimbolia, Recaş and Sânnicolau MAre) and 85 communes. The county capital is Timisoara Municipality.

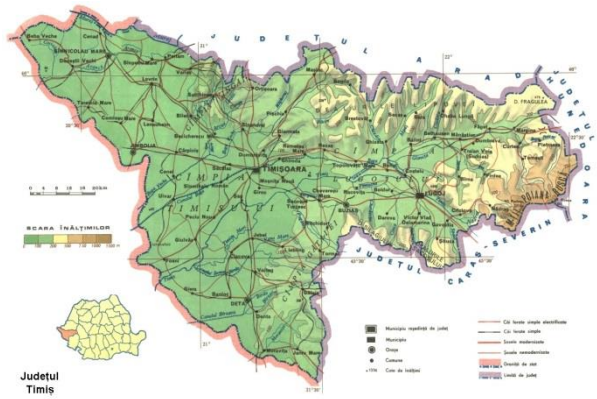

Fig. 1. Timis County Map

At Timiş County level, in the year of 2010, the total population was 679,695 people of which 353,759 women and 325,936 men number.

In urban areas there were 198,476 males and 223,774 females.

In rural areas there were 129,985 women and 127,460 of the total of 257,445. Population density (residential) is 78.2%.

In 2011, at Timis County level, the stable population was of 650,544 persons and the number of population households was of 241,098 households.

Female population is majority, representing 51.8% of the resident population.

At Timiş Countylevel, in 2011, population density was of 78.2 inhabitants per square kilometer.

Most densely populated localities are: Timisoara (2,360.2 people per square kilometer), Dumbrăviţa (381.1 inhabitants per square kilometer), Lugoj (377.0 inhabitants per square kilometer), Deta (180.7 inhabitants per square kilometer), Ghiroda (175.5 inhabitants per square kilometer), Giroc (153.3 inhabitants per square kilometer), Jimbolia (92.2 inhabitants per square kilometer), Cărpiniş (90.0 inhabitants per square kilometer), Sag (86.0 inhabitants per square kilometer), Moşniţa Noua (84.2 inhabitants per square kilometer), Giarmata (83.5 inhabitants per square kilometer), Sânnicolau Mare (83.0 inhabitants per square kilometer), Tomnatic (81.4 inhabitants per square kilometer), etc.

Employed population in Timis County is of 318.6 persons (third place in the country), distributed by branches of activity mainly on industry and agriculture, as follows:

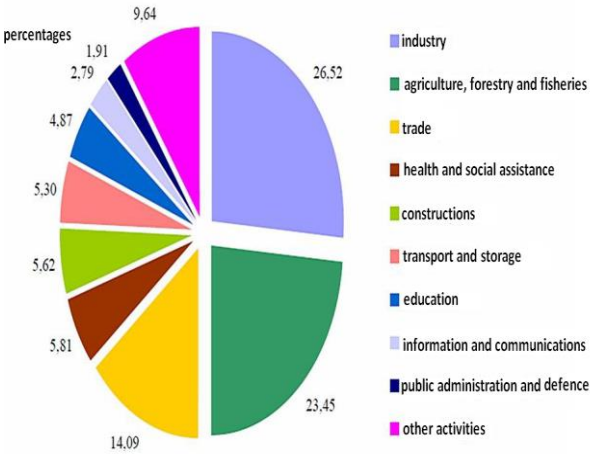

Fig. 2. Timis County population structure by branches of activity

Labor resources represent 454. 8 people of which the employed civilian population - total of 318. 6 people.

Employees - total of 210.5 thousand of people of which the majority work in industry 80.3 thousand persons, followed by agriculture, forestry and fishing of 71. 6 thousand and 45. 7 thousand work in wholesale and retail, repair of motor vehicles and motorcycles.

Registered unemployed in 2010 are a total of 12,367 of which 5,678 women; of total unemployed 8,111 people receive unemployment benefits of which 3,558 are women. In 201, at Timis County level there were 6,280 unemployed persons.

Unemployment rate in the county of Timis is 3.7 % in 2010 and 1.9 % in 2011.

Timis County has rich natural resources: oil, natural gas, manganese, basalt, marble, building materials, mineral and thermal water, wood, wildlife, etc.

Agriculture is well developed especially in Timis and Arad Counties, located in Western Plain of the country.

Timis County ranks first in the country both in terms of agricultural area (702,066 ha) and arable land (533,122 ha).

Timis County enjoys a diverse and complex industry, here being the place where many

investors, domestic and foreign make their presence.

The main industry branches are: machine building, electrotechnical and electronic, chemical and petrochemical, textile, leather and footwear, wood processing, building materials, food industry.

In Timis County people have higher living standards and a comfortable traditionally living, being characterized by a high share of homes with plumbing, wiring and central heating.

Table 1.SWOT Analysis of Timis County

Strengths	Weaknesses
GDP per capita in the county is higher than the national average, on the second place by country after Bucharest Municipality	Reduced number of SMEs in rural and remote areas
The diversity of business areas of companies	Increasing trend in the number of unemployed due to economic crisis
Industrial tradition of the county	Insufficient cooperation between industry and cooperation
Strong development of the private sector in trade and services	Reduced number of companies that have implemented management systems at international standards
Low unemployment compared to other counties	Labor productivity within the enterprises is below the national average
Development above the national average in terms of technology information use within the enterprises	Industry decline in the mining and metals businesses
Strong competition in the small business	High staff fluctuation between different economic sectors

Timis County development strategy is based on several strategic goals and basic objectives, such as follows:

Strategic Objectives:

1.Improving living standards;
2.Creating new jobs;
3.Protection and regeneration of environment;
4.Increase local competitiveness internationally.

Table 2. SWOT Analysis of Timis County

Opportunities	Threads
The development in Timisoara City of a center to promote economic relations between CEFTA member countries	Invasion of market with imported products
Increasing investors number	Decreasing within the rate of privatization process
Simplifying customs procedures and visa regime	The possibility of maladjustment by economic agents to quality conditions imposed by the EU
Increasing the number of SMEs that are generating new jobs	The development of underground economy
The existence of some production spaces and of some production capacities unused	Tax policy is continuously changing and this fact makes difficult the effective planning of a business
Development and improvement of labor legislation	Illegal employed labor force
Increasing business competitiveness by investing in R &D-innovation projects	

Specific objectives:

Agriculture:

•workforce training for agriculture and complementary services;
•protecting the rural space as ecological living space and stimulating the production of organic food, revitalizing and preserving social structures typical to rural life;
•fostering the development of health system in rural areas.

Industry:

•modernization and development of physical infrastructure;
•Improving and adapting the level of qualification - retraining in the field of workforce;
•creating an environment conducive to innovative activities in the field of business support infrastructure.

Services:

• workforce training to improve the quality of services;
• creating a suitable information environment by diversify the quality of infrastructure;

• diversification of education correlated with the growing trend of service sector;
• encouragement of private initiative in the field of health services.

Tourism:

• Strengthening the economic basis of tourism through improving the quality of infrastructure of tourist services;
• creating new jobs and workforce training to improve the quality of tourism services;
• revival of spas and treatment emplacements in order to improve the offer of leisure services and health maintenance.

CONCLUSIONS

- Timis County ranks first in terms of living indicators level, GDP per capita is about 40 % higher than the national average.
- However there are large differences in terms of development between urban and rural space, the latter one is facing problems especially linked to poor infrastructure development. Therefore there is risen the need of developing some effective investment programs to develop infrastructure in these areas. There are still many localities and villages where, for example, there is no running water, sewer or gas distribution network.
- Another issue of Timis County is represented by labor migration to EU countries, a phenomenon with negative impact on the manufacturing industry of the county. It may be mentioned as well the migration of rural youth to cities or to other countries where they have found other ways of living than those offered in the place of birth. These aspects make necessary to find measures to motivate the workforce, to increase the attractiveness of work in the country, both in cities and in rural areas.

REFERENCES

[1]Mateoc-Sîrb Nicoleta, Ungureanu, G., 2010, Dezvoltarea regională şi rurală. Evoluţii şi tendinţe, Editura Mirton, Timişoara, 2010
[2]Mateoc-Sîrb Nicoleta, Mănescu Camelia, 2012, Dezvoltare rurală şi organizarea teritoriului, Editura Mirton, Timişoara
[3]Breviarul statistic al judeţului Timiş, INS, Direcţia regională de statistică Timiş, 2011
[4]http://www.adrvest.ro - Agenţia pentru Dezvoltare Regională - Regiunea Vest

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STUDIES CONCERNING THE DEVELOPMENT LEVEL OF AGRICULTURE IN ROMANIA

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Abstract

Within this paper, the authors have analyzed the current state of agriculture development in our country with reference to the following aspects: land Fund, the typology of agricultural holdings, size and dimension of agricultural holdings, agricultural production, agricultural labor force, as well as the degree of equipment with agricultural machines and devices. After the year 1990, the Romanian agriculture has undergone profound changes in the structure of land ownership, large agricultural units disappeared as their communist organization way and therefore new types of holdings appeared: family households, family associations, agricultural societies. Following the conducted analysis, the authors underline the existence of a very large number of small farms in parallel with very large farms, which reveals structural imbalance affecting agriculture in our country and its competitiveness. From the performed analysis within this paper, there can be concluded that in Romania there are three types of agriculture: a subsistence type agriculture - characterized by agricultural holdings to 10 hectares, representing a share of 97.7% of total holdings and occupy 38.7% of UAA; a middle type agriculture - defined by agricultural holdings of 10 to 100 hectares, representing a share of 1.9% of total holdings and occupy 12.4% of UAA; an agro-industrial type agriculture - agricultural holdings of over 100 hectares, representing a share of 0.4% of total number of holdings and occupy 48.9% of UAA.

Key words: *agriculture, development, holdings, level*

INTRODUCTION

Existing land structure in Romania is consistent quantitative and qualitative requirements of plant and animal development, to meet domestic demand drive food consumption and ensure availability for export. Agricultural area of the country is about 14.7 million hectares (61.7% of the total) of which 9.4 million hectares of arable land, pasture and hay covers an area of 4.8 million hectares, vineyards and fruit orchards have 418 000 hectares.

Of the 23.8 million ha as sums the territory of Romania, the agricultural area of the country is 14.7 million ha (61.7%), of which 9.4 million ha is arable land.

The paper goal was to analyze the current state of agriculture development in Romania with reference to the following aspects: land Fund, the typology of agricultural holdings, size and dimension of agricultural holdings, agricultural production, agricultural labor force, as well as the degree of equipment with agricultural machines and devices.

MATERIALS AND METHODS

In order to set up this paper, the empirical data have been collected from Romania's Statistical Yearbook regarding land Fund, the typology of agricultural holdings, size and dimension of agricultural holdings, agricultural production, agricultural labor force, as well as the degree of equipment with agricultural machines and devices. The data were processed based on index method.

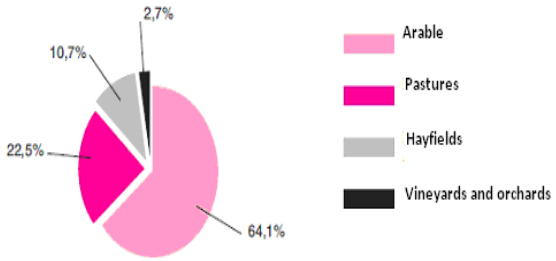

Fig. 1. Structure of agricultural area by category of use, in the year 2011

RESULTS AND DISCUSSIONS

After the year 1990, Romanian agriculture has undergone profound changes in the structure of land ownership, large agricultural units disappeared as their communist organization, yet arising new types of exploitations: individual households, family associations, agricultural societies.

Table 1.The situation of agricultural holdings, 2010

INDICATORS	U.M.	Total agricultural holdings		Agr.hld. without legal personality		Agr.hld. with legal personality	
		2002	2010	2002	2010	2002	2010
No, agricultural holdings	thsd	4.485	3.856	4.462	3.825	23	31
Used Agricultural area (UAA)	thsd ha	13.931	13.298	7.709	7.445	6.222	5.853
-arable land	thsd ha	8.774	8.305	5.437	4.721	3.337	3.584
-pastures and hayfields	thsd ha	4.644	4.494	1.878	2.306	2.766	2.188
-permanent cultures	thsd ha	344	317	225	236	119	81
- family gardens	thsd ha	169	182	169	182	-	-
UAA /holding	ha	3,11	3,45	1,73	1,95	274,43	190,84

Source**:** MARD, 2012

Holdings by size class structure of the agricultural area (UAA) in 2010 is as follows:
-Farms to 10 hectares is 97.7% of total holdings and occupy 38.7% of OR;
-Farms between 10 and 100 hectares represents 1.9% of total holdings and occupy 12.4% of OR;
-Farms over 100 hectares represents 0.4% of total holdings and occupy 48.9% of the UAA.

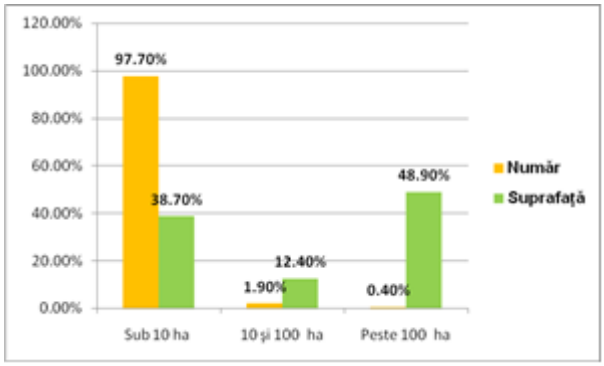

Fig. 3. Holdings by size class structure of the surface, 2010

The existence of a large number of small farms in parallel with very large farms reveals the structural imbalance that affects agriculture in our country and its competitiveness.

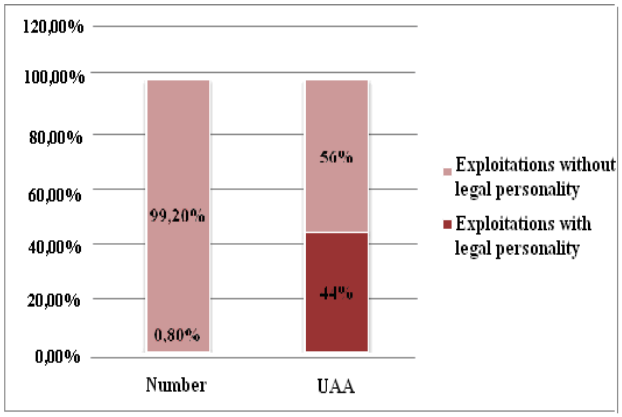

Fig. 3. The structure of agricultural holdings based on their legal status (%)

The holdings without legal personality hold 99.2% of total number of agricultural holdings and 56% of utilized agricultural area, and those with legal personality, although numerically hold only 0.8% of total holdings, these occupy 44% of the utilized agricultural area.

Agricultural production in Romania not only suffer from lack of volume or production costs comparable to European ones because of technical effort useless and extremely expensive, but suffer from lack of quality first. Most farms are specialized, with a combined production profile of both plant and animal, and focused on a variety of crops and animal species.

Another problem of the Romanian agriculture, which concerns both crop production and livestock production refers to the uniformity of products. Achieving a high quality standard is as important as maintaining it. Market presence depends primarily on the ability to group productions in different locations within an agreed quality standard.

The average yields per hectare are an essential element of economic efficiency, respectively of profitability. Average production level is dependent, on one hand, on the natural fertility of the soil and, on the other hand, on the applied production technologies.

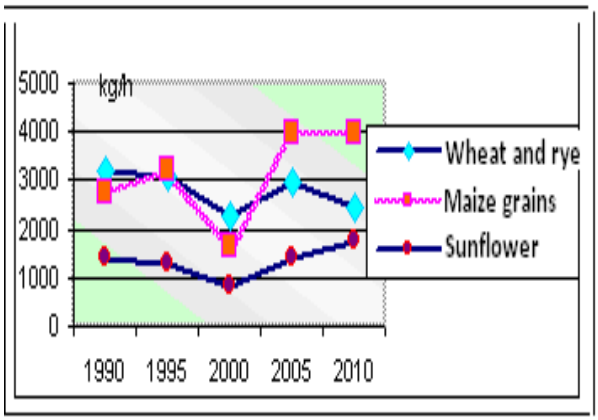

Fig. 4. Evolution the average yield of main crops

All these per hectare in our country are incomparably lower to average yields obtained in some European Union countries (Table 3.6.).

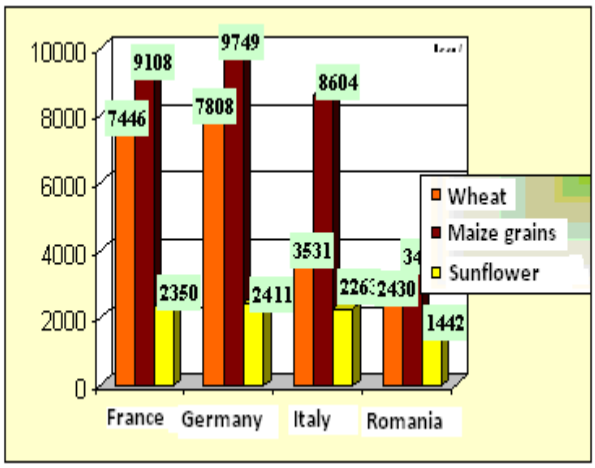

Fig. 5. Average yields obtained for main crops in some EU countries, 2009

The average yield of wheat produced by France in 2009 was of 7,446 kg /ha while in Romania the average yield per hectare was 2,430, in Germany it is even higher – 7,808 kg /ha and in Italy of 3,531 kg /ha, considering that this is not a large grain cultivator. In what concerns corn, the average yields are more than twice as high in France, Germany and Italy, respectively over 9,000 kg /ha, compared to Romania where the average yield per hectare is 3,416 kg /ha.

Livestock farming has an important share in Romanian agriculture and represents one of the core activities in the rural sector.

Except sheep and goats where increases of livestock farming were recorded, while in other livestock sectors there were recorded decreases of livestock.

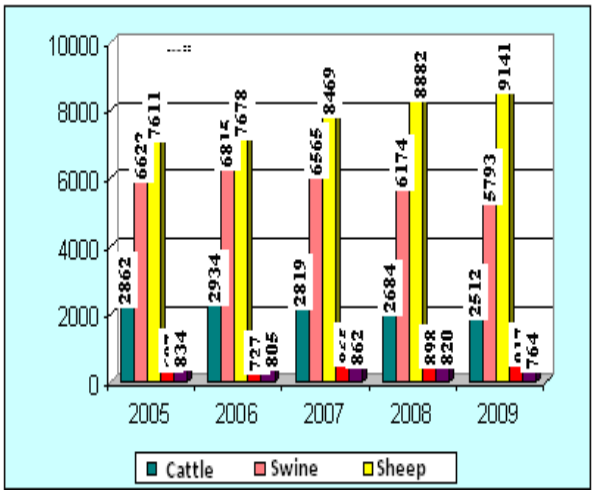

Fig. 6. Evolution of livestock, during the period of 2005-2009

Within the yield structure of agriculture branch, crop production sector is predominant, holding, in 2011, 70.8% of total yield, compared to 28.5% as livestock sector represents and about 0.7% by agricultural services.

Regarding the evolution of the labor force in Romania's agriculture, it is noted that employment in agriculture falls under the general tendency in all countries in course of modernization, meaning of reducing until 2007, after which due to the emergence of the economic crisis, it began again to increase slightly, noting that decreased to 28.5% in 2011.

CONCLUSIONS

From the conducted analysis in this paper, there can be concluded that in Romania there are three types of agriculture:

- **Subsistence agriculture** - characterized by agricultural holdings up to 10 hectares represent 97.7% of total number of holdings and occupy 38.7% of UAA;
- **Middle agriculture** - characterized by agricultural holdings between 10 and 100 hectares represent 1.9% of total number of holdings and occupy 12.4% of UAA;

- **Agro-industrial agriculture** - agricultural holdings over 100 hectares represent 0.4% of total number of holdings and occupy 48.9% of UAA.

The existence of a large number of small farms in parallel with very large farms reveals the structural imbalance that affects agriculture in our country and its competitiveness.

The gaps on the average size of farms in Romania to most of EU Member States are a major impediment in ensuring a high level of efficiency because there be no investments and can not organize any activity on modern basis. The territorial average size of farms from the old EU Member States exceeds 20 hectares. In France in 2007 the average size was 52.64 ha, in Spain 24.17 ha, in the Netherlands 25.54 ha etc.

REFERENCES

[1]Mateoc-Sîrb Nicoleta, Mănescu Camelia-Maria, 2012, Rural development and territory organization, Mirton Press House, Timişoara
[2]Otiman, P.I. , 2006, Dezvoltarea rurală durabilă în România, Editura Academiei Române, Bucureşti
[3]Vincze Maria, 2000, Dezvoltarea regională şi rurală – Idei şi practici, Presa Universitară Clujeană, Cluj-Napoca
[4]Guvernul României, Planul Naţional Strategic pentru Dezvoltare Rurală 2007 – 2013
[5]Ministerul Agriculturii şi Dezvoltării Rurale – Planul Naţional de Dezvoltare Rurală 2007 –2013
[6]MADR, Program Naţional pentru Dezvoltare Rurală 2007-2013,
[7]Perspective financiare 2007–2013, Consiliul UE, Bruxelles,19 decembrie 2005.
[8]Anuarul statistic al României 1990-2012, Institutul Naţional de Statistică

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THE INFLUENCE OF ECONOMIC CRISIS ON THE LABOUR IN THE EUROPEAN UNION'S MEMBER STATES

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Abstract

The economic crisis is far to an end. After a recursion of the recession in 2012 and a continuance in 2013, its' effects are increasingly stronger and the most tangible effect is the poverty increase among the active population. It is due to the revenues decrease, to poverty and exclusion's risks, the attenuation of protection effects which are socially and initially carried out by the decrement of tax incomes and by the increase of expenditures level for social performances. These effects are being acutely experienced, particularly by the member states in the Southern and Eastern Europe. Therefore, at the E.U. point, one performed studies, one determined the causes and it is trying to find solutions. This scientific paper aims to analyze the main parameters onto one must interfere in and the actions that should be considered in order to increase population's standard of living.

Key words**:** *economic crisis, globalization, labour, labour market*

INTRODUCTION

In terms of the economic crisis that still persist, whereupon are added the globalization, the technological progress and last, but not least, population aging, the state economy within the E.U deals with serious issues in the field of labour, with a series of distortions onto the labour market, being identifiable by the means of coexistence of a labour shortage, in certain economic branches, but at the same time, having a lower degree of using it as a whole.

Financial and economic crisis effects have come forward by a reduction of workplaces and unassailably, releasing labour into unemployment, by restricting and slowing down the processes of creating new workplaces, having direct consequences locking young people's access at the labour market and labour market egress of people with assailable position.

MATERIALS AND METHODS

In order to meet the need of information to be used for presenting the subject to be discussed, a bibliographical research and a statistical research have been performed, through which data for the conclusions regarding the performed study were collected, processed and analysed. Statistical tables have been used by which data were presented in a tabular way. This is a method which allows the description of indicators on which the performed analysis is based, and the establishing of the existing connections between its component elements. Graphical representations have been used to emphasize the extent and/or variation of data subject to the statistical research in view of showing their evolution in time.

RESULTS AND DISCUSSIONS

Poverty's significant growth among population of working age is one of the most tangible social consequences of the economic crisis, and a progressive decrement of unemployment could not be adequate for inverting this situation, if the salary polarization continues, mostly due to an increase of part-time labour cases, shows an annual Report of the European Commission. *Unemployment,* as we mentioned before, represented the most

obvious cause of the economic recession, had maximum limits for almost the last twenty years. According to Eurostat data, in 2013, the most affected countries in the E.U. were Greece and Spain where almost 60% of the young people were searching some working places, and the unemployment rate recorded values of 26.8% (Greece), respectively 26.9% (Spain). In Italy, the unemployment had a value of 17.6% in May, 2013. Romania has an unemployment rate of 7.5%, Hungary of 10.5%, and Bulgaria has a rate of 12.7%. At the opposite pole one may found Austria with 4.7%, Germany with 5.3% and Luxembourg with 5.7%, these countries becoming a destination for the emigration of population from the South-Eastern Europe. On the first place, as emigration destination, there is The United Kingdom of Great Britain and Northern Ireland, which is followed by Germany.

Table 1. The evolution of the main macroeconomic indicators at EU-27 level during the period 2011 – 2014

INDICATORS	**2011**	**2012**	**2013** rating	**2014** Prevision
GDP(real increase rhythm %)	1,6	-0,3	-0,1	1,4
Volume of private consumption (%)	0,1	0,7	-0,4	1,0
Volume of productive investments(%)	1,4	-2,8	-1,7	2,6
Unemployment rate (in % of active population)	9,7	10,5	11,1	11,1
Inflation rate (it is measured through the harmonized index of consumer prices, in %)	3,1	2,6	1,8	1,7
Budget deficit(in % of GDP)	-4,4	-4,0	-3,4	-3,2
Public debt (in % of GDP)	83,1	86,9	89,8	90,6
Balance of current payments (in % of GDP)	0,1	0,9	1,6	1,9

Source: European Commission: „European Economic Forecast Spring 2013", 9 May, 2013 Brussels

In accordance with the papers published by the European Commission, relying on this basis, there was an absolute decrease of the private consumption volume, in particular the one of the real rhythm of productive investments, owed to the disadvantageous evolution of financial-banking situation and of the austerity measures adopted by Government in the most countries.

The evolution of the main macroeconomic indicators, at EU-27 level, is being presented in Table 1.

This way, one could summarize that on the basis on the analyzed, estimated and predicted indicators, the existing situation at EU's level was not improved. Although the inflation rate was decreasing, the investments level decreased, and the unemployment rate increased.

In the matter of the rhythm evolution for the economic increase in the EU countries, this was disadvantageous many times in 2013 than in 2012 and has contributed to the aggravation of contradictions between countries in recession and the other member states.

Table 2. Rhythm evolution for the economic increase and the unemployment rate in EU member states during 2011-2014 (I)

C.N.	Country	**GDP's real increasing rhythm - in % -**			
		2011	2012	2013 rating	2014 prevision
1.	Germany	3,0	0,7	0,4	1,8
2.	France	1,7	0,0	-0,1	1,1
3.	Italy	0,4	-2,4	-1,3	0,7
4.	Spain	0,4	-1,4	-1,5	0,9
5.	Netherlands	1,0	-1,0	-0,8	0,9
6.	Belgium	1,8	-0,2	0,0	1,2
7.	Austria	2,7	0,8	0,6	1,8
8.	Finland	2,8	-0,2	0,3	1,0
9.	Greece	-7,1	-6,4	-4,2	0,6
10.	Portugal	-1,6	-3,2	-2,3	0,6
11.	Slovakia	3,2	2,0	1,0	2,8
12	Slovenia	0,6	-2,3	-2,0	-0,1
13.	Estonia	8,3	3,2	3,0	4,0
14.	Ireland	1,4	0,9	1,1	2,2
15.	Luxembourg	1,7	0,3	0,8	1,6
16.	Malta	1,7	0,8	1,4	1,8
17.	Cyprus	0,5	-2,4	-8,7	-3,9
	Euro area	**1,4**	**-0,6**	**-0,4**	**1,2**
18	Great Britain	1,0	0,3	0,6	1,7
19.	Sweden	3,7	0,8	1,5	2,5
20.	Denmark	1,1	-0,5	0,7	1,7
21.	Poland	4,5	1,9	1,1	2,2
22.	Czech Republic	1,9	-1,3	-0,4	1,6
23.	Hungary	1,6	-1,7	0,2	1,4
24.	***Romania***	***2,2***	***0,7***	***1,6***	***2,2***
25.	Bulgaria	1,8	0,8	0,9	1,7
26.	Latvia	5,5	5,6	3,8	4,1
27.	Lithuania	5,9	3,6	3,1	3,6
	European Union	**1,6**	**-0,3**	**-0,1**	**1,4**

Source**:** European Economic Forecast – Spring 2013

Thus, Germany was the main economic power in the Euro area, being considered and "engine" of the European economic increase. But on the basis of the performed prognosis, one may notice a relative decrease from 0.7% in 2012 to 0.4% in 2013.

Also, for France it was predicted an absolute reduction of increase rhythm too in 2013, followed by a soft economic increase of 1.1 % in 2014. **Italy, Spain, Netherlands, Greece, Portugal, Cyprus** and **Slovenia** were in recession in 2013 too, and this situation will not be improved neither in 2014. (Table 2 and 3).

In Romania, the real increasing rhythm has decreased from 2.2% in 2011 to 0.7% in 2012, and the one in 2013 was estimated at 1.6%.

Table 3. Rhythm evolution for the economic increase and the unemployment rate in EU member states during 2011-2014 (II)

C.N.	Country	**Unemployment rate – in % of the active population -**			
		2011	2012	2013 rating	2014 prevision
1.	Germany	5,9	5,5	5,4	5,3
2.	France	9,6	10,2	1,2	1,7
3.	Italy	8,4	10,7	11,8	12,2
4.	Spain	21,7	25,0	27,0	26,4
5.	Netherlands	4,4	5,3	6,9	7,2
6.	Belgium	7,2	7,6	8,0	8,0
7.	Austria	4,2	4,3	4,7	4,7
8.	Finland	7,8	7,7	8,1	8,0
9.	Greece	17,7	24,3	27,0	26,0
10.	Portugal	12,9	15,9	18,3	18,6
11.	Slovakia	13,6	14,0	14,5	14,1
12	Slovenia	8,2	8,9	10,0	10,3
13.	Estonia	12,5	10,2	9,7	9,0
14.	Ireland	14,7	14,7	14,2	13,7
15.	Luxembourg	4,8	5,1	5,5	5,8
16.	Malta	6,5	6,4	6,3	6,1
17.	Cyprus	7,9	11,9	15,5	16,9
	Euro area	**10,2**	**11,4**	**12,2**	**12,1**
18	Great Britain	8,0	7,9	8,0	7,9
19.	Sweden	7,8	8,0	8,3	8,1
20.	Denmark	7,6	7,5	7,7	7,6
21.	Poland	9,7	10,1	10,9	11,4
22.	Czech Republic	6,7	7,0	7,5	7,4
23.	Hungary	10,9	10,9	11,4	11,5
24.	***Romania***	***7,4***	***7,0***	***6,9***	***6,8***
25.	Bulgaria	11,3	12,3	12,5	12,4
26.	Latvia	16,2	14,9	13,7	12,2
27.	Lithuania	15,3	13,3	11,8	10,5
	European Union	**1,6**	**-0,3**	**-0,1**	**1,4**

Source: European Economic Forecast – Spring 2013

According to the data published by NIS, the value realized after the first quarter of 2013 was at a value of 1.7%, and its improvement until the end of the year was a result of the great agricultural year and exports increase.

In accordance with the published data, Romania has recorded the biggest economic increase in EU in 2013, of 3.5%.

The unemployment rate has decreased from 7.4% in 2011 to 7% in 2012, predicting that this will be of 6.9% in 2013. Although, the effective rate was of 7.5%, and the unemployment natural rate was of 7.37%.

Even if, at the first sight, it could seem a reduction of unemployment, this is not sufficient enough as long as there is a salary polarization, in particular due to an increase of part-time labour cases that involve a high degree of vulnerability.

László Andor, the commissioner for employment, social affairs and inclusion, published a report in 2013, showing that "We must pay attention not only to create jobs, but job quality, in order to achieve a sustainable recovery that could reduce both unemployment phenomenon and poverty*"*.

The European Commission Report regarding employment in 2013 highlights the existence of a job that could help someone to leave poverty but only in half of cases, the result being determined by the nature of the working place, the number of members in a household that that salary should support, the situation of partner's labour market, the expenditures with the household.

Also, the analysis specifies that contrary to the prejudices, a redundancy paid unemployed is more interested in searching for a job than another one which is not redundancy paid; in this situation could appear the disappointment and the loss of trust in its' capacity of finding a job (Report of the EC, 2013).

At the E.U. level, the medium rate of employed people's poverty is 9%. But, in Romania it had a value of 19% in 2012, in Greece of 15%, and in Italy and Spain of 12%, which that a significant part of the population, even if has a job, lives in poverty limits.

Also, Romania is on the first place at EU level regarding the number of people living in households with a standard of living under the poverty line because of the fact that none of the family's members has a job.

Regarding the costs with the labour, these have increased due to salaries, remaining reduced and insufficient to cover all the household's necessities. This fact is also doubled by the increased fiscal stringency and it encourages black labour as a component of hidden economy. Romania has the most extensive hidden economy in the EU, with a value of 28.4% of GDP (Report of the EC, 2013).

In some countries in the Eastern Europe such as Romania, Bulgaria and Poland, social performances in connection with the unemployment phenomenon (unemployment benefit and specific performances for social assistance) do not cover the basic needs in a household, so they have as a result the accession of familial solidarity degree as well as the increase of informal or under the counter occupancy rate.

Incomes from labour cover almost 80% of employee necessities about insufficient salaries, the difference being completed by social transfers and parents' provisions.

Probabilities of descending under the poverty line or of its overtaking range between the member states. Some population categories are widely affected. Thus, adult young people, unemployed women and lonely mothers are fighting against more increased risks of permanent poverty. The absence of a visible redressing got up steam to households incomes in most of the member states and heightened exclusion's risks on a long term.

The real gross income of people's households has declined in 2011 in comparison with 2009 with a value of 17% in Greece, of 8% in Spain, of 7% in Cyprus and of 5% in Estonia and Ireland. In northern countries such as Germany, Poland and France there has been an increase of global incomes during the crisis due to the existence of some social protection systems which were well developed and of some strengthened labour markets. However, an extension of the crisis would lead to a general increase of exclusion risks on a long term.

These measures should be generalized for all member states. Concerning the efficiency in combating poverty, organizing national systems for social protection is an important aim. One could remark that member states with similar levels of social expenditures record very different rates of reducing poverty. The taxation systems and those of social performances may influence in a significant way the results in employment field through certain facilities such as providing services for infant care, as a part of a strong factor favourable to restart professional activity, particularly among women.

Reorientation of fiscal duty, from labour to other sources (CO_2 emissions, consumption, possession) impels the employment. Thus, within this reorientation it is necessary to considerate the aspects which regard the allocation of fiscal duty when one could identify alternative sources in order to compensate incomes loss generated by reducing taxes onto labour.

One could reduce salaries by measures in improving competitiveness, but it will also reduce domestic demand for consumption; this could lead to redundancy within producing companies. Employees contribution to total incomes generated by the economy has decreased in Europe, while polarization between two categories of work places –the correct and incorrect remunerate ones- was overweight.

In the matter of the relation between the level of minimum wages and redundancies, one could notice that in the countries with a higher level of minimum wages, companies didn't act with a redundancy of people with a lower level of qualification; on the contrary there was a tendency of recording some higher rates in employment for these categories.

Another important aspect that should be highlighted here is referring to *gender disparities* that women fight with, phenomenon which decreased during the crisis period of time, but it still persist in the matter of participation at the labour market, remuneration and poverty risk.

In addition to this, women still have the tendency of working fewer hours than men and, even if this fact could reflect some individual preferences, it leads to reduced

possibilities in career development, smaller salaries and future provisions, total unexploited human capital, and as a consequence, an economic increase and a more reduced prosperity. Therefore, gender disparities generate both an increase of economic costs and social ones.

Analysing gender disparities situation in relation to the number of working hours in E.U. member states, one could remark differences form a country to another. Thence, in Holland, Germany, Austria and Great Britain, an increased number of women are working, but the timetable is relatively short, in many countries from Central and Eastern Europe, such as Spain and Ireland, women's involvement is more reduced, but the employed ones have a tendency of working relatively more, while some member states (mainly Northern and Baltic countries) combine increased rates of feminine employment with a decreased level of gender disparity concerning working hours.

There was a prosecution of increasing macroeconomic, social and employment discrepancies, threatening EU central objectives, such as the benefit for all its members by promoting en economic convergence and improving citizens' life from all member states.

The analysis made at European Council level prove that actual discrepancies are based on the introduction of Euro currency, which created deficiencies resulted from lopsided increase based on debt accumulation in some member states, as a result of low rates of interest, of the capital growth at high level, being sometimes related to evolutions not as obvious as for productivity and competitiveness.

In the absence of a certain possibility of *currency devaluation*, states from Euro area are trying to regain costs competitiveness and they should base on domestic wages devaluation (wages and prices control). However, this policy has its limits and inconveniences, particularly for unemployment increase and social difficulties, while its efficiency depends on many factors (economic opening, the resistance of foreign demand, policies and investments presence which encourage the competitiveness that is not based on prices).

CONCLUSIONS

The main challenges of the European area facing with the employment field are as following:

- **demographic**: an accentuate aging and reduction of labour resources;
- **participation on labour market**: the increased level of unemployment and its progressive tendency, mainly for youth unemployment; the high number of youth that are not working, educated or trained; the reduced participation of old people and of ones with lower level of qualification; the increased incidence of unemployment on a long term; a flexible labour market, a dynamic one, more rapid and efficient transactions; the development of a proper policy in order to stimulate creation of new jobs within potential sectors (eco - efficiency, IT, health); the consolidation of human capital by developing some new abilities and competences; the guarantee of a better concordance between offered competences and their demand on labour market;
- **social protection**: the accession of poverty level in particular for the working population; the assurance of a proper social protection which could stimulate he activation, maintaining at the same time the purchasing power; a better appropriateness of measures regarding the inclusion of vulnerable groups; the unsuitable level and degree of covering the social protection system, poverty trap, poverty risk and low-incomes trap.

Crisis impact highlighted the fact that economic realities proceed faster than public policies. In recent years, at European level, millions of persons lost their jobs and they were affected in a bigger way by poverty and social exclusion, and this position imposed upon the enactment of some reformations and measures in order to improve the situation.

REFERENCES

[1]European Economic Forecast – Spring 2013
[2]*** Report of European Commission (2013) - The social situation and employment in Europe
[3]Statistical yearbook, edition 2009
[4]Statistical yearbook, edition 2010
[5]Statistical yearbook, edition 2011
[6]Statistical yearbook, edition 2012
[7]National Strategy for employment (2013-2020)

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EVOLUTION OF SUPPLY AND DEMAND OF WHEAT IN ROMANIA

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Abstract

The paper aimed to present the evolution of supply demand and of wheat in Romanian market. It is based on the statistical data provided by National Institute of Statistics and European Statistics (Eurostat). The data have been processed into the following indicators: cultivated surfaces, obtained production, consumption per capita. Wheat production is correlated with seeding surface, but, sometimes paradoxes appear, where even if the cultivated surface is large the production is low. During the analyzed period, cultivated surfaces remained constantly; the production has continuously increased, so that in the year 2013 there are 7,383 million tonnes of wheat in Romania. As a conclusion, Romania is able to support domestic demand for wheat and can also export a significant amount of this grain.

Keywords: *evolution, Romania, wheat demand, wheat offer*

INTRODUCTION

Wheat is unique. Of all the seeds in the plant kingdom, the wheat grain alone has the gluten proteins capable of forming the fully elastic dough required to bake leavened bread. These gluten proteins are also needed to make the great variety of foods that are associated with wheat around the world [1]. This unique property is the reason why over 2 million hectares of wheat plants are cultivated in Romania, producing well over 7 million tonnes of grain. This level of wheat production is equivalent to an average of nearly 165 kg of grain per person per year. However, in practice, this theoretical estimate is meaningless, since the regions of wheat production differ from the populations in need of the grain. Furthermore, wheat is one of the most important food plants cultivated in many countries, feeding 35-40% of the world population and is an important source of trade [2]. The main use is for the manufacture of bread and various products that are made from flour, and stems (straw) remaining after harvesting have multiple uses: raw material for manufacturing of pulp, bedding, feed, organic fertilizer, incorporated into the soil itself, immediately after harvest or after being subjected to a composting process [5]. Also, wheat is used as raw material for various other industrial products (starch, gluten, alcohol, bioethanol used as fuel).

MATERIALS AND METHODS

In order to characterize the offer evolution (wheat production) and the demand, the following indicators were used: cultivated surfaces, obtained production, consumption per capita, the coverage of consumption needs. The period analysed in this study is 2007-2013. The data, collected from National Institute of Statistics and Eurostat, have been statistically processed and interpreted, building the trend.

RESULTS AND DISCUSSIONS

National *wheat supply* is required both by the need to ensure food security and the desire to trade in cereals. Seen through the prism of supply of wheat, regardless of historical period analyzed, the share of the arable crop yields per unit area emphasizes its socio-economic position. This, especially for the

fact that it is a cereal considered noble, requested for export. The offer is composed of factors that condition it and are directly correlated with the yields achieved, the cultivated areas and yields per hectare. Wheat production holds a priority place in Romania's agriculture; so that the wheat is cultivated on an area of 2.2 million ha (18 to 25% of arable land). Wheat production, last year, was about 5.2 million tonnes. The cultivated area was about 2 million hectares, resulting in a yield of the crop of 2.6 tonnes per hectare. In the long term, area planted with wheat will decrease as a result of improving the qualitative structure of household consumption on account of animal products. An amount of about 1.5-2.0 million tonnes can be exported annually.

Table1. The cultivated area with wheat and wheat production in Romania during the period 2008-2013

Specification	2008	2009	2010	2011	2012	2013
Cultivated area(1000ha)	2.110,3	2.148,8	1.994,4	1.979,8	1.992,2	2.128,9
Total production (1000t)	7.181	5.202,5	5.587,5	7.192,2	5.297,7	7.383,5
Yield (average yield per ha – 100kg/ha)	34	24,2	28	36,3	26,6	34,7

Wheat production has been an uneven evolution throughout the analyzed period, climatic conditions, the quality of seedlings and compliance with the technology culture having a decisive influence. The minimum was recorded in 2009 when production decreased by about 2 million tons from the previous year, and the maximum in 2013 (over 7.3 million tonnes). However, total production has fluctuated, ranging between 5-7 million tons annually. Compared with the European Union, in terms of production, we are far enough, because in the year 2012, for example, we had a yield of 25 times smaller.
On the other hand, although it seems that we have the lowest yield of production in the EU, there have been years (2011, for example), in which the yield has been more than half of that of the EU.

The demand for wheat is expressed through household consumption of wheat, flour and bakery products.

Table 2.Annual average consumption of wheat in grains equivalent, per capita, in the period 2007-2011(kg)

2007	2008	2009	2010	2011
168	166,7	163,5	162	165,6

Annual average consumption of wheat and rye (the biggest share being wheat) per capita has a linear trend over the period, being situated around 160 kg, higher values explained by the fact that cereals are the basis for human food. In the last year analysed (2011), the consumption has increased by 1 percent from 2010. Average consumption of cereals has been increasing until 2005, after that date, consumption started to decrease; in 2011 it reached 165.6 kg (1.5% less than in 2007) [6]. This evolution has taken place on the fund to stimulate the consumption of seed and industrial use, but also to lower consumption of animal feed.

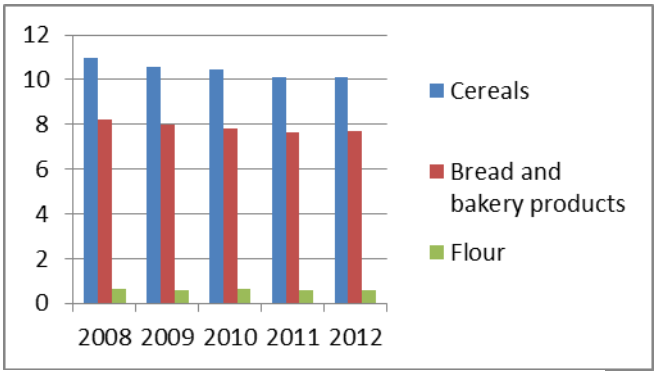

Fig.1. Dynamic of wheat products purchased by a household

A large quantity of bread and bakery products was purchased by a household throughout the period in question, on average, 8 kg – but which shows a gradual decrease also cereals per total. Instead, the quantity of flour purchased has a linear evolution. The concern for a healthier diet has led to this aspect.
Possibility in which domestic production would cover consumptionneeds is above average because, as is illustrated in the calculations from the following table, are

available, on average, 56 tonnes of wheat per person.

Therefore, the necessary consumption for the period analysed, is smaller than the total wheat production.

Table 3.Coverage of the consumption needs

1. Specifications	2. 2007	3. 2008	4. 2009	5. 2010	6. 2011
7. Consumption needs in Romania (tonnes)	3.622.939,9	3.588.822,121	3.515.023,7	3.476.874,132	3.546.127,7
8. Total wheat production (tonnes)	7.100.000	7.181.000	5.202.500	5.587.500	7.192.200
9. Coverage of the consumption needs (t/pers)	51,03	49,98	67,56	62,23	49,31

So, the internal production can sustain also the population consumption and exportation without deficits. The share of the consumption in total output was the highest in 2009, it was 67%, but this was because this year was a low production. Instead, in 2011, when production was the highest, consumptions needs accounted for only 49% of total internal production.

*Wheat offer at regional level.*At this level, the highest wheat production was obtained in the West region, in 2012, followed by the North-West region. It can be seen that these two regions are those where production is the most efficient, but during the period analyzed these values are varying. Thus, in 2008, the South East region presents the highest wheat production (3572 tons / ha) in the next year this region presents the lowest production per hectare compared to other regions (2,142 tons / ha to 2,806 tons / ha for the West region) [7].

Table 4.Wheat production indevelopment regions

Regions	Years				
	2008	2009	2010	2011	2012
	UM: Kg/ ha				
North-West	3445	2228	2920	3620	2968
Centre	3283	2789	2753	3656	2647
North-East	3205	2615	2696	3366	2317
South-East	3572	2142	2725	3732	2353
South-Muntenia	3535	2330	2621	3822	2669
Bucharest - ILFOV	3366	2218	3008	3791	2846
South-West	3054	2607	2478	3219	2396
West	3437	2806	2993	4032	3878

Cereals offer of our country is required both by the need to ensure food security and the desire to trade grain. Viewed through the supply of grain, regardless of the historical period analysed, the weight of crop cereals in arable land and yields per unit area emphasize the socio-economic function of these crops [3]. This, especially for a cereal that is considered noble, requested to export. The offer falling within factors that condition it and which are directly related to output, respectively of areas under cultivation and yields per hectare.

The average price of on the domestic market wheat increased overall, except for the years 2009 and 2010 when, due to the emergence of the economic crisis that has led to lower purchasing power, has decreased the price of wheat. In the next years, the average prices increase sharply, reaching 0.91 RON last year. The price of bread wheat reached in July 2013 - 700 USD/tonne (157 euros/tonne), the lowest level compared to the same period of last three preceding years.

Compared to two years ago, the quote wheat is 21% smaller and the decline in the past six months is 40 %.

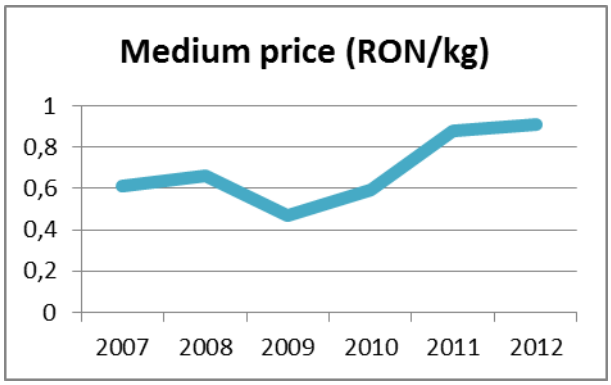

Fig.2 Price dynamics in local wheat market

Evolution has an impact mainly on the profit margins of farmers because wheat crop will bring to the economy, despite the lower price, one billion euros, a level similar to last year (2012). The decreasing in the price of wheat this year, was made in the context in which projections show a total harvest close to 7 million tons, with 40% above the level of 2012 when productivity has been pulled down from adverse weather conditions.

The effects of freight rates and exchange rates are considered to evaluate dynamic relationships among international wheat prices. The model results suggest significant dynamic relationships among prices in different international wheat markets and between the prices and exchange rates and transportation costs [1].

Local wheat price could remain relatively stable in the following period, but it is possible that 2014 to provide an increased up to 15%, because, statistically, is unlikely to repeat very good agricultural year, both in Romania and worldwide. Currently, the price of wheat is significantly lower than the same period last year, due to favorable conditions both domestic production this year and the significant decline in international prices. Wheat traded on the Chicago Board of Trade (CBOT) was cheapened by over 22% last year, and the RON is, in its turn, almost 5.4% stronger against the dollar than a year ago. The local market, the purchase price from the manufacturers is almost 20% lower than last year, independent of other factors; price erosion should be reflected in a cheapening of products based on wheat.

CONCLUSIONS

1.Wheat accounts for Romania one of the most important cereal crops and although the production level has fluctuated from 2008 to the present, this will not change in the future.

2. The national wheat offer was very high in the agricultural year 2013, reaching a level of 7.3 million tonnes.

3. Regarding wheat market demand, it follows closely the consumption evolution, being relatively stable during the agricultural year. Short-term fluctuations were noted for wheat demand, mainly due to demographic factors and the fact that this market works and carriers demand unrelated to consumption, but pursue other goals.

3.Wheat price is significantly lower than the same period last year, due to favorable conditions of domestic production this year and the significant decrease in international prices, which is influenced by the amount of wheat obtained.

5.Because wheat is the basic food consumption, especially in Romania, its cultivation remains a tradition of our country and it seems that the necessary consumption is satisfied without problem, with the possibility of export.

6. However, the seasonality of production and dependence on climatic factors are particularities for cereal products affecting both supply and demand nationwide.

REFERENCES

[1Goodwin]Barry K., Schroeder Ted C., 2008, Price Dynamics in International Wheat Markets, Canadian Journal of Agricultural Economics, Volume 39, Issue 2, Article first published online: 13 Nov. 2008

[2]Gooding, M.J., Davies, W. P., Wheat production and utilization: systems, quality and the environment

[3]Pet Elena, Ruset, C., Pet, I., Brad, I., Iancu, T., On the evolution of cereals offer in Romania

[4]Wrigley, C.W., Food Science Australia and Wheat CRC, North Ryde (Sydney), NSW, Australia

[5]http://www.recolta.eu/arhiva/importanta-biologia-ecologia-543.html

[6]Eurostat,http://epp.eurostat.ec.europa.eu

[7]National Institute of Statistics of Romania,Tempo-Online time series

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ANALYSIS ON THE PHENOMENON OF POPULATION'S MIGRATION IN ROMANIA

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Abstract

In this paper the authors analyze the migratory movement of population from Romania. Demographic dynamics of the last decade confirms that Romania's population declined. The demographic developments in Romania have mainly economic reasons (examples : migration, low birth rate, rural - urban migration). The comparative analysis of statistical data obtained in the population censuses of 2002 and 2011 shows that the most of the Romanian communities have lost population due to a negative natural and migratory growth. Fron the situation of the absent population (migrants) at the time of the population census, between 2002 and 2011 is that the number of those who have left home for longer periods has increased exponentially. Most of those absents from their home at the time of the last population census were living abroad. Romania needs a realistic vision of economic and social development in the coming decades. In defining and naming a strategy for sustainable development, population is the central element and from this perspective one of the strategy component should be to stop the demographic skidding. Simultaneously with the decrease of the total population, Romania records a demographic aging trend. The causes are both negative natural growth (low birth rate combined with high mortality) and also the migration phenomena. Projections show that these trends will persist on the medium and long term.

Key words: *aging, birth rate, declining, migration, population*

INTRODUCTION

On July 1, 2012 the Romanian population was 21,316,420 inhabitants, of which 10.4 million men (48.7 %) and 10.9 million women (51.3 %).

The negative values of natural growth, combined with those of external migration balance, caused the population to fall between the period 1 July 2009 - 1 July 2012, with 153.5 thousand people.

The average age of the population increased from 39.5 years (1 July 2009) to 40.0 years (1 January 2012), the average age that characterizes countries with "adult" population.

Female population with an average age of 41.5 years was also on January 1, 2012 older then the male one with 3.0 years.

Birth rate, the first component of population movement, met a decreased trend. Given that, in short and medium term, there cannot be expected that mortality to significantly contribute at reducing demographic decline in Romania, the birth rate remains the only component over which there can be actioned with effective results. Recovery birth rate can have positive effects of long term. In 2012, the number of live newborns (201.1 thousand) decreased by 21.3 compared to 2009.

Mortality remained relatively high in Romania. In 2012, 255.5 thousand people died, with 1.7 thousand people less than in 2009.

Between fertility and birth rate there is a direct connection, the intensity of fertility causing the birth rate. The evolution of fertility is influenced, besides demographic behavioral factors, by some changes in the number and structure of fertile female contingent too.

The image of fertility evolution of Romania's population in recent decades is one of a continuing downward trend, which began in the early years after World War II, has increased in the period of 1957-1966 and has decreased alarming in the past five years.

MATERIALS AND METHODS

To achieve this scientific paper, the authors studied the following statistical documents relating to: Romanian population, population

censuses, migration statistics, monographs demographic and population registers. This research was performed using methods, procedures and techniques of the traditional and modern. In the category of traditional scientific approach are based on the first analysis and synthesis with which they have been using other methods or processes geographical: observation and geographical description.

RESULTS AND DISCUSSIONS

Demographic dynamics of the last decade confirms that Romania's population declined.
Comparative analysis of statistical data obtained in the population censuses of 2002 and 2011 shows that the biggest part of Romanian communities have lost population due to a negative natural growth and migration.
From the quantification of the situation of the absents (migrants) at the moment when the census was performed is that, between 2002 and 2011 the number of those who left home for longer periods has increased exponentially.
Most part of those absent from home at the time of the last census were living abroad.
In the early '90s in Romania has been a dramatic increase of internal migration, from 8.6 ‰ in 1985 to 33.9 ‰ in 1990.
In the next 10 years, from 1991 to 2000, the volume of territorial mobility has decreased considerably compared to 1990, remaining between 10 and 13 residence changes to 1,000 residents.
Starting with 2001, the flow of immigration intensifies, often exceeding 16 ‰ (during economic growth periods) and emerginf of global crisis worldwide caused a decrease in population mobility (only 15.4 ‰ in 2009), while the extension of economic downturn has caused among population a growth of the desire to change residence, thus leading to 21.4 ‰ in 2010, the highest value of internal migration rate after 1990.

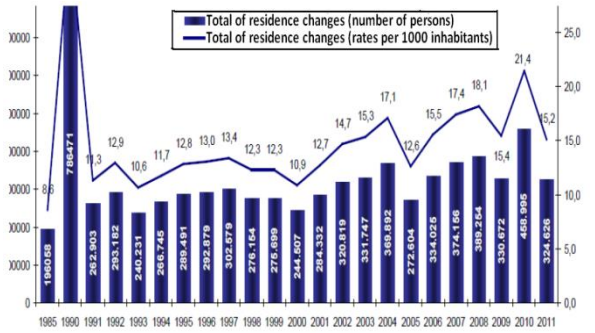

Fig. 1. Total of residence changes during the period 1985-2011

In 1991 over half (50.3%) of the internal migration from rural to urban flow back over the next nine years (until 2000) the share of this type of migration has decreased considerably from year to year until value of 19.5% in 2000, while the share of urban to rural flows increase from 10.1% in 1991 to 33.8% in 2000. Since 2001 the population movement from rural to urban areas and vice versa, from urban to rural, remains approximately constant, representing around 20% and 30% of total migration flows.

In 1990, there was a massive migration of Romania population towards abroad. Thus, in 1990, chose to emigrate from Romania 96,929 persons, respectively 4 persons per 1,000 citizens decided to change their residence abroad. In the next four years, the number of immigrants decreases, reaching to year 1994 where the number of people who left to be below 18,000, respectively below 1 immigrant per 1,000 residents, while in 1995 the number of people who emigrated from Romania increased to over 25,000 immigrants, respectively to 1.13 immigrants per 1,000 inhabitants.
There should be noted that the year 1990 remains the benchmark in terms of emigration phenomenon spreading, because so far the value has not been exceeded. Therefore, in the last 10 years, overally, the number of people decided to immigrate to another country is becoming smaller oscillating around the value of 10,000 people respectively 0.5 immigrants per 1,000 inhabitants.

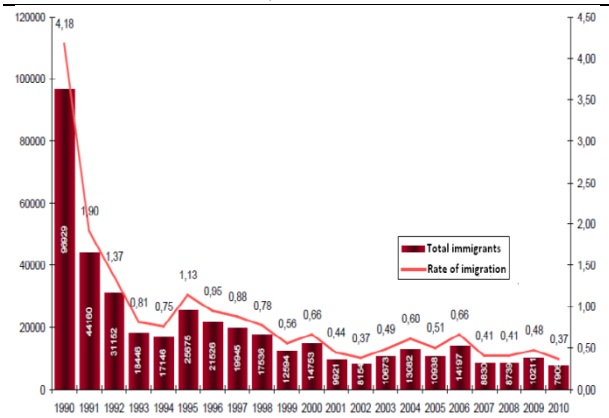

Fig. 2 Evolution of population emigration from Romania and migration rate

The main destination countries of immigrants from Romania, during the period 1990-2011, were: Germany, USA, Spain, Canada and Italy, but the evolution of immigrants flow by country of destination is different. Thus, if at the beginning of the period, the trend was more towards the U.S.A and Canada, and currently the share of European countries (Germany, Italy and Spain) and those from overseas (Canada and USA) reached about the same value.

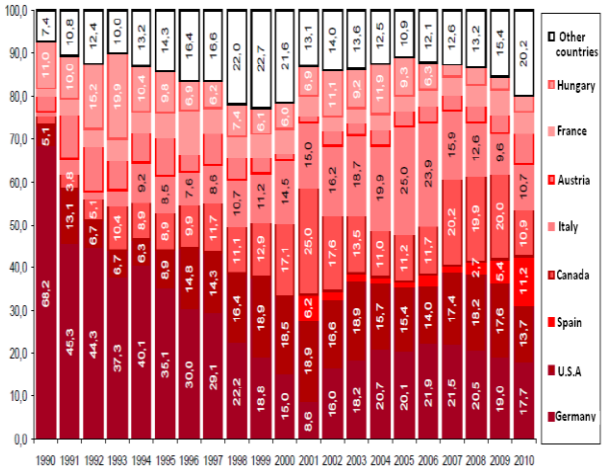

Fig. 3. The main destination countries of immigrants from Romania

Immediately after the year1990, in Romania, the flow of immigration was almost nonexistent, the number of people who have decided to live legally in Romania oscillating around 1,500 people respectively 0.05 immigrants per 1,000 inhabitants.

After the year 1995, the flow of immigration is increasing gradually for about six years, at reaching in 2001 to be over 10,000 immigrants, representing about 0.5 people per 1,000 inhabitants. During the next period, the evolution of immigrants number is oscillating, so between 2002 and 2005 the number of immigrants arrived in Romania falls below 4,000 people, and after 2005, this number gradually increases, surpassing again the value of 10,000 immigrants. Since 2008, the evolution trend of immigrants number is downward, and now this represent 0.33 persons per 1,000 inhabitants.

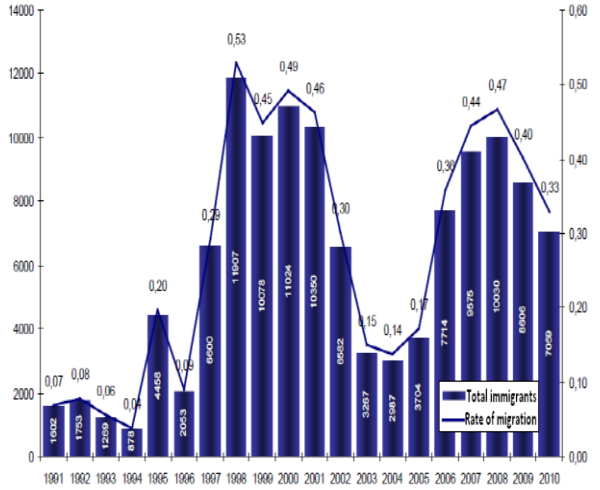

Fig. 4. Evolution of population emigration from Romania and migration rate

CONCLUSIONS

Romania needs a realistic vision of its economic and social development in the coming decades. In defining the structure of a strategy for sustainable development, population is the core element and from this perspective one of the components of strategy should be to stop demographic crisis.

The structure by age of the population bears the imprint typical to a demographic aging process, marked mainly by declining of birth rate, which caused the absolute and relative reduction of young population (0-14 years) and of increasing the share of the elderly population (60 years and over).

The average age of the population increased from 39.5 years (1 July 2009) to 40.0 years (1 January 2012), the average age that

characterizes countries with "adult" population.

In conclusion , if the changes that have occurred in the profile and socio-economic structure of Romania in the period immediately following 1989 have caused an increase of territorial mobility among the population, especially from rural areas to urban areas, after the year 1996 signified changes occur in the evolution migration flows by changing the direction of internal migration, rural-urban flow being the main direction of migration.

REFERENCES

[1]Man, T.E., Mateoc-Sîrb Nicoleta, 2008, Dezvoltarea rurala si regionala durabila a satului românesc, Editura Politehnica, Timisoara
[2]Mateoc-Sîrb Nicoleta, Ungureanu, G., 2010, Dezvoltarea regionala si rurala. Evolutii si tendinte, Editura Mirton, Timisoara
[3]Mateoc-Sîrb Nicoleta, Mănescu, Camelia, 2012, Dezvoltarea rurală şi organizarea teritoriului. Editura Mirton, Timisoara
[4]Otiman, P.I., Mateoc-Sîrb Nicoleta, Mănescu Camelia, 2013, Economie rurală, Editura Mirton, Timisoara
[5]"Situaţia demografică a României în perioada 1990-1998", Oficiul de studii şi proiecţii demografice, 1999, Institutul Naţional de Statistică;
[6]"Proiectarea populaţiei României pe medii şi regiuni", Oficiul de studii şi proiecţii demografice, 2005, Institutul Naţional de Statistică;
[7]"Anuarul demografic al României", 2006, Institutul Naţional de Statistică;
[8]România în cifre 2013, Breviar statistic

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RESEARCH ON THE LABOUR FORCE FROM ROMANIAN AGRICULTURE

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Abstract

Through this research is analyzed labor force from Romanian agriculture. The agriculture in Romania has a very large share in the Gross Domestic Product (GDP). Compared to other countries, the share of romanian agriculture in the GDP is 1.6 times higher compared to Hungary, almost three times compared to Poland and more than nine times to European Union. This does not explain the performance of romanian agriculture, but rather show the underperforming of the other sectors (industry and services sector) from Romania compared to those sectors of the developed countries. Also, Romania is currently one of the European countries, with the most farmers about 30% of the total active population. This share is almost 40% of the number of farmers, existing in the European Union, where the share of the active population in agriculture of all activities, is less than 5%. In Romania, the share of active population employed in agriculture, was relatively stable until 1990, about 3 million people were employed in this area. Structural economic reforms and dismantling of Agricultural Production Cooperatives of the early 1990s led to a drastic increase of the labor force employed in agriculture area. Rural labor force is engaged mainly in the agricultural sector, which is one of the major constraints of economic development of the country. Regarding of the quantitative and qualitative structural evolution of the labor resources in romanian agriculture, on long-term, the employment in agriculture fall into the general tend of all countries wich are in the course of modernization, respectively of the absolute and relative reduction.

Key words: *active, agriculture, economy, labor force, population*

INTRODUCTION

During the whole period after 1990, agriculture has played a very important social role, absorbing a large part of the labor force made redundant of urban industries.

In agriculture as in other branches of material production, the normal course of production processes involves the direct presence on the one hand, of material resources, respectively of production means, as the means of labor and labor objects, and on the other hand, of human resources represented by the workforce needed for both performing agricultural works and for technical guidance, organization, leadership and management of all available resources within the agricultural units.

Of course, the essential particularity of agriculture consists in the fact that all kinds of productive resources participate in obtaining the production based on the existence of natural climatic resources, showing large differences or regional specificities among these ones, diversities in terms of volume and structure of quality within the agricultural entities and their organization subdivisions.

The economic development of agriculture in overall agricultural households in particular are interrelated with each of the resources of agricultural production, taken in hand, the optimality range of efficiency depending on the economic rationality of insurance , organization and use of these resources . Without underestimating the role and importance of all resources, it should be noted that the total resources and factors of agricultural production, human resources, viewed both quantitatively and especially qualitatively, has the highest dynamic and has decisive influence on the results of productive activity in agriculture, regardless characteristic typology of economic systems . The decades of rapid industrialization of the economy have been accompanied by accelerated rates of numerical decrease in the active population employed in agriculture, economic and social phenomenon extremely

complex and important implications on the essential correlations have been established between the main parameters of economic performance all agriculture , but especially in territorial - resource productivity and efficiency technical and financial materials . By highlighting some of the key aspects of the evolution of quantitative and numerical and structural- quality human resources in agriculture, becomes useful highlighting their main characteristics that define their role in agricultural production and their relative position to other resources involved. Undoubtedly employment resource is a very important category for agriculture.

MATERIALS AND METHODS

The paper is based on the data provided by Romanian Institute of Statistics regarding labor force in the period 1990-2010.
They were processed according to the modern methodology used for such a study.

RESULTS AND DISCUSSIONS

In Romania, the share of active employed population in agriculture was relatively stable until 1990, with about 3 million people employed in this field. Structural economic reforms and dismantling of Agricultural Production Cooperatives in the early 1990s led to a drastic increase of workforce employed in agriculture.
Rural labor force is engaged mainly in the agricultural sector, which is one of the major constraints of economic development of the country.
The share of employed population in agriculture in total rural population has increased significantly since 1990 when it was 28.8 % to 35 % in 2000 and then declined slightly in 2002 to reach 29.7% and 28.8 % in 2010.
Around the same evolution had and the share of employed population in agriculture in total employed population, which has increased from 28.2% (in 1990) to 40.8% in 2000 and declined slightly in 2003 to 39, 5%, reaching in 2010, at 30%.

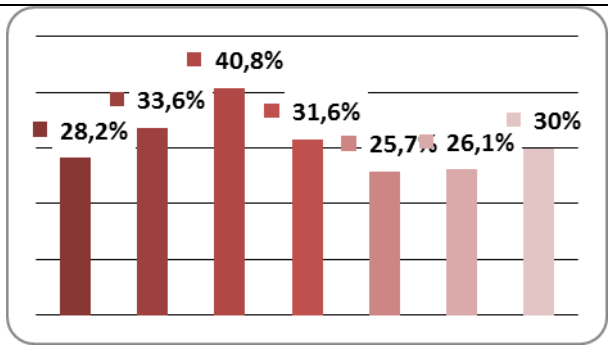

Fig. 1. The share of employed population in agriculture in total employed population

The increase of employed population in agriculture was due not so much to the needs of agriculture, but especially to workforce redundancies from the other sectors of the economy.With regard the employed population in agriculture by age groups, there is noticed an aging trend of workforce in this sector. Thus, over half of this belongs to the age group of over 45 years and the share of employed population in agriculture aged between 55 and 64 years is increasing.

Table 1. Percentage evolution of employed population in agriculture by age groups

Specification	2006	2007	2008	2009	2010
	%				
15-25	10,1	9,2	9,0	9,4	7,8
25-34	19,9	18,0	17,6	17,3	26,6
35-44	17,9	18,4	18,5	19,7	28,9
45-54	18,4	17,7	17,2	17,6	20,8
55-64	18,4	19,2	20,2	20,1	11,4
Over 65	15,3	17,5	17,5	15,9	4,5

Source: Romanian Statistical Yearbook, 2007-2010.

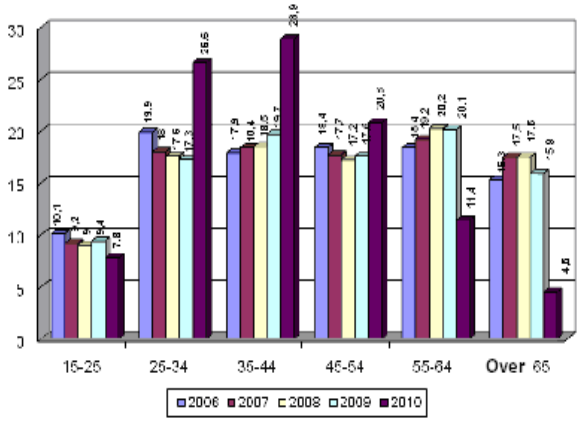

Fig. 2 The share of employed population in agriculture by age groups

Researches on the social- economic characteristics of labor force from agriculture show that typical family farm household is composed of an aged farmer, self-employed, which has a level of education below middle, and family members. In general farming population could be divided into three categories, as follows:

- full employment in agriculture;
- workers in other sectors but working in agriculture as well;
- workers which are not working in other sectors and in agriculture are only working partially.

In Table 2.20 there is presented the evolution of average number of employees in the total economy and agriculture. If in 1990, about 655,000 people were employed (ie 8.03 % of total employed persons in Romania), in 1996 this number dropped to 55.5% of total employees in agriculture existing in 1990 (i.e. 6.12% of total people employed in Romania in 1996), while in 2009 this reduction continued reaching 95 thousand or 16.8% of total employees in agriculture existing in 1990 and to 2.3 % of total employees existing in Romania in 2009.

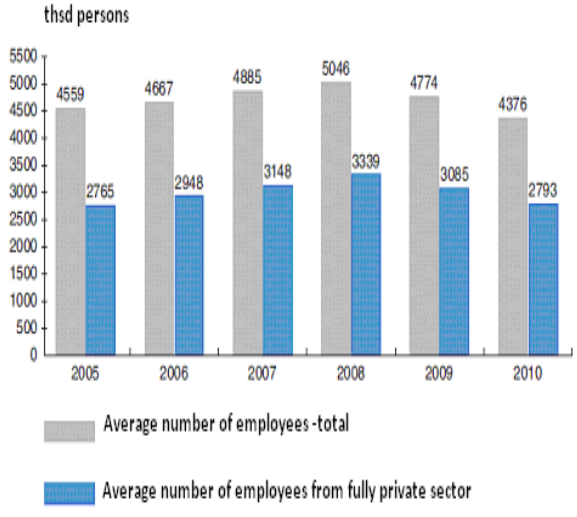

Fig. 3. Evolution of average number of employees

The sharp decline in the number of employees in agriculture was determined by the transformations of property relations, was due as well to economic activity reduction from the major agricultural companies. This is a great loss for agriculture, as the professional qualification level of smallholders is extremely low.

At this point it is clear that only agricultural activities can not sustain rural population incomes and this applies in the case of Romania, state where the percentage of the population employed directly in agriculture is 1.5 times higher than in the 15 old member states of EU combined.

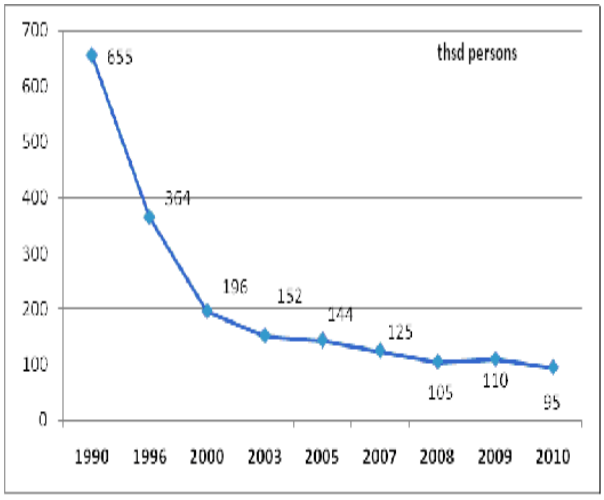

Fig. 4 Evolution of average number of employees in agriculture

There must be found new ways to meet the needs of rural development and the political class must articulate a vision of future for long-term of Romanian rural society and must develop a comprehensive policy, including institutional arrangements to facilitate the achievement of these objectives of perspective.

CONCLUSIONS

Following the study carried out during the scientific research report, we can conclude the followings:

- Agriculture in Romania has not yet approached the European agricultural model; it is not being directed to the market and towards the achievement of expected efficiency after joining the European Union;
- While employment in agriculture of Romania still remains one of the largest in Europe, the share dynamics of population employed in agriculture show a gradual

downward trend thereof, from 40.9% in 2001 to 30% in 2010.

REFERENCES

[1]Man, T.E., Mateoc-Sîrb Nicoleta, 2007, 2008, Dezvoltarea rurală şi regională durabilă a satului românesc, Editura Politehnica, Timişoara
[2]Mateoc-Sîrb Nicoleta, Ungureanu, G., 2010, Dezvoltarea regională şi rurală. Evoluţii şi tendinţe, Editura Mirton, Timişoara
[3]Mateoc-Sîrb Nicoleta, Mănescu Camelia, 2012, Dezvoltare rurală şi organizarea teritoriului, Editura Mirton, Timişoara
[4]http://www.crpe.ro - O ţară şi două agriculturi. România şi reforma Politicii Agricole Comune a Uniunii Europene;
[5]http://www.maap.ro - Ministerul Agriculturii şi Dezvoltării Rurale;
[6] http://www.gazetafermierului.ro;

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PRIMARY OFFER OF MILK IN BUCOVĂŢ VILLAGE, DOLJ COUNTY

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Abstract

The first documentary attestation dates from 1897 Bucovăţ it bordering the communes Predesti and Breasta (north) east Craiova (boundary being formed by the river Jiu), municipalities Podari and Vârvoru de Jos (south) and Terpeziţa village (west). Specific activities in the area appear as industry and agriculture. The common includes the following villages: Bucovăţ, Leamna de Jos Leamna de Sus, Sărbătoarea, Cârligei and Palilula. The village has a total area of 8264 ha, of which 111.50 ha urban and 8152.50 ha unincorporated. The population consists of 4224 people, which are grouped in the 1544 households, ie the 1780 houses. For the period 2010-2012 can be observed a total area of 8264 ha, of which 56.40% is agricultural land - 4661 ha, and 43.60% are non-agricultural area - 3603 ha. Elucidating the communal potential of milk production is based on use of year Appropriate set of indicators: Effective in exploitation (by species), total production and average yield per head. The study covers the period 2010-2012, Taken as a starting point for Developing a strategy of Reviving the sector of production.

Keywords**:** *milk production, livestock, potential*

INTRODUCTION

Livestock (or live cattle) for the concrete conditions of our country, are of particular importance due to the following reasons: provides essential products for human consumption, contributes to manufacturing industries with raw materials ensure better use of crop production; effectively exploit crops and by - products industrial supplies organic fertilizer for crop production; recovered with high economic efficiency based on natural forage pasture and meadow (about 4.9 million hectares); ensure uniform use of labor throughout the year, providing money liquid to farms throughout the year, that provides steady income to producers, livestock by production technologies lend themselves to industrial production processes, resulting in high levels of productivity comparable to leading branches of the economy. These considerations highlight the role of agriculture and livestock production across the economy, argues the necessity to develop manufacturing sector [4].

Keep the cattle in agricultural holdings in Romania, are important food industrial valorization of fodder resources side the use labor resources, export, sources of profit [1].

This importance is emphasized by the milk which is a specific product of the livestock sector, a product with multiple meanings. Thus the sheep milk has a dual significance: biological-indispensable fodder lambs feeding - and commercial-food with high nutritional value for humans. The percentage of fat from the sheep milk is between 6.5-7.5% and depends on the breed, age, diet and stage of lactation. Thus early lactation fat content are 4 - 4.5% and at the end of 9-10%, with a curved antagonistic milk production. The factors influencing milk production related to both heredity (race, individuality, age, fecundity, season of calving, lactation) and environmental and operating conditions (climate, the food, the number of milking etc.) [2].

Herd structure is influenced by the peculiarities of breeding various species, breeding system practiced towards production, herd size, etc.[3].

MATERIALS AND METHODS

Making paper was based on the conduct of two phases: the phase of office documentation

or processing. After the documentation of the territory, data processing was performed using comparison method in time and composition based on certain indicators used structures. The data collected and analyzed, covers the period 2010-2012, operating and average period.

RESULTS AND DISCUSSIONS

Table 1 shows the production of milk for the main species that are found in the commune Bucovăț, analyzing livestock slaughtered (fig. 1), total meat production that was obtained (fig. 2) and average milk yield (fig. 3) [5].
In the structure of milk production animals are found from the following species: cattle, sheep and goats.
It can be seen that in cow milk production, number of cattle used ranged from 420 heads in 2012 to 434 heads for 2010, while the average period reached 428 heads. Dynamics of indicators highlights a downward trend of herds: -0.9% in 2011 compared with 2010, -3.2 and -2.3% in 2012 to the terms of reference (2010 and 2011). Media ahead of 1.01 times the previous term of the dynamic series, but is lower by 1.4% compared to the first term of the dynamic series. In sheep herds used for milk production ranged from 1300-1600 head for 2010 and 2012 respectively. Under these conditions the average period ends in 1473 reached (+13.3% compared to 2010 and 7.9% compared to the specific situation of 2012). Dynamics of indicators highlights upward trend of its successive annual increases were 16.8% in 2011 and 5.4% in 2012.

Table 1. Milk production *

Nr. crt.	Specification	Anul									Average 2010-2012		
		2010			2011			2012					
		Effective	Dynamics		Effective	Dynamics		Effective	Dynamics		Effective	Dynamics	
			I_{bf}	I_{bm}		I_{bf}	I_{bm}		I_{bf}	I_{bm}		I_{bf}	I_{bm}
1	**Effective in exploitation (heads)**												
1.1.	- bovine	434	100	100	430	99.1	99.1	420	96.8	97.7	428	98.6	101.9
1.2.	- sheep	1300	100	100	1518	116.8	116.8	1600	123.1	105.4	1473	113.3	92.1
1.3.	- goats	1275	100	100	1537	120.5	120.5	1550	121.6	100.8	1454	114.0	93.8
2	**Total production (hl)**												
2.1.	- cow milk	14973	100	100	15050	100.5	100.5	15960	106.6	106.0	15327.7	102.4	96.0
2.2.	- sheep milk	1456	100	100	1745.7	119.9	119.9	1920	131.9	110.0	1707.2	117.3	88.9
2.3.	- goat milk	4399	100	100	5379.5	122.3	122.3	5580	126.8	103.7	5119.5	116.4	91.7
3.	**Average production (l/cap.)**												
3.1.	- cow milk	3450	100	100	3500	101.4	101.4	3800	110.1	108.6	3581	103.8	94.2
3.2.	- sheep milk	112	100	100	115	102.7	102.7	120	107.1	104.3	116	103.6	96.7
3.3.	- goat milk	345	100	100	350	101.4	101.4	360	104.3	102.9	352	102.0	97.8

* Town hall of Bucovăț, date of statistical reportage

Goats has averaged 1454 heads, with limits of variation of 1275 heads in 2010, up to 1550 heads in the year 2012. Indicator falls on a strictly upward trend dynamics is dominated by the component index above par levels (120.5% in 2010, 121.6 and 100.8% in 2012, 114.0% for the average period - from the first term of dynamic series). Only sub unitary value from dynamic media characterized the period -93.8% - compared to the previous period (2012).

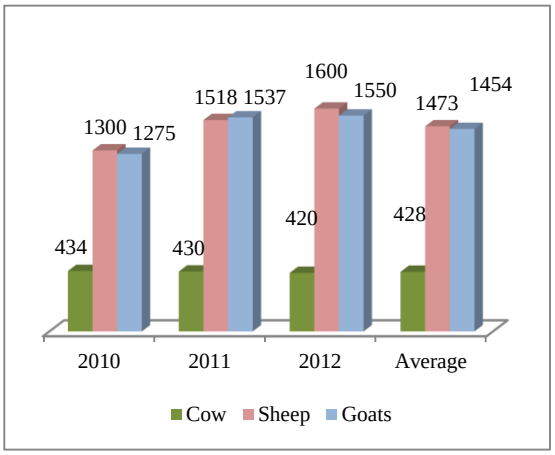

Fig.1. Effective total used in the production of milk (heads)

Total milk production of cows was between 14973 hl in 2010, and 15960 hl, in the year 2012 The dynamics for average period being 15327.7 hl. Upward trend highlights of its successive annual increases of 0.5% in 2011 and 6.0% for 2012. Average exceeds 2.4% the first term of the dynamic series, but was lower with 4.0% than the previous period (2012). For sheep there was an average milk production of 1707.2 hl (+17.3% compared to 2010, -11.1% compared with the previous term of the dynamic series), which is based on average annual sequential levels of 1456 hl 2010, 1745.7 hl in 2011 (19.9% compared with the first dynamic series) 1920 hl in 2012. These issues highlights strictly upward trend indicator. Goats were provided between 4399 and 5580 hl of milk (2010 and 2012), an average of 5119.5 hl (assuming a level of 5379.5 hl in 2011). Developments highlight the dynamics strictly ascending thereof - successive annual increases of 22.3% in 2011 and 3.7% in 2012.

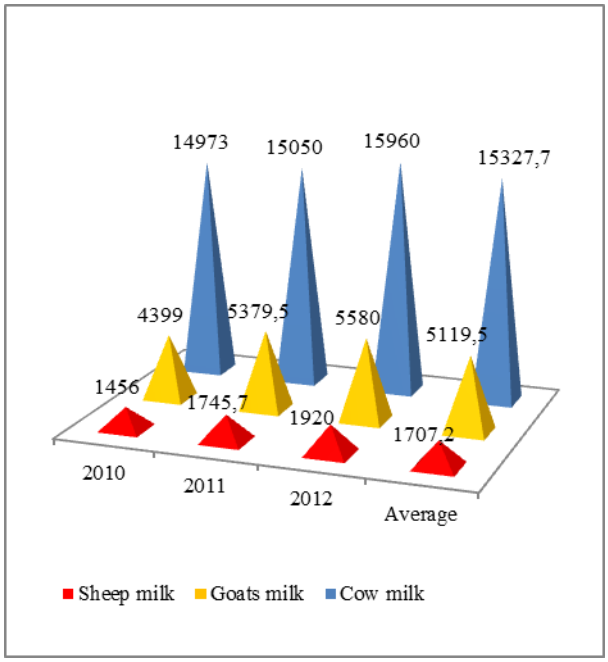

Fig. 2. Total milk production (hl)

For average milk production situation is as follows: the average production per cow was 3581 l, with variation limits from 3450-3800 l - in 2010 and 2012 respectively. The indicator evolved strictly ascending, with low limits (1.4% in 2011, 8.6% in 2012 compared to the previous terms of dynamic series) for sheep average milk yield ranged from 112 to 120 l (2010 and 2012), the average period of 116 l.

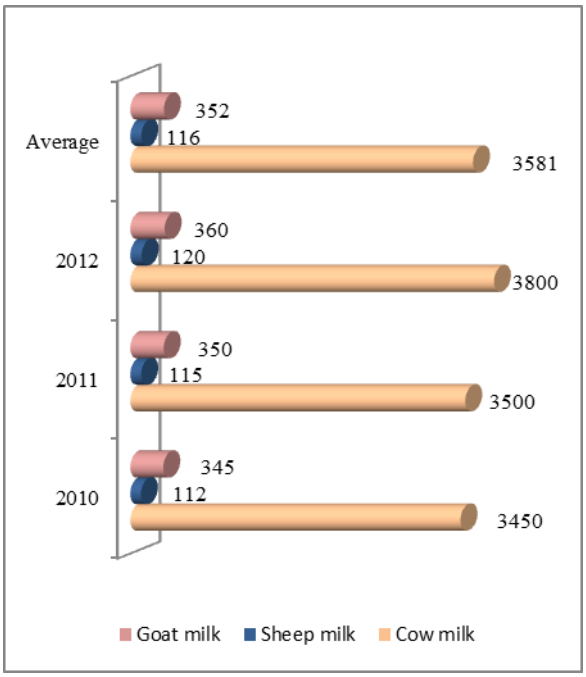

Fig. 3. Average milk production (liters / head)

Dynamics of indicators growth highlights timid in 2011 (+2.7% compared with 2010) phenomenon that persist in 2012 (+7.1 and +4.3% to the terms of reference) that determine the average period positioning both under and over reporting terms (103.6 and 96.7% respectively compared to 2010 and 2012) are characterized by a goats average milk production of 352 l (period average) compared to absolute variations : -7 l in 2010, -2 l 2011 2012 l +8.

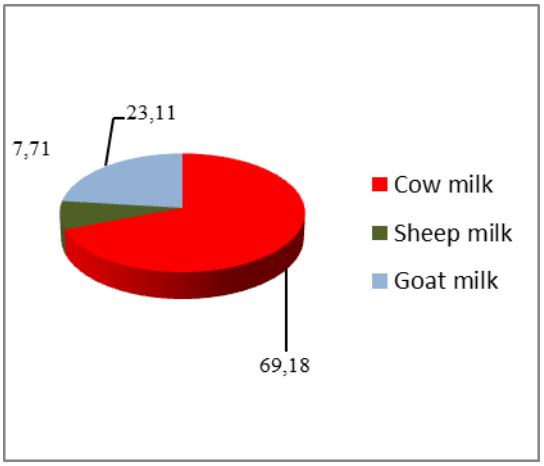

Fig. 4. Structure of milk production (%)

Fig.

The indicator evolved downward for the period under review (dynamic subunit levels is dominated by the component indices - except for the mobile base period average - 121.5%).

CONCLUSIONS

a. Bucovăț represents 1.11% of the total area of the county and can be considered a medium to large sized village for Dolj County. The village holds at the level of different categories of use, variable weights in the county context from 0.24% for vineyards and nurseries (42 compared to 17334 ha) to 3.18% in natural grassland (94 to 2952 ha). The percentage is 0.65% for arable land, 0.79% for total agricultural land, 0.92% in the case of orchards and fruit tree nurseries and 1.85% for natural grassland [5];
b. if we compare the total yields obtained to the county situation, we can emphasize the following weights: 1.76% cow milk production (15327.7 hl compared to 871 000 hl) 2.04% of the total milk production (22154.4 to 1086000 hl) 3.18% in milk production of sheep and goats (6826.7 hl compared to 215,000 hl);
c. the structure of total production of milk - 22154.4 hl was as follows (Fig. 4): 69.18% cow's milk, 23.11% goat's milk, 7.71% sheep's milk.
d. is noted convenient development potential of milk production through the suburban settlement of the village, something which creates higher meanings in terms of investment objectives that can be achieved, but also in terms of market opportunities in a market adjacent significant - Craiova.

REFERENCES

[1]Barbu, C., Pânzaru, R.L, 2000, Agricultural Economics, Hyperion Publishing House, Craiova, Chapter 7, Part II, p 331-365
[2]Cola, M., 2011, Animal Science II, Manual for distance learning university, Universitaria Publishing House, Craiova, Chapter 2, pp. 45-85
[3]Pânzaru, R.L., Medelete, D.M., Ștefan, G., 2007, Elements of management and marketing in agriculture, Universitaria Publishing House, Craiova, Chapter 6, pp. 116-148
[4]Ştefan, G., Toma, A. D., Pânzaru, R.L., 2006, Economics and food policy, Alfa Publishing House, Iaşi, Chapter 2, pp. 22-48
[5] xxx - Hall Bucovăţ, data statistical reporting, 2010-2012

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PRIMARY OFFER OF MILK IN GOIEŞTI VILLAGE, COUNTY DOLJ

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Abstract

Goieşti commune is attested from 1577 on 28 July in a document issued by a big ban of Craiova and includes 13 villages. Name of the village comes from the name given its first inhabitant, namely "Goieşteanu" name which today does not appear to any inhabitant of the village, however is the most inhabitants from the neighboring village Simnicu de Sus. Goieşti village is situated in the hilly Getic Plateau, is crossed from south to north the hills of Oltenia. The climate is specific to the hills and plains of Romania, with harsh winters and dry summers with high temperatures. The average annual temperature in the area is between 10 ˚ C and 11 ˚ C. The average January temperature is between -2 and -3 ˚ C and average July temperature is between 20 ˚ C and 21 ˚ C. The value of mean annual precipitation ranges from 500-600 mm. Vegetation consists of oak forests, acacia and meadow coppices Amaradiei prevail. The soil in the area is predominantly by brown-red. The population of Goieşti 3118 inhabitants is dispersed in 13 villages: Adâncata, Goieşti, Gruita, Malaiesti Mogoşeşti, Muiereni, Pioreşti, Pometeşti, Popeasa, Ţăndărei, Vladimir, Zlătaru. The population consists of 1814 inhabitant female and male residents 1304, children and adolescents under 18 years representing 718 inhabitants. There are no industry in the area, most people of working age is employed in Craiova, in various areas: industry, services, other areas. Agriculture is the main occupation of the inhabitants, usually the first-past youth. Young people are not really interested in this branch, because the land is less productive to the lowlands and hence is not as pleased. However agricultural land is cultivated at a rate of approx. 80-90% due to Romanian and foreign investors mostly leased land and their works. Forestry occupies an important place locality surrounded by forests of oak and locust, and on the river Amaradia there are riverside coppices. On some hillsides where there were groves of fruit trees (plum, apricot, cherry) began afforestation works, not depreciate slopes. Elucidating the communal potential, of milk production is based on use of an appropriate set of indicators: effective in exploitation (by species), total production and average yield per head. The study covers the period 2010-2012, taken as a starting point for developing a strategy of reviving the sector of production.

Keywords**:** *milk production, livestock, potential*

INTRODUCTION

Productive end use of the species of animals is based on their importance versatile: food industry, to exploit the of fodder side resources the use of labor resources, a source of articles for export, a source of profit [1].

Cow's milk is a yellowish-white liquid with a sweetish taste and characteristic odor. As the milk is deemed nutritionally complete food, and complex. It contains over 100 substances essential for human nutrition, including 20 amino acids, 10 fatty acids, 25 vitamins and 45 minerals. The energy value of milk is 690 calories / kg, and due to its nutritional characteristics and dietary cow's milk in the diet is recommended for all categories of people, especially children, the elderly, pregnant women and convalescent. In cows, the individual milk production affected by a number of factors which, by their nature, can be grouped into genetic factors and environmental factors. [2].

Starting from the above, we can say that the selection of breeds based on specific issues. Issues pursued are: the characteristics of the requirements to natural factors and to environmental conditions, genetic potential on yields obtainable (average milk yield - l / day feeding), specific consumption of food (nutrient units (UN) / l milk) of fodder the structure of rations required; consumption of labor required; reaction to intensification; specific investment, payback period [4].

Herd structure is influenced by the peculiarities of breeding of various species, breeding system practiced towards production, herd size, etc. [3].

MATERIALS AND METHODS

Making the paper was based on running two phases: the phase of office documentation or processing. After the documentation of the territory, data processing was performed using comparison method in time and composition of structures based on certain indicators. The data collected and analyzed, covers the period 2010-2012, operating and average period.

RESULTS AND DISCUSSIONS

Table 1 shows the production of milk for the main species that are found in the commune Goieşti, analyzing livestock slaughtered (fig. 1), total meat production that was obtained (fig. 2) and average milk yield (fig. 3) [5].
In the structure of milk production animals are found from the following species: cattle, sheep and goats.

It can be seen that in the production of milk cattle number used ranged from 250 heads in 2011 to 400 heads in the case of 2012, while the average period reached 317 ends. Dynamics of indicators highlights an uneven development of herds.
For sheep herds used in the production of milk ranged from 150 to 300 heads for the years 2011 and 2012. Under these conditions the average period reached 233 heads.
Goats have averaged 325 heads, with limits of variation from 275 heads in 2011 to 400 heads at the level of 2012.
Total milk production of cows was between 8000 hl in 2010 to 12000 hl, in the year 2012, average period being of 9766.7 hl. Dynamics of indicators highlights fluctuations of It, decreases being reported in 2010 (-14.0% compared to 9300 hl obtained for 2010), while increases occur in the case of 2012 (demotions of 1.29 and 1.50 respectively the terms of reference).

Table 1. Milk production *

Nr. crt.	Specification	Year									Average 2010-2012		
		2010			2011			2012					
		Effective	Dynamics		Effective	Dynamics		Effective	Dynamics		Effective	Dynamics	
			I_{bf}	I_{bm}		I_{bf}	I_{bm}		I_{bf}	I_{bm}		I_{bf}	I_{bm}
1	**Effective in exploitation (heads)**												
1.1.	- cattle	300	100	100	250	83.3	83.3	400	133.3	160.0	317	105.7	79.3
1.2.	- sheep	250	100	100	150	60.0	60.0	300	120.0	200.0	233	93.3	77.7
1.3.	- goats	300	100	100	275	91.7	91.7	400	133.3	145.5	325	108.3	81.3
2	**Production total (hl)**												
2.1.	- cow milk	9300	100	100	8000	86.0	86.0	12000	129.0	150.0	9766,7	105.0	81.4
2.2.	- sheep milk	172.5	100	100	110	63.8	63.8	204	118.3	185.5	162,2	94.0	79.5
2.3.	- goat milk	510	100	100	420	82.4	82.4	600	117.6	142.9	510	100.0	85.0
3.	**Average production (l/head)**												
3.1.	- cow milk	3100	100	100	3200	103.2	103.2	3000	96.8	93.8	3100	100.0	103.3
3.2.	- sheep milk	69	100	100	73	105.8	105.8	68	98.6	93.2	70	101.4	102.9
3.3.	- goat milk	170	100	100	153	90.0	90.0	150	88.2	98.0	158	92.9	105.3

* Goieşti town hall, date of statistical report

Average exceeds by 5.0% the first term of the dynamic series, but is 18.6% less than the previous term.
In the case of sheep the recorded average milk production was 162.2 hl, which is based on an average annual sequential level of 110 hl in 2011 (-36.2% compared to 2010), 172.5 hl in 2010, 204 hl in 2012 (exceeded by 18.3 and 85.5% respectively of the baseline).
Goats have provided between 420 and 600 hl of milk (2010 and 2012), an average of 510 hl (assuming a level of 510 hl in 2010). Dynamics of indicators sinuous evolution highlights the, of it - decreased by 17.6% in 2011 compared to 2010, increased by 17.6

and 42.9% compared with the terms of reference in 2012 (value equal to the fixed base indices and sub unitary for those with mobile base - in the case of average period).

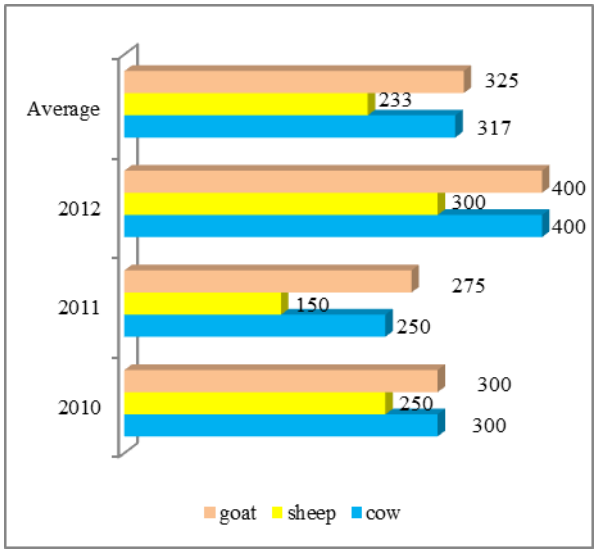

Fig. 1. Total effective used for the production of milk (heads)

For average milk production situation is as follows: the average production per cow was 3100 liters, variation limits from 3000-3200 l - in 2012 and 2011.

The indicator has evolved unevenly, with low limits (exceeding maximum reference period was 3.3% - based mobile index for period average, while the largest decrease was -6.2% in 2012 to previous term of the dynamic series) for sheep average milk yield ranged from 68 to 73 l, the average period of 70 l.

The amplitude of variation for the indicator was 12.6% and has been one sinuous evolution (growth in 2011, decreases in 2012); goats are characterized by an average milk production of 158 l (period average) versus the absolute variations were: 5l in 2011 -8 l and +12 l in 2012 2010.

The indicator evolved downward for the period under review (dynamic subunit levels is dominated by the component indices - except for the mobile base period average - 105.3%).

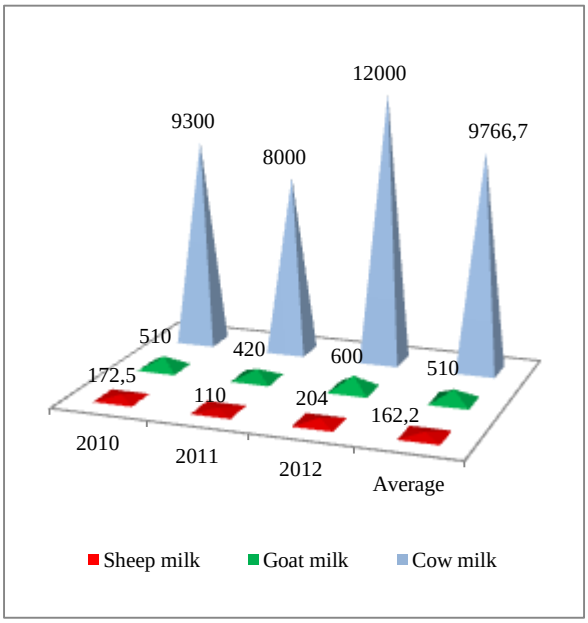

Fig. 2. Total production of milk (hl)

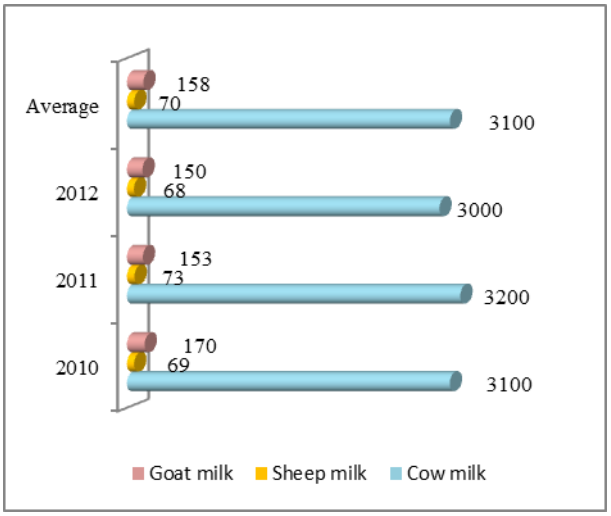

Fig. 3. Average production of milk (l/cap)

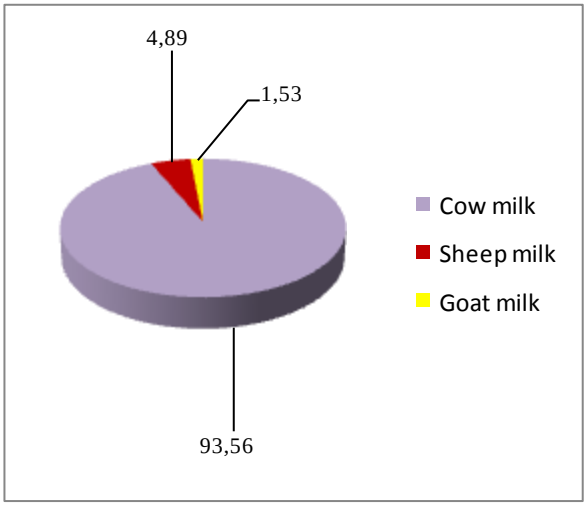

Fig. 4. The structure for the total production of milk (%)

CONCLUSIONS

a. In the context of agricultural production, the village holds 1.10% of the total agricultural surface of the county and 0.91% of the arable surface. Regarding livestock can be seen that the locality has variable weights as follows: 1.6% for cattle, poultry 0.99%, 0.56% for pigs, goats 0.42% 0 17% for sheep [5];

b. If we compare total production related to direction of exploitation given to the situation of the county, we can emphasize the following weights: 0.96% of the total county milk, 1.12% county production of cow's milk, 1.80% of the sheep and goats;

c. Structure of the total production of milk - 10438.9 hl was as follows (Fig. 4): 93.56% cow milk, 4.89% sheep's milk, 1.53% goat milk. There is a need to rebalance the structure of the total production of milk, taking into account that locality offers meanings for sheep and goats (landforms and vegetation that could be well exploited by those species);

d. Stands as a summary conclusion, the need to increase livestock, while using a biological material quality - productivity aspect both animals and their adaptability to local conditions to enable a swift acclimatization of animals. At the same time it is noteworthy the possibility of using the favorable characteristics of the local market milk of Craiova - near the ground and relatively high absorption rate.

REFERENCES

[1]Barbu, C., Pânzaru, R.L., 2000, Agricultural Economics, Hyperion Publishing House, Craiova, Chapter 7, Part II, p 331-365

[2]Cola, M., 2011 Animal Science II, Manual for distance learning university, Universitaria Publishing House, Craiova, Chapter 1, page 5-44

[3]Pânzaru, R.L., Medelete, D.M, Stephen, G., 2007, Elements of management and marketing in agriculture, Universitaria Publishing House, Craiova, Chapter 6, pp. 116-148

[4] Ştefan, G., Bodescu, D. Toma, A.D., Pânzaru, R.L., 2007, Economy and agri-food chain, Alpha Publishing, Iaşi, Chapter 3, pp. 53-157

[5] xxx - Hall Goieşti, data statistical reporting, 2010-2012

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THE EVOLUTION OF HONEY PRODUCTION IN ROMANIA BETWEEN 2000 AND 2011

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Abstract

In many European Union countries, the beekeeping sector is in decline due to the decrease of the agricultural land areas, pesticides and bee diseases. However, there are countries where honey production is augmenting. Romania is among the countries where honey production has considerably increased over the last decade. The scope of this paper is to show the honey production evolution in Romania between 2000 and 2011 and is based on the statistics provided by the Ministry of Agriculture, Forests and Rural Development.The data has been produced with the help of following metrics and indicators: the number of beekeepers, the number of bee families, honey consumption, honey price and honey production. During the mentioned period, the total number of bees has grown continuously with a maximum for 2011 at 1.2 million of bee families. Honey production also increased from 11.746 tons for the year 2000 to 24.700 tons for 2011. Therefore we can conclude that Romania is among the countries with a well-developed beekeeping industry, due to several factors: the high number of bee families available for farming, the quantity and quality of honey production, the diversity of bee farming and the results of scientific research and human resources'level of work qualification.

Key words: evolution, honey production, Romania

INTRODUCTION

Beekeeping or apiculture is one the oldest traditional fields of Romanian agriculture, with a great heritage and historical roots, demonstrated by numerous historical findings and folklore sources that show the continuity of the practice in this geographical area of the country [7]. Romania holds a key role in European and worldwide honey production, due to the high quality and so the export demand keeps increasing [1]. In this context the current paper highlights an analysis of honey production evolution in Romania with the objective to show the evolution of beehives and total honey production during the period of 2000-2011.

MATERIAL AND METHODS

To highlight the honey production evolution we use the following indicators: bee numbers, beehives total, honey production and consumption per individual and the current status of Romania on the EU and WW market. The data has been provided by the National Institute of Statistics, Year 2012 for the period 2000-2011 [10]. In this purpose the statistical data provided by National Institute for Statistics have been collected and processed using index, share and comparison methods, and finally the results were tabled and interpreted. All calculation is based on the methodology specific for this market research.

RESULTS AND DISCUSSIONS

Nationwide there are over 40.000 beekeepers with a total numbers of bee families over 1.1 million. The main counties to host bee farming are: Vâlcea, Mureş, Arad and Bihor [8]. Romania is on the 7th European place by bee totals with 1.2 million beehives, while before 1989 this number was about 1.4 million [9].

In 2011 the honey production in Romania was of 21.000 tons while the pollen production was of about 50-60 tons and propolis production of 25-30 tons. Starting with year 2000 the numbers of beekeepers has grown

continuously reaching 40.000 in 2011. In the same year the honey production per bee family was 18.5 kg per bee, twice as much as of 1990, this being a major factor in the honey production increase [11].

In 2007 Romania had produced with 90% more than in 1990. Starting with year 2000, the number of bee families has grown exponentially and in 2011 the total number had doubled due to the support policies, active through The National Program for Rural Development, and also through The National Beekeeping Program. But despite the increase in bee numbers, the loss of thousands of bee hives every year has to be mentioned [2].

The accession of Romania to the European Union transformed Romania into an important competitor for the other developing countries that produce honey. The financial help for beekeepers through the National Beekeeping Program and the positive climatic conditions that allow the economic explotation of large numbers of bees, have determined a good increase in the beehives number during 2000 – 2011. (Table 1)

Table 1. The evolution of bee numbers in Romania between 2000 – 2011

Year	Bee number
2000	614,000
2001	649,000
2002	745,000
2003	781,000
2004	840,000
2005	888,000
2006	888,200
2007	891,043
2008	982,368
2009	998,000
2010	1.057,186
2011	1,274,917

Source: Faostat

Starting with year 2000, the number of bee families has grown exponentially and by 2011 the total number had doubled.

The apiary size varies from a beekeeper to another and from a region to another. In Romania, apiary size is relatively small compared to other countries. It varies from 20 to 400 bee families, with an average of 23 units, because most of the apiaries have a small number of bee families [3].

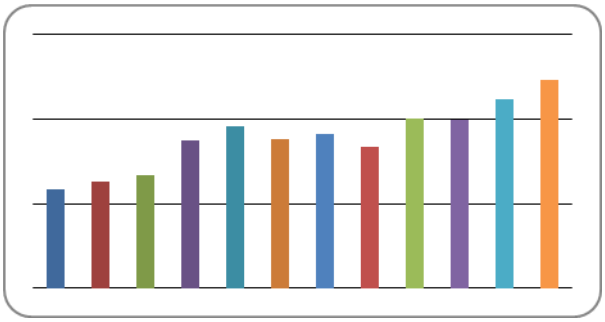
Honey production in Romania has increased during the mentioned period with a constant growth from 11.746 tons in 2000 to 24.700 in 2011. The time period with the highest increase in value was between 2008 and 2011 due to the financial support from the EU and the development programs that were implemented. (Table 2)

Table 2. Honey production in Romania between 2000 – 2011

Year	Honey production (t)
2000	11,746
2001	12,598
2002	13,434
2003	17,409
2004	19,150
2005	17,704
2006	18,195
2007	16,767
2008	20,037
2009	19,937
2010	22,350
2011	24,700

Source: Faostat

In 2011 Romania held the 17th place among top honey producers with a production of 25.000 tons. Table 2 shows the evolution of honey production between 2000 – 2011, with the highlight that the year 2011 had a growth of 78% since 2000.



Source: Faostat

Fig.1.Evolution of honey production in Romania between 2000 – 2011

The growth in quantity is due not only to the development through the National Beekeeping Program, but also to the increasing number of bee families, the implementation of corresponding beekeeping technologies, the use of selected bee queens able to develop strong families, to assure better pickings and to fill combs with honey,

the making of treatments just in time, preparing bee families for winter better and assuring good picking opportunities both stationary and in pastoral [4]. Another strong point for Romanian bee farmers is the diversity of honey and related products, from acacia honey, linden or mixed flowers to forest honey. In addition, in the recent years, some beekeepers have turned to organic honey which gives it a special quality.

The production growth year by year is also reflected in the export trade of Romania, which raised in the year 2011 to 29.6 million euros. Romania exports 80% of the honey eco-production in top markets like Germany and the Nordic countries.

The average price of honey varies from year to year depending on demand and offer market variation. When the honey production is lower then of course the price is higher than in more productive years. The prices for Romanian honey are determined by the export demand.

Table 3. Honey price in Romania between 2000 – 2011

Year	Honey price (USD/t)
2000	1,840.4
2001	1,923.3
2002	2,521.4
2003	3,734.7
2004	4,036.5
2005	4,252.3
2006	4,150.2
2007	4,924.8
2008	5,256.3
2009	4,851.9
2010	5,085.1
2011	6,207.2

Source: Faostat

About 60% of production is for export with prices ranging from 2.4 – 3.5 Euro per kilo, depending on the honey type (acacia or mixed), with main markets in Germany, UK and Italy. During 2000 - 2011 the price of honey increased from 1.841 USD/ton to 6.207 USD/ton.

The honey consumption also increased during this period. Average honey consumption per individual in Romania is very small in comparison with other countries from Western Europe. In 1990, honey consumption was 50 gr per inhabitant, but today it reached 0.60 kg. Taking into account that honey is a natural product, rich in nutrients, biostimulators and antioxidants, it has important prophylactic and therapeutically properties, it's recommended to be consumed by all ages in different amounts. It is obvious that if Romanians would consume honey at the level recommended by nutritionists, domestic honey production would be unsufficient. Because, in general, Romanians are not accustomed to consume too much honey, about 60% of domestic production is exported mainly in the EU countries where demand is very high [5].

Photo 1. Romanian beekeeper

Romania's place on the international honey market - In the year 2000 Romania had exported 7.510 tons of honey, while in 2011 the export was of 9.900 tons. Imported honey value decreased from 137.000 tons in 2000 to about 25.000 tons in 2011. This makes the balance trade to be positive and Romania to be a net exporter of honey.

In 2011 Romania has contributed with 5.7% to European honey exports and 1.5% worldwide. In the same year the honey import of Romania 0.008 from the worldwide total [6]. While international honey production had a steady decline between 2000–2011, reaching in 2007 a 15% decrease than year 2000, honey production in Europe increased by 10.8 %. But the most dynamic growth, of 72 %, was achieved by Romania in the same period, reflecting its potential as a top honey producer.

Honey balance of trade - Despite that Romania is a honey producing and exporting country, in the last years it also imported honey. In 2011 its import accounted for

25.000 tons. Domestic market is negatively influenced by the fact that import growth is higher than export growth. However the honey trade balance is still a positive one, as we can observe in Table 4.

Table 4. Honey balance of trade between 2000-2011

Year	Honey import (t)	Honey export (t)
2000	137	7,501
2001	506	6,862
2002	739	5,784
2003	232	9,633
2004	52	8,757
2005	21	6,632
2006	63	9,606
2007	315	6,255
2008	777	7,087
2009	515.5	10,654
2010	222	11,016
2011	25	9,898

Source: MADR

CONCLUSIONS

Beekeeping is an important sector contributing to the increase of agricultural production and keepers income, to the reduction of unemployment among rural population, to a better coverage of consumption and a better trade balance. Honey production increased because of a higher number of bee families and a higher productivity, modern technologies applied, a more efficient honey chain: production, collection, processing, embottling, labeling, packaging, marketing on the domestic and foreign market.

Romania has a high potential in producing honey because its traditional in beekeeping longer than 2,000 years and for the favorable geographical conditions. Romania is an important honey producer in Europe and in the world. Beekeeping has become an attractive sector in agriculture mainly for people living in the rural areas. For this reason the number of beekeeping has increased.

Beekeeping requires unification and alignment quality production standards and the national standards. Given the natural conditions differentiated from European countries, the major manufacturers will significantly influence the production of honey in the EU.

It's honey production represent 6.28% of the UE production and 1.9% of world honey production. Because of its high quality, Romanian honey is more and more required on the external market and mainly on the UE market. Honey is highly acclaimed Romanian foreign markets, but is valued at a low price because honey external processors offer low prices that do not cover the costs of beekeeping, the preferred wholesale acquisition system Beekeepers Association. The largest markets for Romanian honey are found in Europe, Germany absorbing around 60% of Romania's exports of honey. Most of the production of honey is for small private producers, some of them being under the protection of processors or trade associations, or scrolling through supply contracts with them.

The main directions which should contribute to the further development of beekeeping are: genetic improvement and production of selected queens, maintaining genetic heritage, extending bee resources, production diversification and increase of honey quality, strengthening of beekeepers associations to become effective professional organizations

REFERENCES

[1]Beldescu, A., Dumitrescu, M.J., Smion, M., 2010, Romania's Export Potential. Honey. Romanian Center for Trade and Foreign Investment Promotion

[2]Dobre, T., 2011, Village Life Magazin No. 2, January 2011

[3]Popescu Agatha, 2010, Study upon the Economic Efficiency of Romania's Honey Foreign Trade, Scientific Papers Series D, Zootehnics, Faculty of Animal Science Bucharest, Vol. LIII, p.176-182

[4]Popescu Agatha, Guresoaie, I., 2003, Study on a high performance integrated Beekeeping Technology, JCEA, Vol.4(2):153 -160

[5]Popescu Agatha, 2006, Study upon honey market in the E.U. countries, Bulletin of USAMV Cluj-Napoca, Zootehnics and Biotechnology, No.62, p.215

[6]Pîrvuțoiu, I., Popescu Agatha, 2011, Analysis of Romania's Honey Market, Bucureşti

http://ro.wikipedia.org/wiki/Apicultura_%C3%AEn_Rom%C3%A2nia

[8] www.apidava.ro/despre_noi_cifre.php

[9] www.madr.ro

[10] www.insse.ro

[11]National Program for Rural Development2007-2013, March 2012

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THE SOCIAL ORIENTATION OF THE ACTIVITY OF THE LABOUR WORKING COOPERATIVES FOR DISABLED PEOPLE IN BULGARIA

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Abstract

Bulgaria's membership in the European Union defines the orientation of our country in line with the key strategic priorities of Europe 2020, which aims to achieve smart, sustainable and inclusive growth. The role of the cooperative system becomes especially important at this time when the EU itself is constructed as a union of equal socially oriented states. In the paper is depicted the role of the labour working producer cooperatives for disabled people as one of the main actors of the social economy in the EU which contribute to solving many economic and social problems of a substantial part of the Bulgarian population and to implement the priorities of the strategy "Europe 2020". In line with this aim, are given suggestion for the trends in improving their activity. So that they could provide better labour rehabilitation, strengthen the social integration of their members, promotion of production, improvement of working conditions, proposals for changes in legislation.

Key words: *Europe 2020, social cooperatives*

INTRODUCTION

Bulgaria's membership in the European Union defines the orientation of our country in line with the key strategic priorities of Europe 2020, which aims to achieve smart, sustainable and inclusive growth. Directing the efforts towards the achievement of these "three mutually reinforcing priorities" involves not only developing an economy based on knowledge and innovation, which will be greener and more competitive and will create high levels of employment, but will accelerate the processes of social and territorial cohesion.

The role of the cooperative system becomes especially important at this time when the EU itself is constructed as a union of equal socially oriented states.

The labour working cooperatives for disabled people as one of the main actors of the social economy in the EU contribute to solving many economic and social problems of a substantial part of the Bulgarian population and to implement the priorities of the strategy "Europe 2020". In line with this aim, a priority for the specialized production cooperatives for disabled persons are the support of labour rehabilitation, strengthening social integration of their members, promotion of production, improvement of working conditions, proposals for changes in legislation. These people need to enabled exercise their right to work having equal opportunities for productive and highly paid jobs, allowing them to have a dignified life based on labour.

MATERIALS AND METHODS

Findings and conclusions in the paper are based on the results of university research project [4] and information from documents of National Union of labour working cooperatives. The analysis of the social activities of the labour working cooperatives for disabled people is made on the basis of information from the annual reports of cooperatives and from a conducted survey in which participated chairmen of 33% of the labour working cooperatives for disabled people. Questions contained in the survey are closed type, as well as for personal evaluation. Open questions were used to obtain additional information about the projects and problems.

RESULTS AND DISCUSSIONS

Characteristics of the normative status of social cooperatives in Bulgaria

The legal basis for the functioning of the Bulgarian cooperatives from the national Union of Labour Productive Cooperatives is defined by the Law on Cooperatives, Law for Small and Medium Enterprises, the Law for Integration of People with Disabilities and other regulatory documents. These laws regulate the employment of people with disabilities and their integration into the work environment.

In Labour working cooperatives for disabled people is executed the integration of people with disabilities in all directions included in Law for the Integration of People with Disabilities, namely: medical and social rehabilitation; education and training; employment; accessible environment; social services; socio-economic protection; available information[3].

The labour working cooperatives for disabled people is a voluntary association of people with disabilities and non-disabled people, with variable capital and variable number of members, who via mutual aid and cooperation carry out industrial, commercial, social, cultural, and other activities. The proportion of disabled people in the cooperative is not less than 30 percent of the total number of employees[2]. The proportion of non-disabled cooperative members can not be greater than 70 percent of the total number of employees.

The main objective of the cooperative is to create conditions for the integration of disabled people into specialized work environment through employment and social rehabilitation for carrying out of production, trade, social, cultural and other activities to meet the interests and needs of cooperative members. Thus the cooperative can be defined as an organization with a strong social function associated with the creation of equality of people with disabilities, social integration and support of people with disabilities to exercise their rights and their integration into the work environment [3]. In the specific provisions of the statute of Labour working cooperatives for disabled people is added that the disabled persons and reassigned persons have rights to use rehabilitation and healthcare facilities, have social benefits and other rights under the Law for Integration of People with Disabilities, Labour Code and other special regulations [5].

One of the important features that executes the Managerial Board in these cooperatives is to choose the cooperative Rehabilitation Committee which has the status of a subsidiary body of the Managerial Board. This committee directs people with disabilities to appropriate jobs, gives prescriptions for ergonomic conditions in the workplace, develops individual rehabilitation programs for people with disabilities as prescribed by the Medical Commission, prepares an annual program for its activities which is approved by the Board and reports before him.

Analysis of the social activity of the labour working cooperatives for disabled people

Members of the National Union of Labour working cooperatives are 31 specialized production cooperatives for disabled persons. They employ approximately 1180 cooperative members with varying levels of disabilities in terms of employment consistent with their condition. Cooperative members with different physiological and psychosomatic illnesses and disabilities are 30% of the staff of these cooperatives. In the market economy these cooperatives have an important role to solve social and economic problems of this highly vulnerable to economic change social group of people.

The executed social activities in these cooperatives are aimed in several directions. One of them is provision of a work rehabilitation and vocational guidance and training of members of the cooperative, which secures an income to support their existence and their social fulfillment and social inclusion. For this purpose are developed projects to improve working conditions, for modernization of production facilities, for development of new activities, for the implementation of international standards, for the qualification and re-qualification from the

Operative programs / OP "Competitiveness" OP "Regional Development "/, Agency for Persons with Disabilities / APD /.

The second, but not less important aspect of social activity is associated with a rendered by the National Union of labour working cooperatives help to these social cooperatives consisting of the provision of general support rehabilitation activities based on allocations from the state budget to the National Union as a national presented organization, by performing market research to find new market niches for new customers for the products and services of the social cooperatives, through financial support of social cooperatives for participation in fairs, bazaars, exhibitions and more., by exploring and implementing positive practices from international experience.

Third strand in the development of social activity of labour productive cooperatives for disabled people is allowing members of the cooperative to undergo social rehabilitation in recreation facilities, providing an opportunity for sports and tourism, assisting members in case of illness, provision of canteens, additional medical and dental care.

The fourth strand in the development of social activity of the labour working cooperative for disabled people is related to the activity of the National Union for labour working cooperatives regarding the support and representation of specialized cooperatives to the state and public authorities and organizations at home and abroad. The National Union, according to the decision of the Council of Ministers of the Republic of Bulgaria is a representative organization at national level and it is a member of the National Council for the integration of persons with disabilities where defends the interests of social cooperatives and participates in the development of protective legislation in this regard.

The volume and diversity of the executed social activity in the labour working cooperatives for disabled people is largely predetermined by the type and proportion of formed internal funds. There is a variety in type and proportion of formed internal funds. The majority of the surveyed cooperatives - 70%, form such funds, while others have specified that do not set aside such funds. Most often the cooperatives form a Reserve, an Investment and a Social Fund in different proportions and on different basis - income /profit/, share capital. Half of the surveyed cooperatives allocate 20% Reserve Fund and 10% Investment Fund, 10% of the social cooperatives allocate 5% Reserve Fund and 10% Investment Fund and 10% of the cooperatives allocate only a Reserve Fund in the amount of 73% of the profits /Table 1/. None of the surveyed cooperatives do not set aside funds for dividends, for social and cultural events and for fund Education and training. Along with this fact, and the low share/only 10%/ remarked for investment, and not by all of the cooperatives is a testament to their difficult financial and economic situation and fewer opportunities for implementing active social activity. From the type and volume of the generated internal funds can be concluded that the support and development of social activity of the cooperatives is not their priority.

Table 1. Formed internal funds by types in labour working cooperatives for disabled people

Type of fund	Ratio, %
Reserve Fund – % from total number of cooperatives	70
Size of Reserve Fund - % from income	5-20
Size of Reserve Fund - % from profit	73
Investment Fund - % from total number of cooperatives	60
Size of Investment Fund - % from income	5-10
% from total number of cooperatives without any funds	30

In the studied cooperatives are developed various social activities for provision of social rehabilitation to their members and the developed social activities are consistent with the specificity and focus of their activities. Most cooperatives offer a combination of two or three social activities, which is a clear evidence of the social orientation of their activities/Table 2/. 80% of the analyzed cooperatives secure rehabilitation to their members and assist its members in case of illness, which is understandable in view of health status of their members. 40% of the

cooperatives propose provision of holidays, while 20% provide canteen/food vouchers to its members. More interesting is the fact that 20% of the cooperatives provide three different social activities. Average number of executed social activities per one cooperative is 2-3 activities.

Table 2. Types of social activities in labour working cooperatives for disabled people

Type of activity	Ratio of total number of cooperation, %
Helping the members in case of illness	80
Canteen/food vouchers	20
Securing of holidays	40
Securing of rehabilitation	80

It can be made a general conclusion that despite the difficult financial and economic situation and the lack of a specialized Social Fund the labour working cooperatives for disabled people develop significant volume and variety of social activity which according to the opinion of 50% of the respondents is not enough. Only 20% of the surveyed cooperatives believe that social activities are well developed. The majority of the surveyed cooperatives state /80%/ that social services should be developed within the capabilities of the cooperative. Some of them /30%/ give other reasons - want social work to be developed only at National Union level. This high percentage corresponds to the proposals to expand and enrich the functions of the regional unions in which 60% of the respondents want social activity to be organized by the regional unions./Table 3/ Other proposals are related to the implementation of social activities related to occupational rehabilitation, improvement of marketing activities, training of staff. 60% of surveyed cooperatives wish to strengthen the role of regional unions and the National Union in organizing the training of its members, who often have low educational and professional qualification. 30% of the members of social cooperatives support strengthening the role of regional unions to search for information and funding opportunities at European, national and other programs and to encourage participation in national and international exhibitions and fairs to present their products and looking for new partners. 20% of the cooperatives consider that it is necessary to strengthen the role of these organizations to carry out market research to find but new customers and market segments, as well as to support the development of the projects of the social cooperatives. Not surprisingly, the proposals to enrich the activities of the National Union contain identical proposals - creating a marketing research team to examine markets, to seek for new customers for the goods and services produced by the cooperatives, offering new market niches to widen and diversify the assortment list of their activities. In this regard, fully corresponds the proposal to support the cooperatives when applying for European and national projects, when participate in competitions for government contracts. The only difference in the proposals for enrichment the functions of the National Union stems from its function of supreme representative body - actively to participate in various forums at higher government level where they can lobby for improved legislation concerning the activities of cooperatives for disabled people.

Table 3. Suggestions for enrichment and widening of the functions of the regional unions and of the National Union of labour working cooperatives

Suggestion	Ratio of total number of cooperation,%
Organization of social activities for cooperative members - % from total number of cooperatives	60
Organization of education for cooperative members - % from total number of cooperatives	60
Stimulation of cooperative participation in international and national fairs and exhibitions- % from total number of cooperatives	30
Provision of information for financing for new European, national programs - % from total number of cooperatives	30
Organization of marketing research- % from total number of cooperatives	20
Establishment of team of consultants for projects elabouration - % from total number of cooperatives	20

Proposals to enrich the functions of regional unions and of the National Union are made on the basis of their past activities to improve the

conditions of employment and social rehabilitation of the members of cooperatives, to look for opportunities for new activities and services, as well as for new partners, of their effort to improve the regulatory framework in order to alleviate the tax burden of the cooperatives. 80% of the investigated cooperatives state that they receive full support from the National Union and only 20% of them partially agree with this statement. The proportion of full support to the activities of regional unions in the studied cooperatives reduces to 40%. 30% partially agree with this statement and the remaining 30% of the cooperatives have no opinion on this issue. This is proof that the National Union provides more effective support to the specialized cooperatives and represents them to the state and public authorities and organizations at home and abroad and enjoys the confidence of the executive power as a reliable partner in the field of social policy for people with disabilities and is a signal where and how regional unions should improve their activities.

The activity of the National Union of labour working cooperatives is aimed primarily at changing the legislation covering the activities of specialized cooperatives for people with disabilities, specifically the Law for Integration of Persons with Disabilities. Additional opportunity for diversification of social activities provides the increase from 30 to 50% of remitted funds from the state budget for Social Security, mandatory health insurance and compulsory pension insurance. This change will allow for a greater volume of rehabilitation of disabled persons.

The National Union is a nationally represented organization of and for people with disabilities and as such is entitled to an annual subsidy from the state budget for the rehabilitation of people with disabilities. Each year the National Union based on estimates and financial statements presents to the Ministry of Finance a request for subsidy. For the period 2007 – 2010 was received a subsidy of 637 mln euro, which were used for:

- Occupational Rehabilitation - supplement for the reduced working abilities of the cooperative members with disability in accordance with Regulation 13 of the Labour Code.

-Vocational guidance, training and qualification by organizing similar courses at the Center for Vocational Training with the National Union and training cooperative specialists to projects development .

-General rehabilitation needs - financial support for people with disabilities in social cooperatives when visit exhibitions and fairs, construction of information systems of social cooperatives and its connection to the National Union system with the aim to establish business contacts, marketing research, learning of positive experience of similar structures.

-Social Rehabilitation - improving the health of cooperative members who are disabled people through rehabilitation services, performing of medical checks at medical and dental centers.

Financing of social activities of labour working cooperatives for disabled people

The main part of the social activities of labour productive cooperatives for disabled people is provision of occupational rehabilitation, vocational training and education of cooperatives' members. Opportunities to provide decent and comprehensive occupational rehabilitation during the ongoing economic crisis are limited. 50% of surveyed labour working cooperatives for disabled people have reduced the value of its net sales from 20 to 50 percent compared to 2007, 10% have decreased by 20%, 20% of the cooperatives reduced them from 50 to 100%, 10% of them due to restructuring of production have kept the same level of the value of the net revenues from sales and only 10% of labour working cooperatives for disabled people have increased the net income by 10% (Table 4).

Despite the deterioration of the financial and economic conditions /in 80% of labour productive cooperatives for disabled people/ only 50 percent of them have cut the spending for social needs, which is a testament for the social focus of their activities.

Table 4. Influence of the economic crisis on cooperatives' activities in comparison to 2007

Influence	Ratio of total number of cooperation,%
Value of net sales revenues decrease up to 20%	10
Value of net sales revenues decrease from 20% till 50%	50
Value of net sales revenues decrease from 50% till 100%	20
Due to restructuring of production the net sales revenues are kept at the same level	10
Increase of net sales revenues with 37%	10
Have limited the expenses for social activities	50

Negative is the fact that the increase in the share capital of the cooperatives from the system of the National Union of Labour working cooperatives is noticed only in 10% of cases. In 50% of social cooperatives it does not change, in 20% of the cooperatives for disabled people decreases and 20% of the surveyed cooperatives do not answer this question. Alarming is the fact that in one social cooperative is observed 50% reduction of the share capital due to departure of cooperative members. The high average age of the membership of most cooperatives for disabled people postulated the development of this trend in the future in other cooperatives as well.

Small is the number of cooperatives using long-term loans - 20 percent. /Table 5/ The main source of financing the activities are proceeds from various European and national programs /70% of cooperatives for disabled people/, which is a positive signal for activation of their activity toward seeking diverse sources of funding. 50% of the cooperatives for disabled people finance their activities by selling assets. In some cases, this is related to the disposal of unneeded assets and in others - indicates inability to use more appropriate sources of funding. 40% of the cooperatives cited as a source for financing their activities the depreciation. Given the outdated material and technical base of most of them and the low book value, this source does not allow generation of sufficient amount of financial resources to perform various occupational rehabilitation. 30% of cooperatives for disabled people finance their activities through additional installments. Because their size is usually low, they do not represent a serious source which can ensure the opportunities for realization of their social activities. 20% of the cooperatives present their reserves as a source to finance their activities. 30% of the surveyed cooperatives cited as a source for their work the short-term loans and 20% of them the long-term loans as well, which is an indication for their poor financial and economic situation /the majority of the cooperatives perform poor investment activity/. 10% of the social cooperatives fund their activities from the retained profits. The low rate of the profits in some cooperatives prevents the successful finding of their activities, which does not ensure an appropriate capital structure and an implementation of wide and varied social activities.

Table 5. Sources for current funding of labour productive cooperatives for disabled people activities /are possible more than one answer/

Type of source	Ratio of total number of cooperation,%
Retained profit	10
Long-term loans	20
Short-term loans	30
Assets sale	50
European and national programs	70
Additional installments	30
Depreciation	40

The development and implementation of projects financed by the state budget is implemented mainly by the producer cooperatives for disabled people. During the analyzed period, there is a relatively high activity when applying for national projects - 90% of the surveyed cooperatives applied and accomplished such projects. Only 10% of the cooperatives have no experience in this field. For the period 2007-2011 were won and implemented 26 projects from 9 cooperatives for disabled people, as one cooperative successfully completed 6 projects /Table 6/. The average value of completed projects is 22497 euro, they varied between 15338 and 36813 euro. Despite the variety of their goals it can be identified two main directions with almost equal number of projects. The first trend is focused on improving health and safety at work and in the second projects aimed at technological upgrading of the

equipment, repair of production facilities and warehouses, increase of labour productivity, reduction of production costs and increase of the quality of production. These topics fully meet the needs of the social cooperatives because 80% of them are engaged with the production of knitwear and baby-wear, children's and women's clothing, 10% are engaged within the manufacturing of metal products and 10% produce souvenirs. As a negative can be count the fact that a single donor for the projects is the Agency for People with Disabilities /APD/. Overall for a year the Agency provides funds for implementation of projects to the amount of 3067798 euro for the last four years. For the analyzed period all cooperatives for disabled people have won about 33% of the allocated budget funds. This is a proof for the success of the social cooperatives as in the Agency competitions take part 128 specialized companies and cooperatives across the country.

Table 6. Approved and realized projects of the cooperatives for disabled people during the period 2007-2011

Topic of the project	Number of projects	Number of cooperatives
Improvement of healthy and safety working conditions	11	6
Technological renovation of material basis	5	4
Repair of production facilities	4	4
Decrease of cost price and increase of production quality	3	2
Increase of labour productivity	1	1
Repair of flooring of production facility	1	1
Installation of air conditioning system	1	1

Non-approved by APD projects of the investigated cooperatives are five /Table 7/, two cooperatives have applied two times with the same projects that were rejected by the APD and 1 cooperative failed in approving one project.

It can be appreciated positively the relatively small number of rejected projects from the total number of projects - only 19%. Worth approval and praise the tenacity of these cooperatives that by improving their projects they were successfully approved during their second or third time application.

Table 7. Non-approved and non-realized projects of the social cooperatives during the period 2007-2011

Topic of the project	Number of projects	Number of cooperatives
Improvement of healthy and safety working conditions	1	1
Technological renovation of material basis	2	1
Repair of flooring of production facility	2	1

The development and implementation of projects financed by the Operational Programs is implemented by the National Union of labour working cooperatives, by labour working cooperatives and by the labour productive cooperatives for disabled people. By the end of December 2012 according to data from the information system of the Ministry of Finance were registered and implemented 9 projects under three operational programs - one in OP "Administrative Capacity", 6 in OP "Human Resources Development" and 2 in OP "Competitiveness".

Under the Operational Program "Human Resources Development" on 15.06.2011 was launched a scheme for provision of grants 'Opportunity for all' through an open competitive process for the selection of projects. The aim is to promote the development of social services and to invest in the social capital. The maximum size of the financial grant is up to 127 825 euro and does not require co-financing by the applicant. Under OP after examination and approval of projects till 31.12.2012 were approved 6 projects, 2 of which are suspended. All six social cooperatives work in the textile and clothing industry, which together with the clothing industry are the predominant activities of the cooperatives for disabled people.

All projects envisage better and more effective professional qualification of cooperatives' members via provision of training and education. The aim is to prevent social exclusion of people with disabilities

working in the cooperatives. Will be promoted EU policy for equal opportunities for people with disabilities.

From the analysis of registered and completed projects can be concluded that there is still a small number of social cooperatives who have participated in projects funded by EU programs, this fact suggesting poor knowledge of the requirements and conditions for eligibility under each Operational Program. In most labour working cooperatives for disabled people there is no clear concept for participation in the projects of the operative programs, nor are performed analyzes for the cooperatives' needs from technical and technological development. In the management of most organizations there is a sense of uncertainty about the ability to ensure an adequate cash resources required for the project realization, due to the low rate of advance subsidy and the ongoing financial and economic crisis.

Explanation for the small number of donors may be looked at the reasons hampering labour working cooperatives for disabled people in applying for funding from the EU and national funds. Difficulties can be divided into two groups - requirements related to the financial position of the cooperatives and requirements related to existing institutional capacity and professional experience in project preparation and the complicated application procedure. From the first group of difficulties as the main obstacle to diversify funding 80% of the surveyed cooperatives for disabled people indicate requirements for needed amount of profit, and 60% of the cooperatives consider that the requirement for co-financing hinder their participation in such programs. This is easily explained, since most studied organizations do not generate profit, but rather it is noticed a decrease in their income. They find working capital with great difficulties and thus the requirement for co-financing is impossible for most of them.

From the difficulties in the second group 30% of the surveyed cooperatives for disabled people indicate the complex procedures for validation of projects, 20% declare a shortage of capacity for independent development of project documentation, and 10% identify as the main difficulty reporting of project activities. Most of them do not have trained people with skills to prepare the projects, to submit the documentation, to perform its reporting. So one of the recommendations of their members towards the regional unions and the National Union is to support their work precisely in this direction by creating a team of consultants for preparation and reporting of projects.

However, we should assess positively the intention of the majority of the surveyed cooperatives to work on projects over the next four years by emphasizing the applications in various operational programs or programs funded by other donors. Projects that they intend to prepare concern the improvement of health and safety work conditions, improvement of material basis, repair of production facilities, expansion of production capacity, development of social activities which will contribute to the sustainable development of the producer cooperatives for disabled people.

All opinions for the surveyed social cooperatives about what the problems are for the development of a favorable business environment for their employees with disability revolve around the unsupported legal, economic and institutional environment /insufficient funds, high bank interest rates, lack of institutional support, low wages/ the worsened age and qualification structure of the workforce /staff aging, low skilled workforce, low productivity, low wages, complex models/ and depict the main direction for improving the performance of the cooperatives which will allow them to enable the realization of a broader social activity.

Low labour productivity, impaired qualification and age structure of most social cooperatives do not explain their low activity regarding the proposals for raising the qualifications of directors, experts and executives. Underestimated is the importance of the human factor, as only 30% of the analyzed cooperatives have specific suggestions for improvement of the

workforce. Part of the cooperatives for disabled people wish to improve the applied information technology, the control on the material flow and manufacturing process, they understand the importance of their claims to be appropriately represented in the relevant institutions. Therefore, most of the proposals regarding the leaders and experts are linked with organization of courses in order they to acquire specific skills and competencies, and most often they are related to the work with computer programs, preparation and delivering of presentations, risk management, development of marketing strategies, training in computer accounting programs and changes in tax laws and courses which are associated with certain highly specialized skills led by foreign partners / "courses conducted by German and Austrian specialists" of clothing cooperative for disabled people working mainly for export/.

-Low skills and professional qualification of the staff explain the fact that most of the proposals are related to the organization of training courses to enhance their skills, courses for acquiring of specific skills /sewing, etc./, exchange of experience and others.

-Improving and strengthening the financial position of social cooperatives by provision of various financial sources through improved staff qualification, by diversifying the production range and by improving the facilities through the implementation of projects funded by EU and national programs will allow diversification and enrichment of their social activities.

Based on the analysis can be concluded that for the analyzed period is improved the social activity in the labour productive cooperatives for disabled people:

-The opportunities for decent and comprehensive occupational rehabilitation due to the ongoing economic crisis are limited. Despite the difficult financial and economic situation and non-forming of a specialized Social Fund in these cooperatives is developed a significant volume and variety of social activity.

-The majority of the surveyed cooperation believe that social activities should be developed within the capabilities of the cooperative.

-The studied cooperatives receive full support from the National Union and the support from the regional alliances is smaller, which is a proof that the National Union effectively supports and represents the specialized cooperatives with the state and public authorities and organizations in the country and abroad, and is trusted by governments as a reliable partner in the field of social policy for people with disabilities. This fact is a signal where and how regional unions should improve their activity.

-The activity of the National Union is aimed primarily at changing the legislation covering the activities of specialized cooperatives for people with disabilities and specifically the Law for Integration of Persons with Disabilities.

-The National Union of labour working cooperatives presented as a national organization of and for people with disabilities receive a subsidy from the state budget for the rehabilitation of people with disabilities, which is used legally according to the requirement of the Ministry of Finance and achieves the goals especially in the fields of "Training" and "social rehabilitation.

-The small size of the profit in the cooperatives prevents the successful financing activities, which could ensure an appropriate capital structure and the implementation of a wide and varied social activities.

-The main source for funding the activities are the proceeds from various European and national programs. Still is limited the number of social cooperatives who have participated in projects under programs financed by EU funds. In most of the cooperatives there is still no clear concept for participation in OP projects, are not performed analyzes for the technical and technological development of the organizations.

-The regulatory environment in which operate the cooperatives from the National Union creates preconditions for strengthening the social role of cooperatives for disabled people

and turning them into social enterprises, and this is done by:

-specified in the Law on cooperatives and in the Statute of the cooperatives rights and obligations of the members, which secure the implementation of some of the values of the cooperative organizational form;

-the executed functions of the General Assembly, some of them with a strong social focus;

-opportunities for re-qualification of managers and for enhancement of their knowledge in order to create conditions for the development of the social cooperatives, which is carried out through the Centre for Education and Extension Service with the national Union;

-the existing in the Cooperative Statute opportunities to form various funds which support activities, setting the high social responsibility of the cooperatives for disabled people;

-the possibility in the Cooperative Statute for the election and functioning of the Committee on Social Affairs;

-the opportunities of the Cooperative Statute to appoint on contract employees who are not cooperative members;

-the set in the Law on Cooperatives opportunities for social cooperatives to associate and to form cooperative enterprises;

-opportunities provided by the Law on Cooperatives and the Law for Integration of People with Disabilities to meet their interests, creating equality of people with disabilities, opportunities for social and work integration and to exercise their rights;

-activities performed by the Commission on Rehabilitation.

CONCLUSIONS

The regulatory environment in which labour working cooperatives for disabled people from the National Union operate create conditions and prerequisites for the implementation not only of manufacturing, commercial and cultural activities of the cooperatives, but also of a social, through which they satisfy the interests of its members and create opportunities for integration of people with disabilities. Despite the differences in legislation for social enterprises in different European countries it is necessary for Bulgaria to implement some of their practices related to social enterprises to improve the regulatory environment, and to achieve greater efficiency in their operation.

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REFERENCES

[1] Annual reports of labour working cooperatives for disabled people.
[2] Law on Cooperatives.
[3] Law for Integration of People with Disabilities.
[4] Project no 1-17/2011. "Development of the system of labour productive cooperatives in Bulgaria under the social market economy" University of National and World Economy, Sofia.
[5] Statute of Labour working cooperative for disabled people
[6] http://ahu.mlsp.government.bg.

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PROMOTION OF ECOLOGIC PRODUCT CERTIFICATION AS INSTRUMENT TO SPEED UP THE ECOLOGIC AGRICULTURE

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Abstract

This paper present a vision about the possibility to speed up the conversion process to an ecological agriculture in Romania. The link from ecological products consumer and ecologic agricultural producer is also explained from point of view of certification process. Presenting the consumer mentality and principles and rules of organic farming and certification can open the way to a sustainable and ecological agriculture.

Key words**:** *certification, ecologic product, sustainable agriculture*

INTRODUCTION

The ecologic products certification is an important step to an agriculture based on environment protection, the respect of human health and nature. This segment of consumers witch are in continuous growing from numeric point of view aware the importance of healthy products from the industry of organic farming.

MATERIALS AND METHODS

In this paper, the intention is to make a link between the bioproducts consumers and ecologic farming through ecologic products certification process.

Consumers

Factors that led to the initiation and implementation of the concept of organic farming, and also organic product are:

1. The appearance of new types of consumers;
2. Evolution of knowledge in human nutrition and food safety;
3. Environmental issues.

Consumers of organic products market affiliates are divided into:

•Consumers militants (they are regular consumers of "bio", convinced that agriculture);

•Consumers "bio farmer products" (consumers seek authenticity of a product and a return to the past);

•Dietary Consumers (consumers seeking a cure for disease or healthy food for the body);

•Consumers "newcomers" (their motivation lies in environmental concerns, the taste of the product, its shape etc.).

Recent statistics illustrate the fact that their number is in continuous increasing. The influence of media that promote the latest knowledge in the field of human nutrition through debates and documentaries, the features not just healthy of the consumer market and last but not least cultural level are some factors of consumer conversion to this type of consumers.

As a result, the role of the organic farming is to produce food cleaner, suitable human metabolism in full correlation with environmental conservation and development, in other words, one of the main goals of organic farming is the production of agricultural products and fresh food genuine processes designed to respect nature and its systems.

Promoting their benefits of such a system is the existence of networks of production, processing and marketing and also organized a market potential production covered. If we take into account the percentage of regular

and occasional organic consumers located between 3 and 53%, we estimate that there is a high proportion of occasional users who may become permanent in the near future, given the existence of trade policies to attract thereof.

Principles and rules of organic farming and certification

Objectives, principles and rules of organic production are included in EU and national legislation in this area. These rules, together define the method of production in the plant production, livestock and aquaculture regulates the following aspects of organic farming system : processing, labeling, trade, import, inspection and certification.

Processing, labeling and trade may be called traceability system (records and traces the production, since taking over from the suppliers of products, parts and materials, through processing them and distributing them as finished products - ISO 9000:2005).

The farm production stage prohibiting genetically modified organisms (GMOs and their derivatives) of synthetic fertilizers and pesticides, growth stimulators and regulators, hormones, antibiotics. In the food processing stage restricting the use of additives, complementary substances and synthetic chemicals used in the preparation of organic food. Organic farming has a major contribution to sustainable development, increasing economic activities with significant added value and increase interest in rural areas.

Labeling provisions from organic farming laid down in Regulation (EC) no. 834/2007 on organic production and labeling of organic products and Regulation (EC) no. 889/2008 laying down detailed rules for implementing Regulation (EC) no. 834/2007 are very precise and are considering offering full consumer confidence in organic products, the products produced and certified according to the strict rules of production, processing, inspection and certification.

To obtain and marketing of organic products bearing labels and logos specific manufacturers must undergo a strict process to be followed strictly.

Thus, before getting agricultural products that can be marketed as “ecological” holding must undergo a conversion period of at least two years.

Throughout the chain of production of an organic product, operators must comply with the rules established permanent EU and national legislation. They must submit the work of inspection visits carried out by inspection bodies and certification in order to control compliance with the legislation on organic production.

In Romania, control and certification of organic products is currently provided by private inspection bodies and certification. They are approved by the Ministry of Agriculture and Rural Development, on the basis of independence, impartiality and competence in the order no. 181/2012 approving the Rules on the organization of inspection and certification, approval of inspection bodies and certification and inspection bodies supervising. Approval by MADR inspection and certification bodies is preceded necessarily accreditation, in accordance with European standard EN ISO 45011:1998, issued by a competent body for this purpose.

Following checks carried out inspection and certification bodies, operators have complied with production rules will receive a certificate of organic product will be able to label products with the words, organic '. The label affixed to an organic product are required following: referring to organic production, logos, names and code inspection and certification body that issued the certificate of inspection and ecological product.

National logo ae specific for organic products with the Community logo is used to supplement labeling by consumers to identify products produced in accordance with organic production methods.

Applying EU logo on repacked foods is mandatory as of July 1, 2010. Its use remains optional for imported products. Using EU Community logo should be accompanied by an indication of the production of agricultural commodities. This indication may be of the form 'EU', 'non-EU' or / and Member State

EU or outside the EU, where they were obtained product or its raw materials. Community logo recognition to certified organic products throughout the European Union. Information on how to apply the Community logo labeling of organic products are found in the manual of the Community logo.

Logo ae is MADR property and guarantees that the product so labeled, are Organic and certified by an approved inspection body and certification. Rules of Use of the logo ae are contained in Annex 1 to the Joint Order amending and supplementing the Annex to the Minister of Agriculture, Forests and Rural Development no. 317/2006 and President of the National Authority for Consumer Protection Rules nr.190/2006 approving specific labeling of organic products [4, 5].

RESULTS AND DISCUSSIONS

As discussed above there is an intrinsic connection between the needs of consumers and the development of organic agriculture. Coverage of healthy eating principles and in a certain measure of itself influence of organic products to individuals around brings a cultural contribution in this direction and thus increasing the number of people who turn in potential consumers in actual consumption of organic products [1, 2].

Increase the number of consumers brings a proportional market demand for organic products.

The organic market has two sources: external (imports) represented internal and domestic producers.

Certainly Romania's agricultural potential is significant compared to many countries in the European Community. Allocation of funds in this direction is timely considering that as consumers of organic products increased the agricultural industry becomes increasingly important.

There are two ways to accomplish this :

1. Convert farms focused on industrialized agriculture ;
2. Developing existing organic farms ;
3. Increase the number of farms that practice organic farming.

As a specific program to promote organic farming methods are a number of steps:

- Identifying potential areas of organic production;
- Identify opportunities for farmers who convert land and livestock facilities;
- Conducting courses and training in organic farming to prepare specialists in the field;
- Development of promotional materials both directions actual consumer and producer to familiarize themselves with the concepts and specific methods progressively;
- Regional centers consultancy organic farming. They can be and inspection and certification body for organic products;
- Financial support from the Romanian state and European funds.

Forerunner of all this above all producers should make a gradual conversion to organic farming to prevent skidding irreversible data intensive industrialized farming principles.

Creating a specific closed circuit mixed farms (animal and vegetable) will lead to some advantages that open the way to ecological:

-Fermented organic fertilizer produced locally in breeding areas;
-Biological control systems by conducting onsite biostations production and use archaic recipes pest control;
- Minimized waste management;
-Sustainability of land by removing chemicalization;
- Customers who are supplied directly from the source [3].

All this should lead to the ultimate goal of every producer, namely certification of organic products. This certifies the quality and nature of the products that will satisfy consumer confidence.

Virtually the entire process that starts from the awareness manufacturer to completion leads to certification of organic products applying the concept of sustainable investment.

CONCLUSIONS

The stimulation of ecologic products certification can be made through

concentrated actions on farmers. They must be made aware by:

1.Presenting the increasing trend of consumers number followers of this type of diet;

2.The demand for organic products is growing;

3.Sustainability on the use of organic fertilizers and biological control methods rather chemicalization sometimes resulting in irreversible destruction of the land.

REFERENCES

[1]Angheluta, V., 2004, Managementul dezvoltarii. O abordare ecosistemica, Editura Ars Docendi, Bucuresti.
[2]Puia, I., Soran, V., Carlier, L., Rotar, I., Vlahova, M., 2001, Agroecologie si ecodezvoltare, Editura AcademicPress, Cluj-Napoca.
[3]Wistinghausen Sattler, 2000, Ferma biodinamica, Editura Enciclopedica, Bucuresti.
[4]www.ec.europa.eu/agriculture/organic/home_ro
[5] http://www.meadr.ro

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FACTORS AFFECTING GROUND WATER POLLUTION IN THE MEADOW OF BORCEA ARM

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Abstract

This paper aims to study the factors leading to water pollution by nitrates in the Meadow of Borcea arm, mainly derived from agricultural sources. mIn oder to model the amount of nitrate nitrogen in the soil, which can be partially used by plants or leached into the ground water, research was made on alluvial soil in the Meadow of Borcea arm. I tried to study in the laboratory the influence of three factors of nitrate nitrogen pollution of ground water: soil type, environmental conditions (temperature and humidity) and the amount of mineral fertilizers incorporated. The resulting amount of nitrate nitrogen resulted with nitrogen fertilizer dose, and the temperature and it was affected by humidity especially 40-80% of field capacity.

Key words*: aluviosol, ammonium nitrate, nitrate, pollution*

INTRODUCTION

Nitrogen is the second element, after the carbon, of importance in the development of the vital processes. It is the vital plant mineral element, accounting for crop productivity. The yield depends on both carbon and on nitrogen mineralization processes that occur in organic compounds in the soil. It is about the soil organic subtance mineralization, plant and animal remains.

The mineral fertilizers have risen over time problems, especially the processes of mineralization and nitrification of soil nitrogen.

The fertilization with organic and mineral fertilizers are an important way of increasing the content and quality of soil organic substance [10].

In conditions where the soil organic substance may provide the plant through mineralization processes large amounts of nitrogen, it increasingly requires further research on finding ways to optimize nitrogen regime to ensure a greater efficiency of the mineral fertilization.

Conversion of nitrogen compounds in the soil is effected by means of soil population [9].

The nitric form of nitrogen used by plants through passive consumption, is soluble in water, with its leaching risk, with the possibility of contamination of ground water, where it can remain for a long time - years.

The problem of correspondence between the intensity of organic nitrogen mineralization and the period in which it is necessary to the plant nutrition is of great importance in agriculture. It is known that the activity of micro-organisms capable of decomposing the organic substance of the soil is typically the maximum period in which the crop plants do not show its maximum absorption. As a result, in the soil large quantities of nitrate nitrogen eliminated where in the conditions of rainfall they can be easily moved by water into the soil [6].

Due to the low stability of soluble nitrogen compounds in the soil, a significant part of the nitrogen applied in excess of plant needs can not be assimilated by them and subject to transformation in the soil to ground water or the atmosphere, they pollute. The risk for pollution is linked mainly to the oxidation of the nitrogen compounds.

Nitrates and nitrites, with the negative charge can not be adsorbed by the soil colloidal complex and remain in the soil solution from

which, some are absorbed and metabolized in higher plants or in micro-organisms biomass, and another part is leached in soil [6].

MATERIALS AND METHODS

The sources of pollution of ground water with minerals containing nitrogen (ammonium, nitrite, nitrate) are nitrogen mineral fertilizers, humic substances, especially animal waste, municipal and communal waste.

Nitrogen pollution of ground water with nitrates resulted from the soil depends on the environmental conditions (temperature and humidity), soil type and quantity of mineral fertilizers incorporated [7].

The nitrate content reflects the best conditions of ensuring nitrogen to the plants for the moment on cultivated soils.

The nitrates are the only natural source of nitrogen available for soils with relatively neutral p_H in Calarasi [5]. The optimal conditions for nitrifying flora, ammonia and organic mineral fertilizers into the soil is rapidly converted to nitrate.

The soil studied was an aluviosol, proxicalcaric and was taken from Roseţi locality, so from the Meadow of Borcea arm. The ground water is at a depth of 2-3 m surface. The appearance of land surface is of flat meadow and the vegetation in this area is of the Danube steppe.

As regards the chemical characteristics of the soil: the first 20 cm pH is of 7.6; carbonate are in a ratio of 1%, 3.1% humus. In the wet state is small-grained structure, moderately developed. The soil texture is clay loam in the top 35 cm depth.

In order to model the amount of nitrate nitrogen from the studied soil, which can be used by plant or partially leached, researches were made on soil samples taken from the horizon Amp (0-20 cm), the three repetitions of the field and have been mixed in an average sample of the experimental variant.

The dose of nitrogen fertilizer used was NH_4NO_3 (N active) and had graduations:N_0, N_{80}, N_{150}, N_{250}.

The samples were prepared from three extreme temperatures regimes (50 ° C - as is the case early spring 20^0C - spring 30^0C - summer) and humidity (40%, 80%, 100% of field capacity), the greater forming a nitrification process.

From soil samples subject to conditions above and incubated for 15 days, the amount of nitric spectrophotometer method was determined [8].

The nitrate extraction was done with a solution of K_2SO_4. Nitrate dosing was phenol-disulphuric acid, by which nitrates are bound to nitro-acid phenol-disulphuric, coloured in yellow in alkaline medium. The colour intensity obtained depended on the concentration of nitrates. The maximum extinction was at 410 nm.

The content expressed in ppm nitrate N in soil was calculated using the formula:

$$N\ (ppm) = \frac{C \times V_e}{m \times a_e}$$

where:

C = N content of the sample, in micrograms;

V_e = volume in ml of extract soil;

m = mass of soil taken into consideration, in g;

a_e = volume of aliquot part of the extract in ml.

RESULTS AND DISCUSSIONS

The results obtained from the analysis are presented in the tables and figure below.

Table 1. Influence of incubation temperature (5°C) the soil samples according to moisture and chemical fertilizers with nitrogen on nitrification potential

Temp. (^{o}C)	C.C.A (%)	Dose nitrogen (Nkg/ha)	NO_3^- (ppm)	
			Initial	Final
5^{o}C	40%	0	1,50	2,36
		80	1,74	4,80
		150	2,06	6,25
		250	2,55	4,79
	80%	0	1,50	4,01
		80	1,74	7,45
		150	2,06	7,18
		250	2,55	9,10
	100%	0	1,50	5,19
		80	1,74	7,81
		150	2,06	7,05
		250	2,55	10,65

We can see from the data obtained that the amount of nitrogen fertilizer influenced the nitrification potential.

Table 2. Influence of incubation temperature (20°C) the soil samples according to moisture and chemical fertilizers with nitrogen on nitrification potential.

Temp. (°C)	C.C.A (%)	Dose nitrogen (Nkg/ha)	NO_3^- (ppm)	
			Initial	Final
20°C	40%	0	1,50	4,44
		80	1,74	5,55
		150	2,06	8,26
		250	2,55	9,33
	80%	0	1,50	4,48
		80	1,74	6,04
		150	2,06	7,36
		250	2,55	6,24
	100%	0	1,50	6,04
		80	1,74	6,78
		150	2,06	8,66
		250	2,55	9,41

Table 3. Influence of incubation temperature (30°C) the soil samples according to moisture and chemical fertilizers with nitrogen on nitrification potential.

Temp (°C)	C.C.A (%)	Dose nitrogen (Nkg/ha)	NO_3^- (ppm)	
			Initial	Final
30°C	40%	0	1,50	4,80
		80	1,74	6,84
		150	2,06	9,02
		250	2,55	12,84
	80%	0	1,50	6,23
		80	1,74	7,42
		150	2,06	10,79
		250	2,55	9,45
	100%	0	1,50	5,21
		80	1,74	8,28
		150	2,06	7,22
		250	2,55	4,06

The amount of nitrate increased with dose of nitrogen fertilizer. The correlation is particularly close to 100% of field water capacity. These findings confirm numerous previous data [3] and they have provided the basis of the observation that in fact the ability of mineralization-nitrification is the most faithful index to assess the crop nitrogen need [1].

From the data obtained, it was found that moisture differentially influenced the nitrification process. Humidity between 40 and 80% of field capacity has most influenced the amount of nitrates, probably because optimal conditions for aeration and humidity, condition so necessary to this process.

From Fig.1. it can be seen that the capacity for mineralization-nitrification at 20^0C, is somewhat higher, although the correlation coefficient is low.

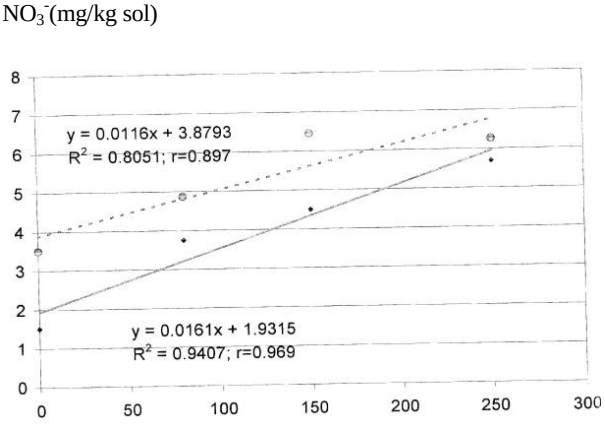

Fig.1. Mineralization-nitrification capacity in Calarasi alluvial soil, incubated at 40% humidity and 5^0C ( ) and 20^0C (-------)

The positive influence of incubation temperature on the nitrification process of the nitrogen was present in all doses that were administered.

The influence of temperature increased the amount of nitrate found in the soil sample with increasing incubation temperature. Increasing the temperature has proved to be favourable to the process of nitrification, especially in the fertilizer and soil fertilized with 150 kg N / ha of active substance.

CONCLUSIONS

The possible influence of soil nitrate ion administered as agricultural fertilizer on soil nitrification capacity.

The nitrates resulting from the oxidation of ammonia in the soil and added to the same mineral fertilizer, is on the one hand, the nutrition elements for other organisms, as well as a process for nitrification of waste. Under anaerobic conditions produced in the version of reaching the ceiling of 100% of field capacity for soil water, soil nitrates or existing products can be a source of oxygen for respiration anaerobic of the micro flora, known as nitrate reduction and de-nitrification.

As we saw, there were no anaerobic conditions or lasted very little, because there is an increase

of nitrate content with increasing field water capacity, which probably facilitated the development of various species of soil micro flora and it released into the environment easily assimilated organic substances.

From the experimental data, we observe that at the humidity of 100%, the nitrification was stimulated even when the blank, which has not received the ammonium nitrate. Such observation may underlie the finding that in irrigated fields, organic matter mineralization processes are always high, especially at high doses of mineral fertilizer.

From our data we can see that the system has a great influence on fertilizer nitrogen in soil nitrification.

The crop is the main factor depleting soil mineral nitrogen solution [4].

Considering the soil organic substance as a carrier of potential fertility features (the chemical elements required storage plants, improving water retention properties of soil by soil structure, etc.) that mineral nitrogen product is a measure of the potential loss of fertility.

Increasing doses of nitrogen exerts a stimulatory effect on nitrification.

As we observed in our study the bacteria develop and nitrify best when the humidity is between 60-80% of field capacity.

Depending on the local environmental conditions, the nitrification processes are subject to seasonal dynamics. The shredded waste is accumulated into the ground at the end of the growing season are only partially decomposed due to the low temperature of the soil in the season. The disintegration processes are reduced in the winter months. Only at the beginning of the growing season it may be expected an increase in nitrification. The process culminates in early summer, being interrupted only during periods of drought. Land works have a key influence on this dynamics.

The nitrification is most intense in autumn (when there are favourable conditions of temperature and humidity) and there is also an increased risk of water pollution by nitrates. In countering this phenomenon, the crop rotation is essential. It is good to be interspersed with the main crop in a crop rotation with rapid growth, able to capitalize residual nitrogen in the spring and it can be used in spring as green manure for spring-summer crops.

In order to reduce the nitrogen losses and the risk of water pollution of Borcea arm, it is better to choose the proper rotations, ensuring the maintenance of soil covered with vegetation for a longer period of time, especially in wet seasons, to properly manage waste as vegetable (especially with C / N ratio high) and limited to the minimum necessary work to mobilize soil [2].

Other means of reducing the residual nitrogen can be: rotation that also includes a winter crop, intercrop introduction of native species, resistant to cold and frost, able to occupy quickly the land and form a vegetation cover, thick enough, and uniform to protect the soil from the rain effects in autumn - winter.

REFERENCES

[1]Borlan, Z., Hera, C., Dornescu, D., Kurtinecz, P., Rusu, M., Buzdugan, I., Tănase G, 1994, Soil fertility and fertilization. Compendium of Agro-chemistry, Ed Ceres, Bucharest., 33

[2] Code of Good Agricultural Practice, Vol. 1, 2003, Bucharest, 16, 97

[3]Eliade, G., Ghinea, L., Ştefanic, G., 1983, Biological basis of soil fertility. Ed. Ceres, Bucharest, 126

[4]Ghinea, L., 2002, Soil biology and microbiology – course, Ed Agroprint, Timisoara, 62

[5]Neagu Cecilia Violeta, Muşat Rodica Elena, 2005, „Pollution with nitrate terminal basin of the Danube "- National Symposium with international participation: Perspectives of restructuring and relaunch agriculture in competition for EU integration, Ed Domino, Bucharest, 284-289;

[6]Neagu Cecilia Violeta**,** 2006, PhD Thesis, USAMVB Timişoara, 110

[7]Neagu Cecilia Violeta, 2007, „The effect of nitrogen fertilization on the organic matter in the alluvial mollisol from Călăraşi", National Symposium with international participation: Perspectives of restructuring and relaunch agriculture in competition for EU integration, Ed Domino, Bucharest, 293-296;

[8]Ştefanic, G., 1999, Methods of soil analysis (biological, enzymatic and chemical). Problem. The Agrofam. Theory. and Applied vol.XXI, 59

[9]Ştefanic, G., Irimescu M.E., 2000 – Study on the processes and nitrification capacity of the soil. Annals ICCPT Fundulea, LXVII, 225

[10]Şumălan Renata, 2003, PhD Thesis, USAMVB Timişoara, 20.

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THE STUDY FOR SUBSTANTIATE OPTIMAL LOCATION FOR A PROCESSING RAPESEED FACTORY IN CALARASI COUNTY

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Abstract

To ensure a high economic efficiency of productive work is necessary to determine the optimal location of the objective investment. Optimal location creates a prerequisite for approaching the maximum level of investment efficiency both in the national economy and the economic agent. The problem of optimal location of the investment objective must be addressed in a broad vision to solve it using: economic criteria, functional criteria - technological, social, plus natural factors. From the research it was found that the future investment objective on the processing rapeseed in bio fuel and edible oil in Calarasi County is conveniently located in the city being Lehliu Station due to the fact that it has the coordinates close to those resulting from the calculation.

Key words**:** *factory, localities, optimal location, quantity supplied, rapeseed*

INTRODUCTION

To ensure a high economic efficiency of productive work is necessary to determine the optimal location of the objective investment. Optimal location creates a prerequisite for approaching the maximum level of investment efficiency both in the national economy and the economic agent. [3,4] In substantiation of optimum location it is necessary to consider both possibilities raw material supply and sales of production obtained.[6] The problem of optimal location of the investment objective must be addressed in a broad vision to solve it using: economic criteria, functional criteria - technological, social, plus natural factors.[5]Among economic criteria on which you can base the optimal location of a target investments include: proximity to the stocks of raw materials in present and in perspective, attracting local resources into the economic, efficient use of labor, thus bringing to fruition surplus labor in the area, reducing transportation costs and production costs, production close to consumption centers.[1,2]
Social criteria that may underlie an objective substantiation optimal investment location refers to economic growth at the county level, mobilizing resources and local resources, combating environmental pollution, attract economic circuit productive workforce unemployed or fellowship employment, improved living standards of the population in the area.
In this context investment objective is conveniently located in an area where they cover the necessary raw materials and labor, and thus reduce production costs due to reduce transportation costs of raw materials[7][8].

MATERIALS AND METHODS

The study was undertaken to determine the optimal location of a processing plant in Calarasi County rapeseed. To substantiate optimal location Steiner-Weber method was used. Under this method it is assumed that the volume of transport costs is proportional to the quantities to be transported and the distances travelled from suppliers to beneficiaries. It is considered that there is no difference between the rate of transport of the feedstock (rapeseed) or finished product

(biodiesel, edible oil,etc.). And the same locality can participate both as a supplier of raw materials and finished products as beneficiary. Optimal placement of rapeseed processing plant can be established based on the minimum amount of travel expenses and raw material.

It is considered n points Pi (i = 1, 2 .... n) from which will carry the quantities C_i of raw material r_i. Minimum function will be

$$Z(\min) = \left(C_{1r_1} + C_{2r_2} + ...C_{nr_n}\right) = \sum_{i=1}^{n} C_i r_i$$

In cartesian coordinates, this relation becomes:

$$\min (x,y) = \sum_{i=1}^{n} C_i \sqrt{(x - x_i)^2 + (y - y_i)^2}$$

in which:

(x, y) = coordinates of the location of the investment objective and must be determined;

(x_i, y_i) = studied localities coordinates needed to establish location of the new investment objective;

C_i = required amount stocked in and out of localities i

n = number of localities.

Based on the above relationship determining the number of tonne-kilometers that must be transported, where it has a transport fare t/km bulk. Since the number of t/km is minimal and transport costs will be minimal. Solution (x,y) is determined based on a recurrence relationship. For this we start from the solution (x0, y0) given by the relations:

$$X^0 = \frac{\sum_{i=1}^{n} C_i x_i}{\sum_{i=1}^{n} C_i}; Y^0 = \frac{\sum_{i=1}^{n} C_i y_i}{\sum C_i}$$

Starting from the original solution is calculated by means of an improved version of the following formula:

$$X^{k+1} = \frac{\sum_{i=1}^{n} \frac{C_i x_i}{\sqrt{(x^k - x_i)^2 + (y^k - y_i)^2}}}{\sum_{i=1}^{n} \frac{C_i}{\sqrt{(x^k - x_i)^2 + (y^k - j_i)^2}}};$$

$$Y^{k+1} = \frac{\sum_{i=1}^{n} \frac{C_i y_i}{\sqrt{(x^k - x_i)^2 + (y^k - y_i)^2}}}{\sum_{i=1}^{n} \frac{C_i}{\sqrt{(x^k - x_i)^2 + (y^k - j_i)^2}}}.$$

For each iteration k is calculate the value function Z (x, y) and the calculation ends when the new function value exceeds the previous or the differences between the two values are sufficiently small and hence completion of a new phase is insignificant.

RESULTS AND DISCUSSIONS

In towards producing a investment objective rapeseed processing in Calarasi County was designed and analyzed several possibilities location taking into account both technical factors, natural factors, social factors and a number of other factors. For establishing the location to consider the Calarasi County fact that part of South Muntenia Region, holding for a share of 14.8% area[10]. Calarasi County has an agricultural area of 424 833 ha and 410 871 ha arable area, the main crops are cereals grains, oil plants for proper grain legumes, fodder plants[9].

Among oil plants grown at the county level include rape. The area planted rape, rape total production and production per hectare achieved in 2011-2013, in Calarasi County are presented in Table 1. Surface cultivated with rapeseed at the Calarasi county in 2011 was 36304 ha, in 2012 fell to 8620ha area due to poor weather conditions, the culture is largely calamity. In 2013 the surface increased to 44884ha, increase of 23.6% as compared to the cultivated area in 2011.

The total production of rapeseed obtained in Calarasi County 2011 was 72935 tons, in 2012 fell to 16982 tonnes, as a result of the calamity suffered by culture, and in 2013 it increased to 129970 tons, increasing by 78.2% as compared production obtained in 2011.

In 2012 the total production of rapeseed was only 23.3% of the production in 2011.

Average yield per hectare decreased from 2009 kg in 2011 to 1970 kg in 2012, the

decrease was 1.9%. In 2013 the average yield per hectare of rapeseed was 2896kg. Average yield per hectare obtained in 2013 was 44.2% higher than in 2011 and 47% of that produced in 2012.

Table 1. Surface, total production, average yield per hectare of Calarasi County in 2011-2013 and their dynamics

Specification	Years			Dynamics (%)		
	2011	2012	2013	2012/ 2011	2013/ 2011	2013/ 2012
Cultivated area (ha)	36304	8620	44884	23,7	123,6	520,6
Total production (tonnes)	72935	16982	129970	23,3	178,2	765,3
Average yield (kg/ha)	2009	1970	2896	98,1	144,2	147,0

Source: General Division of Agriculture, Calarasi County

Of the 50 localities in the county of Calarasi were taken into account within 7, with largest cultivated the surface, total production and have achieved the highest average.
The data relating to the previously named indicators 2011 are shown in Table 2.

Table 2. The first seven localities from Calarasi county, which have the largest area cultivated with rape in 2011

Localities	Cultivated area (ha)	Total production (tonnes)	Average yield (kg / ha)
Belciugatele	549	1,348	2,455
Borcea	3,949	7,321	1,854
Călăraşi	1,003	2,732	2,723
Ciocăneşti	597	1,532	2,566
Dorobanţu	862	1,828	2,121
Dragalina	1,095	2,076	1,896
Dragoş vodă	1,351	4,112	3,044

Source: General Division of Agriculture, Calarasi County

The area planted by the seven localities in 2011 was from 5,500 hectares (localities Belciugatele) to 3,949 hectares (localities Borcea). The total production of rapeseed obtained from first seven localities ranged from 1348 tons (localities Belciugatele) to 7321tone (localities Borcea) and production per hectare recorded ranged from 1,854 kg / ha (localities Borcea) to 3,044 kg / ha (localities Dragos Voda).
In 2012 the first seven localities that rapeseed cultivated, realize indicators are presented in Table 3.

In 2012, the cultivated area of the seven localities shown in the table ranged from 253 hectares (localities Chirnogi) to 1288 hectares (localities Roseţi).
The total production of rapeseed ranged from 526 tons (common Borcea) to 2573 tons (common Roseţi). Average yield per hectare also varied from 1725 kg/ha (common Borcea) to 1998kg / ha (common Roseţi). In 2012 the area was much lower due to climatic conditions that led to the calamity of considerable areas cultivated with rape.

Table 3. The first seven localities from Calarasi county which have the largest area cultivated with rape in 2012

Localities	Cultivated area (ha)	Total production (tonnes)	Yield (kg/ha)
Borcea	305	526	1,725
Budeşti	534	976	1,828
Chirnogi	253	950	3,755
Dorobanţu	663	1,317	1,986
Roseţi	1,288	2,573	1,998
Şoldanu	340	592	1,742
Unirea	778	976	1,254

Source: General Division of Agriculture, Calarasi County

For 2013 the three indicators at the first seven localities are presented in table. 4
The area planted in 2013 by the first seven common at county level was much higher than in the other two years previously analyzed.
This ranged from 1,133 hectares (Dorobanţu Commune) up to 3636 hectares (Budeşti Commune).
The total output produced of rapeseed by the seven localities was from 2,968 tons (Grădiştea Commune) to 10,129 tonnes (Budeşti Commune).
In terms of production per hectare, it was from 2,601 kg/ha (Grădiştea cOMMUNE) to 3,403kg/ha (Dragos Voda Commune).
Given the results of the rapeseed cultivation in the county of Calarasi, took into account the possibility of building a factory for processing into biofuel oilseed rape and edible oil.
For this it is necessary to study more possibilities to meet the economic criteria, social criteria and natural conditions to ensure proper functioning of the technological

process and to determine the maximum economic effect.

Table 4.The first seven localities from Calarasi county that have the largest area cultivated with rape in 2013

Localities	Cultivated area (ha)	Total production (tonnes	Average yield (kg/ha)
Borcea	2960	7973	2694
Budeşti	3636	10129	2786
Dragalina	1956	6121	3129
Dragoş Vodă	1634	5561	3403
Dorobanţu	1133	3694	3260
Grădiştea	1141	2968	2601
Perişoru	1853	5130	2768

Source: General Division of Agriculture, Calarasi County

It has been established that six localities can be beneficiary of this location, the quantities needed of each and their geographical coordinates. The localities chosen coordinates and possible quantities supplied for each locality are presented in Table 5.

Table 5. Localities, geographic coordinates of localities and possible quantities supplied

Nr. crt.	Localities	Geographic coordinates of localities	Possible quantities supplied (tonnes)
1.	Călăraşi	(60 ; 0)	100000
2.	Fundulea	(90 ; 100)	130500
3.	Lehliu Gară	(145 ; 160)	142000
4.	Budeşti	(0 ; 195)	85000
5.	Oltenița	(65 ; 170)	120000
6.	Dragalina	(75 ; 145)	150000

The localities are shown graphically in a coordinate system in figure 1.

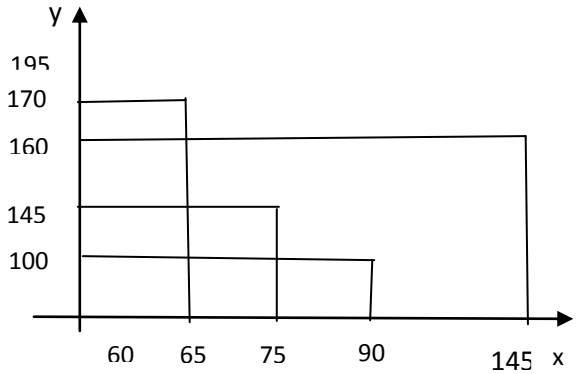

Fig.1. Locating beneficiaries

To determine the optimal location of the processing plant rape in Calarasi County is necessary to find the minimum function:

$$\min (x,y) = \sum_{i=1}^{n} C_i \sqrt{(x - x_i)^2 + (y - y_i)^2}$$

Through this function will determine the number of tonne-kilometers to be transported on a transport tariff ie a price per t / km bulk.

Solution coordinates (x, y) was based on a system of recurrence relations.

The coordinates determined in a first calculation of the following: x = 82 km and y = 130 km, and the value of the function C (x, y) was 42 426 000 tone.

Based on the initial solution to calculate an enhanced version, to give the following results: the coordinates x 'and y' being determined by calculation to x = 130km and y = 85 km, the value of the function C (x ', y') of the 43460500tone was.

The calculation shows that the value function C (x, y) has improved, resulting in a higher value than previously established. The difference C (x, y) - C (x ', y') = 370t/km found to be sufficiently small, the pressure on us to the conclusion that the calculation steps can stop here.

It follows that investment objective may be located at the point having coordinates x = 130km and y = 85km.

If you compare these coordinates with the location of the localities shown in Table. 5 is found that they are very close to the city Lehliu Station coordinates, which means that the optimal investment objective is to be located in this city.

CONCLUSIONS

Following the research it was found that future investment objective on rapeseed processing in bio fuel and edible oil is best to be placed in the city Lehliu Station.

REFERENCES

[1]Nicolescu, O., Verboncu, I., 1994,Management şi eficienţă, Editura Nora Bucureşti
[2]Românu Ion, Vasilescu I., 1997, Managementul investiţiilor, Editura Mărgăritar, Bucureşti,.

[3]Românu Ion, Vasilescu I., 1993, Eficienţa economică a investiţiilor şi a capitalului fix, Editura Didactică şi Pedagogică, R.A. Bucureşti,.
[4]Stoica Maricica, 1998, Proiectarea obiectivelor de investiţii, Editura Economică, Bucureşti.
[5]Staicu Florea, Stoian, M, Vasilescu, I., 1995, Eficienţa economică a investiţiilor, Editura Didactică şi Pedagogică, R.A. Bucureşti.
[6]Vasilescu, I., Luban, F., 1996, Investiţiile şi relansarea economică, Ed. Semne, Bucureşti.
[7]Vasilescu, I., Botezatu, M., 1999, Investiţii, studii de caz, Ed. Economică, Bucureşti.
[8]Vasilescu, I.,1998, Proiect Economic Editura ERA, Bucureşti,
[9]Anuarul statistic, 2013
[10]Anuarul statistic al judeţului Călăraşi 2013

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THE ECONOMICS OF INDUCED BREEDING OF *Heterobranchus longifilis* (VALENCIENNES, 1840) USING HORMONAL INDUCTION AND MANUAL STRIPPING

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Abstract

The economics of two induced breeding methods-hormonal induction and manual stripping were evaluated. In a 1:1 male: female ratio. Three (3) trials were made in each method using spawners weighing 1.5kg each. In the hormonal trial, 0.5ml ovaprim was injected into each spawner and both placed in a breeding tank containing aerated water 10 cm deep. Spawning occurred overnight and eggs incubated at 26^0C. In the stripping method, eggs were obtained from the female by gentle pressure on the abdomen and fertilized with milt from the macerated testes of the male partner, incubated in another tank containing aerated water 10 cm deep at 26^0C. Hatching occurred 25 hours later in both tanks. Fingerlings raised were harvested on the 30^{th} day with mean counts of 509 and 3,032 in the hormonal and stripping methods, respectively. Statistical analysis using the least significant difference test (LSD) showed that there was a significant difference ($p<0.05$) between the mean effect of the treatments. Economic analysis showed a loss of ₦9,089.00 and a profit of ₦64,600.00 with mean cost-returns ratios of 0.30 and 1.6 in the hormonal and stripping methods, respectively. It was therefore recommended that farmers use the stripping method in producing Heterobranchus lonifilis fingerlings.

Key words**:** *hormonal, induced, Breeding, stripping, economics*

INTRODUCTION

The catfish *Heterobranchus longifils* is one of the most suitable fish species for aquaculture in West Africa [14,10]. Biological and ecological characteristics such as omnivorous food habit, good acceptance of commercial pellet diet, resistance to disease, pollution and tolerance to low dissolved oxygen make it an excellent candidate for aquaculture [15,7,13]. It commands high market value in West Africa because of its good flavor and ability to grow to large size [14]. In Nigeria, it also commands high market value and demand because if its meat quality and good taste. Its fast growth rate, large size, vigorous carnivorous habit and efficient controller of over-population of *Tilapia* in fish ponds, have earned it the nickname "lion in water" [16]. In spite of these good qualities, a besetting problem to a Nigerian catfish farmer in the culture of this highly cherished pond fish is a viable and economical method of obtaining its fry/fingerlings to keep him in business all-year-round. It does not reproduce freely in captivity and its ovulation is not spontaneous, hence the fingerlings are scarce [9]. Two sources of obtaining the fingerlings by Nigerian farmers are wild collection and hatchery production [8]. Parasites and diseases reduce the efficiency in wild collection [1]. This puts hatchery production to a more reliable and safer way of fry/fingerling production of this good pond fish. It also brings about high rate of fertilization and hatchability with adequate protection of eggs and larvae against predation and disease [11].

In order that the catfish farmer in Nigeria remains in business all-year-round, it is important that he has a good knowledge of how to produce his viable fry/fingerlings and cheaply too. Consequently, two methods of production are the subject of this study. They

are induced breeding by hormonal induction and manual stripping without hormone. The economics of these two methods on *H. longifilis* fingerling production are evaluated to ascertain which is more economically profitable for the fish farmer.

MATERIALS AND METHODS

Breeding Tanks/Accessories

Two breeding tanks, each measuring 120.0x100.0 x 100.0 cm were used, one for each of the two methods in Abia State University's fish hatchery at Umuahia. One aerator was used in each tank. Straws were used for egg collection/incubation in the hormonal method, while hatching trays with mosquito netting bases were used for egg collection in the stripping method.

Brood stock

Twelve (12) breeders (of equal males & females) weighing 1.5 kg each, collected from the brood stock ponds of Avigram farms, Owerri, in Imo State, Nigeria were used. The females were gravid as mature eggs oozed out with the slightest pressure on the abdomen. The males were aggressive showing they were ripe for breeding.

Experimental Procedure

In a 1:1 male: female ratio, 3 trials were made in each method. In the hormonal treatment group, 0.5 ml ovaprim was administered intramuscularly on the dorso-lateral side of both sexes at an angle of 30^0 to the body of the fish at 1800 hours. The injected area was rubbed with the finger to distribute the hormone evenly in the muscle for proper circulation. Both spawners were placed in the breeding tank containing water 10 cm deep with straws for egg collection. They were allowed to spawn overnight. The hatchery room was dark and adequate tranquility maintained over the night for a successful spawning. By the following morning, spawning had taken in the breeding tank. The breeders were netted out with scoop net and the fertilized eggs were allowed to incubate. The eggs were incubated in aerated water at 26^0 C.

In the stripping method, the gravid female was stripped immediately after handling the hormonal treatment set. The female was stripped by gentle pressure on the abdomen. Eggs oozed out into a plastic plate and fertilized with milt taken from the macerated testis of the male partner in pure saline solution of 0.7% NaCl. Drops of water were added to enhance fertilization. The fertilized eggs were placed in single layers in hatching trays for incubation in another breeding tank, also containing aerated water 10 cm deep at 26^0C. Twenty-five (25) hours later, hatching occurred in both tanks as fish larvae were seen. The straws and the hatching trays were removed seven (7) hours after the commencement of hatching. Unfertilized and eggs not hatched were siphoned out from the tanks to avoid disease infection.

Early Fry Nursing

Endogenous feeding of fry on egg yolk continued till the yolk sacs were resorbed after 2-4 days. Exogenous feeding followed with brine shrimp naupli *Artemna salina*, six times daily (between 600 hours and 1800 hours), ensuring previous rations were consumed. Feeding was sparingly carried out to avoid water contamination by excess food. Aeration was discontinued during the feeding period. Unconsumed food was siphoned out daily. Water was changed every two days and replenished with fresh one. Aeration continued after feeding and water volume progressively increased as the fry advanced in age/development.

Advanced Fry Nursing

The early fry terminated with metamorphosis into advanced fry; from this stage (usually between 10-12 days) the young fish accepted and grew well on artificial dry feed. Commercial dry feed coppens of particle size 0.35-0.50mm was fed to the young fish up to the 17^{th} day. This commercial feed was maintained with the 2mm size from the 18^{th} day until harvest on the 30^{th} day of the experiment. Water level was increased to a peak of 30cm by the 20^{th} day at which the young fish had grown into fingerlings. This final water level and feed were maintained till the 30^{th} day when the fingerlings were

harvested. The same procedure for the hormonal and the stripping methods were strictly maintained in the 2nd and 3rd trials of the experiment.

Fingerling Harvesting

On the 30th day of each of the trials, the fingerlings were harvested. Harvesting was done early in the morning to minimize stress. Water in the breeding tanks were drained to very low level and the fingerlings collected with scoop nets and counted into basins containing clean water. A hundred percent (100.0%) recovery was achieved in each tank.

Cost-Returns Rationale

The fingerlings were sold at ₦30.00 each, irrespective of method of production. Economic decision was made by considering differences of gross income from items of costs (Gross margin enterprise net profit) and cost-returns ratio.

Data Analysis

The data obtained in this study were subjected to statistical analysis using the Least Significant Difference (LSD) at a probability level P=0.05 to determine the significant differences between the variables (fingerling production in hormonal and stripping methods). The Gross margin was estimated as the difference between gross income and total variable costs and net profit as the difference between the gross margin and fixed costs. Thus:

1. Gross margin= Gross Income minus Total Variable Costs;
2. Enterprise Net Profit = Gross Margin minus Fixed costs

When all costs incurred were considered as a long run variable without discounting at any interest rate, an index of cost/returns was generated for decision making.

3. The Cost-Returns Ratio (CRR) was calculated using:

$$CRR = \frac{\text{Gross Income}}{\text{Total Cost of Production}}$$

RESULTS AND DISCUSSIONS

Fingerling production in the two methods is shown in Table 1. Mean value of the trials in the hormonal method was 509, while that of stripping method was 3,032. Statistical analysis using the least significant difference test (LSD) showed that there was a significant difference ($P<0.05$) between the mean values of the fingerlings produced.

Low fish yield in the hormonal method is in line with the fingerlings of [9] that *H. longifils* does not freely breed in captivity. The use of hormone inducer to accelerate ovulation may have resulted in premature ovulation and release of some oocytes that had low potential hatching ability [3]. Consequently, hatching was poor resulting in very low fry/fingerling count. As growth continued, feeding still with *Artemia salina* and increased water volume, size differences were observed in this group. This may have further aggravated number of survivors as cannibalism was enhanced. This agrees with the findings of [12,17] that cannibalistic behavior is intensified by increasing size differences. However, good management practices such as efficient aeration and the siphoning away of egg shells, dead unfertilized eggs and deformed larvae enhanced survival [8], in spite of such a limiting factor. Higher fish yield in the stripping method may be as a result of efficient manual fertilization that may have occurred here. More eggs possibly got fertilized in the naturally matured eggs that were not induced to mature by hormone inducer. Size of the breeders assured large quantities of eggs. This is in line with the findings of [2] that size of brood stock influences quantity of eggs extruded. Since fertilization method was much more efficient in an optimum hatching temperature of 26^0C, hatching was more profuse here due to the same efficient management practices adopted in hormonal method.

Cannibalism which is a limiting factor in catfish fry/fingerling production as reported by [16] and [5] was successfully controlled by feeding the fry/fingerlings *ad libitum* with *Artemia salina* and later with commercial diet at a higher water volume that minimized stress and overcrowding [8,4] with more survivors recorded here. Also, homogenous size observed as growth continued in this group, could account for the higher number of

surviving fingerling, confirming decreases in cannibalism [7].

Table 1. Fingerling Production in Hormonal and Stripping Methods

Treatment	Trials				
	1	2	3	Total	Mean
Hormonal	430	491	605	1,526	509[a]
Manual stripping	3,120	2,975	3,001	9,096	3,032[b]
Total	3,550	3,466	3,606	10,622	

Mean with superscript [a] =not significantly different from zero at P>0.05;
Mean with superscript [b] =not significantly different from zero at P<0.05;

Cost and Returns Analysis of the Fingerling Production

Table 2 showed the gross profit realized from sale of the fingerlings produced through both breeding methods.

Table 2. Analysis of Costs and returns from Hormonal and Manual Treatment Methods of Fingerlings Production

S/N	Economic Items	Treatment	
	Cost-Return Items	Hormonal	Manual Stripping
1.	Total fingerlings Produced and sold	509	3,032
	Values	(Naira)	(Naira)
2.	Unit sales price	30.00	30.00
3.	Gross income	15,261.00	90,960.00
4.	**Variable Costs**		
5.	Petrol/oil	5,000.00	5,000.00
6.	Breeders	7,000.00	7,000.00
7.	Hormone	1,000.00	nil
8.	Surgical Blade	Nil	60.00
9.	Cotton wool	Nil	100.00
10.	Towel	Nil	150.00
11.	Disposable syringe	100.00	nil
12.	Transportation	1,750.00	1,750.00
13.	Commercial feed	700.00	3.500.00
14.	**Total Variable costs**	**15,550.00**	**17,560.00**
15.	**Fixed Costs** Five years depreciated value of:		
16.	Galvanized metal tank	5,000.00	5,000.00
17.	Aerator	800.00	800.00
18.	Power generator	3,000.00	3,000.00
19.	**Total Fixed Costs**	**8,800.00**	**8,800.00**
20.	**Total Costs (14+19)**	**24,350.00**	**26,360.00**
21.	Gross Margin (3-14)	-289.00	73,400.00
22.	Net Enterprise profit (21-19)	-9,089.00	64,600.00
23.	Costs/Returns ratio(20/3)	1.6	0.3

The table revealed that the manual stripping method gave a net profit of ₦64,600.00 (sixty four thousand, and six hundred naira) compared with ₦9,089.00 (nine thousand, and eighty nine naira) loss incurred in the hormonal method. Inputs supplies in both cases were from markets in Umuahia and Owerri while sales on demand was done in Umuahia.

The cost-returns results in the two tried methods showed a ratio of 0.30 for stripping method and a ratio of 1.60 for the hormonal method.

This revealed a huge gap in profitability in the use of the two methods as for every ₦1.00 invested by a farmer adopting the hormonal method will only yield a return of 30 kobo with a 70 kobo loss while adoption of manual stripping will allow a farmer to reap a return of 60 kobo for every one naira investment in *H. longifilis* fingerling production.

CONCLUSIONS

Hormonal induction method of producing *H. logifilis* fingerling compared poorly with manual stripping method of *H. logifilis* fingerling production. Hormonal induction method was characterized with poor egg hatching, size differences amongst hatched fingerlings, fewer fingerlings, and obvious cannibalism. The relatively fewer fingerlings in the hormonal induction method attracted lower gross enterprise income compared with manual stripping method of *H. logifilis* fingerling production.

We therefore recommended that fish farmers wishing to produce *H. logifilis* fingerlings should use the manual stripping method for better output and income.

REFERENCES

[1]Adedire, C.O., Aytounde, E.O., Fagbenro, O.A., Owoseeni, E.A., 1992, Studies on the biology and Aquaculture potential of Feral Catfish *Heteroebranchus bidorsalis* (Geoffery St. Hilarie 1807) (Clariidae): Tropical Zoology p.69.

[2]Adikwu, A.I., Sule, O.D., 2004, Effects of Broodstock Size on eggs and larval size and survival of African Catfish, *Clarias gariepinus* under laboratory conditions *Journal of Aquatic Sciences* 19(1): 1-4.

[3]Aguigwo, J.N., 1993, Inter-and intraspecific hybridization of Clarias albopunctatus (Nicholas and

Lamoute) and *Heteroebranchus longifili* (Cuvier and Valenciennes) in natural and artificial conditions *Journal of Aquatic Sciences* (8): 45-50.

[4]Aluko, P.O., Aremu, A., Nlewadim, A.N., 2001,. Observation of fry cannibalism in *Clarias gariepinus* (Burchell, 1822). *Journal of Aquatic Sciences* (16): 1-6.

[5]Aluko, P.O., Nlewadim, A.N., Onuoha, A.C., 2004, Studies on the growth and Survival of fry and fingerlings of Clarid Catfish species: *Clarias gariepinus* (Burchell, 1822). *Heteroebranchus bi dorsalis and Heteroebranchus longifili* (Valenciennes, 1840).j. Aqua. Trop. 19(1):1-14.

[6]Atse, B.C., Kouame, P., Koumi, A.R., 2008, Growth and Cannibalism of the African Catfish *Heteroebranchus longifili* fingerlings (Valenciennes, 1840) Fed Isoproteic Diets with Partial or Total Substitution of Fish protein with Soy protein *Journal of Fisheries International* 3(3): 68-74.

[7]Bard, J.P., Kimpe, De and Lessent, P. 1976. Nouveauxpoisons et nouvelles methods d'elevage en Afrique. FAO/CIFA Technical Paper Proceedings Symposuim on Aquaculture in Africa. Accra Ghana. p.365-372.

[8]Ayinla,O.A., 1991, Spawning of selected cultivable fish species In: Proceedings of the fish seed production course (Ed. O.A. Anyinla) NIOMR/ARAC, PortHarcourt, Nigeria. p.37.

[9]Campbell, D., Delince, G.A., Janssen, J.A.L., Kutty, M.N., 1987, Seed Production Lecture Presented at African Regional Aquaculture Centre (ARAC) for the Senior Aquaculturist's course Port Harcourt, Nigeria. p. 1-37.

[10] Hem, S., Legendre, M., Oteme, Z.J., 1996, Nouvelles especes de poisons-chats pour le de'veloppment de lapisciculture Africaine, In: Legendre,M. and Proteau, J.P. (eds). The biology and culture of Catfish. Aquatic living Res., (9): 207-217.

[11]Horvath, L., Woynarovich, E., 1980, The Artificial Propagation of warm water fish: A manual foe extension. FAO Fish Tech. Paper.

[12]Hseu, J.R., 2002, Effects of Size differences and Stocking Density on cannibalism rate of juvenile grouper *Epinephelus coioides*. Fish Sci. (68):1384-1386.

[13]Legendre, M.,1983, Examen pre'liminaire de potentialities d'un silure African *Heteroebranchus longifilis* (Valenciennes, 1840) pour l'aquaculture en milieu langunire. Document Scientifique, Centre de Recherches Oceanographiques d' Abidjan, (14): 97-107.

[14]Legendre, M., 1989, Enquete pre'liminaire sur la consummation du silure *Heteroebrachus logifilis* en-Cote d'Ivoire Archieves Scientifiques, Centre de Recherches Oceanographiques d' Abidjan, (12): 1-12.

[15]Micha, J.C., 1973, Etude des Populations piscicoles de l'Ubangui et tentative de se'lection and D'adaptation de quelques especes al'eting de pisciculture C.T.F.T, Division de Recherches en Piscciculture, Paris, France, p.110.

[16]Nwachukwu, A.N., Functional Fish Hatchery Operations and Management (Ist Edition). Whytem Publishers, Nigeria. Publishers of posterity books, 96 Owerri Road Okigwe. p.31.

[17]Reay, P., Smith, C., 1991, Cannibalism in Teleost fish. Rev. Fish Biol. (1):41-46.

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THE PRIMARY CORN OFFER OF DOLJ COUNTY (2010-2012), IN THE REGIONAL CONTEXT

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Abstract

The paper refers to the primary supply situation for corn in Dolj County, for 2009-2011, being considered in a regional context. Dolj County appears as main agricultural producer of the region South - West, which is highlighted especially through production potential it holds. Such are the total area and arable noted that it ranks first regionally. Corn is one of the main crops at regional and county level, which has implications in financial indicators in those rural economy.

Keywords**:** *average production, corn, share, surface, total production*

INTRODUCTION

The importance and benefits of corn production resulting from destination or versatility of its use: forage industrial agricultural technology - technological export article and source of profit for farms [1].
Due to its biological features, and in particular by introducing the culture of hybrids, corn has large production capacity, 6000 - 9000 kg / ha grain in unirrigated areas, 9000-16000 kg / ha and even more to irrigate. It is also resistant to drought and the fall is less attacked by pests and diseases, capitalizes very well irrigation and organic and chemical fertilizers. Corn can be grown on soils and climatic conditions very different is not pretentious to previous plant and supports better than other cereal monoculture. Corn has high coefficient of multiplication, therefore requiring a small amount of seed per hectare, and culture presents great possibilities of mechanization, from sowing to harvesting. [5]
Factors profitability and economic efficiency in the production of corn grains are the average yield per hectare, cost management and trading [3].
Best offer for an 'X' is the quantity that producers are willing to produce to a cost "K" in view of the profit that they will get. It thus becomes important to anticipate which manufacturer rationality in choosing and producing combinations of goods (X1, X2, ... Xn) which gives the maximum return on the resources available [4].
Cereal offer of the country at national level is required both by the need to ensure food security and the desire to trade grain. Seen through the supply of grain, regardless of the historical period under review, the share of cereals in arable crop yields per unit area emphasize the socio-economic function of these crops. This, especially for the fact that is a cereal considered noble, requested at export. The offer includes the factors that determines and are directly correlated with the yields achieved, ie the areas planted and yields per hectare [2].

MATERIALS AND METHODS

The paper realization involved the documentation, through the use of statistical reporting data [6].
In order to realize the paper we use a system of indicators to highlight specific primary supply of corn - area cultivated, total production and average yield. Therefore were collected quantitative data on the volume achieved at regional and county level.

The data collected and analyzed, covers the period 2009-2011, operating with average of period to. Average was determined by computing the following relationship:

$$M = \frac{X_1 + X_2 + \ldots + X_n}{n}$$

RESULTS AND DISCUSSIONS

For Development Region South - West respectively Dolj are trying the establishment of corn primary offer, considering area cultivated, total production and average yield obtained per unit of product - hectare.
In Table 1. are included data for the area cultivated with maize on region of development South - West.
South - West cultivated from 2009 to 2011 an average area of 348397.7 ha maize, the limits of variation of the indicator being of 276369 ha in 2010 and 386455 ha in 2011.

Table 1. South - West Area, Corn – Cultivated Surface (ha)*

Nr. crt.	Year	Effective	Dynamic		% beside national
			Ibf	Ibm	
1	2009	382342	100	100	16.4
2	2010	276396	72.3	72.3	13.2
3	2011	386455	101.1	139.8	14.9
4	Average 2009-2011	348397.7	91.1	90.2	14.9

*http://www.dolj.insse.ro/cmsdolj/rw/pages/R40_SuprafCultivExplPpCult.ro.do

Compared with the first of dynamic series - 2009 (382342 ha), composed dynamics, shows levels both under - and above par to fixed base indices: 72.3% in 2010, 91.1% and 101.1% for average of period in the case of year 2011.
If we relate the regional level of the indicator, by the national area planted with corn, annual percentage contributions can be observed as follows: 13.2% in 2010, 14.9% in 2011, 16.4% for 2009. Under these conditions average of the period held an average share of 14.9% in the national structure of the indicator - fig. 1.

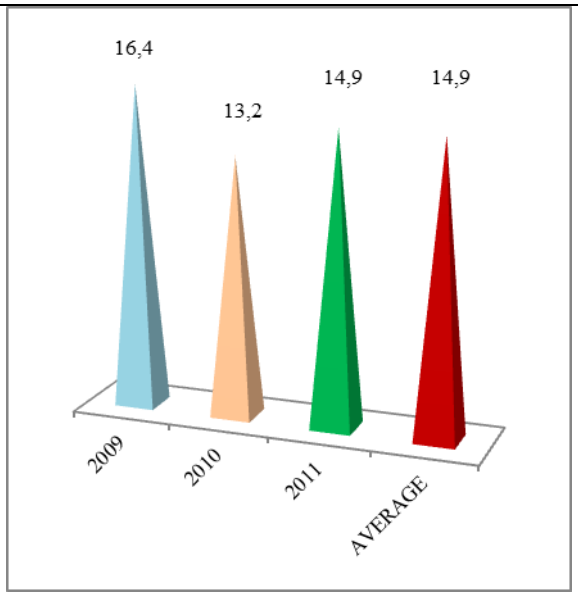

Fig. 1. Corn. South West Region – share in national surface (%)

Data for total production of maize specific the Southern-West Development Region - are presented in Table 2.

Table 2. South-West Development Region, Corn – Total production (t)*

Nr. crt.	Year	Effective	Dynamic		% beside national
			Ibf	Ibm	
1	2009	1453235	100	100	18.2
2	2010	1189394	81.8	81.8	13.2
3	2011	1569294	108.0	131.9	13.4
4	Average 2009-2011	1403974.3	96.6	89.5	14.7

*http://www.dolj.insse.ro/cmsdolj/rw/pages/R43_ProdAgrVegPpCult.ro.do

It may be noted that the total production ranged from 1189394 t in year for 2010 to 1569294 t for 2011. Together, these levels with a quantity of 1453235 t produced in 2009, reaching an interval average of 1403974.3 t (-3.4 and -10.5% compared to the reference bases used for building dynamic - 2009 and 2011 respectively).
In the national production of corn Development Region South - West recorded variables, contribution percentage as follows: 13.25 in 2010, 13.4% in 2011, 18.2% for 2009 and 14.7% the average period - fig. 2.

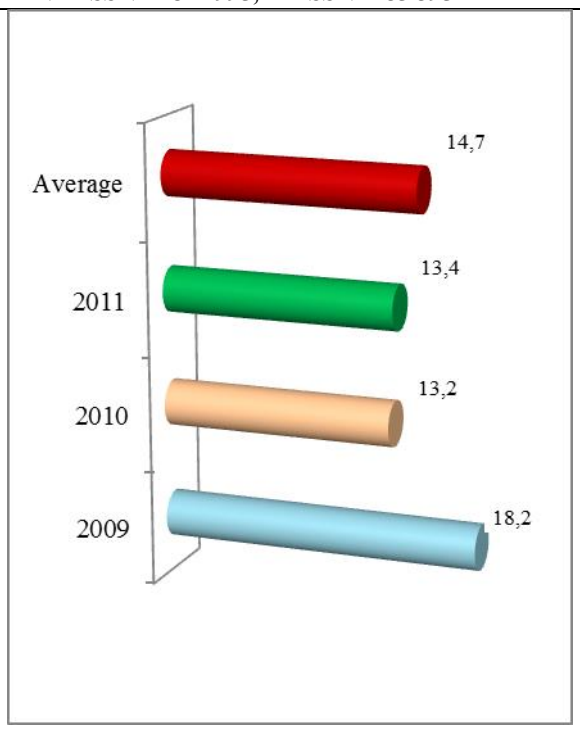

Fig. 2. Corn. South-West Region – share in national production (%)

Based on the total quantities of maize obtained from cultivated areas were determined corresponding average production levels per hectare - at regional level - Table 3.

Table 3. South-West Region, Corn – Average production (kg/ha*)

Nr. crt.	Year	Effective	Dynamic		% beside national
			Ibf	Ibm	
1	2009	3801	100	100	111.2
2	2010	4303	113.2	113.2	99.7
3	2011	4061	106.8	94.4	89.7
4	Average 2009-2011	4030	106.0	99.2	98.4

*http://www.dolj.insse.ro/cmsdolj/rw/pages/R44_ProdMedHectarPrincipCult.ro.do

For the period under review it is found fact that average yield per hectare ranged between 3801kg in 2009 to 4303 kg in 2010, while the average of period reached 4030 kg.
The dynamics contains fixed base indices, strictly above unit - 6.0% for average of period 6.8% in 2011 (4061 kg), 13.2% in 2011 compared to the specific situation of 2009, but also variable levels for mobile based index: 94.4 and 99.2% in 2011 and average of the period 113.2% in 2010.

Analyzing the situation of the South - West, in the national context, it is noted mainly positioning subunit: 89.7% in 2011, 98.4% of the average period 99.7% in 2009, but above par level - 111 25 for 2009. - Fig. 3.

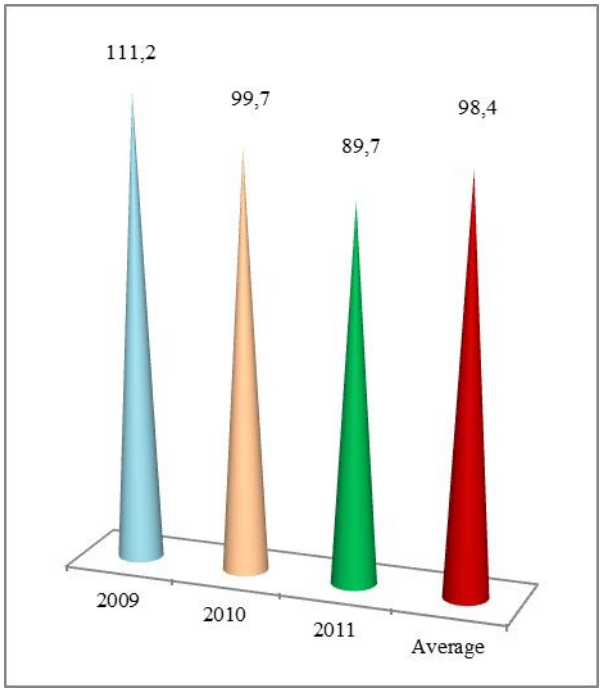

Fig. 3. Corn. South West Region – positioner beside national average production (%)

Analysis of the situation of county area planted with corn, is accomplished by interpreting the data included in Table 4.

Table 4. Dolj County, Corn – Cultivated area (ha)

Nr. crt.	Year	Effective	Dynamic		% beside regional
			Ibf	Ibm	
1	2009	118300	100	100	30.9
2	2010	71725	60.6	60.6	26.0
3	2011	94037	79.5	131.1	24.3
4	Average 2009-2011	94687.3	80.0	100.7	27.2

*http://www.dolj.insse.ro/cmsdolj/rw/pages/j40_SupCult.ro.do

The indicator ranged from 71725 ha in 2010 to 118300 ha in 2009 the average period reaching a rate of 94687.3 ha, given that 2012 is characterized by an area of 94037 ha planted with corn.
The dynamics contains strictly sub unitary values for fixed base indices (decreased by 20.0, 20.5 and 39.4% compared to the first

term of the dynamic series on period average, 2011 and 2010 respectively), and varying levels for mobile based indices (subunit - 60.6% in 2010, and above par - 100.7 and 131.1% for average period 2011).

Compared to the regional situation, Dolj cultivated quite important area with corn.

In the regional structure of the indicator Dolj register with weights as follows: 24.3% in 2011, 26.0% in 2010, 27.2% of the average period, and 30.9% in 2009 - fig. 4.

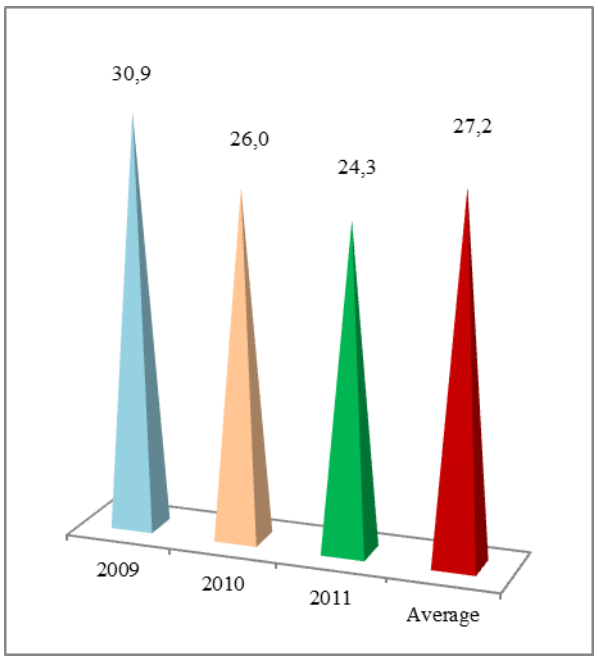

Fig. 4. Corn. Dolj County – share in Regional surface (%)

Regarding the total quantities of maize in Dolj County, for the period 2009 - 2011, data are presented in Table 5.

Table 5.
Dolj County, Corn – Total production (t)*

Nr. crt.	Year	Effective	Dynamic		% beside regional
			Ibf	Ibm	
1	2009	430780	100	100	29.6
2	2010	363491	84.4	84.4	30.6
3	2011	378935	88.0	104.2	24.1
4	Average 2009-2011	391068.7	90.8	103.2	27.9

*http://www.dolj.insse.ro/cmsdolj/rw/pages/j43_ProdVeget.ro.do

The amount of corn ranged from 363491 t in 2010 to 430780t in 2009.

Under these conditions, in conjunction with the level of 378935 t in 2011, the average period reached 391068.7 tons

Evolution in time of the indicator is emphasized through mobile and fixed base indices that make up the dynamic. It observes the strict subunitary levels of indices with fixed base (-15.6, -12.0 and -9.2% in 2010, 2011 and for period average). Indexes with movable bases are below par in 2010 (84.4%), but for the remaining terms are above unit (exceeding by 1.03 and 1.04 times the terms of comparison to average of period for 2011).

In the regional context, Dolj obtained between 24.1 and 30.6% of total production of corn (2011 and 2010), in which the average weight was 27.9% - Fig. 5.

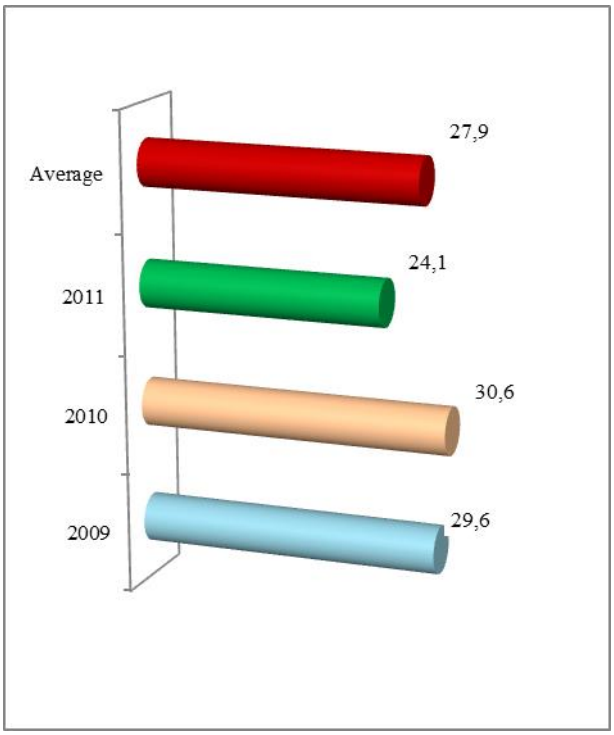

Fig. 5. Corn. Dolj County – share in regional production (%)

Table 6 provides information on the average yields per hectare obtained in Dolj County for maize during the period.

For interval, it is found the fact that average yield per hectare ranged between 3641 kg in 2009 and 5068 kg in 2010.

Adding to these levels the specific on of the year 2011 - 4030 kg has been determined that the average for the period under review has reached 4130 kg.

Dynamics of indicators consists mainly of constituents with above par value, except the indexes with movable bases for year 2011 - 79.5%.

Table 6. Dolj County, Corn – Average production (kg/ha)*

Nr. crt.	Year	Effective	Dynamic		% beside regional
			Ibf	Ibm	
1	2009	3641	100	100	95.8
2	2010	5068	139.2	139.2	117.8
3	2011	4030	110.7	79.5	99.2
4	Average 2009-2011	4130	113.4	102.5	102.5

*http://www.dolj.insse.ro/cmsdolj/rw/pages/j44_ProdMedCult.ro.do

Outruns of the comparison were 1.39 times in 2010, 1.10 times for 2011 (compared to the first term of the dynamical series), 1.13 and 1.02 times the average period. Dolj situation analyzed in the regional context, emphasizes positioning both above and below the comparator - fig. 6.

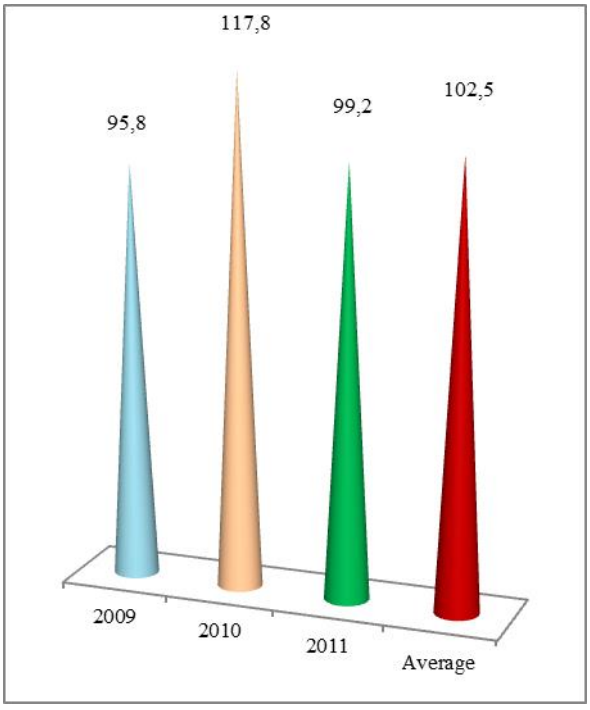

Fig. 6. Corn. Dolj County – positioning beside the average production of the region (%)

Thus recorded subunitary levels in 2009 and 2011 (-4.2 and -0.8% respectively), and levels above par in 2010 and for average of the period (17.8 and 2.5% respectively).

CONCLUSIONS

Regarding import situation appear as conclusions the following:

a. regarding regional situation:

- the surface Has evolved uneven, corn holding 33.64% and 44.21% of the arable land in the area occupied by grains (1035785.3 respectively 788057.7 ha); maize appears, from this point of view, as a second crop as potential after wheat occupying 48.47% (381989 ha) of the area cultivated with cereals;
- total production of corn has evolved fluctuating decreases in 2010 being followed by increases in 2011;
- maize contributed with 54.15% to constitution of cereal total production - 2592532 t as a result, corn is the main cereal product of the region, followed by wheat with a share of 40.45% in total (1048778.3 t) ;
- average yield has evolved unevenly increases in 2010 (13.2%), followed by declines in 2011 (-5.6%);

b. concerning the county situation:

- corresponding surface of the maize crop has evolved fluctuant over the period analyzed, the decreases from 2010 (-39.4%), being followed by increases in 2011 (31.3%);
- maize (94687.3 ha) took 23.29 and 32.18% of the arable land and respectively from area occupied by cereals - 406531.3 and 294244 ha;
- corn ranked second after wheat was cultivated on 177971 ha - 60.48% of the area cultivated with cereals;
- total production of corn has evolved uneven manifesting decreases in 2010 (-15.6%) and increased in 2011 (4.2%);
- in the county production of cereal (935852.7 t), maize owned 41.79% being overtaken by wheat with a share of 52.24% (488848 t);
- the average production per hectare has fluctuated the increases of 39.2% in 2010, being followed by declines in 2011 (-20.5%).

REFERENCES

[1]Barbu, C., Pânzaru, R.L., 2000, Agricultural Economics, Hyperion Publishing House, Craiova, Chapter 8, Part I, pp. 125-162
[2]Constantin, M. et al., 2009 Marketing of agricultural production, Ed Agro Engineering, Bucharest, Chapter 3, Part I, pp. 37-72
[3]Pânzaru, R.L., Medelete, D.M, Ştefan, G., 2009, Economics of crop production, Universitaria Publishing House, Craiova, Chapter 3, pp. 7-67
[4] Ştefan, G., Bodescu, D, Toma, A.D., Pânzaru,R.L., 2007, "Economy and agri-food chain" Alpha Publishing, Science, Chapter 10, pp. 326-446
[5] Ştefan, M., 2011, Crop Production I + II, Manual for distance learning university, Universitaria Publishing House, Craiova, Theme 5, p 73-110 [6] http://dolj.insse.ro

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OLT COUNTY PRIMARY OFFER OF WHEAT (2010-2012), IN THE REGIONAL CONTEXT

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Abstract

The paper refers to the primary wheat supply situation in Olt County, for 2009-2011, being considered in a regional context. Olt County appears as a major agricultural producer Southern of the Region - West, emphasized, especially through production potential which it holds. Such are noted the total area and arable area that it ranks first regionally. Wheat is one of the main crops at regional and county level, which has implications in the existence of producers. Aspect is particularly relevant for areas that have not traditionally linked to the practice of horticulture or vegetable growing.

Keywords**:** *area, percentage, yield, wheat*

INTRODUCTION

Wheat is one of the oldest cultivated plants being cultivated by humans in the Middle East with about 10-12000 years BC.

In our country wheat crop goes back over 2500 years, evidence for this being the inscriptions on the coins of old cities on the Black Sea (Tomis, Callatis). For example, coins of the city Tomis (Constanta), wore on one side the image of Demeter, goddess of agriculture, and on the other hand, ears of wheat. Therefore, from ancient times, wheat was used more than any other plant in human nutrition and remained inseparable from civilized man throughout history. Wheat is the most important cereal as a result of the use on which it receives [5].

For farms in Romania, wheat are important as food, industrial, fodder, agricultural technology, technological exports as a source of profit [1].

Factors profitability and economic efficiency of winter wheat are the average yield per hectare, cost management and trading [3].

Deals on agricultural commodity markets is dispersed and irregularly quantitative. Production volume depends on the one hand of the technical equipment and on the other on the climatic and biological conditions which are random, printing these commodity on markets from agriculture a highly mobile character. Quantitative bid of a product on the sales market depends primarily on the benefit that it will achieve the entrepreneur. Because the gain (benefit) may be influenced by changes in costs and (or) price is considered as the main causes that influence the supply of agricultural products, the following: land fund with reference to agricultural land available amelioration systems used, the yields obtained in pure culture and successive production capacity and technical equipment of the company, which makes and determine the actual agricultural production system, climatic factors affecting the supply of agricultural products through those limiting factors for normal climatic conditions and accidental situations that can alter normal climatic conditions, yields (yields) crops and animals that are related to production systems and technologies used, plant protection and veterinary, energy and mechanization available feed; work force employed in agriculture, its structure, financing and facilities loans and socio-economic factors that are reflected in market access and stability of agricultural producers supply the market price of the product, the price of substitute product, price means of production [4].

Structure of the offer is differentiated causing changes in annual baking grain market. Ensuring the wheat consumption was achieved by importing significant amounts. Market development peasant or more specifically shorting grain movement is the result of millions of producers on tenderers small partial contribution, but major nationwide. The offer fit The factors which condition it and are directly correlated with the yields achieved, ie cultivated areas and yields per hectare. At farm level, the supply of cereal products, the quantity of products that is intended market comes increasingly more from the big operators who take land on lease from a large number of individuals. Small family farms producing mainly for covering their own households. Only a small part of the production in the family farms are entering the commercial markets offer [2].

MATERIALS AND METHODS

Making the paper involved documenting, through the use of statistical reporting data [6], [7]. In order to achieve the paper we worked with a system of indicators to highlight specific primary supply of corn - area cultivated, total production and average yield.
Therefore were collected data on the volume quantitative achieved at regional and county level.
The data collected and analyzed, covers the period 2009-2011, operating and average period. Media was determined by computing the following relationship:

$$M = \frac{X_1 + X_2 + \ldots + X_n}{n}$$

RESULTS AND DISCUSSIONS

Development Region South - West respectively Olt trying constitution primary supply of wheat, taking into account area cultivated, total production and average yield obtained per unit of product - hectare. In Table 1 are included the data for area cultivated with wheat for South - West Development Region.

Table 1. South - West region, Wheat - area cultivated (ha) *

Nr. crt.	Year	Effective	Dynamic		% Beside national level
			Ibf	Ibm	
1	2009	385137	100	100	18.0
2	2010	407681	105.9	105.9	18.9
3	2011	353149	91.7	86.6	18.1
4	Average 2009-2011	381989	99.2	108.2	18.4

*http://www.dolj.insse.ro/cmsdolj/rw/pages/R40_SuprafCultivExplPpCult.ro.do

It can be seen that the region has cultivated, on average, an area of 381989 ha of wheat level based on annual sequential situations: 353149 ha in 2011, 385137 ha in 2009, 407681 ha for 2010.
The dynamics made, shown that the surface has increased by 5.9% in 2010 compared to the first term of the dynamical series, then the indicator decreased by 9.3 and 13.4% to the terms of reference. For average can notice a decrease of 0.8% compared to 2009 and 1.08 times outrunning the situation in 2011.

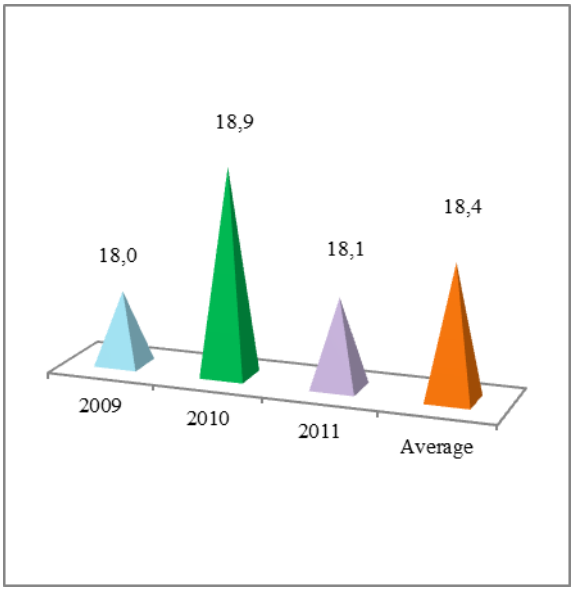

Fig. 1. Wheat. South - West region - a share of the national area (%)

In this context it is worth noting that the region has achieved, compared to the national situation variable weights: 18.0, 18.9 and

18.1% for the years 2009, 2010 and 2011. Therefore it can be seen that the average period is characterized by a share of 18.4% in the national situation of the indicator - fig. 1.

In terms of total production of wheat (Table 2.) South - West region has achieved an average of 1048778.3 t, which is - in dynamics - an excess of 4.7% of the first term of reference and a reduction of 7.5% compared to the previous term of the dynamic series.

Table 2. South - West region, Wheat - Total production (t) *

Nr. crt.	Year	Effective	Dynamic		% Beside national level
			Ibf	Ibm	
1	2009	1002147	100	100	19.3
2	2010	1010587	100.8	100.8	17.4
3	2011	1133601	113.1	112.2	15.9
4	Average 2009-2011	1048778.3	104.7	92.5	17.3

*http://www.dolj.insse.ro/cmsdolj/rw/pages/R43_ProdAgrVegPpCult.ro.do

This situation has been determined by annual amounts of: 1002147 t in 2009, 1010587 t in 2010 (+0.8% compared to the previous term of the dynamic series), 1133601 t of 2011 (increases of 1.13 and 1.12 times respectively of the terms of reference).

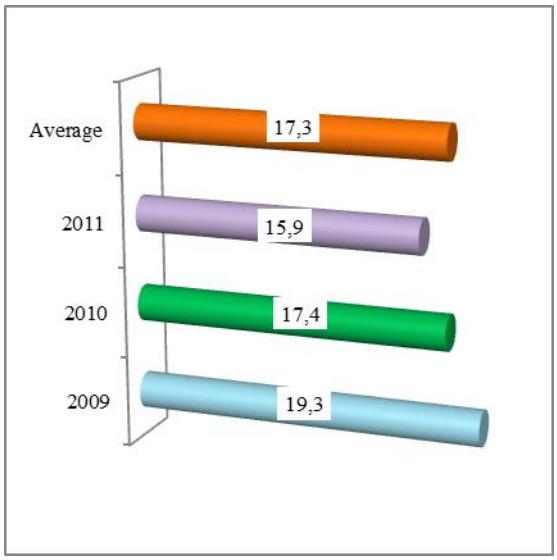

Fig. 2. Wheat. South - West region - share in national production (%)

Analyzing the in the national context, it may be noted that the region provided between 15.9 and 19.3% of national quantity of wheat (2011 and 2009) average share being 17.3% (assuming a level of 17.4% specific to 2010) - Fig 2.

Table 3 contains the specific situation of South-West Region, in terms of average production achieved.

Table 3. South - West region, Wheat - Average yield (kg / ha)

Nr. crt.	Year	Effective	Dynamic		% Beside national level
			Ibf	Ibm	
1	2009	2602	100	100	107.0
2	2010	2479	95.3	95.3	91.8
3	2011	3210	123.4	129.5	87.6
4	Average 2009-2011	2746	105.5	85.5	94.4

*http://www.dolj.insse.ro/cmsdolj/rw/pages/R44_ProdMedHectarPrincipCult.ro.do

The region recorded an average of 2746 kg/ha the indicator, level which is based on the quantities of 2602 kg/ha in 2009, 2479 kg/ha in 2010 and 3210 kg/ha for 2011.

As a result of this situation is apparent that for the dynamics composed, fixed base indices ranged from 95.3% in 2010 to 123.4% in 2011 (5.5% for period average), while the mobile base indications was below par in 2010 and period average (-4.7 and -14.5% respectively compared with the two reference bases) and above unit for 2010 (downgrade 1.29 times the term comparison).

Analyzed in the national context, the region was below the general level of the indicator - only 94.4% of the comparator. Sequentially finding subunit levels in 2010 and 2011 (-8.2 and -12.4% respectively) and a favorable situation in 2009, when the comparator is exceeded by 7.0% - Fig. 3.

Table 4 contains the data for wheat area cultivated in the county.

It is apparent that the cultivated area ranged between 136877 ha in 2009 and 143291 ha for 2011, while the average period reached 140404.7 ha.

Dynamics of indicators is dominated by the component index value above par, the only

exception being signaled for the average period - decrease of 2.0% from the previous term of the dynamic series (2011).

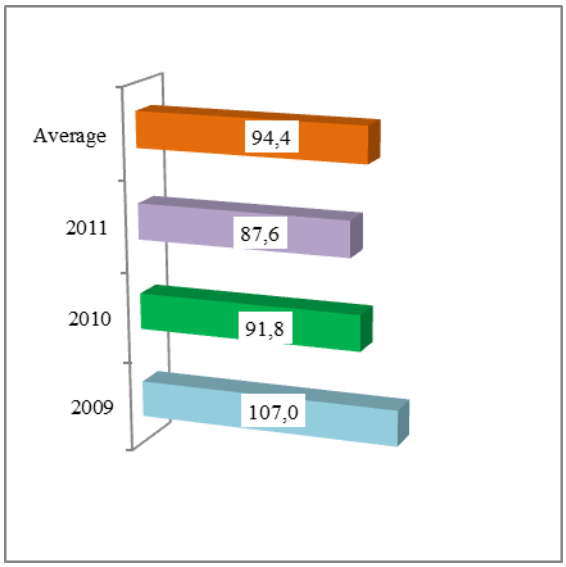

Fig. 3. Wheat. South - West region. Average production - positioning to national level (%)

Table 4.Olt County, Wheat – Cultivated surface (ha) *

Nr. crt.	Year	Effective	Dynamic		% Beside regional level
			Ibf	Ibm	
1	2009	136877	100	100	35.5
2	2010	141046	103.1	103.1	34.6
3	2011	143291	104.7	101.6	40.6
4	Average 2009-2011	140404.7	102.6	98.0	36.8

*http://www.olt.insse.ro/main.php?lang=fr&pageid=436

Reported on regional levels of the indicator it can be observed an average share for Olt county of 36.8%, with annual sequential weights: 34.6% in 2010 (141046 ha), 35.5% for 2009 and 40 6% in the case of 2011 - fig 4.

In terms of total production of wheat, Olt County is characterized by an average period 364591.7 t average which appeared as a result of annual sequential levels: 426101 t in 2009, 360474 t for 2010 and 307200 t for 2011 - table 5.

Dynamics of indicators is dominated by the subunit levels component index, except for the mobile base period average - 18.7% compared with the previous term of the dynamic series (2011).

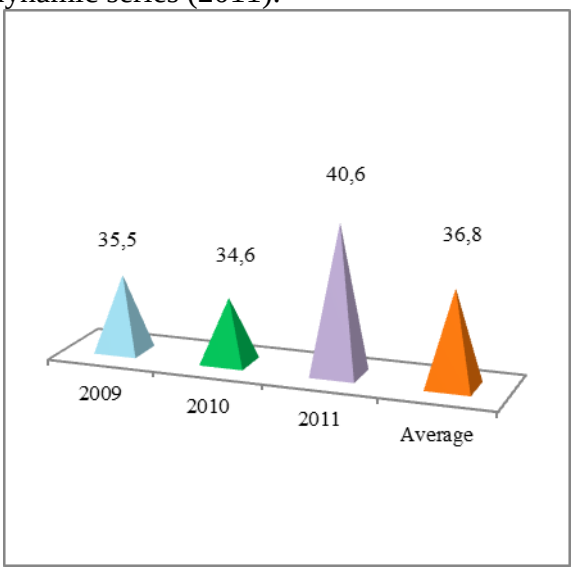

Fig. 4. Wheat. Olt County - share in the regional area (%)

Table 5. Olt County, Wheat - Total production(t)*

Nr. crt.	Year	Effective	Dynamic		% Beside regional level
			Ibf	Ibm	
1	2009	426101	100	100	42.5
2	2010	360474	84.6	84.6	35.7
3	2011	307200	72.1	85.2	27.1
4	Average 2009-2011	364591.7	85.6	118.7	34.8

*http://www.olt.insse.ro/main.php?lang=fr&pageid=423

Starting from the reporting bases used were observed reductions of 15.4% in 2010, 27.9 and 14.8% in 2011, 14.4% of the average period - compared to the first term of the dynamical series (2009).

In the regional context, Olt represents one of the important producers of wheat, making it the annual percentages of 27.1, 35.7, 42.5 and 34.8% for the years 2011, 2010, 2009, and respectively for the average period - fig. 5.

If we consider average production the data for wheat crop (Table 6.) can be observed an average indicator of 2597 kg/ha, which is based on annual sequential levels, such as 2144 kg/ha for the year 2011, 2556 kg/ha in the year 2010 and 3113 kg/ha for 2009.

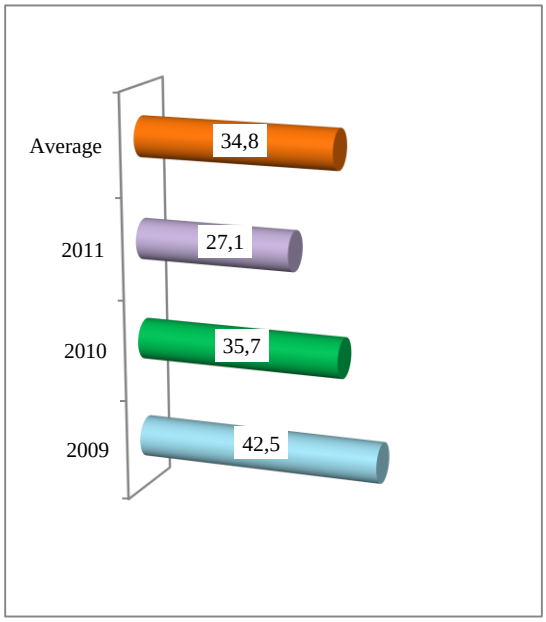

Fig. 5. Wheat. Olt County - share in the regional production (%)

Table 6. Olt County, Wheat - Average production (kg / ha)*

Nr. crt.	Year	Effective	Dynamic		% Beside regional level
			Ibf	Ibm	
1	2009	3113	100	100	119.6
2	2010	2556	82.1	82.1	103.1
3	2011	2144	68.9	83.9	66.8
4	Average 2009-2011	2597	83.4	121.1	94.6

*http://www.olt.insse.ro/main.php?lang=fr&pageid=434

Dynamics of average production per hectare is one similar to that of total production. Fixed base indices have strict subunit values compared to the reference period (68.9, 82.1 and 83.4% for 2011, 2010 and period average). For, the second category of indicators, the mobile base is found a range from 82.1% in 2010 and 121.1% for the period average (16.1% in 2011 compared to basis of reporting).

Compared with the regional situation of the indicator, Olt County is characterized by positioning both above and below par. Therefore in 2009 and 2010, the benchmark is exceeded by 19.6 and 3.1% respectively, while for 2011 and for average of the period are recorded decreases by 33.2 and 5.4% respectively compared to bases reporting - fig. 6.

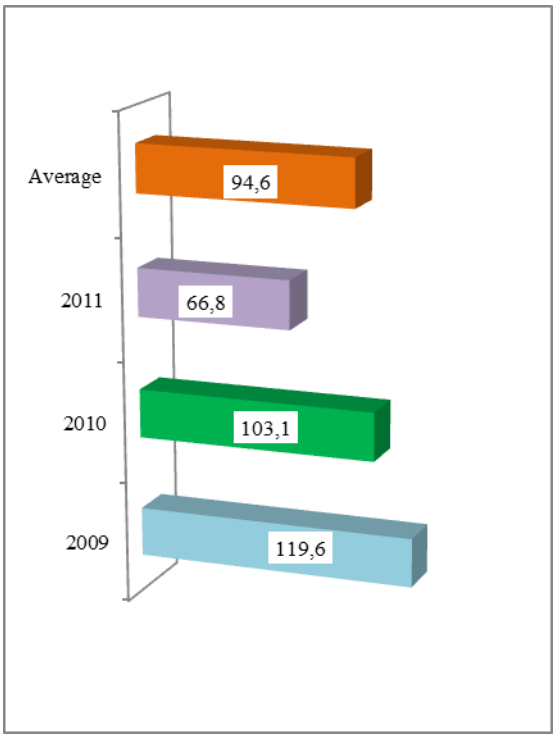

Fig. 6. Wheat. Olt County. Average production - positioning compared to regional level (%)

CONCLUSIONS

Starting from the above issues appear as conclusions the following:

a. regarding regional situation:

- wheat represented as surface, 36.88% of regional arable land (1035785.3 ha) and 48.47% of the area cultivated with cereals (788057.7 ha). It is noteworthy that wheat is ahead corn as share in the total area cultivated with cereals, which hold only 44.21% of the indicator (348397.7 ha);
- within the total production of cereals (2592532 t), wheat held a share of 40.45%, which surpassed of maize - 54.15% (1403974.3 t);
- performance issues are related more to climate order and less technological in the national context, given the region's weights somewhat similar to nationally in terms of area cultivated and total production. While not neglected poor technological performance compared to the national situation - issues

highlighted by positioning the regional average production compared to national;

b. concerning the county situation:

- area cultivated with wheat was 41.98% of the arable land cultivated (334396.7 ha) and 55.13% of the area occupied by cereals (254665 ha). Compared to corn cultivated on average of 91375 ha (36.02% of the cereal sector related indicator), wheat showed an excess of 53.65%;
- total wheat production represented 50.40% of total cereal production (723351.7 t), exceeding the total production of corn 60265.4 t (304326.3 t - 42.07% in the index structure);
- average production per hectare it may be established downward trend of the indicator (successive annual declines of 17.9 and 16.1% in 2010 and 2011 compared with the previous terms of the dynamic series.

REFERENCES

[1]Barbu, C., Pânzaru, RL, 2000, Agricultural Economics, Hyperion Publishing House, Craiova, Chapter 8, Part I, pp. 125-162
[2]Constantin, M. et al., 2009 Marketing of agricultural production, Ed Agro Engineering, Bucharest, Chapter 3, Part I, pp. 37-72
[3]Pânzaru, R.L., Medelete, D.M, Ştefan, G., 2009, Economics of crop production, Universitaria Publishing House, Craiova, Chapter 3, pp. 7-67
[4] Ştefan, G., Bodescu, D., Toma, A.D., Pânzaru, R.L., 2007, "Economy and agri-food chain," Alfa Publishing House, Iaşi, Chapter 10, pp. 326-446
[5] Ştefan, M., 2011, Crop Production I + II, Manual for distance learning university, Universitaria Publishing House, Craiova, Theme 1, p 4-30
[6] http://dolj.insse.ro
[7] http://olt.insse.ro

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STUDIES REGARDING THE SITUATION OF RURAL DEVELOPMENT IN PRAHOVA COUNTY AND THE MANAGERIAL MEASURES WHICH NEED TO BE TAKEN

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Abstract

The paper is an analysis of the situation of rural development in Prahova county in all fields and aspects: agriculture and food industry, forestry, infrastructure, tourism, law and legislation, regional and government support towards rural entrepreneurs and inhabitants, rural life, customs and traditions, but also the impact of the European Agricultural Policy . The quantity analysis is based upon statistical data retrieved from Romanian statistical yearbook, while the quality analysis is based on discussions with the main actors and stakeholders in order to determine the managerial measurements that need to be taken.

Key words: *analysis, measures, Prahova county, rural development, rural space*

INTRODUCTION

Taking into consideration that over 56% of the population in the 28 Member States of the European Union is living in rural areas, which cover over 91% of the territory[3], rural development has become a vital policy. Moreover, Europe possesses a great regional diversity of landscapes ranging from mountains to plains, from impenetrable forests to steppes. Also at budgetary level there is a shift from Market support policy to the rural development aiming at diminishing the intervention mechanisms and stirring the economic, social and environmental development in the countryside [2].

However, with all its importance for the rural areas and the necessity of a strong policy regarding rural development, European consumers and tax payers have raised a series of concerns. The Common Agricultural Policy (CAP) is considered by most Europeans too expensive (with over 45 % of the European budget allocated) and its application nontransparent.[6]

With the beginning of the negotiations for Romania's joining the European Union, a new topic has entered the attention of the public – the situation of the rural development in the country. The Romanian rural areas were leaving the 45 years of communism and collective farming that it imposed only to enter a transition period just as difficult. The law 18 passed on 1991 was giving back the confiscated land to the former owners or their descendents, but plunged them into the whirlpool of Market economy. The 1st of January 2007 marked the integration of Romania into the European Union, but found the rural areas totally unprepared for what was to come.

SAPARD (Special Accession Programme for Agriculture and Rural Development) was meant to prepare the rural areas for the upcoming integration, but it didn't have the desired results [6]. Romania entered the EU with 4 million farmers, the vast majority being

unprepared to face the harsh realities of the European Agricultural Markets.

Another challenge awaits the rural inhabitants with the liberalization of the Arable Land Market starting the 1st of January 2014. From that date any European citizen will be able to purchase land freely.

Even though that Prahova county is known for being one of the most well developed in Romania, the future of the CAP will have without any doubt a great impact on its future. European, national and regional intervention

and support will be vital to strengthen the rural areas, to keep alive the local economy but also to preserve the traditions, customs but most of all the environment and wildlife[5].
This paper wants to be not only a simple presentation, but a work aiming at revealing the main challenges and drawbacks that the Prahova region faces and finding the best measures that need to be applied.

MATERIALS AND METHODS

The data needed for the completion of this paper has been collected from the Romanian National Yearbook, but also from documents and reports issued by the regional authorities responsible for agriculture and rural development in Prahova county.
The analyzed period so far is 2006 – 2011. The data is being statistically processed and interpreted in order to establish the trend line and set the forecast for the years following the analyzed period.
In order to characterize the evolution of the rural space, mainly its agricultural side, several components have been presented and analyzed:
-allocation of agricultural real estate by category of usage
-the evolution of the surface cultivated with the main crops
-production of the main crops
-the evolution of the animal husbandry sector
In this paper, time series have been used regarding the evolution of the main components of the agricultural sector[1]. The interpretation of the statistical data in order to determine the dynamic of the analyzed components has been made using fixed based indicators, the reference year being 2006.

RESULTS AND DISCUSSIONS

This section presents the evolution of the analyzed components in the period spanning between 2006 and 2011.
The table below shows main components of the agricultural real estate for the period between 2006–2011 and their evolution in time. As the table shows the main components are the arable land and forests.

Table 1. The allocation of agricultural real estate by category of usage between 2006-2011 (Ha) [6].

	2006	2007	2008	2009	2010	2011
Total surface	471.587	471.587	471.587	471.587	471.587	471.587
Cultivated land	275.244	275.020	274.678	274.525	272.834	272.499
Arable land	145.088	145.652	144.964	145.560	144.267	144.007
Pastures	71.842	70.084	69.279	68.852	71.677	69.606
Hayfield	36.877	38.921	40.127	40.754	38.641	40.658
Vineyards	8.829	8.559	8.572	8.422	8.134	8.100
Orchards	12.608	11.804	11.736	10.947	10.115	10.128
Forests	150.436	150.249	150.314	150.468	151.332	150.846
Wetland	9.061	8.789	8.624	8.427	8.167	8.388
Other surfaces	36.846	37.529	37.971	38.167	39.254	39.854

Taking into consideration these aspects the county has great potential in the production of cereal and oil crops, but also the development of the forestry sector. An important resource is represented also by the extensive surfaces covered by vineyards and orchards, but also the vast surfaces covered with pastures, suitable for the development of the animal husbandry sector.
During the analyzed period the components of the agricultural real estate have remained fairly constant from year to year, suffering very little variation. This fact is beneficial for the general development of the county showing that a balance in the both the agricultural sector and the real estate market has been achieved. Having this potential, the main stakeholders (such as farmers, entrepreneurs and people who dwell in the countryside) can focus on exploiting these resources to their maximum yield.

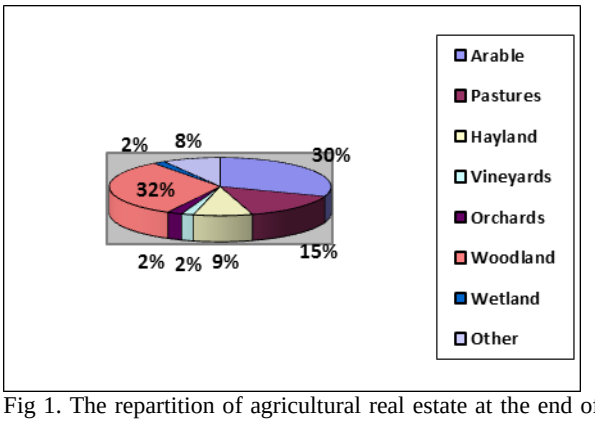

Fig 1. The repartition of agricultural real estate at the end of 2011

The chart above shows the repartition of the main components of the agricultural real

estate at the end 2011, highlighting the percentage allocated to each category.

Table 2. The main crops cultivated between 2006-2011 (Ha) [6]

	2006	2007	2008	2009	2010	2011
Cereal crops (total)	96.195	98.263	100.778	103.257	97.688	100.224
Wheat	33.559	25.637	34.569	36.935	34.930	36.120
Barley	2.326	3.050	3.467	5.372	5.171	4.464
Oat	380	340	752	669	857	715
Maize	59.920	69.183	61.805	60.018	56.459	58.442
Sunflower	10.748	7.762	8.202	9.153	10.688	13.703
Rapeseed	1.676	4.697	5.054	5.918	6.355	5.706
Sugar beat	353	14	-	-	-	-

Having 31% of its surface covered with arable land, the cereal and technical crops are predominant. The cereal crops have peaked during the years 2008, 2009 and 2011 which have been good in terms of precipitation enabling high yields. A drawback is the fact that the surfaces covered with sugar beats have diminished by 2521% from 2006 and 2007, being completely abandoned in the years coming after. However there has been a constant increase in the cultivation of sunflower and rapeseed which in the Romanian agriculture have become "cash crops" due to the steady demand and price.

The surfaces allocated to wheat and maize have remained constant during the whole period suffering small variations from year to year.

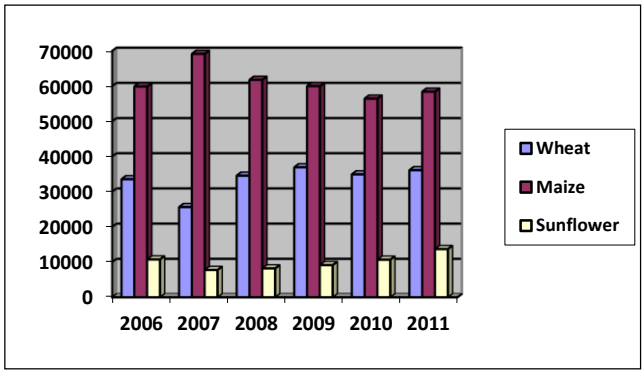

Fig 2. The evolution of the surface cultivated with the main crops between 2006-2011

As the chart above shows, maize (58% of the total cereal crops) and wheat (36% of the total cereal crops) have shown little change during this period, the constant increase being in the cultivation of sunflower. Although the crop has decreased in the year 2007 (which was characterized by a severe drought), it has increased overall in 2011 compared to 2006 by 27.4%.

Table 3. Productions of the main crops between 2006-2011 (tons) [6]

	2006	2007	2008	2009	2010	2011
Cereal crops (total)	278.186	141.910	294.547	357.200	347.030	402.240
Wheat	76.221	39.918	109.625	104.102	90.780	125.413
Barley	4.331	4.067	11.897	13.806	14.434	13.967
Oat	688	334	1.277	944	1.330	1.233
Maize	196.934	97.502	171.033	237.292	239.604	260.383
Sunflower	11.445	5.054	8.938	16.459	13.588	23.709
Rapeseed	2.553	4.171	8.400	8.063	12.725	11.081
Sugar beat	8.951	7	-	-	-	-

The total production of a crop in influenced by both the surface it covers but also by the agricultural techniques used by the farmers and weather conditions.

As mentioned previously the year 2007 had a massive drought which reduced production by more than 50% compared to the following years.

A year like this may affect the decision to increase/decrease the surface cultivated with a crop but foremost it affects the economic balance of the people involved in agriculture by reducing their income.

After 2007, the increase in production has been constant, not due to the extension of the surfaces occupied by these crops, but mostly due to the improving in the average yields obtained for each crop.

For example the production of sunflower has increased in 2011 compared with 2006 by 207%.

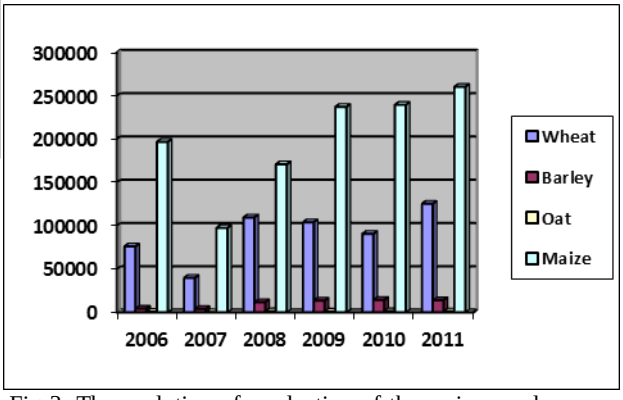

Fig 3. The evolution of production of the main cereal crops between 2006-2011 (tons)

Another important sector of the agriculture of Prahova county is the animal husbandry. The great potential in cereal production, but also the large portions occupied by pastures and hayland have enabled the raising of various species of animals.

Table 4. The evolution of the animal husbandry sector between 2006-2011 (heads) [6]

	2006	2007	2008	2009	2010	2011
Cattle	63.317	50.788	48.085	45.985	35.901	35.500
Pigs	190.842	150.979	164.202	165548	112270	109442
Sheep	129117	116053	143431	177635	151435	162579
Goats	19169	24150	23699	24258	31902	31226
Horses	14524	15784	15822	15426	10775	8521

But compared with the productions in the biological sector, which have increased from year to year, the number of animals raised in the county has had a steep decline. The most notable is the decrease in the number of cattle – the figure went down in 2011 compared to 2006 by 56%. This is not specific to Prahova county, but instead it follows the national trend in cattle breeding.

CONCLUSIONS

Using the 4 components presented above, I was able to make a small analysis in order to characterize the agricultural sector of Prahova county. Even though that in terms of rural development this sector has decreased, it is still the main component and source of income for the rural areas. The repartition of the agricultural real estate by usage, the crops and animals raised may influence the wellbeing of the rural communities. The fact that overall productions have increased as mentioned can be beneficial as an important source of income and taxes. A strong attention however must be direct towards the animal husbandry sector. The sharp decrease in the number of animals raised must attract the reaction of the regional and national authorities in order to take measures to stop this decline. Taking into consideration that the cereal production has grown constantly (one of the most important indicator in animal breeding) , mixed farms can be created with regional financial support in order to have a better use of the biological production, but also improve the efficiency of the farms in economic terms.

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REFERENCES

[1]Alboiu Cornelia, Stirbu, R., 2013, The impact of price volatility on the vegetable market chain fragmentation in Romania, University of Agricultural Sciences and Veterinary Medicine Bucharest
[2]Belletti Giovanni, 2008, Economia dell' azienda agraria e agroindustriale; Universita di Firenze
[3]Belletti Giovanni,2008, Politiche agroambientali e rurali, Universita di Firenze
[4]Marescotti Andrea, 2008, Economia Rurale, Universita di Firenze
[5]Simoncini Riccardo, 2008, Politiche agroambientali e rurali, Universita di Firenze
[6] Zahiu Letitia, 2006, Agricultura Uniunii Europene sub impactul Politicii Agricole Comunitare, Editura Ceres,București
[7]Romanian Statistical Yearbook, 2012

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RESEARCH ON THE MILK PRODUCTION DIFFERENCES DETERMINED BY THE CALVING MONTH OF THE DAIRY COWS

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Abstract

The paper aimed to assess the effect of the calving month on milk production and to correct the biases determined by this environmental factor in order to increase the precision in the breeding value estimation and assure a better evaluation of candidate cows as mothers of sires and bulls used in the artificial insemination to improve genetic gain in the dairy herds. A specific mathematical model, $x_{ij}=m \cdot a_i \cdot e_{ij}$, where x_{ij} – the milk record of the daughter „j" in the month „i" (i=1,2,....12), m – a constant factor, a_i –multiplicative effect of the month „i", e_{ij} – the residual multiplicative effect, was used to process the data regarding milk yield and fat yield by month of calving collected from 4,100 Friesian dairy cows under milk testing. In order to eliminate the biases $\hat{a}_i$, adequate multiplicative adjusting factors were calculated as $1/\hat{a}_i$. The conclusion was that the calvings carried out in the fall-winter months recorded a milk yield by 3.5 % higher in January, by 5.4 % in September, by 6.3 % in December and by 10.5 % in November. The cows with early spring calving have been distadvantaged by 0.4 % in February, by 1.8 % in August up to 7.9 % in May. Therefore, correction factors are imposed to be used in order to increase precision in milk production estimation and finnaly to assure an accurate breeding value for dairy cows and bulls.

Key words**:** *adjusting factors, calving month, dairy cows, high precision, milk yield*

INTRODUCTION

Milk production is determined by a range of environmental factors such as: calving season, nutrition, cow health, milking frequence, geographical region [4, 5, 18, 26].

Milk production performance has a great economic importance both for farmers, being in close relationship with their income and profit, and for breeding value estimation and genetic gain assurance in the dairy farms [14].

The precision in milk production evaluation is extremely important to assure the accuracy of the results regarding the assessment of the heritability of milk characters, the correlations exiting between them and breeding value for various characters of the individual animals [12].

In Europe, the value of animal production accounted for Euro 123 billion in 2005 and the annual genetic gain at farm level was just Euro 1.8 billion, representing 1.5 % [10].

As it is expected a 7 % world consumption of animal products for the next decade, the genetic gain in milk production is recognized as a major tool, besides nutrition, involved in milk production increase. More than this, taking into account the limited land resource for producing forages, production increase should be supported by 3 % genetic gain compared to 1.5 % in the previous period [13]

For this reason, the increase of precision is requested for a more accurately breeding value estimation [1]

In this respect, the scientists have already set up various mathematical models. [12, 16, 19, 21, 25, 30]

Among the non genetic factors influencing milk yield is the calving season and month [2, 3, 6, 7, 11, 15,17, 20, 22, 23, 24, 31, 35, 36]

There are large differences in milk yield among the cows calving in different months. Usually, dairy farmers practice three calving plans: spring, fall and year-around calving, each one with a different impact on the value of weaned calves, annual cow costs and facilities cost. If calving is moved from early spring season to a late season, the calf live

weight for sale will be lower and the income produced per cow and year as well. Feeding cost represents 65-70 % of the total annual production costs/cow and forages are usually the most expensive cost item. A calving planed in the period when the harvested forages are used in cow diet, production cost per cow will be higher and diminish the farmer's profit. Also, an earlier calving increases maintenance cost in the shed for protecting the new born calves and post partum cows from bad weather conditions. A late calving assures calf health, reduced mortalities and the benefit of grazing for cow and calf. Therefore, the month of calving is closely linked to production performance, animal health and farm profitability. [4, 8,33, 34].

Regarding the precision in the breeding value estimation, the research results pointed out important solutions destined to eliminate the influence of the calving month on milk characters [6, 15, 36, 27, 28, 29, 30].

In this context, taking into account that in Romania there are few results regarding the effect of calving month on milk production [9, 27, 28, 29,32], the purpose of this paper is to study and assess the effect of the month of calving on the two basic characters used in cow selection: milk quantity and fat quantity, to establish the corresponding adjusting factors and predict the correct production level which has to be considered for increasing precision of the breeding value estimation.

MATERIALS AND METHODS

A number of 4,100 Friesian dairy cows raised in 221 farms situated in 35 counties of Romania were used as biological material. Their 305 days milk performances for the of the 1st lactation were grouped by calving month and the specific statistical parameters such as: milk yield and fat yield for the 305 days of the 1st lactation, standard deviation and variation coefficient were determined according to the following mathematical formulas:

Milk Yield (MY), $MY = \frac{X_1 + X_2 + ...X_n}{n}$, (1)

where n = the number of dairy cows and X= milk yield/cow/month

Milk yield variance or dispersion of variables,

$\boldsymbol{S^2}$**,** $S^2 = \frac{\sum_{i=1}^{n}(X_i - \overline{X})}{n-1}$, (2)

Standard Deviation, S,

$$S = \left(\sqrt{\frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}} \right) \quad (3)$$

Variation Coefficient, $V_{\%}$,

$$V_{\%} = \frac{S}{\overline{X}} \text{ x } 100 \quad (4)$$

The assessment of the calving month effect on milk production in terms of milk quantity and milk fat quantity was based on the following linear mathematical model:

$x_{ij} = m \cdot a_i \cdot e_{ij}$ (5)

where x_{ij} – the milk performance of the „j" daughter in the calving month „i" (i=1,2,....12), m – a constant factor (geometrical average), a_i –the multiplicative effect of the month „i", e_{ij} – the multiplicative residual effect.

An additive model was associated to the model presented above, as follows:

$Y_{ij} = M + A_i + E_{ij}$, (6)

where: $Y_{ij} = \lg X_{ij}$, $M = \lg m$, $A_i = \lg a_i$, $E_{ij} = \lg e_{ij}$ and applying the least square method resulted

$M + A_i = Y_i/n_i$, (7)

where the presence of the point indicates the summation according to the index which is substituted.

In order to separate A_i from M, the following conditions was imposed:

$$\hat{A}_1 + \hat{A}_2 + ... \hat{A}_{12} = 0. \quad (8)$$

As a result, $\sum M + A_i = 12M + \sum A_i = 12\hat{M}$

or $M = \frac{1}{12}\sum M + A_i$, implicitely

$A_i = M + A_i - \hat{M}$ si $\hat{a}_i = 10^{Ai}$ (9)

In order to eliminate the biases determined by the effect of $\hat{a}_i$, it was applied the adjusting factor calculated as $1/\hat{a}_i$.

RESULTS AND DISCUSSIONS

The average milk production varied between 3,119.42 kg/cow in the month of November and 2,656.98 kg/cow in the month of March (Table 1).

Table 1.Parameters of milk yield by calving month

Calving month	N	$\overline{X} \pm s_{\overline{X}}$	S	V%
1	285	2,940.5±49,6	837.9	28
2	329	2,848.1±49,4	896.1	31
3	580	2,656.9±36,3	875.5	33
4	581	2,709.8±35,8	864.6	32
5	420	2,660.1±45,6	936.4	35
6	321	2,730.0±47,1	844.4	31
7	242	2,716.5±49,9	777.2	29
8	216	2,821.0±60,6	890.9	32
9	227	2,987.9±55,7	839.4	28
10	222	3,063.6±53,5	797.9	26
11	348	3,119.4±44,3	827.7	27
12	329	3,023.0±48,3	876.5	29

Source: Own calculations

In general, in the interval March-July, production records were lower than in the period October-February.

The milk fat yield registered the highest average value in the Winter months, and the maximum value was noticed in December, 118.39 ± 1.69 kg/cow and the minimum of 09.9 ± 1.61 kg/cow in the month of May.

The evolution of the milk fat yield across the year was in general similar with the one recorded by milk yield, if we take into consideration calving season and month (Tabel 2).

The variation coefficient registered almost similar values for the both milk characters, for the same reason mentioned above, varying between 26-35 %.

Table 2.Parameters of milk fat yield by calving month

Calving month	n	$\overline{X} \pm s_{\overline{X}}$	S	V%
1	285	110.8±1.93	32.6	29
2	329	107.1±1.88	34.2	32
3	580	99.4±1.38	33.4	34
4	581	101.5±1.39	33.5	33
5	420	98.9±1.61	33.1	34
6	321	102.2±1.78	31.9	31
7	242	102.4±1.97	30.6	30
8	216	107.6±2.36	34.7	32
9	227	112.8±2.11	31.8	28
10	222	114.6±2.03	30.3	26
11	348	118.3±1.69	31.5	27
12	329	114.2±1.89	34.3	30

Source: Own calculations

The effects of the calving month on the two milk production characters registered, in general, similar values, following aproximately a similar trend along the year (Table 3).

Table 3.The effect estimate of the calving month for milk yield and milk fat yield at the 1st lactation

Calving month	The effect of the calving month on milk yield	The effect of the calving month on milk fat yield
1	1,035	1,037
2	0,996	0,996
3	0,924	0,921
4	0,944	0,939
5	0,921	0,911
6	0,956	0,951
7	0,957	0,959
8	0,982	0,995
9	1,054	1,055
10	1,086	1,079
11	1,105	1,116
12	1,063	1,066

Source: Own calculations

The calculated values show that the cows calving in the months of Fall-Winter seasons had higher milk records than the real data by 3.5 % in January, by 5.4 % in September, by 6.3 % in December and by 10.5 % in November. The cows with the first parturition in Spring to Summer seasons were disadvantaged by 0.4 % in February, by 1.8 % in August up to 7.9 % in the month of May.

The adjusting factors for the month of calving aimed to eliminate these biases in order to allow the comparison of the

production record at the first parturition among the dairy cows.(Table 4).

Table 4.The multiplicative adjusting factors for milk production by calving month

Calving month	Correction factors for milk yield	Correction factors for milk fat yield
1	0.966	0.965
2	1.004	1.004
3	1.082	1.086
4	1.059	1.065
5	1.086	1.098
6	1.046	1.051
7	1.045	1.043
8	1.019	1.005
9	0.948	0.948
10	0.921	0.927
11	0.905	0.896
12	0.940	0.938

Source: Own calculations

For instance, considering two cows, of which Cow A, which had the calving in January and produced 2,940 kg milk and 110 kg milk fat and the Cow B, which had the parturition in May and produced 2,660 kg milk and 90 kg milk fat, to establish which of them has A higher production potential. At the first sight, not taking into account the calving month, it looks that the cow A has a higher production than the cow B. But, after making the required corrections upon milk records for the both cows, one may notice that the cow B achieved 32 kg milk in addition, and, respectively, 3 kg milk fat in addition compared to the cow A.

Corrected milk character records for the calving month and the differences of production compared to the real data are presented in Table 5.

After the application of the correction factors for the month of calving, the corrected data of the milk yield reflect that the peak of average production was registered in May, March, August, April, February, January, November and October.

The highest differences between the corrected milk yield and the real milk yield are registered in the Spring months reflecting that Spring parturitions have a lower effect on milk production record. Similar remarks are available for the differences recorded between the corrected milk fat yield and the real milk fat yield.

Table 5.Corrected milk yield and milk fat yield according to the calving month

Calving month	Real milk yield RMY (kg)	Correction factor	Corrected milk yield CMY (kg)	Differences CMY-RMY (kg)	Real milk fat yield RMFY (kg)	Correction factor	Corrected milk fat yield CMFY (kg)	Differences CMFY-RMFY (kg)
1	2,940.5	0,966	2,846.47	-94.1	110.8	0,965	106.9	-3.9
2	2,848.1	1,004	2,859.49	+11.39	107.1	1,004	107.0	-0.1
3	2,656.9	1,082	2,874.85	+217.87	99.4	1,086	107.9	+8.5
4	2,709.8	1,059	2,869.73	+159.88	101.5	1,065	108.1	+6.6
5	2,660.1	1,086	2,888.94	+228.77	98.9	1,098	108.6	+9.7
6	2,730.0	1,046	2,855.65	+125.58	102.2	1,051	107.4	5.2
7	2,716.5	1,045	2,839.22	+122.26	102.4	1,043	106.8	+4.4
8	2,821.0	1,019	2,874.66	+53.6	107.6	1,005	108.1	+0.5
9	2,987.9	0,948	2,710.18	-277.74	112.8	0,948	106.9	-5.9
10	3,063.6	0,921	2,821.64	-242.04	114.6	0,927	106.2	-8.4
11	3,119.4	0,905	2,823.07	-296.35	118.3	0,896	106.0	-12.3
12	3,023.0	0,940	2,841.65	-181.39	114.2	0,938	107.1	-7.1

Source: Own calculations

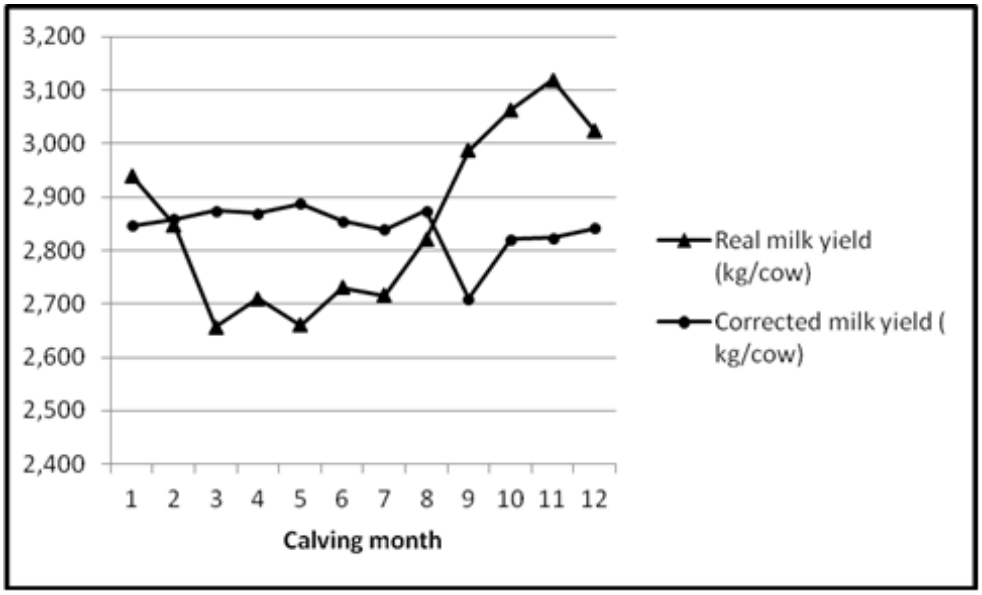

Fig.1.Real milk yield and corrected milk yield for the calving month

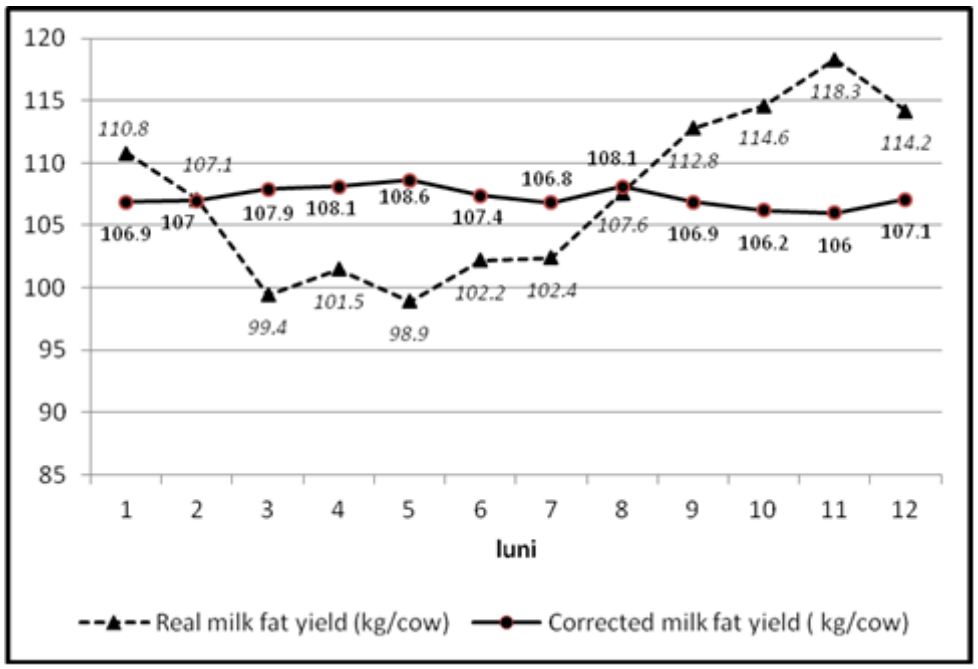

Fig.2.Real milk fat yield and corrected milk fat yield for the calving month

The results are in accordance with other results belonging to the American scientists who calculated the correction factors for the calving month in the prediction of the 305-day lactation yields in the USA dairy herds as mentioned in the study entitled "A Review of the Calving Pattern Management in Dairy Herds" (Table 6).

As one can see from Table 6, the differences between the calving month regarding the milk and milk yield fat were 5.7 and 4.3 % in Holstein cows and 7.7 and 5.7 % for the both Guernsey and Jersey breeds.

However, comparing with the adjusting factors calculated in this experiment, one can notice that in Romania, the value of the correction factors is much different from a month to another because of the large range of raising conditions in various dairy farms with a deep influence on production performance.

Also, milk yield is much lower than lactation yield in the USA.

Table 6. Correction factors for calving month in the prediction of the 305-day lactation yields in the USA for Guernsey, Holstein and Jersey dairy breeds

Month of calving	Guernsey	Holstein	Jersey
1	0.97	0.99	0.98
2	0.97	0.99	0.99
3	0.98	0.98	0.98
4	0.96	0.99	0.98
5	1.00	0.99	0.99
6	1.04	1.02	1.02
7	1.03	1.04	1.03
8	1.04	1.03	1.03
9	1.04	1.01	1.02
10	1.01	1.01	1.00
11	0.99	1.01	1.01
12	0.99	1.02	1.02

Source: A Review of the Calving Pattern Management in Dairy Herds, www.dairyco.org.uk

The effect of the calving month on the total lactation yields in terms of milk yield index

Taking into account that the lowest production was recorded in the month of March (March=100), it was also determined the effect of calving month on the milk yields in terms of milk yield index.

Table 7. The effect of the calving month on the milk yields in terms of milk yield index for the Romania's Friesian dairy cows

Month of calving	Milk yield index (March=100)	Lactation yield (kg)
1	110.7	2,940.5
2	107.2	2,848.1
3	100.0	2,656.9
4	101.9	2,709.8
5	100.1	2,660.1
6	102.8	2,730.0
7	102.2	2,716.5
8	106.2	2,821.0
9	112.4	2,987.9
10	115.3	3,063.6
11	117.4	3,119.4
12	113.8	3,023.0

Source: Own calculations, adapted from Amies (1981) and Poole (1984), cited in A Review of the Calving Pattern Management in Dairy Herds, www.dairyco.org.uk

In this respect, it was used the model adapted from Amies (1981) and Poole (1984) as mentioned in the British study "A Review of the Calving Pattern Management in Dairy Herds"(Table 7).

The effect of the calving month on the milk yields for 305 days of lactation developed in the United Kingdom referred to two dairy breeds were used: the British Friesian and Jersey as presented in Table 8.

Table 8.The effect of the calving month on the total lactation yields in terms of milk yield index for the of UK Holstein dairy cows

Month of calving	Milk yield index (July=100)	Milk yield index (July=100)	Lactation yield (kg)
1	111	105	5,642
2	108	103	5,530
3	105	104	5,580
4	104	103	5,507
5	102	102	5,455
6	101	101	5,383
7	100	100	5,353
8	104	101	5,396
9	109	103	5,523
10	112	107	5,704
11	114	108	5,808
12	113	109	5,857

Source: A Review of the Calving Pattern Management in Dairy Herds, www.dairyco.org.uk

The study pointed out large differences between cow calving in different months. The yields varied from 4,227 kg for Jersey and 7,169 kg for Holstein, with the highest individual of 17,282 kg achieved by the British Friesian which has a lactation length of 305 days and a calving interval of 341 days, and also is the most dominant dairy breed in UK.

CONCLUSIONS

The values of the effects of calving month on the production records of the dairy cows should not be ignored, on the contrary, they should be eliminated by correcting the real data using the corresponding adjusting factors.

Because the effects of the calving month could be amplified by the cow age at the first

parturition, it is imposed to study the cumulated effects of these two factors on milk production.

The correction factors must be updated every year, so that the variations which could appear from a year to another to be avoided.

The application of the correction factors for the calving month is very important because it bring an additional precision in milk production estimation, dairy cow evaluation and bull ranking based on their daughters performance assessment and the preserve in the top of the breeding pyramid the best bulls.

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REFERENCES

[1]A Review of the Calving Pattern Management in Dairy Herds, *www.dairy*co.org.uk

[2]Auran, T., 1973. Studies on monthly and cumulative monthly milk yield records. 1. The effect of age, month of calving, herd and length of the first period. Acta Agric. Scand. 24, 339-348.

[3]Bereskyn, B., Freeman, A.E., 1965, Genetic and environmental factors in dairy size evaluation. I. Effects of herds, months and year-seasons on variance among lactation records, repetability and Heritability. J. Dairy Sci., 48 (2): 347-351

[4]Blezinger Steven B., 2005, Calving season shou**ld** be based on economics, resources, Cattle Today Onlline, http://www.cattletoday.com/archive/2005/April/CT388.shtml

[5]Chagunda, M. G., Wollny, C., Ngwerume, F., Kamwanja, L. A., Makhambera, T. P. E., Environmental factors affecting milk production of a Holstein Friesian herd in Southern Malawi, http://www.ilri.org/InfoServ/Webpub

[6]Cooper, J.B. & Hargrove, G.L., 1982. Age and month of calving adjustments of Holstein protein, milk and fat lactation yields. J. Dairy Sci. 65, 1673 - 1678.

[7]Dam, B. P. Van, Bartlett, P.C., Kirk, J.H., Mather, E.C.,1988, The effect of age at calving on reproduction, milk production and disease incidence in the first lactation of dairy heifers. Theriogenology, 30(3) :583-591

[8]De Vries Albert, Van Leeuwen Jessika, Thatcher William W., 2013, Economics of Improved Reproductive Performance in Dairy Cattle, EDIS, University of Florida, IFAS Extension, http://edis.ifas.ufl.edu/an156

[9]Drăgănescu, I.C., Constantinescu, C., 1973, Research on the infleunce of the age at first calving and calving season on milk production at the first lactation, Scientific Papers, Institute for Animal Science and Production Corbeanca, Vol. I:49-69

[10]FABRE-TP 2005, Farm animal breeding and reproduction in Europe technology platform, sustainable animal breeding and reproduction—a vision for 2025. Draft, 5 October 2005

[11]Fahey J., Morton J.M.,Macmillan K.L., 2003, Associations between milk protein percentage and reproductive performance in Holstein-Friesian cows in seasonal-calving dairy herds. Proceedings of the 15th Conference, Association for the Advancement of Animal Breeding and Genetics, Melbourne, Australia, 7-11 July 2003. pp. 68-71.

[12]Flint, A.P.F, Woolliams, J.A., 2008, Precision animal breeding, Phil. Trans. R. Soc. BS, V*ol. 363*(1491): 573-590

[13]Food and Agriculture Organization 2000, Global Environmental Outlook, Ch. 2. London, UK Earthscan Publications Ltd, on behalf of the United Nations Environment Programme

[14]Gonza´lez-Recio, O., Pe´rez-Cabal, M. A., Alenda, R., 2004, Economic value of female fertility and its relationship with profit in Spanish dairy cattle. J. Dairy Sci., 87: 3053–3061

[15]Gravir, K., Hickman, C.C., 1974, Control of Seasonal Effect in the Regression of First-Lactation Yield on Age of Dairy Cattle. 1st Wld. Congress on Genetics applied to livestock production. Madrid

[16]Guerra José Lúcio Lima, 2004, Statistical models and genetic evaluation of binomial traits, Disertation, Louisiana State University, p.8-24, 48-53

[17]Hintz, R. L., Lusby, K. S., Totuse Robert, Influence of Month of Calving on Daily Milk Yield: Progress Report on Development of a Model of a Cow-calf System , Oklahoma Agricultural Experiment Station, p.68-72, http://beefextension.com/research_reports/research_56_94/rr81/rr81_20.pdf

[18]Javed, K., Afzal, M., Sattar, A., Mirza, R. H., 2004, Environmental factors affecting milk yield in Friesian cows in Punjab, Pakistan, Pakistan Vet. J., 24(2): 58-62

[19]Kaps Miroslav, Špehar Marija, 2004, Estimation of Genetic Parameters and Breeding Values of Milk Traits for Simmental Cattle in Croatia Using a Lactation Animal Model, Agriculturae Conspectus Scientificus, Vol. 69(4):91-94

[20]Khan, U.N., Benishek, I.I., Ahmad, M.D., Chaudhary, M.Z., Athar, S.M., 1989, Influence of the first calving on the milk production on native and crossbred dairy cows, Animal Sciences Institute, Islamabad, AJAS, Vol.2(4):565-570

[21]Khanzadeh Hassan, Hossein-Zadeh Navid Ghavi, Naserani Mohammad, 2013, Estimation of genetic parameters and trends for milk fat and protein

percentages in Iranian Holsteins using random regression test day model, Archiv Tierzucht 56:47, p.2
[22]Miller, R.H., Lentz, W.E., Henderson, C.R., 1970, Joint influence of month and age of calving on milk yield of Holstein cows in the Northeaster United States. J. Dairy Sci., 53 (3)
[23] Mostert, B.E., Theron, H.E., Kanfer, F.H.J., 2001, The effect of calving season and age at calving on production traits of South African dairy cattle, South African Journal of Animal Science, 31(3):205-215
[24]Mulholland, M.,Hutchinson, R., 1998, Seasonality of milk production – implications for milk pricing. Technical Note Dairy 10. Greenmount College of Agriculture and Horticulture, Department of Agriculture and Rural Development.
[25]Neuer Stefan, Edel Christian, Emmerling Reiner, Thaller Georg, Götz Kay-Uwe, 2009, Precision of genetic parameters and breeding values estimated in marker assisted BLUP genetic evaluation, Genet. Sel. Evol. 2009,41(1): 26
[26]Obadina, A.O., Factors Affecting Milk Yield, Dairy Production 342-450, A Milk Yield & Composition, p.1-9, http://unaab.edu.ng/attachments/Obadina.pdf
[27]Popescu Agatha, 1987, Elimination of the effect of calving month on the milk performance of Friesian dairy cows. Annals of the Agricultural Institute Cluj-Napoca. Actualities in the technology of animal production, Vol.XII: 65-70
[28]Popescu Agatha, 1987, Elimination of the calving month effect on the cow productive performance. Animal Production J., no. 8
[29]Popescu Agatha, 2014, Increase of the precision in the breeding value estimation by B.L.U.P.-Best Linear Unbiased Prediction, Ed.Eikon Cluj-Napoca, Ed.RawexComs, Bucharest, p.87,116-119
[30]Schaefer Lawrence R., 2010, Linear Models and Animal Breeding, University of Guelph, Centre for Genetic Improvement of Livestock, www.aps.uoguelph.ca/~lrs/ABModels/DATA/EuropeNotes.pdf
[31]Simpson, D., 1998, Relationships between age at calving, peak milk yield and season of calving on the reproductive performance of Holstein Friesian and Jersey cattle in a commercial herd. BSc Agriculture Dissertation, Department of Agriculture, University of Aberdeen
[32]Stanciu, G., Roşu, M., Jurca, A., 1982, Influence of the calving season and age upon milk or fat production in Romanian Spotted Breed, Animal Production J., no.5
[33]Street, P, 1974, Studies in milk production systems. 1. Seasonal calving pattern an economic decision. Journal of the British Grassland Society, 29: 163-171
[34]Valencia, V., Anderson D., 2000, Choosing optimal milk production systems in a changing economic environment. Farm Management 10: 618-630.
[35]Wilson, G. F., 2014, The influence of date of calving on milk production, New Zealand Journal of Agricultural Research, 7(1):80-86
[36]Wilmink, J.B.M., 1987. Adjustment of test-day milk, fat and protein yield for age season and stage of lactation. Livest. Prod. Sci. 16, 335-348.

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RESEARCH ON THE MEAT PRODUCTION DIFFERENCES DETERMINED BY THE BIRTH MONTH OF THE FATTENED STEERS

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Abstract

The purpose of the paper was to assess the effect of the birth month on some meat production characters such as live weight at the age of 180 days, live weight at the age of 365 days and daily gain during the fattening period in progeny testing for bulls' breeding value estimation in order to correct the biases determined by this environmental factor. In this purpose, the following linear mathematical model was used: $x_{ij}=m \cdot a_i \cdot e_{ij}$, where x_{ij} - the live record of the "j" steer in the month "i" (i=1,2,....12), m- geometrical average of the meat production characters taken into account, a_i- the multiplicative effect of the birth month "i" and e_{ij} – the residual multiplicative effect. A number of 1,705 half-brothers belonging to 105 Friesian bulls from Romania was included in this progeny testing. In order to eliminate the biases $\hat{a}_i$, adequate multiplicative adjusting factors were calculated as $1/\hat{a}_i$. The conclusion was that the effects of birth month on the meat production in terms of live weight at the age of 180 days, live weight at the age of 365 days and daily gain during the fattening period should not be ignored, on the contrary, they should be eliminated by correcting the real data using corresponding adjusting factors. Therefore, adjusting factors are justifed to be used in order to improve the accuracy of the bulls' breeding value estimation for meat production.

Key words**:** *adjusting factors, birth month, high precision breeding value, meat production, progeny testing, steers fattening*

INTRODUCTION

The development of cattle meat production involves a series of technological factors such as: animal breeding, reproduction, nutrition, raising, housing, and farm management in order to increase the live weight at slaughter and improve beef quality in order to better cover consumer's needs.

Genetic improvement is based on breeding programmes which have to be scientifically based on the use of pertinent and more precise data regarding the performance of the individuals taken into consideration [6, 11, 26].

The influence of various environment factors on the accuracy of the data used in animal breeding imposed the setting up of various adjusting factors in order to eliminate their biases which trend to obscure the true genetic ability of sires.

Because of the small amount of data at the herd level, correction factors are usually calculated from the data collected from many herds existing in a region or a country and then they are used in all the herds of that environment.

In order to avoid the biases caused by the different number of groups where the simple group average is calculated, it is imposed to involve more individuals and divide them into subclasses based on various criteria [8, 11, 19, 27]. However, it is also needed to chose a standard to which to adjust various specific characters for beef steers, e.g. birth weight, weaning and post-weaning weight, daily gain etc, which are commonly used in the developed countries. In some countries, besides these factors, there are additionally considered more environmental factors such as: herd and year, season age of dam, previous parous state, calving interval in order to get a higher precision in bull's breeding value assessment, because it is know that bulls assure the highest selection pressure in

transmitting high value genes to a larger proportion of the progeny than a female [9].
Most of the breeding programmes are supported by the application of various linear models whose evolution has deeply performed across the time [13,21, 25, 28].
The scientists who approached the problem of progeny testing for meat production were dealing with various characters which could be divided into three categories:(a) live characters such as: birth weight, weaning and post-weaning weight, weight at various ages of the young steers used in the progeny testing [1, 3, 4, 12, 23, 24]; (b) carcass characters such as: carcass weight, composition, lean meat yield, muscle-bone ration, eye muscle volume index [5, 6, 14]; (c) both live and carcass characters [2, 15, 16,17, 22, 29].
In the recent decades, genomics has been deeply involved in the increasing the accuracy of the estimated breeding value [20].
Also, bioeconomic models were set up linking the biological characters of animals with the financial results of the production system in order to support the development of beef production in low input family-based beef cattle production system [18].
In this context, taking into consideration that in Romania there are few results regarding the effect of birth month on meat production [5,7,23], the present paper aimed to give its contribution to the setting up of adjusting factors for birth month of the steers used in progeny testing in order to increase the accuracy of bull's breeding value estimation.

MATERIALS AND METHODS

The biological material was represented by 1,705 half-brother steers belonging to 105 Friesian bulls from Romania. The steers were fattened in various testing herds for 12 months. The selection characters taken into consideration were the steer live weight at 180 days and 365 days as well as the daily gain during the fattening period.
The average, standard deviation and variation coefficient for the meat production characters mentioned above were calculated using the following mathematical formulas:

Average Weight (AW),

$$AW = \frac{X_1 + X_2 + ...X_n}{n}, \quad (1)$$

where n = the number of steers cows and X= weight (kg/head) at different ages;

Weight variance, S^2, $S^2 = \frac{\sum_{i=1}^{n}(X_i - \overline{X})}{n-1}$, (2)

Standard Deviation, S, $S = \left(\sqrt{\frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}} \right)$ (3)

Variation Coefficient, $V_{\%}$, $V_{\%} = \frac{S}{\overline{X}}$ x 100 (4)

The evaluation of the birth month effect on meat production parameters was based on the following linear mathematical model:

$x_{ij} = m \cdot a_i \cdot e_{ij}$ (5)

where x_{ij} – meat production character of the „j" half-brotther steer in the birth month „i" (i=1,2,....12), m – geometrical average of the meat production character, a_i –the effect of the birth month „i", e_{ij} – the multiplicative residual effect.
An addititional model was attached to this model presented above, as follows:

$Y_{ij} = M + A_i + E_{ij}$, (6)

by using logarithms as follows: $Y_{ij} = \lg X_{ij}$, $M = \lg m$, $A_i = \lg a_i$, $E_{ij} = \lg e_{ij}$.
Also, the least square method was applied, resulting the effect of the birth month, symbolized $\hat{a}_i = 10^{Ai}$ and the corresponding adjusting factor $1/\hat{a}_i$.

RESULTS AND DISCUSSIONS

The average live weight at the age of 180 days by birth month varied between 162.0 ± 3.81 kg registered by the steers born in November and 116.4 ± 1.80 kg recorded by the steers born in July.

Table 1.Parameters for the live weight at the age of 180 days by birth month

Birth month	N	$\overline{X} \pm s_{\overline{X}}$	S	V%
1	283	141.4±1.52	25.6	18
2	189	129.6±1.56	21.5	17
3	225	138.1±1.77	26.6	19
4	268	118.9±1.33	21.7	18
5	183	128.1±1.86	25.2	20
6	131	123.7±1.45	16.6	13
7	57	116.4±1.80	13.6	12
8	11	119.3±4.23	14.0	12
9	152	137.8±1.83	22.5	16
10	94	140.4±2.48	24.1	17
11	51	162.0±3.81	27.2	17
12	61	146.0±3.43	26.8	18

Source:Own calculations

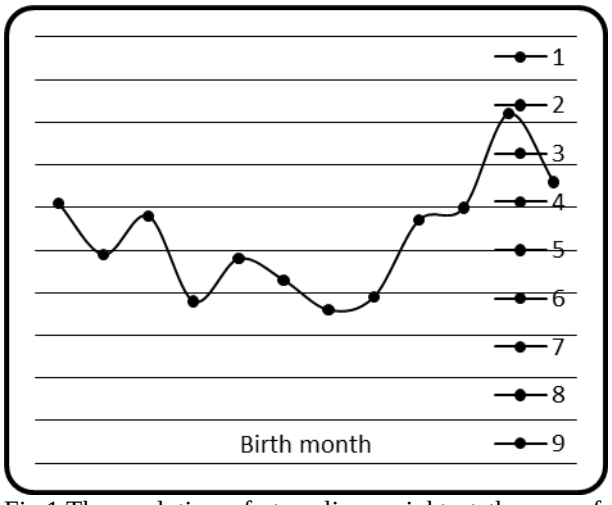

Fig.1.The evolution of steer live weight at the age of 180 days by birth month

Looking at the other figures presented in Table 1, one can see that the individuals born in the months of November, December and January, that is during the winter season were heavier than the ones born in June, July and August, that is in the Summer season.

The variation coefficient varied between 12 % in July and 20 % in May showing that there were no large differences between steers for the studied meat production character in relation to the birth month.

The effect of the birth month and correction factors for the live weight at the age of 180 days are presented in Table 2.

The average live weight at the age of 365 days by birth month varied between 311.5 ± 3.82 kg registered by the steers born in December and 273.8 ± 3.11 kg recorded by the steers born in May.

Table 2. The multiplicative effect of the birth month and the adjusting factors for the live weight at the age of 180 days

Month of birth	Effect of Birth Month	Correction Factors
1	1.056	0.947
2	0.990	1.010
3	1.057	0.946
4	0.940	1.064
5	0.983	1.017
6	0.938	1.066
7	0.896	1.128
8	0.912	1.097
9	1.008	0.992
10	1.020	0.980
11	1.168	0.856
12	1.075	0.930

Source:Own calculations

Looking at the other figures presented in Table 3, one can see that the individuals born in the Fall and Winter seasons registered higher live weights at the age of 365 days in compariosn with the ones which were born during the Summer season.

The variation coefficient varied between 11 % in February and November and 16 % in April showing lower differences between steers for the birth month at the age of 365 days compared to the case at the age of 180 days (Table 3).

The effect of the birth month and correction factors for the live weight at the age of 365 days are presented in Table 4.

Table 3.Parameters for the live weight at the age of 365 days by birth month

Birth month	N	$\overline{X} \pm s_{\overline{X}}$	S	V%
1	283	307.7±2.16	36.4	12
2	189	287.5±2.37	32.6	11
3	225	293.6±2.70	40.5	14
4	268	275.1±2.73	44.7	16
5	183	273.8±3.11	42.1	15
6	131	293.9±3.56	40.8	14
7	57	284.1±5.29	39.9	14
8	11	292.4±12.16	40.3	14
9	152	311.0±3.67	45.2	15
10	94	310.3±4.95	48.0	15
11	51	305.5±4.90	35.0	11
12	61	311.5±3.82	29.9	10

Source:Own calculations

The average daily gain during the fattening period birth month varied between 963.4 ± 56.6 g for the steers born in August and 772.0 ± 23.3 g for the ones born in November.The daily gain varied from a month to another but mainly for the steers born in the months of the Summer season.

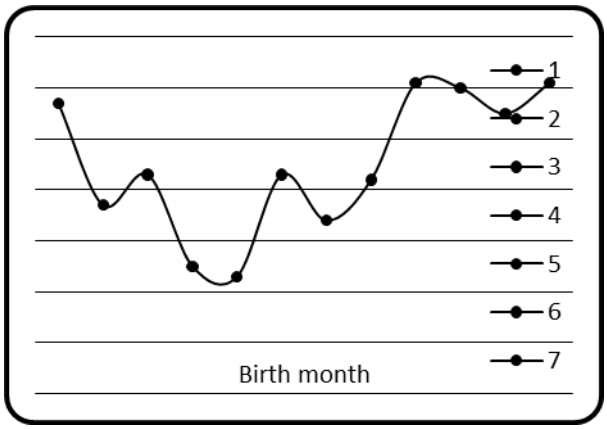

Fig.2.The evolution of steer live weight at the age of 365 days by birth month

Table 4. The multiplicative effect of the birth month and the adjusting factors for the live weight at the age of 365 days

Month of birth	Effect of Birth Month	Correction Factors
1	1.021	0.980
2	0.963	1.039
3	1.002	0.998
4	0.987	1.014
5	0.960	1.041
6	1.010	0.990
7	0.971	1.030
8	0.996	1.004
9	1.038	0.964
10	1.037	0.964
11	0.999	1.001
12	1.021	0.979

Source:Own calculations

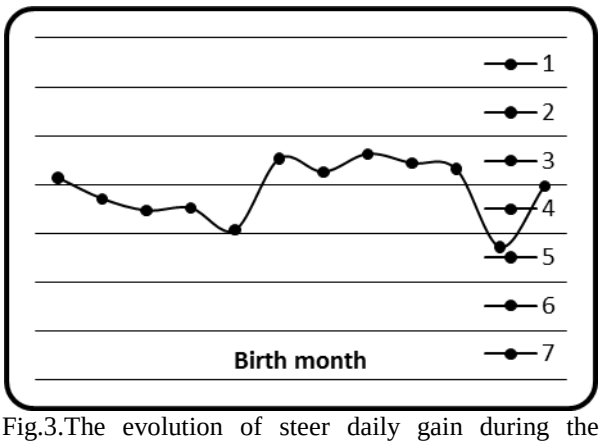

Fig.3.The evolution of steer daily gain during the fattening period by birth month

The variation coefficient varied between 13 % in January and 24 % in May (Table 5).

Table 5.Parameters for the daily gain during the fattening period by birth month

Birth month	N	$\overline{X} \pm S_{\overline{X}}$	S	V%
1	283	914.5±6.8	115.2	13
2	189	871.7±8.5	117.7	14
3	225	847.4±10.1	152.3	18
4	268	852.8±10.8	177.1	21
5	183	807.3±14.3	194.6	24
6	131	953.5±19.3	221.4	23
7	57	926.7±24.4	104.5	20
8	11	963.4±56.6	107.9	20
9	152	944.8±16.3	199.3	21
10	94	932.3±21.2	205.7	22
11	51	772.0±23.3	167.0	22
12	61	897.5±18.6	145.8	16

Source:Own calculations

The effect of the birth month and correction factors for the daily gain during the fattening period are presented in Table 6.

Table 6. The multiplicative effect of the birth month and the adjusting factors for the daily gain during the fattening period

Month of birth	Effect of Birth Month	Correction Factors
1	1.012	0.989
2	0.966	1.035
3	0.973	1.028
4	0.986	1.015
5	0.972	1.028
6	1.063	0.941
7	0.991	1.010
8	1.040	0.961
9	1.039	0.963
10	1.048	0.954
11	0.921	1.086
12	0.999	1.001

Source:Own calculations

CONCLUSIONS

The effects of birth month on the meat production records in terms of live weight at the age of 180 days, live weight at the age of 365 days and daily gain during the fattening period should not be ignored, on the contrary, they should be eliminated by correcting the real data using the corresponding adjusting factors.

The correction factors proposed to be used in the practice of animal breeding should be updated every year, so that the variations which could appear from a year to another to be avoided.

The application of the correction factors for the birth month is very important because it brings an additional precision in meat production assessment, bull breeding value estimation ranking based on their sons performance so that in the top the breeding pyramid to be retained only the best bulls.

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REFERENCES

[1] Averdunk, G., 1968, Genetic aspects of test period lenghthon rate of gain in cattle. J. An. Sci., 27, 1124

[2]Averdunk, G., 1974, Progeny testing for beef characteristics, 1st . World Congress on Genetics applied to livestock production. Madrid

[3]Bar-Anan, R., Levi, U., Shillo, A., Soller, M., 1965, Progeny testing Israeli-Friesian A.I. Sires for rate of gain. World Review of An. Prod. Vol.7 (special issue), 53

[4]Calo, L.L., Mc. Dowel, R.E., Van Vleck, L.D., Miller, P.D., 1973, Parameters of growth of Holstein-Friesian bulls, J. An. Sci., 37: 417

[5]Călinescu, E., 1969, Bull testing for meat production. Agrosilvica Press House, Bucharest

[6]Dickerson, C.E., Kunzi, N., Cundiff, L.V., Koch, B.M., Arthaud, V.R., Gregory, K.E., 1974, Selection criteria for efficient beef production. J.Anim. Sci., 39(4):651-673

[7]Draganescu, C., 1979, Animal Breeding, Ceres Press House, Bucharest

[8]Eisner, P., 1963, Bull evaluation based on progeny testing, Selhozghiz. Moscow

[9]FAO, Breeding plans for ruminant livestock, http://www.fao.org

[10]Fimland, E., 1971, Progeny testing for meat production characters in 1971. Buskap Audratt. 23: 203

[11]Furtunescu, A., 1975, Sire Breeding Value Estimation, Ceres Press House, Bucharest

[12]Hashiguchi Tsutomu, Maeda Yoshizane, Kashima Manabu, Tanoue Yuseki, Yamaji Masanori, 1982, Effectiveness of "On-farm Progeny Testing" on the Meat Production Performance of Japanese Black Cattle, (Faculty of Agriculture, Kagoshima University; Kagoshima Prefectural Livestock Experiment Station, Nihon Chikusan Gakkaiho, Vol.53(10):656-663

[13]Henderson, C.R., 1984, Application of linear models in animal breeding. Guelph, Ontario: University of Guelph, 462 p

[14]Johnson, E., 2008, Genetic improvement in beef cattle using a progeny testing system based on carcass merit, Australian Veterinary Journal, Vol.73(6):225-232

[15]Keane, M.G., Diskin, M.G., 2007, Performance and carcass traits of progeny of Limousin sires differing in genetic merit, Irish Journal of Agricultural and Food Research, Vol. 46: 63–76

[16]Koots, K.R., Gibson, J.P., Smith, C., Wilton, J.W., 1994a, Analyses of published genetic parameter estimates for beef production traits. 1. Heritability. Animal Breeding Abstracts, Vol..62, 309-338

[17]Koots, K.R., Gibson, J.P., Wilton, J.W., 1994b, Analyses of published genetic parameter estimates for beef production traits. 2. Phenotypic and genetic correlations. Animal Breeding Abstracts, Vol..62, 825-852

[18]Laske Carlos Henrique, Teixeira Bruno Borges Machado, Dionello Nelson José Laurino, Cardoso Fernando Flores, 2012, Breeding objectives and economic values for traits of low input family-based beef cattle production system in the State of Rio Grande do Sul, R. Bras. Zootec. Vol.41(2) Viçosa Feb. 2012

[19]MacDonald, M. A., 1956, Evaluation and Selection of Beef Cattle, Ruakura Animal Research Station, Department of Agriculture, Hamilton,New Zealand. http://www.asap.asn.au/livestocklibrary/1956/MacDonald56.PDF

[20]Montaldo Hugo H. , Casas Eduardo , Ferraz José Bento Sterman, Vega-Murillo Vicente E., Román-Ponce Sergio Iván, 2012, Opportunities and challenges from the use of genomic selection for beef cattle breeding in Latin America, Animal Frontiers, Vol.2(1):22-23, http://www.animalfrontiers.org/content/2/1/23.full

[21]Pribyl, J., Misztal, I., Pribylova, J. , Šeba, K., 2003, Multiple-breed, multiple-traits evaluation of beef cattle in the Czech Republic, Czech J. Anim. Sci., 48, (12): 519–532

[22]Phocas, F., Colleau, J.J., Ménissier, F., 1995, Expected efficiency of selection for growth in a French beef cattle breeding scheme. I. Multistage selection of bulls used in artificial insemination , Gen.Sel.Evol., 27:149-170

[23]Popescu Agatha, 1987, Corrections for the birth month of the steers under progeny testing for meat production. Annals of the Agricultural Institute Cluj-Napoca. Actualities in animal production, Vol.XII, p.77-83

[24]Popescu Agatha, 2014, Increase of the precision in the breeding value estimation by B.L.U.P.-Best Linear Unbiased Prediction, Eikon Cluj-Napoca, Ed.RawexComs, Bucharest Press Houses, p.122-129

[25]Schaefer Lawrence R., 2010, Linear Models and Animal Breeding, University of Guelph, Centre for Genetic Improvement of Livestock, www.aps.uoguelph.ca/~lrs/ABModels/DATA/EuropeNotes.pdf
[26]Searle, S.R., 1964, Progeny tests of sire and son. J. Dairy Sci., 47:414
[27]Skerjvold, H., 1963, The optimum of progeny groups and optimum use of young bulls in A.I. Breeding. Acta Agric. Scand, XIII: 131-140
[28]Van Vleck, L. D., Hakim, A. F., Cundiff, L.V., Koch, R.M., Crouse, J. D., Boldman, K.G., 1992, Estimated breeding values for meat characteristics of crossbred cattle with an animal model, J. Animal Sci., 70:363-371
[29]Wilson, L. L., Mc Curley, J. R., Ziegler, J. H., Watkins, J. L., 1976, Progeny of Polled Hereford Sires and Angus-Holstein Cows Genetic Parameters of Live and Carcass Characters, Journal of Animal Science, 43:569-576

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RESEARCH ON THE INFLLUENCE OF THE CALVING INTERVAL ON MILK YIELD

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Abstract

The paper goal was to study the influence of the calving interval on milk yield for the Romanian Brown breed, using 950 lactations, of which: 573 lactations (60.31 %) belonged to the over 400 days calving interval and 377 lactations (39.69%) belonged to the 351-400 days calving interval. The calving interval varied between 446.41±18.94 days, the highest length for the 51 dairy cows which had parturition in September and 373.49 ±14.28 days, the shortest length for 53 cows which calved in October. The average calving interval for the cows with a calving interval longer than 400 days accounted for 425.58±14.10 days, while the average calving interval for the cows with this reproductionindicator between 351 and 400 days was 358.65±10.07 days. For the cows whose calving interval was longer than 400 days, milk yield accounted for 4,682.5±124.92 while for the cows whose calving interval varied between 351 and 400 days registered 4,240.0±215.10 kg. The calculations revealed a gross product of Lei 6,087 per lactation in case of cows whose calving interval was longer than 400 days and Lei 5,512 in case of the cows whose calving interval varied between 351-400 days. For an average difference of 66.93 days calving interval between the two calving interval size groups taken into consideration, the milk yield difference accounted for 442.50 kg in the benefit of the cows with the calving interval longer than 400 days. Also, a difference of Lei 575 was recorded in the favor of the cows with calving intervals longer than 400 days because they registered higher a milk yield. This means Lei 8.59 additional income per cow and calving interval day longer than 400 days.

Key words**:** *calving interval, dairy cows, economic efficiency, milk yield*

INTRODUCTION

Milk yield and milk fat content are the main factors that drive the economic profitability in dairy farming. As long as, the heritability of the milk characters is very low, ranging between 0.2-0.3, this means that the growth of milk yield depends mainly of the environmental factors among which feeding is recognized to be the major one. But, among the non genetic factors affecting milk yield, we have to also include age at calving, calving interval, days dry, calving month/season, cow health, milking frequence, herd and parity, agro-ecological conditions where the farm is operating [4, 5, 9, 11, 13,14].

Less attention was paid by research to the link which could exist between the length of the calving interval and milk yield [2, 3, 6, 8,10, 12, 16, 18, 19], most of the studies were focused on calving interval as the key reproduction indicator [15] and just a few approached the aspect of profitability [1,7,17]. The length of the calving interval could also affect the number of offspring and meat production.

More than this, calving interval is mentioned as a factor causing errors in bulls breeding value estimation [16].

In this context, the paper aimed to study the calving interval and milk production for the Romanian Brown breed, in order to establish in what measure the length of the calving interval affect milk yield and gross product coming from milk production.

MATERIALS AND METHODS

In order to carry out the research study, the data about milk yield per lactation and calving interval from a population of Brown dairy cows from various farms of Romania were collected. The data were divided into two sub

categories by calving interval size groups as follows: over 400 days calving interval and 351-400 days calving interval. The total number of lactations counted for 950, of which: 573 lactations (60.31 %) belonged to the over 400 days calving interval and 377 lactations (39.69%) belonged to the 351-400 days calving interval.

The average, standard deviation and coefficient of variation were statistically determined both for milk yield and calving interval, according to the following mathematical formulas:

Average Parameter (AP),

$$AP = \frac{X_1 + X_2 + ...X_n}{n}, \quad (1)$$

where n = the number of variables and X= indicator taken into account (milk yield/calving interval)

Variance of variables, S^2, $S^2 = \frac{\sum_{i=1}^{n}(X_i - \overline{X})}{n-1}$, (2)

Standard Deviation, S, $S = \left(\sqrt{\frac{\sum_{i=1}^{n}(X_i - \overline{X})^2}{n-1}}\right)$ (3)

Variation Coefficient, $V_{\%}$, $V_{\%} = \frac{S}{\overline{X}}$ x 100 (4)

In the paper it was also calculated the gross product coming from milk/cow in terms of current milk price (Lei 1.3/milk kg) and the difference of gross product was pointed out in close relationship with the length of the calving interval as an expression of the profitability.

RESULTS AND DISCUSSIONS

The distribution of calving intervals by calving month was the following one: January 74 (7.78%), February 73 (7.68%), March 162 (17.05 %), April 118 (12.42 %), May 100 (10.52 %), June 82 (8.63%), July 63 (6.63%), August 48 (5.05 %), September 51 (5.36%), October 53 (5.57 %), November 64 (6.73 %) and December 62 (6.52 %) as presented in Table 1.

Calving interval parameters by calving month.

The figures from Table 1 show that the calving interval varied between 446.41 ± 18.94 days, the highest length for the 51 dairy cows which had parturition in September and 373.49 ± 14.28 days, the shortest length for 53 cows which calved in October.

In 8 months: January, February, April, June, July, August, September and November, the calving interval was longer than 400 days and in only 4 months of calving: March, May, October and December the calving interval it was less than 400 days.

The variation coefficient of the calving interval varied between 36.71 % in case of the calvings in December and 21.30 % in case of the calvings in August.

Table 1.Parameters of calving interval by calving month

Calving month	N	$\overline{X} \pm s_{\overline{X}}$	S	V%
1	74	414.24±12.95	113.98	27.51
2	73	404.19±14.45	123.45	30.53
3	162	392.08±10.56	134.40	34.27
4	118	422.04±9.64	104.76	24.62
5	100	398.24±10.39	103.90	26.08
6	82	423.28±11.81	106.89	25.25
7	63	417.04±15.43	122.42	29.35
8	48	427.33±13.15	91.05	21.30
9	51	448.41±18.94	135.24	30.29
10	53	373.49±14.28	103.99	27.84
11	64	440.98±16.64	133.16	30.19
12	62	386.96±18.05	142.07	36.71
Total	950	408.94±13.85	117.94	28.84

Source: Own calculations

Regression of the calving interval by calving month was r = +0.383, small and less significant, according to the regression function: Y = 409.65 + 0.363 x.

Calving interval parameters by calving interval size group are presented in Table 2.

The average calving interval for the cows with a calving interval longer than 400 days accounted for 425.58±14.10 days, while the average calving interval for the cows with this

reproduction indicator between 351 and 400 days was 358.65±10.07 days.

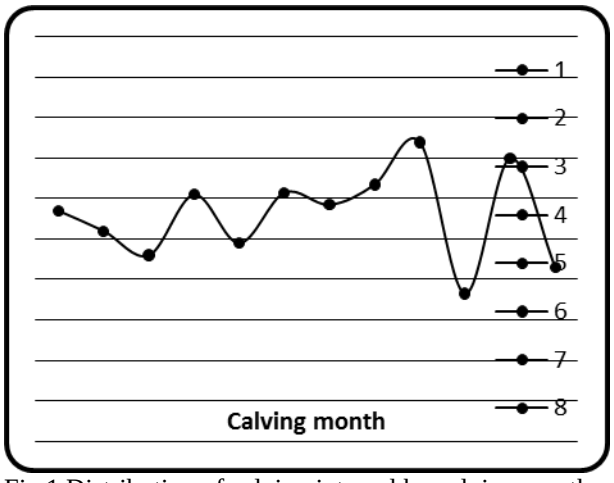

Fig.1.Distribution of calving interval by calving month

Table 2.Calving interval parameters by calving interval size group

Calving interval size group	N	$\overline{X} \pm s_{\overline{X}}$	S	V%
Over 400 days	573	425.58±14.10	116.61	27.40
351-400 days	377	358.65±10.07	120.94	33.72

Source: Own calculations

The variation coefficient varied between 27.40 % in case of calving intervals higher than 400 days and 33.72 % in case of the calving interval varying between 351-400 days (Table 2).

Milk yield parameters pointed out differences determined by the length of the calving interval. Taking into account the all 950 lactations, the average milk production was 4,506.89±136.09 kg. For the cows whose calving interval was longer than 400 days, milk yield accounted for 4,682.5±124.92 while the cows whose calving interval varied between 351 and 400 days registered 4,240.0±215.10 kg milk.

The variation coefficient for milk yield recorded 19.90 % in case of calving intervals longer than 400 days and 28.66 % in case of calving intervals ranging between 351-400 days (Table 3).

Gross product from milk by calving interval size group. For all the 950 lactations, gross product coming from milk accounted for Lei 5,858 per lactation taking into account the average milk price imposed by processors, Lei 1.3/milk kg. The calculations revealed a gross product of Lei 6,087 per lactation in case of cows whose calving interval was longer than 400 days and Lei 5,512 in case of the cows whose calving interval varied between 351-400 days (Table 4).

Table 3.Milk yield parameters by calving interval size group

Milk yield (kg)	Calving interval		
	Over 400 days N=573	351-400 days N=377	Total N=950
$\overline{X} \pm s_{\overline{X}}$	4,682.5±124.92	4,240.0±215.10	4,506.89±136.09
S	932.14	1,215.46	994.25
V%	19.90	28.66	22.06

Source: Own calculations

Therefore, for an average difference of 66.93 days calving interval between the two calving interval size groups taken into consideration, the milk yield difference accounted for 442.50 kg in the benefit of the cows with the calving interval longer than 400 days.

Also, a difference of Lei 575 was recorded in favor of the cows with calving intervals longer than 400 days because they registered higher a milk yield. This means Lei 8.59 additional income per cow and calving interval day longer than 400 days (Lei 575: 66.93 days calving interval).

Research results obtained by other authors pointed out similar remarks. In the USA, the extended calving had a good impact on

production and profitability for the high yielding cows at 1st lactation. The primiparous and multiparous cows with a longer calving interval were advantaged by USD 0.19 and, respectively, USD 0.12/day of calving interval in net returns [1].
Other results concluded that, on the contrary, a shorter calving interval could contribute to a higher production and profitability [7].
An Israelian study revealed that the net return per day for the primiparous cows was by USD 0.21 higher per day than in case of the control cows for the 1st 150 days of the 2nd lactation. The multiparous cows were advantaged by USD 0.16 per day compared to the control cows. [17]
In Romania, in case of the Black and White Breed it was found that a calving interval of 350-400 days assured the highest milk yield, while a longer one than 400 days as well as a shorter one than 351 days had a negative impact on milk performance [2].

Table 4.Gross product coming from milk by calving interval size group

Specification	MU	Calving interval			Total N=950
		Over 400 days N=573	351-400 days N=377	Difference	
Milk yield	Kg	4,682	4,240	4,682-4,240= +442	4,506
Milk price	Lei/kg	1.3	1.3	1.3	1.3
Gross product from milk	Lei	6,087	5,512	575	5,858

Source: Own calculations

CONCLUSIONS

Calving interval is an important environment factor with a high importance for increasing milk production.
In general, a calving interval longer than 400 days could affect milk yield as well as a shorter calving interval.
However, the recent studied revealed that longer calving interval for primiparous could be in the benefit of an additional net return per day of calving interval.
This study also concluded that Lei 8.59 additional income per cow and calving interval day could be obtained by Brown breed cows if their calving interval was longer than 400 days.
A longer calving interval could be useful for increasing milk production in specific thresholds which are at the farmers' management decision taking into account their farming conditions.

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REFERENCES

[1]Arbel, R., Bigun, Y., Ezra. E., Sturman, H., Hojman, D., 2001. The effect of extended calving intervals in high lactating cows on milk production and profitability. J. Dairy Sci., 84(3): 600-608.
[2]Baul Simona, Stanciu, G., Cziszter, L.T., Acatincai, S., Tripon, I., Erina Silvia, Gavojdian, D., 2008, Study regarding the influence of the calving interval on milk production in Romanian Black and White cows, http://agricultura.usab-tm.ro/Simpo2008pdf
[3]Baul Simona, Cziszter Ludovic-Toma, Acatincai Stelian, Cismas Traian, Erina Silvia, Gavojdian Dinu, Tripon Iulian, Buzamat Genoveva, 2013, Effect of Calving Interval on Milk Yield and Quality Evolution during Lactation in Dairy Cows, Animal Science and Biotechnologies, 2013, 46 (1):289-293
[4]Blezinger Steven B., 2005, Calving season should be based on economics, resources, Cattle Today Onlline, http://www.cattletoday.com/archive/2005/April/CT388.shtml
[5]Chagunda, M. G., Wollny, C., Ngwerume, F., Kamwanja, L. A., Makhambera, T. P. E., Environmental factors affecting milk production of a Holstein Friesian herd in Southern Malawi, http://www.ilri.org/InfoServ/Webpub
[6]Feyzi Ugur, 2003, Influence of Previous Calving Intervals on Milk Yield Traits of Holstein-Frisian Cattle Reared in the Kumkale State Farm Located in

Western Anatolia, Journal of Applied Science, vol. 3, Issue 3, p.203-205
[7]Foster Gary N., CVNA, Why Can Shortening Calving Interval Increase Production and Profitability? http://www.formulate2.com/CalvingInterval.html
[8] Gaines, W.L., Palfrey, R.J., 1931, Length of Calving Interval and Average Milk Yield, Journal of Dairy Science, Vol.14 (4)**:** 294-306
[9]Koc, A., 2012, Short communication. Effects of some environmental factors and extended calving interval on milk yield of Red Holstein cows Spanish Journal of Agricultural Research Vol.10(£)/2012
[10]Krzyzewski, J., Strzalkowska, N., Reklewski, Z., Dymnicki, E., Ryniewicz, Z., 2004, Influence of calving interval length in HF cows on milk yield, its composition and some reproduction traits. Medycyna Weterynaryna 60(1): 76-79.
[11]Javed, K., Afzal, M., Sattar, A., Mirza, R. H., 2004, Environmental factors affecting milk yield in Friesian cows in Punjab, Pakistan, Pakistan Vet. J., 24(2): 58-62
[12]Kume, K., Tahiri, F., 2009, Effect of Calving Interval on Milk Yield in Jersey cows under conditions of small family farms in Albania, Storcarstvo 63:2009(2)3-33
[13]Nyamushamba Godfrey Bernard, Halimani Tinyiko Edward, Imbayarwo-Chikosi Venancio Edward, Tavirimirw Bruce, 2014, Comparative evaluation of non-genetic factors affecting milk yield and composition of Red Dane and Jersey cattle in Zimbabwe
http://www.springerplus.com/content/pdf/2193-1801-3-88.pdf
[14] Obadina, A.O., Factors Affecting Milk Yield, Dairy Production 342-450, A Milk Yield & Composition,p.1-9,
http://unaab.edu.ng/attachments/Obadina.pdf
[15]Popescu Agatha,1987, Some considerations on cow calving interval, Annals of the Agricultural Institute Cluj-Napoca. Actualities in Animal Production, Vol.XII, p.71-76
[16]Popescu Agatha, 2014, Increase of the precision in the breeding value estimation by B.L.U.P.-Best Linear Unbiased Prediction, Ed.Eikon Cluj-Napoca, Ed.RawexComs, Bucharest, 227-230
[17]Pritchard Donald, E., Calving Intervals, Milk Production, and Profitability, Pritchard Dairy Extension Specialist, North Carolina State University http://www.cals.ncsu.edu/an_sci/extension/dairy/newsletters/0601nlet.PDF
[18]Rehn, H., Berglund, B., Emanuelson, U., Tengroth, G., Philipsson, J., 2000, Milk production in Swedish dairy cows managed for calving intervals of 12 and 15 months. Acta Agri Scandinavica Section A-Anim Sci 50(4): 263-271.
[19]Sterman, S., Bertilsson, J., 2003, Extended calving interval in combination with milking two or three times per day: effects on milk production and milk composition. Livestock Production Science, 82: 139-149.

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RESEARCH ON THE CORRELATION BETWEEN THE AGE AT THE FIRST CALVING AND MILK PRODUCTION CHARACTERS

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Abstract

The paper aimed to present the genetic determinism of milk yield traits and age at first calving using a number of 2,237 half sibs, offspring of 989 Friesian bulls and raised in various farms in Romania. Taking into account the peculiarities of half sibs families, it was used a linear mathematical model for unbiased cross classification. Average 305-days milk yield at the first lactation was 3,034.88 ± 14.67 kg, while the average milk fat percentage registered 3.79 ±0.004 %. Average 305 days fat yield accounted for 115.12±0.59 kg, average age at first calving regietered 839.25±1.43 days (27.5 months). Between milk yield and fat percentage, it was found a correlation of r_G - 0.245, reflecting a weak but positive relation between the two traits. The phenotypic correlation was low and a negative one (r_F = -0.181), showing a weak and reverse link between the two traits. Between milk yield and fat yield, both the genotypic and phenotypic correlations were very high and had positive values, r_G = 0.971 and r_F = 0.964. Between fat percentage and fat yield, it was found a genotypic and phenotypic positive correlation, r_G = 0.465, and, respectively, r_F = 0.240. The correlation between age at first calving and milk yield was extremely weak and negative, r_G = - 0.257 şi r_F = - 0.090. Between age at first calving and fat percentage, the correlation was very small and had a negative value (r_G = - 0.187) and (r_F = - 0.032). Between age at first calving and fat yield, both the genetic and phenotypic correlations were weak and negative (r_G = -0.288 and r_F = - 0.093). The values of the heritability and genotypic correlations pointed out the effect of the aditive action of the genes, but the phenotypic correlations indicated that some traits were also determined by the environment factors. Cow selection based on milk yield has a positive impact on the future milk performance. In the breeding programmes, age at first calving should not be neglected as it could lead to a decline of production if it does not fit to the optimal thresholds of the the Friesian breed.

***Key words*:** *age at first calving, correlations, Friesian cows, Romania, genetic determinism, milk production traits*

INTRODUCTION

Age at first calving is one of the most important reproduction traits with a deep impact on milk production [8, 11, 13, 16, 27, 34, 35, 38, 40]

Age at first calving has to be correlated to the heifer body weight in order to assure a mature development and a higher production later during the productive life time. A minimum 450 kg live weight is required for a first age at calving of 23-26 months. The cost per animal could increase by USD 50-75 if a heifer is over 24 months age at first calving [12].

In order to increase milk production, breeding programmes have to pay attention to objectives regarding age at first calving, calving interval and other reproductive traits close connected to milk production characters.

Because of its importance in the growth of milk production, age of first calving has been and still is studied at a larger scale in many countries and in close relationship with the milk production traits for various dairy breeds such as: Holstein Friesian breed [3, 5, 9, 10, 15, 18, 24, 25, 26, 31, 41, 44, 45], Brown Swiss breed [4], Normand Breed [14], Indian cattle breed [42].

In Romania, research results have put into evidence the production potential of Friesian breed [37], but also of Black and White Spotted breed [12, 13, 22, 29], Brown breed, and Simmental breed [6, 33].

Most of the authors revealed the genetic parameters for milk yield and fat yield, but also for age of first calving and all of them proved

that age at first calving has a low heritability and is negatively correlated with milk production.
In this context, the paper goal was to study the age at first calving and milk production traits for the Friesian dairy cows raised in various farms of Romania.
The research brings a new mathematical model set up especially to evaluate the genetic determinism of the milk production and age at first calving traits.

MATERIALS AND METHODS

In order to carry out the research study, the a number of 2,237 half sibs descendants from 989 Friesian bulls were used as biological material. The sample of individuals was divided into 44 classes taking into account the heard-year effect. The calculated genetic parameters were heritability and correlation, as well as their analysis. Their determination imposed the calculation of variance and covariance.
For this purpose, taking into consideration the peculiarities of half sibs families, it was established and used a linear mathematical model for unbiased cross classification similar to one set up by Graybill (1961) [17].
The mathematical model for sires testing using their daughters in various herds was the following one:
Y_{ijk}-□+a_i+b_i+c_{ijk}, where k=0,1,....n_{ij}; j=1,2,....., B; i=1,2,.....A and $\sum_j n_{ij} = n_i$ $\sum_i n_{ij} = nj$ $\sum_{ij} ij = n$.

It was considered that a_i, b_j, c_{ijk} are random variables with the averages equal to zero and variance S_a^2, S_b^2, S_c^2. The analysis suposed the use of estimates, which made it a little difficult. Considering within this unbiased cross classification that: R(□, S, B)=R (S1, □□□B) + R (□, B) (2) and R(□, S,B)=R (B1, □□□B) + R (□, B), the total sum was divided in two ways:

$$\sum {}^2_{ijk} = \frac{Y^2...}{n} + R(S, \mu, B) + R(\mu, B) + \text{(error)}$$

$$\sum {}^2_{ijk} = \frac{Y^2...}{n} + R(B, \mu, S) + R(\mu, S) + \text{(error)}$$

If we proceed in this way and the average of the squares is considered equal to the expected average of the squares, we could obtain two sets of estimates, each of them being unbiased.
Another method could be to divide the total sum of the squares as follows:

$$\sum Y^2_{ijk} = (\frac{Y^2..}{n}) + \left[\sum_i (\frac{Y^2..}{n_i} - \frac{Y^2..}{n}\right] + \left[\sum_j (\frac{Y^2 j..}{nj} - \frac{Y^2..}{n}\right]$$

+ Remaining

This could be placed in a table of variance analysis (Table 1). Then we can find the estimates, equalize the observed average of the squares with the one of the expected squares and solve the resulting set of three equations for three unknowns S_a^2, S_b^2, S_c^2.

Table 1. Analysis of variance for the model of unbiased bifactorial classification

Source of variation	DL	SS	SA	S^2
Total	N	$\sum_{ijk} Y^2_{ijk}$		
Average	1	$\frac{Y^2...}{n}$		
a classes	A-1	$\sum_i \frac{Y_i^2}{n_i} - \frac{Y^2...}{n}$	Ams	$S_C^2+r_5S_b^2+r_6S_a^2$
b classes	B-1	$\sum_i \frac{Y^2 j}{nj} - \frac{Y^2...}{n}$	Bms	$S_C^2+r_3S_b^2+r_4S_a^2$
Remaining	n-A-B+1	Substract	Rms	$S_C^2+r_1S_b^2+r_2S_a^2$

In order to find the expected average of the squares and r_i, we can proceed in the way presented below:

$$E(Ams) = \frac{1}{A-1}E(\sum_i \frac{Y_i^2}{n_i} - \frac{Y^2..}{n}) = \frac{1}{A-1}(n - \sum_i \frac{n_i^2}{n})S_a^2 + \frac{1}{A-1}(\sum_{ij}\frac{n_{ij}^2}{n^i} - \sum_j \frac{n^2 j}{n})S_b^2 + S_c^2$$

The values for r_5 and r_6 were obtained from this formula.

Also, E(Bms) could be written simetrically, replacing i by j and changing S_a^2 by S_b^2 in E(Ams). We will obtain:

$$E(Bms) = \frac{1}{B-1}(\sum_i \frac{n_{ji}^2}{nj} - \sum_i \frac{n_i^2..}{n})S_a^2 + = \frac{1}{B-1}(n - \sum_j \frac{n^2 j}{n})S_b^2 + S_c^2$$

of which r_3 and r_4 could be derived. Then, the sum of squares added to $\sum Y_{ijk}^2$ will result:

$$\sum {}^2_{ijk} = \frac{Y^2..}{n} + (A-1)Ams + (B-1)Bms + (n-A+1)Bms$$

Taking into consideration the expected values of the both sides and simplifying, we will obtain:

$$E(Rms) = \frac{1}{n-A-B+1}\left[E(\sum y_{ijk}^2) - E(\frac{Y^2..}{n}) - (A-1)E(Ams) - (B-1)E(Bms)\right]$$

The amounts from the right side are calculated, except $E(\sum Y_{ijk}^2)$, which could be determined as follows:

$$E(\sum_{ijk} Y_{ijk}^2)E\left[\sum_{ijk}(\mu + a_i + b_j + c_{ijk})^2\right] = n(\mu^2 + S_a^2 + S_b^2 + S_c^2).$$

Then:

$$E(Rms) = \frac{1}{n-A-B+1}\left[n(\mu^2 + S_a^2 + S_b^2 + S_c^2) - n\mu^2 - \sum_i \frac{n_i^2}{n}S_a^2 - \sum_j \frac{n^2 j}{n}S_b^2 - S_c^2 - (n - \sum_i \frac{n_i^2}{n}S_a^2 -\right.$$

$$(n - \sum_i \frac{n_i^2}{n}S_a^2 - ($$

$$\left.\sum_{ij}\frac{n_{ij}^2}{n^i} - \sum_j \frac{n_{.j}^2}{n} - \sum_j \frac{n^2 j}{n})S_b^2 - (A-1)S_c^2 - \sum_{ij}\frac{n_{ij}^2}{nj} - \sum_i \frac{n_i^2}{n})S_a^2 - (n\sum_j \frac{n_j^2}{n})S_b^2 - (B-1)S_c^2\right] =$$

$$= S_c^2 - \frac{1}{n-A-B+1}(\sum_{ij}\frac{n_{ij}^2}{n^i} - \sum_j \frac{n_j^2}{n})S_b^2 - \frac{1}{n-A-B+1}(\sum_{ij}\frac{n_{ij}^2}{nj} - \sum_i \frac{n_i^2}{n.})S_b^2$$

In this way, we could determine r_1 and r_2 as follows:

$$r_1 = \frac{1}{n-A-B+1}(\sum_j \frac{n_j^2}{n} - \sum_{ij} \frac{n_{ij}^2}{n_i})$$

$$r_2 = \frac{1}{n-A-B+1}(\sum_j \frac{n_i^2}{n} - \sum_{ij} \frac{n_{ij}^2}{n_i})$$

$$r_3 = \frac{1}{B-1}(n - \sum_j \frac{n_j^2}{n})$$

$$r_4 = \frac{1}{B-1}(\sum_{ij} \frac{n_{ji}^2}{n_j} - \sum_i \frac{n_i^2}{n_i})$$

$$r_5 = \frac{1}{A-1}(\sum_{ij} \frac{n_{ij}^2}{n_i} - \sum_j \frac{n_j^2}{n})$$

$$r_6 = \frac{1}{A-1}(n - \sum_i \frac{n_i^2}{n})$$

Heritability was determined using the formula: $h^2 = \frac{V_A}{V_F}$ and

$$S_{h2} = (h^2 + \frac{4}{n_i})\sqrt{\frac{2}{S}}$$

Phenoptypic correlation was determined with the formula: $r_F = \frac{\text{cov}\, F_{XY}}{\sqrt{S^2_{FX_x}.S^2_{FY}}}$

Genotypic correlation was calculated with the formula: $r_G = \frac{\text{cov}_{G\,XY}}{\sqrt{S^2_{G_X} S^2_{GY}}}$.

For testing the homogeneousness of the variances regarding the calendar month, it was used Snedecor-Fisher Test[12].

The genetic parameters were determined both for milk production and reproduction traits. In order to increase precision for optimizing these parameters and obtaining pertinent data, close to the expected ones, the computer was asked to select the primary data between the following validation thresholds: 1,700-4,600 for milk quantity (kg), 3.3-4.6 for fat percent (%) şi 700-960 for age at first calving (days).

RESULTS AND DISCUSSIONS

Average and variability indicators for milk production and reproduction traits

Average 305-days milk yield at the first lactation was 3,034.88 ± 14.67 kg, reflecting a good milk potential, if we take into consideration that at this moment of the productive life a primiparous cow should achieve 60-70 % of the maximum lactation. The variation coefficient for this milk trait accounted for 22.86 %, close to the normal value, reflecting a relative homogeneousness of the individuals within the sample.

Average milk fat percentage registered 3.79 ±0.004 %, a satisfactory value for Friesian breed, but not for the desired goal in breeding programmes (Table 2).

Table 2. Average milk production traits and age at fisrt calving for the Friesian half daughters (N=2,237)

Character	$\overline{X} \pm s\overline{X}$	GSS	DSS.	V %
Milk yield (kg)	3,034.89±14.670	493.34	693.93	22.86
Fat percentage (%)	3.79±0.004	0.16	0.23	6.06
Fat yield (kg)	115.72±0.590	20.30	27.05	23.49
Age at first calving (days)	839.25±1.430	34.37	67.55	8.04

Source:Own calculations

The fat percentage registered a normal value for the variation coefficient reflecting a homogenous distribution of the variables around the average value.

Average 305 days fat yield accounted for 115.12±0.59 kg, depending directly on milk performance and fat percentage. As a result, its value is smaller for Friesian breed. The variation coefficient was 23.49 %, a high

value, depending on the variation of milk yield.

Average age at first calving registered 839.25±1.43 days, that is about 27.5 months, a figure close to the normal limits for Friesian cows raised in Romania. The variation coefficient registered 8.04, accepted as a anormal value.

Genetic and phenpotypic parameters of milk yield and age at first calving

Components of variance for milk yield traits and age at fisrt calving

The analysis of variance allowed to put into evidence the components observed needed to establish the effects of various sources of variation such as: genetic differences created between the hals sisters families, due to their sire founders, variations created by the herd-year effect, and variations created within the half sisters families (Table 3).

Table 3.Genotypic and phenotypic variances for milk yield traits and age at first calving

Character/Variance	Age at first calving	Milk yield	Fat percentage	Fat yield
Among sires (S_T^2)	285,479 6,474	60848,332 12,636	1,121 18,535	103,838 11,183
Among herds-years (S_{FA}^2)	1670,597 36,603	191310,560 39,728	2,168 35,846	303,164 41,411
Among half sisters (S_D^2)	2597,979 56,923	229386,327 47,636	2,759 45,619	325,083 44,406
Phenotypic variance (S_F^2)	4564,055 100,000	481544,650 100,000	6,048 100,000	732,085 100,000
Genotypic variance (S_G^2)	1181,916	243393,320	4,484	415,352

Source:Own calculations

The share of the variances by variation source of the phenotypic variance indicated a degree of contribution of the aditive action of genes on the determination of each character and also the degree of influence of environment conditions in the farms and cows. The higher the influence of environment conditions, the lower the impact of genetic determination.

Components of the variance for milk yield showed that the genotypic variance represents 50.54 % of total variance. But, the variance among sires represented only 12.56 % of the phenotypic variance. Despite the expectations, in case of the population considered in this study, milk yield has a high genetic determination.

In case of fat percentage, the genoptypic variance represented 74 % of total variance, showing also that the differences among sires are highly genetically determined.

Components of the variance for fat yield reflected a highly share of genotypic variance in the phenotypic variance.

In case of age at first calving, the genotypic variance represented 25.90 % of the phenotypic variance, as expected, because this trait is deeply influenced by environment conditions.

Heritability of milk yield traits and age at first calving is presented in Table 4.

Table 4. Heritability and its error for milk yield traits and age at first calving

Character	$h^2 \pm S_h^2$	
Milk yield	0.505	0.069
Fat percentage	0.741	0.101
Fat yield	0.567	0.077
Age at first calving	0.258	0.037

Source:own calculations

As one can see from the table above, ***milk yield*** had a heritability of 0.505, a higher figure than the normal ones (0.25-0.30), but close to the ones reported by other authors [22, 42].

Fat percentage has also registered a high heritability, (h^2=0,741), similar to the values calculated by other authors in Romania and other countries [1, 21, 38].

Fat yield recorded h^2=0,567, proving a high genetic determination, as mentioned by other authors in some studies. [1, 22, 28, 29].

Age at first calving registered a heritability of 0.258, a little bit higher, but similar to the one found by some authors [27].

All these high values could be explained by the import of sires and frozen semen from sires which are relatives and used in Romania for artificial insemination for the same cow population with a deep impact on the growth of the genetic variability.

In the USA, it was reported a heritability of 0.44 for milk yield in a cow population relatively closed from a reproductive point of view, and well genetically preserved [8]

Phenotypic and genotypic correlations between milk yield traits and age at first calving.

The analysis of variance was made for six couples consisting of the traits mentioned above, as presented in Table 5.

Table 5.Components of covariance for various pairs of milk yield traits and age at firts calving

Covariance/ Pairs of traits	Among sires Cov_T	Among herds-years $Cov_{F.A.}$	Among half sisters	Phenotypic covariance Cov_F	Genotypic covariance Cov_G
Milk yield x Fat %	5.115	5.694	-13.708	-2.979	20.460
Milk yield x Fat yield	2,442.730	7,370.197	8,290.327	18,103.255	9,770.922
Fat % x Fat yield	0.400	0.850	0.296	1.547	1.600
Age at first calving x Milk yield	-1,089.897	-1,862.311	-1,268.209	-4,220.400	-43,509.511
Age at first calving x Fat %	-0.271	-2.683	-0.225	-0.523	-1.086
Age at first calving x Fat yield	-50.500	-65.561	-55.055	-171.197	-202.321

Source:Own calculations

The change of a trait attracted the variation of another trait in a special direction or another. Thus, the components of the variance reflected that the increase of milk yield will decline the fat percentage, but it will grow up the fat yield.

The change of fat percentage does not affect fat yield too much.

But, the change of age at first calving could cause substantial changes regarding milk yield, fat percentage and fat yield.

Genotipic and phenotypic correlations reflected the links between various pairs of traits (Table 6).

Between milk yield and fat percentage, it was found a correlation of r_G - 0.245, reflecting a weak but positive relationship between the two traits.

But the phenotypic correlation was a negative one (r_F = -0.181), showing a weak and reverse link between the two traits.

All the authors found such a negative correlation between these two characters.

Between milk yield and fat yield, both the genotypic and phenotypic correlation were very high and had positive values, reflecting a strong relationship and of the same sense between the change of the two characters (r_G = 0.971 and r_F = 0.964).

These values are similar to the ones obtained by other authors in Romania [1, 28, 39].

Between fat percentage and fat yield, it was found a genotypic and phenotypic positive correlation, r_G = 0.465, and, respectively, r_F = 0.240, reflecting a weak link between these two characters.

Compared to the results obtained by other Romanian authors, these correlations are a little bit higher. [1, 28, 39]

The correlation between age at first calving and milk yield was extremely weak and negative, r_G = - 0.257 and r_F = - 0.090. Therefore, a higher age at first calving could determine a diminished milk yield at the first lactation.

Between age at first calving and fat percentage, the correlation was very small and haa a negative value, reflecting a minor

importance of these traits (r_G = - 0.187) and (r_F = - 0.032).

Between age at first calving and fat yield, both the genetic and phenotyoic correlations were weak and negative (r_G = -0.288 and r_F = - 0.093).

Table 6. Genotypic and phenotypic correlations between various pairs of milk traits and age at first calving

Genotypic correlations			Traits	Phenotypic correlations		
-0.288	-	-	Fat yield	-	-	-0.093
-0.187	0.465	-	Fat percentage	-	0.240	-0.032
-0.257	0.971	0.245	Milk yield	-0.181	0.964	-0.090
Age at first calving	Fat yield	Fat percentage	Studied traits	Fat percentage	Fat yield	Age at first calving

Source:Own calculations

Comparing the F value obtained for each character with F from tables for P=0.05, P = 0.01 şi P=0.001, one can conclude that the variances are not homogenous, therefore the H_0 hypothese can not be accepted, but the true one, H_1. Therefore, the two factors taken into consideration have a deep influence on the milk production traits and age at first calving (Table 8).

Table 7.Analysis of variance for F Test for milkyield and age at first calving

Sursa de variaţie	DL	SS	AP	F
Age at first calving				
Global variance among groups	11	2,551,367.739	2,311,942.521	-
Error	4,089	86,387,361.361	21,126.769	-
Total	4,100	88,938,729.100	-	10.978
Milk yield				
Global variance among groups	11	111,521,313.490	10,138,301.226	-
Error	4,089	29,766,975,717.830	7,279,761.8936	-
Total	4,100	3,088,821,831.320	-	13.926
Fat percentage				
Global variance among groups	11		2,482	0.225
Error	4,089	309.648	7,572	-
Total	4,100	312.130	-	2.979
Fat yield				
Global variance among groups	11	176,336.579	16,036.052	-
Error	4,089	4,425,984.551	1,082.412	-
Total	4,100	4,602,381.131	-	14.815

Source: Own calculations

Table 8. Calculated F value compared to the critical interval for various probabilities

Selection character	Calculated F	Critical interval for:		
		P=0.05	P=0.01	P=0.001
		1.80-1.83	2.26-2.28	2.86-2.89
Age at first calving	10.978	No	No	No
Milk yield	13.926	No	No	No
Fat precentage	2.979	No	No	No
Fat yield	14.8185	No	No	No

Source: Own calculations

The results of the Test Bartlett applied on the variances froma a month to another, caused by the systematic factors taken into consideration are given in Table 9.

Comparing the B calculated statistic with the tabled one, one can notice the differences. The conclusion is that the variables are substantially influenced by the month of calving.

Therefore, between age at first calving and milk production traits it was found a strong

influence, as the dispersions were not homogenous for any probability rate and any selection trait.

Table 9. Calculated B value compared to the critical interval for various probabilities

Selection character	Calculated B	Critical interval for:		
		P=0.05	P=0.01	P=0.001
		18.30-21.02	23.20-26.21	29.58-32.90
Age at first calving	140,081	No	No	No
Milk yield	12.361	No	No	No
Fat percentage	101.260	No	No	No
Fat yield	11.752	No	No	No

Source: Own calculations

This allow to draw the conclusion that it is compulsory to evaluate the influence of age at first calving on milk production traits and to set up corresponding correction factors in order to increase the accuracy of the data which are later used in the sires breeding value estimation based on their half daughters performances in milk production.

CONCLUSIONS

The genotypic parameters determined in this study are close to the results mentioned by other authors in Romania and other countries, but they are in general a little higher.

The values of the heritability and gentypic correlations pointed out the effect of the aditive action of the genes, but comparing the genotypic correlations with the phenotypic correlations, one can conclude that some traits are determined also by environment factors.

As a conclusion, cow selection based on milk yield has a positive impact on the future milk performance and implicitely on fat yield.

In the breeding programmes, age at first calving should not be neglected as this reproduction character, despite that it has weak influences on production performance, it could lead to a decline of production if it does not fit to the optimal thresholds of the the Friesian breed.

From a practical point of view, farmers have to pay attention to the age at first calving and correlate it with the heifer weight. This means to assure good raising conditions so that the first calving to take place no longer than 24-25 months of heifer age as milk production to reach a corresponding level to the breed potential.

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REFERENCES

[1]Alexoiu, A., 1983, Study of the genotypic and phenotypic traits of the cattle active population mapped in Romania, Ph D Thesis, Nicolae Balcescu Agricultural Institute, Bucharest

[2]Averdunk, 1977, Results of experiences from realising a breeding program for dual-purpose cattle in Bavaria

[3]Bahreini Behzadi, M.R., Amini, A., Aslaminejad, A., Tahmooresporn, A., 2013, Estimation of genetic parameters for production traits of Iranian Holstein dairy cattle, Livestock Research for Rurtal Development 25(9)/2013

[4]Bayram, B**.,** Yanar, M., Akbulut, O., 2009, The effect of avergae daily gain and age at first calving on reproductive and milk production traits of Brown Swiss and Holstein Friesian cattle, Bulgarian Journal of Agricultural Science, 15 (5):453-462, Agricultural Academy

[5]Berry, D. P., Cromie, A. R., 2008, Associations between age at first calving and subsequent performance in Irish sring calving Holstein- Friesian dairy cows, Livestock Science, 2008, Vol. 123(1):44-54

[6]Chereji Ioan, 2010, Study regarding the genetic determination of milk production, Annals of Oradea University, Ecotoxicology, Animal Production and Food Technologies, Vol.IX, 207-210

[7]Craiu, V., Mihoc, G., 1976, Treatese of mathematical statistics. RomanianAcademy Press House, Bucharest

[8]Creangă, H., Cîrlan, M., 2006, Heredity and variability, Vol.I. Alfa Press House, Iasi

[9]Dabdoub, S. A. M., 2009, Milk Production and Reproductive Efficiency in Friesian and Friesian X Sharabi Cows, Al- Anbar J. Vet. Sci., Vol. 2(2)

[10]Dematawewa,. C.M.B., Berger, P.J., 1998, Genetic and phe-notypic parameters for 305-day yield fertility and survival in Holsteins. Journal of Dairy Science, 81, 2700–2709.

[11]Dinescu, S., et al., 1997, Dairy farming, Ceres Press House, Bucharest

[12]Dolis Luminita, Dolis, M., Gilca, I., Usturoi, M.G., Stanescu Teodora Roxana (Cozmanciuc), 2010,

Research concerning the influence of age at the first calving on milk production in Romanian Black and White Breed, Scientific Papers, University of Agricultural Sciences and Veterinary Medicine Iasi, Animal Science, Vol.53, pp. 162-166

[13]Drăgănescu, I.C., Constantinescu, C., 1973, Research on the influence of the age of the first calving and calving season on milk production for primiparous cows. Scientific Papers Research Institute for Bovine Production Corbeanca, Vol. I, 49-69

[14]Ducrocq, V.,1994, Statistical analysis of length of produc-tive life for dairy cows of the Normande breed. Journal of Dairy Science, 77,855–866

[15]Ettema, J. F., Santos, E.P., 2004, Impact of age at calving on lactation, reproduction, health, and income in first-parity Holsteins on commercial farms. Journal of Dairy Science 87: 2730-2742

[16]Gardner, R. W., Schuh, J. D., Vargus, L. G., 1977, Accelerated growth and early breeding heifers. J. Dairy Sci., 60:1941-1948

[17]Graybill, F.,1961, An Introduction to Linear Statistical Models, Vol. I, New York

[18]Hammond, M.H., Salem, M.M.I., 2013, The Genetic Evaluation of Some First Lactation Traits of Holstein Cows in Egypt, Alex. J. Agric. Res. Vol. 58(1):1-8

[19]Harville, D.A., Henderson, C.R., 1966, Interrelationship among age, body weight and production traits during first lactation of dairy cattle. J.Dairy Sci., 49:1254-1261

[20]Hickman, C.C., Gravir, K., 1974, Yield adjusment for differences in age of calving. 1st. World Congress on Genetics applied to livestock production. Madrid, 197

[21]Johanson, J., 1974, Genetic aspects of dairy cattle breeding.1st World Congress on Genetics applied to livestock production, Madrid

[22]Jurco, E. O., Onaciu, G., 2009, Comparative research concerning the milk production traits on Black and White cattle herd of first calving, breeded in private farms from Transilvania, Scientific Papers Animal Science, Vol. 52 (14): 231-234

[23]Kaya, I., Uzmay, C., Kaya, A., Akbas, Y., 2003, Comparative analysis of milk and reproductive traits of Holstein-Frisian cows born in Turkey or imported from Italy and kept on farms under the Turkish-ANAFI project. Italian Journal of Animal Science 2: 141-150

[24]Madani, T., Yakhlef, H., Marie, M., 2008, Effect of age at first calving on lactation and reproduction of dairy cows reared in semi arid region of Algeria, Livestock Research for Rural Development Vol.20(6)

[25]Mustafa Tekerli, Kocak Serdar, 2009, Relationships between production and fertility traits in first lactation and life time performances of Holstein cows under subtropical condition , Archiv Tierzucht 52(4):364-370, Research Institute for the Biology of Farm Animals (FBN) Dummerstorf, Germany

[26]Margarint, I., 2001, Morphophysiological fundamentals of milk production, Vasiliana Press House, Iasi

[27]Mirita, I., Georgescu, G., Velea, C., Stanciou, G, 1982, Technology of cattle production, Didactical and Pedagogical Press House, Bucharest

[28]Muresan, G., Velea, C., Bud, I. ,David, V.,Vomir, M., Draganescu, C., Stef, V., 1987, Study regardin the influence of the age at the first calving on productive life for Romanian Black and White Spotted Breed, Agricultural Institute Cluj-Napoca, Actualities in Animal Production, Vol.XII, p.84-92

[29]Negrutiu, E., Petre, A., 1975, Animal breeding, Didactical and Pedagocical Press House, Bucharest

[30]Nilforooshan, M. A., Edriss, M., A., 2004, Effect of age at first calving on some productive and longevity traits in Iranian Holsteins of the Isfahan province. Journal of Dairy Science 87: 2130-2135

[31]Nistor, G., Nistor, E., 2002, Special Animal Production, Agroprint Press House, Timisoara, 2002

[32]Nistor, E., Bampidis, V.A., Pentea, M., Matiuti, M., Ciolac, V., Adebambo, F., 2011, Genetic and Phenotypic parameters for milk production traits in the first and second lactation in Romanian Simmental dairy cows, IJAS, Iranian J. of Applied Animal Science 1(4);257-263

[33]Oroian, T., Dronca, D. ,2005, Genetic values in animal selection, Mirton Press House, Timisoara

[34]Pipernea, N.,1974, Heredity of the main traits of the domestic animals, Didactical and Pedagogical Press House, Bucharest

[35]Pirlo G., Miglior F., Speroni M., 2000, Our industry today – Effect of age at first calving on production traits and on difference beetween milk yied returns and rearing costs in Italian Holstein, Journal of dairy science, Vol. 83(3):603-608.

[36]Popescu Agatha, 2014, Increase of the precision in the breeding value estimation by B.L.U.P.-Best Linear Unbiased Prediction, Ed.Eikon Cluj-Napoca, Ed.RawexComs, Bucharest, pp.100-114

[37]Popescu Vifor, S., 1978, Animal genetics, Ceres Press House, Bucharest

[38]Popescu-Vifor, S., Alexoiu, A., Tache, D., Calinescu, E., Popescu Agatha, 1979, Sire breeding value estimation in the slection both for milk and meat characters, Scientific Papers of Nicolae Balcescu Agricultural Institute, Series D., Vol.XX-XXI

[39]Popescu Vifor S., Georgescu, M., Giurcă, A., 1991, A comparative study of the genetic determinism of some characters in two Brown populations. Scientific Papers, Institute of Agricultural Sciences Nicolae Balcescu, Series D, Vol. XXXIII XXXIV, pp. 18 -26

[40]Simpson, D., 1998, Relationships between age at calving, peak milk yield and season of calving on the reproductive performance of Holstein Friesian and Jersey cattle in a commercial herd. BSc Agriculture Dissertation, Department of Agriculture, University of Aberdeen.

[41]Sundaresan, D., Eldridge, F.E., Atkeson, F.W., 1954, Age at First Calving Used with Milk Yield during First Lactation to Predict Lifetime Production of Indian Cattle, J. Dairy Sci., 37(11):1273-1282

[42]Van Vleck, 1964, Heritability of milk yield at different environmental levels. Anim.Prod.,61:285-290
[43]Yaeghoobi, R., Doosto, A., Noorian, A.M., Bahrami, A.M., 2011, Genetic parameters and trends of milk and fat yield in Holstein's dairy cattle of West Provinces of Iran, International Journal of Dairy Science 6(2):142-149
[44]Zavadilová, L., Štípková, M., 2013, Effect of age at first calving on longevity and fertility
traits for Holstein cattle, Czech J. Anim. Sci., 58(2): 47 –57

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RESEARCH ON MEAT PRODUCTION PARAMETERS IN STEER FATTENING AND THEIR IMPORTANCE FOR SIRES BREEDING VALUE ESTIMATION IN ROMANIA

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Abstract

The paper presents the genetic and phenotypic parameters for meat production characters using the results in progeny testing based on 1,705 half brothers offspring of 105 Friesian bulls from Romania. The live traits taken into account were weight at the age of 180 and 365 days, and weight daily gain during the period of fattening starting at the age of 2.5 months and ending at the age of 12-15 months of the steers. Taking into account that the fattening was made in 28 herds and the peculiarities of half sibs families, it was used a linear mathematical model for nested (hierarchical) classification. Weight at the age of 180 days registered 138.85±6.04 kg, weight at the age of 365 days was 293.41±1.04 kg in average and daily gain 881.977 ± 4.24 g/head/day. Heritability was h^2= 0.524 for weight at the age of 180 days, h^2= 0.642 for weight at the age of 365 days and h^2= 0.372 for daily gain. The correlations between weight at the age of 180 days and weight at the age of 365 days was r_G = - 0.287 and r_P = - 0.189, between weight at the age of 180 days and weight daily gain r_G = - 0.307 and r_F = -0.726, and between weight at the age of 365 days and weight daily gain r_G = 0.850 şi r_F =0.771. The meat production traits are closely related one to each other. Weight daily gain is substantially influenced by environmental factors. In practice, farmers should pay attention to live weight at various fattening stages and improve all the environment conditions in order to reach the weight daily gain as planned. In the breeding programmes, live characters are the most important ones and the steers month of birth needs to be corrected in order to precisely detemine sire position in the breeding pyramid.

Key words**:** *Friesian breed, meat production characters, Romania, steer fattening*

INTRODUCTION

The development of meat production in commercial fattening farms has to be based on breeding programmes which have to take into consideration the estimates of genetic and phenotypic parameters for the economic traits [1,4,6, 8,12,13,14].

The most important selection criteria commonly used in most breeding programmes for beef production are live weight at different ages (birth, weaning, post-weaning, various stages of fattening), weight daily gain [3,16,17,18,19,20,21, 22, 24, 26, 27, 28, 30, 35,36, 37, 38, 39].

Other selection criteria are carcass weight and its composition characters: meat share in carcass weight, muscle-bone ration, eye muscle surface, rib eye area, marbling score, dressing percentage, fat thickness [5,7,25,31].

Close relationships exist between live weight at different ages, daily gain and carcass components which is an opportunity to simplify the number of traits taken into consideration in breeding improvement [11].

This brings to the conclusion that it is not compulsory to apply multiple traits selection based on live and carcass characters and it is enough to be focused on live characters of beef animals.

The evaluation of meat production characters for beef bulls is achieved in the most of countries in test stations where standard growth conditions are assured in order to allow the comparison among various live records obtained by tested bulls and finally to identify the best ones [15, 29]

The last decades were marked by an increased attention paid to precision of statistical methods applied in breeding value estimation:

BLUP, mixed model, animal model [32,33,36].

In this context, the objective of this paper was to present the genotypic and phenotypic parameters of meat production traits for Friesian breed raised in Romania based on progeny testing for live weight at the age of 180 and 365 days and weight daily gain. Heritability, variances, co-variances among relatives, as well as correlations among the studied traits have been determined and differences were pointed out using Snedecor-Fisher and Bartlett Tests.

MATERIALS AND METHODS

A number of 1,705 half brothers descendants from 105 Friesian bulls in Romania were fattened in 28 specialized fattening units, existing in 18 counties of the country.

The young steers were born in an interval of maximum 60 days and fattening started at their age of 2.5-3 months and ended at the age of 12-15 monts.

During the testing period, the performance for the following meat production characters was registered: live weight at the age of 180 days and 365 days, as well as weight daily gain.

The calculated genetic parameters were heritability and correlations among various studied characters.

Their determination imposed the calculation of variances and co-variances.

The mathematical model used in this research is ***based on the nested (hierarchical)classification,*** because the estimation of the breeding value for sires is based on their offspring testing in the same herd, and has the following formula:

$$Y_{ijk} = \mu + a_i + b_{ij} + c_{ijk} \quad (1)$$

where: k=1,2...., n_{ij}; j=1,2...., B_i; i=1,2,....,A.

$$\sum_j n_{ij} = n_i \quad \sum_{ij} n_{ij} = \sum_i n_i \approx n \sum B_i = B$$

This involves the existence of A groups of a_i. The unit a_i contains B_i units of b_{ij} (or the unit a_i contains n_i units of c_{ijk}) depending on the model as presented in Table 1.

Table 1. Block model for nested (hierarchical) classification

a_1	a_2	a_A
$b_{11}b_{12}....b_1B_1$	$b_{21}b_{22}....b_2B_2$	b_{A1} $b_{A2}.....B_A$ B_A
$c_{111}c_{121}....$		
$c_{112}c_{122}....$		
$c_{113}c_{123}....$		
$c_{11n}c_{12n}....$		

The model used for the analysis of variance is given in Table 2.

Table 2.Analysis of variance for nested (hierarchichal) classification model

Variation source	DL	SS	SA	S^2
Total	N	$\sum_{ijk} Y_{ijk}^2$	-	-
Average	1	$\frac{Y^2...}{n}$		
a classes	A-1	$\sum_{ijk}(y_i. - y^2,,,)$	Ams	$S_c^2 + q_1 S_b^2 + q_2 S_a^2$
b classe	B-A	$\sum_{ijk}(Y_{ij}. - y_i...)^2$	Bms	$S_c^2 + q_o S_b^2$
c classes	n-B	$\sum_{ijk}(Y_{ijk}. - y_{i\,j}...)^2$	C_{ms}	S_c^2

$$q_0 = \frac{n - \sum_i \sum_{j...} \frac{n_{ij}^2}{n_i}}{B - A} = \sum_{ij} n_{ij}^2 f_{ij} \quad (2)$$

$$q_1 = \frac{\sum_{ij}(\frac{n_{ij}^2}{n_i} - \frac{n_{ij}^2}{n})}{A-1} = \sum_{ij} n_{ij}^2 f_i \quad (3)$$

$$q_2 = \frac{n - \frac{\sum_i n_i^2}{n}}{A-1} = \sum_i n_i^2 f_i \qquad (4)$$

where:

$$f_i = \frac{\frac{1}{n_i} - \frac{1}{n}}{A-1} \qquad (5)$$

$$f_{ij} = \frac{\frac{1}{n_{ij}} - \frac{1}{n_i}}{B-A} \qquad (6)$$

The data for the column S^2 and the coefficients q_0, q_1 şi q_2, will be obtained as presented below.

For the beginning to consider:

$$E(B_{ms}) = \frac{1}{B-A} E\left[\sum_{ijk}(y_{\cdot j\cdot} - y_{i\cdot\cdot})^2\right] = \frac{1}{B-A} E\left(\sum_{ij}\frac{Y_{ij\cdot}^2}{n_{ij}} - \sum_i \frac{Y_{i\cdots}^2}{n_i} =\right.$$

$$= \frac{1}{B-A} E\left[Ei_j \frac{(n_{ij}\mu)^2 + n_{ij}a_i + n_{ij}b_{ij} + \sum_k cijk)^2}{n_{ij}} - \sum_i \frac{(n_i\mu + n_i a_i + \sum_t n_{it}b_{it} + \sum_{ts} c_{its})^2}{n_i}\right] \qquad (7)$$

Taking into account that $E_{(ai)} + E_{(bj)} + E_{(cijk)} = 0$ and that all the random variables are uncorrelated we will obtain:

$$E(Bms) = \frac{1}{B-A}\left(\sum_{ij}\frac{n_{ij}^2\mu^2 + n_{ij}^2 S_a^2 + n_{ij}^2 S_b^2 + n_{ij}S_c^2}{n_{ij}} - \sum_i \frac{n_i^2\mu^2 + n_i^2 S_a^2 + \sum_t n_{it}^2 S_b^2 + n_i S_c^2}{n_{ij}} =\right.$$

$$= \frac{1}{B-A}\left(n\mu^2 + nS_a{}^2 + nS_b{}^2 + BS_c{}^2 - n\mu^2 + nS_a{}^2 - \sum_{it}\frac{n_{it}^2}{n_i} S_b{}^2 - AS_c{}^2\right) =$$

$$= S_c^2 + \frac{n - \sum_{it}\frac{n_{it}^2}{n_i}}{B-A} S_b^2 \quad (8) \quad q_o = \frac{n - \sum_{it}\frac{n_{it}^2}{n_i}}{B-A} = \sum_{ij}\frac{1}{B-A}\left(\frac{1}{n_{ij}} - \frac{1}{n_i}\right)n_{ij}^2 \qquad (8)$$

Then, let's consider:

$$E(Ams) = \frac{1}{A-1)} E\left[\left(\sum_{ijk}(y_i\ldots - y\ldots)^2\right] = \frac{1}{A-1} E\left[\left(\sum_i \frac{Y_{i\ldots}^2}{n_i} - \frac{Y^2\ldots}{n)}\right] =\right.$$

$$= \frac{1}{A-1}\left(\sum_i \frac{n_i^2\mu^2 + n_i^2 S_a^2 + \sum_t n_{it}^2 S_b^2 + n_i S_c^2}{n_i} - \frac{n^2\mu^2 + \sum_i n_i^2 S_a^2 + \sum_{ij} n_{ij}^2 S_b^2 + nS_c^2}{n} =\right.$$

$$= \frac{1}{A-1}\left[\sum_i n_i^2\left(\frac{1}{n_i} - \frac{1}{n}\right)S_a^2 + \sum_{ij} n_{ij}^2\left(\frac{1}{n_i} - \frac{1}{n}\right)S_b^2 + (A-1)S_c^2\right] \qquad (9)$$

The coefficients of S_a^2 and S_b^2 correspond to q_1 and q_2. if the average of the expected sqaures is equal to the square average and if the equations resulted are solved for S_a^2 , S_b^2 and S_c^2, these variances are the estimates of the analysis of variance and are unbiased.

For the other items taken into consideration in this study, the mathematical formulas are given below.

Heritability, $h^2 = \frac{V_A}{V_F}$ (10)

Heritability standard deviation,

$S_{h2} = (h^2 + \frac{4}{n_i})\sqrt{\frac{2}{S}}$ (11)

Phenotypic correlation, $r_F = \frac{\text{cov}\, F_{XY}}{\sqrt{S^2_{FX_x}.S^2{}_{FY}}}$ (12)

Genotypic correlation, $r_G = \frac{\text{cov}_{G\,XY}}{\sqrt{S^2_{G_X} S^2_{GY}}}$. (13)

The homogenousness of the variances was checked using Snedecor-Fisher Test [9,10].

RESULTS AND DISCUSSIONS

Weight daily gain for the fattening period was in average 881.977 ± 4.24 g/head/day, ranging between the minimum value of 543.3 g/head/day and the maximum value of 1,128.5 g/head/day. This aspect proves thatthe Friesian young steers have a good growth and fattening capacity. The variation coefficient for this trait was low, accounting for 3.14 % (Tabel 3).

Average and variability indicators for meat production traits

Weight at the age of 180 days registered 138.85±6.04 kg in average, ranging between 191.7 kg, the minimum value and 191.7 kg, the maximum value.The variation coefficient was 19.31 % (Tabel 3).

Weight at the age of 365 days was 293.41±1.04 kg in average, varying between 199.3 kg, the minimum value and 369.1 kg, the maximum value. The variation coefficient was very small, just 4.33 %, compared to the one registered by the steers weight at the age of 180 days. This reflects that at the age of 180 days the variabilitty of performances among individuals was higher, while at the age of 365 years, the steers live weight was more homogenous (Tabel 3).

Table 3. Average and variability parameters for meat production traits registered by the fattened steers (N=1,705)

Meat production trait	$\overline{X} \pm s\overline{X}$	GSD	PSD	V (%)
Weight at the age of 180 days (kg)	138.050±6.04	219.519	249.386	19.31
Weight at the age of 365 days (kg)	293.410±1.04	34.364	42.863	4.33
Weight daily gain (g/head/day)	881.977±4.24	168.524	176.102	3.14

Source: Own calculations

Components of genotypic and phenotypic variance for meat production traits

Weight at the age of 180 days registered a share of the genotypic variance in the phenotypic variance of 52 %, reflecting that this character is genetaically determined in high measure.

Weight at the age of 365 days recorded a share of 63 % of genotypic variance in the total variance, also showing how important is the aditive effect of genes on this trait.

Weight daily gain recorded only a share of 37 % for the genotypic variance in the total variance, which means that this character is deeply influenced by environmental factors than by the genetic differences.

Heritability of meat production traits

Weight at the age of 180 days registered a heritability of $h^2 = 0.524^{\pm}0.072$, reflecting the strong aditive action of genes in the determination of this trait.

Weight at the age of 365 days recorded a heritability of $h^2 = 0.642^{\pm}0.088$, a high value, but smaller than in case of the weight atthe age of 180 days.

The values of the heritability at the age of 365 days are similar with the ones found by Cundiff (h^2=0.56), but different from the ones found by Negrutiu et al. in 1975 (h^2=0.37),

Muresan in 1983 (h^2=0.21) for Friesian breed [11, 22, 23].

Also, some smaller values for the heritability ofthis character were found by Baldi et al.,, 2012 (h^2=0.18-0.30), Schenkel et al.,, 2002, (h^2=0.32-0.40), Nephawe et al., 2006 (h^2=0.22-0.31), Vostry et al., 2009 (h^2=0.15-0.57). [3, 24, 29, 35]

Weight daily gain had the lowest heritability compared to the live weights, only h^2= $0.372^{\pm}0.051$ reflecting that this character is mainly determined by the action of the environment conditions (Table 5).

Table 4. Phenotypic and genotypic variances for meat production characters

Trait/ Variance	Weight at the age of 180 days	Weight at the age of 365 days	Weight daily gain
Among sires (S_T^2)	11060,751 / 13,118	295,229 / 16,068	8829,496 / 9,302
Among herds-years (S_F^2)	12047,200 / 14,288	929,319 / 50,580	71000,168 / 74,806
Among half brothers (S_D^2)	61207,200 / 72,594	612,747 / 33,352	15082,554 / 15,892
Phenotypic variance (S_F^2)	84315,151 / 100,000	1837,295 / 100,000	94912,218 / 100,000
Genotypic variance (S_G^2)	44243,004	1180,916	35317,985

Source: Own calculations

Table 5.Heritability and its error for meat production characters

Meat production character	$h^{2\pm} S_h^2$	
Weight at the age of 180 days	0.524	0.072
Weight at the age of 365 days	0.642	0.088
Weight daily gain	0.372	0.051

Source: Own calculations

The values of heritability estimated for weight daily gain are smaller compared to the ones calculated by Averdunk, 1968 (h^2=0.5), Calo et al., 1973 (h^2=0.44), Negrutiu (h^2=0.44), Vesela (h^2=0.5). [2, 6, 23, 34]

Phenotypic and genotypic correlations between meat production traits

The correlations were calculated based on the variances and co-variances between various pairs of traits. In this respect, firstly, it was needed to calculated the components by source of variation (Table 6).

Genotypic and phenotypic correlations reflect the links between various pairs of traits and this important for the selection practice. The changes of a character or another attract substantial changes upon the other considered traits.

In order to present the sense and intensity of the links between various pairs of meat production characters, it was needed to also determine the coefficients of genotypic and phenotypic correlation. ***Correlation between weight at the age of 180 days and weight at the age of 365 days*** was (r_G = - 0.287 and r_P = - 0.189), a weak and negative value reflecting that the change of this character has a low impact on the change of the other trait.

Between ***weight at the age of 180 days and weight daily gain,*** the correlation was also a negative one, but its value was higher than in first case. Thus, r_G = - 0.307 indicated a weak intensity and of a different sense between the two traits, while the phenotypic correlation r_F = -0.726, showed that between these two characters there is a strong relationship to the environment conditions.

Both genotypic and phenotypic correlations between weight at the age of 365 days and weight daily gain recorder high values, r_G = 0.850 şi r_F =0.771, reflecting a substantial positive influence between these two

characters. For this reason, from a practical point of view, selection should be focused just on only one of these characters in order to improve the other one. (Table 7).

These values for the genptypic correlations are in accordance with the ones found by Schenkel et al.,, 2002 r_G =0.86-0.99 and Baldi et al., 2012 r_G =0.78-0.98 [3, 29].

Table 6. Components of variance by various pairs of meat production traits

Co-variance/ Pairs of traits	Between sires Cov_T	Between herds $Cov_{F.}$	Between half brothers Cov_D	Phenotypic co-variance Cov_F	Genotypic co-variance Cov_G
Weight at the age of 180 days x Weight at the age of 365 days	969.804	-941.250	-631.069	2,542.123	3,879.216
Weight at the age of 180 days x Weight daily gain	3,000.826	-2,845.446	-3,341.778	9,188.050	12,003.304
Weight at the age of 365 days x Weight daily gain	2,323.398	1,260.794	2,236.466	5,820.658	9,293.592

Source: Own calculations

Table 7.Genotypic and phenotypic correlations between various pairs of meat production traits

Genotypic correlations		Traits	Phenotypic correlations	
0.850	-	Live weight at the age of 365 days	-	0.771
-0.307	-0.287	Live weight at the age of 180 days	-0.189	-0.726
Daily Gain	Live weight at the age of 180 days	-	Live weight at the age of 180 days	Daily Gain

Source:Own calculations

Analysis of variance using Snedecor-Fisher Test

Making the comparison between the F statistics obtained for each character with the F value from tables for different probabilities P=0.05, P = 0.01 and P=0.001, one can notice that the variances are not homogenous, therefore the nule hypothesis H_0 can not be accepted, on the contrary, we have to accept the true hypothesis H_1. As a result, the two factors taken into account have a substantial influence on the slection characters for meat production.

The results of the Bartlett Test applied on the variances from a month to another, caused by the systematic factors taken into account, are given in Table 9.

Table 8.Analysis of variance for Snedecor-Fisher Test for meat production characters

Source of variation	DL	SS	SA	F
Weight at the age of 180 days				
Global variance among groups	11	176,895.808	16,081.437	-
Error	1,693	930,328.734	549.514	-
Total	1,705	1,107,224.543	-	29.264
Weight at the age of 365 days				
Global variance among groups	11	330,116.834	30,010.621	-
Error	1,693	2,756,033.555	1,627.899	-
Total	1,705	3,086,150.390	-	18.435
Weight daily gain				
Global variance among groups	11	4,164,207.530	378,564.320	-
Error	1,693	48,049,421.629	28,381.229	-
Total	1,705	52,213,629.159	-	13.338

Source: Own calculations

Comparing the calculated B statistic with the tabled one, we may see non significant differences.

The conclusion is that the characters are deeply influenced by the steers month of birth. Correction factors for the steers month of birth are needed to increase the accuracy of the data which are later used in the sires breeding value estimation based on their half brothers performances in meat production.

Table 9. Calculated B value compared to the critical interval for various probabilities

Selection character	Calculated B	Critical interval for:		
		P=0.05	P=0.01	P=0.001
		18.30-21.02	23.20-26.21	29.58-32.90
Weight at the age of 180 days	77,716	No	No	No
Weight at the age of 365 days	48,215	No	No	No
Weight daily gain	160,940	No	No	No

Source: Own calculations

CONCLUSIONS

Meat production characters studied within this research work: weight at the age of 180 days and 365 days and weight daily gain as well are closely related one to each other and are very important for the practice of selection.

The heritability recorded higher value compared to other authors and reflect the aditive influence of genes, that is, they could be successfully used in selection. The values of the genotypic parameters determined in this study are close to the one found by other foreign and Romanian authors. Weight daily gain is substantially influenced by environmental factors, so that it is wiser to include in the breeding programmes mainly characters linked to live weights at different ages which have a better response to selection. Also, from a practical point of view, this is a reason reason to recommend farmers to pay attention to live weight at various fattening stages and improve all the environment conditions in order to reach the weight daily gain as planned.

In the breeding programmes, it is enough to make selection based on live characters of meat production because their improvement with have a benefic effect on the other meat production traits. Also, the steers month of birth is very important to be taken into consideration because it could lead to error in sires breeding value estimation. For this reason, correction factors for the steers month of birth are imposed to be used in order to increase precision in breeding value evaluation and assure a correct sire hierachization.

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REFERENCES

[1]Albuquerque, L.,G., Meyer, K., 2001, Estimates of covariance functions for growth from birth to 630 days of age in Nelore cattle. J. Anim. Sci. 79: 2776-2789

[2]Averdunk, G., 1974, Progeny testing for beef characteristics, 1st. World Congress on Genetics applied to livestock production, Madrid

[3]Baldi Fernando, Galvão de Albuquerque Lucia, dos Santos Gonçalves Cyrillo Joslaine Noely, Branco Renata Helena, Costa de Oliveira Junior Braz, Zerlotti Mercadante Maria Eugênia, 2012, Genetic parameter estimates for live weight and daily live weight gain obtained for Nellore bulls in a test station using different models, Livestock Science 144:148–156

[4]Bar-Anan, R., Levi, U., Shillo, A., Soller, M., 1965, Progeny testing Israeli-Friesian A.I. Sires for rate of gain. World Review of An. Prod. Vol.7(special issue), 53

[5]Brackelsberg, P. O., Kline, E. A., Willham, R. L., Hazel, L. N., 1971, Genetic parameters for selected beef carcass traits. J. Anim. Sci. 33:13.

[6]Calo, L.L. , Mc. Dowel, R.E., Van Vleck, L.D., Miller, P.D., 1973, Parameters of growth of Holstein-Friesian bulls, J. An. Sci., 37: 417

[7]Călinescu, E., 1969, Bull testing for meat production. Ph.D.Thesis, "Nicolae Balcescu" Agricultural Institute Bucharest

[8]Cantet, R.J.C.M., Steibel, J.P., Birchmeier, A.N., Santa Coloma, L.F., 2003, Bayesian estimation of genetic parameters for growth and carcass traits of grass-fed beef cattle by Full Conjugate Gibbs. Arch. Tierz., Dummerstorf 46: 435-443

[9]Craiu, V., 1982, Checking the statistical hypothesis. Didactical and Pedagogical Press House, Bucharest

[10]Craiu, V., Ciucu, G., Stefanescu, A., 1974, Mathematical Statistics and Operation Research, Didactical and Pedagogical Press House, Bucharest

[11] Cundiff, L. V., Gregory, K. E., Koch, R. M., Dickerson, G. E., 1971, Genetic relationships among

growth and carcass traits of beef cattle. J. Anim. Sci. 33:550.
[12]Dickerson, C.E., Kunzi, N., Cundiff, L.V., Koch, B.M., Arthaud, V.R., Gregory, K.E., 1974, Selection criteria for efficient beef production. J.Anim. Sci., 39(4), 651-673
[13]Eriksson, S., Näsholm, A., Johansson, K., Philipsson, J., 2002, Genetic analysis of post-weaning gain of Swedish beef cattle recorded under field conditions and at station performance testing. Livest. Prod. Sci. 76:91–101
[14]Fimland, E., 1971, Progeny testing for meat production characters in 1971. Buskap Audratt. 23: 203
[15]Fouilloux, M.N., Renand, G., Gaillard, J., Ménissier, F., 2000, Genetic correlation estimation between artificial insemination sire performances and their progeny beef traits both measured in test stations. Genet. Sel. Evol. 32, 483–499
[16]Goyache, F., Fernandez, I., Royo, L.J., Álvarez, I., Gutierez, J.P., 2003, Factors affecting actual weaning weight, preweaning average daily gain and relative growth rate in Asturiana de los Valles beef cattle breed. Arch. Tierz., Dummerstorf 46: 235-243
[17]Groen, A.F., Vos, H., 1995, Genetic Parameters for Body Weight and Growth in Dutch Black and White Replacement Stock. Livest. Prod. Sci. 41: 201-206
[18] Hashiguchi Tsutomu, Maeda Yoshizane, Kashima Manabu, Tanoue Yuseki, Yamaji Masanori, 1982, Effectiveness of "On-farm Progeny Testing" on the Meat Production Performance of Japanese Black Cattle, Nihon Chikusan Gakkaiho, Vol.53(10)656-663
[19]Koots, K.R., Gibson, J.P., Smith, C., Wilton, J.W., 1994, Analyses of published genetic parameter estimates for beef production traits. 1. Heritability. Animal Breeding Abstracts, Vol.62:309-338
[20]Koots, K.R., Gibson, J.P., Wilton, J.W., 1994, Analyses of published genetic parameter estimates for beef production traits. 2. Phenotypic and genetic correlations. Animal Breeding Abstracts, Vol.62:825-852
[21]Krejčová, H., Přibyl, J., Přibylová, J., Štípková, M., Mielenz, N., 2008, Genetic evaluation of daily gains of dual purpose bulls using random regression model. Czech J. Anim. Sci. 53, 227–237.
[22] Mureşan, G., 1984, Contributions to the study of the morphoproductive characters in the Black and White Friesian. Ph.D.Thesis, Agricultural Institute Cluj-Napoca
[23]Negrutiu, E., Petre, A., 1975, Animal breeding, Didactical and Pedagocical Press House, Bucharest
[24]Nephawe, K.A., Maiwashe, A., Theron, H.E., 2006, The effect of herd of origin by year on post weaning traits of young beef bulls at centralized testing centres in South Africa. S. Afr. J. Anim. Sci. 36:33-39
[25] Oikawa, T., Hoque, M. A., Hitomi, T., Suzuki, K., Uchida, H., 2006, Genetic Parameters for Traits in Performance and Progeny Tests and Their Genetic Relationships in Japanese Black Cattle, Asian-Australasian Journal of Animal Sciences 19: 611-616
[26]Popescu Agatha, 2014, Increase of the precision in the breeding value estimation by B.L.U.P.-Best Linear Unbiased Prediction, Ed.Eikon Cluj-Napoca, Ed.RawexComs, Bucharest, p.102-115
[27]Pribyl, J., Misztal, I., Pribylova, J., Šeba, K., 2003, Multiple-breed, multiple-traits evaluation of beef cattle in the Czech Republic, Czech J. Anim. Sci., 48 (12): 519–532
[28]Robinson, D.L., 1996,Estimation and interpretation of direct and maternal genetic parameters for weights of Australian Angus cattle. Livest. Prod. Sci., 45:1-11
[29]Schenkel, F.S., Miller, S.P., Jamrozik, J.,Wilton, J.W., 2002, Two-step and random regression analyses of weight gain of station-tested beef bulls. J. Anim. Sci. 80, 1497–1507
[30]Szabo, F., Lengyel, Z., Domokos, Z., Bene, S., 2008,Estimation of genetic parameters and (co)variance components for weaning traits of Charolais population in Hungary. Arch. Tierz. 51:447-454
[31]Temişan, V., 1976, The actual state, program and perspective of of meat production breeding of the Romanian Cattle breeds, Ph.D.Thesis, Agricultural Institute Cluj-Napoca
[32]Thompson Robin, Brotherstone Sue, White Ian M.S., 2005, Estimation of quantitative genetic parameters, Phil. Trans. R. Soc. B, 29 July 2005, Vol.360(1459): 1469-1477
[33]Uchida, H., Oikawa, T., Suzuki, K., Yamagishi, 2001, Estimation of genetic parameters using an animal model for traits in performance and progeny testing for meat production of Japanese Black cattle herd in Miyagi prefecture. Anim. Sci. J. 72:89-98
[34]Vesela, Z., Pribyl J., Safus, P., Vostry,L., Stolcand, L., Seba, K., 2006, Estimation of genetic parameters for type traits in beef cattle in the Czech Republic, Book of Abstracts of the 57th Annual Meeting of the European Association for Animal Production, Sept.17-20, 2006, Antalya
[35]Vostry, L., Přibyl, J., Schlote, W., Vesela, Z., Jakubec, V., Majzlik, I., Mach, K., 2009, Estimation of Animal × Environment Interaction in Czech Beef Cattle. Arch. Tierz. 52:15-22
[36]Vostrý Luboš, Veselá Zdeňka, Přibyl Josef, 2012, Genetic parameters for growth of young beef bulls, Archiv Tierzucht 55 (3): 245-254
[37]Waldron, D.F., Morris, C.A., Bakeraker, R.L., Johanson, D.L., 1993, Maternal effects for growth traits in beef cattle. Livest. Prod. Sci. 34:57-70
[38]Wilson, L. L., McCurley, J. R., Ziegler, J. H., Watkins, J. L., 1976, Progeny of Polled Hereford Sires and Angus-Holstein Cows Genetic Parameters of Live and Carcass Characters, Journal of Animal Science, 43:569-576
[39]Zulkadir Uğur, Keskin Đsmail, Aytekin Đbrahim, Khattab Adel Salah, 2010, Estimation of Phenotypic and Genetic Parameters and Effect of Some Factors on Birth Weight in Brown Swiss Calves in Turkey Using MTDFREML, In: Proceeding of the 2nd International Symposium on Sustainable Development, June 8-9 2010, Sarajevo, p.269-274

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EVALUATION OF THE IMPACT OF AGRICULTURAL LAND LEASE RELATIONS IN AGRICULTURAL SUBJECTS IN SLOVAKIA

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Abstract

The aim of the scientific paper was to find correlation between total utilized agricultural land and leased farmland by agricultural holdings in Slovakia. The evaluation was realized by using the method of regression analysis to verify the hypotheses and correlation. Based on the research we can conclude that was confirmed by 48% correlation between the total utilized land and acreage of leased land only by small individual farmers. Based on the research we came to the conclusion that, the correlation between the area of agricultural land leased from individuals and the amount of the rent for one hectare is quite strong, accounting for 60%.In Slovakia the agricultural holdings and farmers are farming on leased land and the fact is that the rent is relatively low. Amount of rent for agricultural land in Slovakia in 2012 ranged from 6.50 to 120.00 EUR.ha^{-1}. The low amount of rent for agricultural land in Slovakia compared to EU countries is directly related to a lower level of agricultural production and also revenues, up about 30 to 40% per hectare of agricultural land. By comparing the rent per 1 ha of agricultural land in Slovakia with selected EU countries shows that in Slovakia is the rent 14 to 55 times lower. We can assume that the interest in rent of agricultural land will have a growing trend due to revenue arising from the implementation of direct payments under the CAP of the EU.

Key words**:** *agricultural land, agricultural holdings, farm, lease relations, rent*

INTRODUCTION

Land is a specific basic factor of production in agriculture. Therefore the use of agricultural land influence the agricultural activity and for agricultural holdings the land use has impact on the structure of agricultural activity. Structure of land tenure mainly in the proportion of own and rented land in member states of EU is different and changes by time. In most member states is the share of rented land higher than owned land, therefore the rent enables more flexible and more efficient land use. Agricultural land is mainly used by tenants. This trend, which prevails in Slovakia is an European trend [6]. Vital importance for the development of rural areas and agriculture [8] does have the tenure relations to the agricultural land and properly functioning agricultural land markets. This knowledge is true in general, but is especially important for the new EU Member States, where land reform and restructuring of agriculture for the last 20 years completely changed the existing structure of ownership and use of agricultural land. Therefore, much attention has been paid in the last decade to this process. Agricultural land use and related ownership titles are thus one of the important factors affecting rural development. The priority here extends not only to the issue of employment of the population in rural areas, but also the effective use of agricultural land. Why actually it is necessary to pay attention to ownership and lease relations to the agricultural land in the context of rural development? If they are not solved ownership relations to agricultural land, so the agricultural land market is not functioning because we can not determine the owner, so the land can not be a subject of selling or buying. If the agricultural land market is not properly functioning it is one of the indicators that agriculture stagnates and causes the stagnation of rural development. Agricultural land market plays an important role in rural development because it is an

indicator of investment in rural development, prevents structural changes in rural areas where agricultural production is reduced, there can be find an alternative uses of land, such as agrotourism, and thus can create new jobs, affects the degree of infrastructure and last but not least, the markets for agricultural land will keep the population in rural areas and improve the demographic development. Legal regulations of various EU countries show significant differences. Slovakia regulated the issue of the agricultural land lease after the year 1990 several times and it is assumed that the current legislation will be amended again. It can be stated that the current regulation is more to protect the tenant as to protect the owner, which is obviously due to the fact that agricultural land is currently utilized in Slovakia, but also in the EU more by tenants than by the owners of agricultural land. Regulation is directed mainly to achieve the purpose of the lease and in several countries takes also into account the effects of structural changes on the land manager's farming sector (creating and preserving agricultural farms). The lease of agricultural land is regulated by the Act n.504/2003 on the lease of agricultural land, farm and forest land and amending certain acts as amended.

Thru agriculture will continue to be one of the most important economic sectors in rural areas and will contribute to the innovation in the rural areas. We can assume that the interest in rent of agricultural land will have a growing trend due to revenue arising from the implementation of direct payments under the CAP of the EU. This statement is in accordance with several studies which have analysed the impact of direct payments on land sales and rental prices (Ciaian & Swinnen, 2009, Kirwan 2009; Latruffe & Mouël, 2009) [1,2,3].

MATERIALS AND METHODS

The research was realized as a part result of the VEGA project n. 1/1213/12 Variant approaches of measuring competitiveness of regions. As materials were used data of 72 observed agricultural holdings and small farmers in Slovak republic for the year 2012, FADN data from Ministry of Agriculture and rural development of Slovak republic (MPSR) as well as Eurostat data (share of leased agricultural land, land rent). The evaluation of the impact of agricultural land lease relations in agricultural subjects in Slovakia was realized by using the statistical method:

Method of regression analysis to verify the following hypotheses and correlation:

a) Correlation between the total area of utilized agricultural land of the agricultural holding and the share of leased land, particularly by agricultural holdings and by self-employed small farmers

Dependent variable in the application of the regression model was the share of agricultural land leased area to the total utilized agricultural area of the holding and the independent variables consisted of the total area of utilized agricultural land in the observed agricultural holdings and small farmers.

$Yi = \beta_0 + \beta_1 * Xi$

Yi - share of leased agricultural land area to the total utilized agricultural area of the holding

β_0, β_1 - parameter of regression model

Xi - total area of utilized agricultural land

i - observed agricultural holding/farmer

b) Correlation between the average area of agricultural land leased from one private person to the land rent per 1 ha.

$Yi = \beta_0 + \beta_1 * Xi$

Yi - land rent EUR.ha^{-1}

β_0, β_1 - parameter of regression model

Xi - average area of leased agricultural land from one priveate person

i - observed agricultural holding/farmer

We have verified the hypothesis by using regression analysis.

Hypotheses 1: With the growth of the total area of utilized agricultural land in the farm also grows acreage of leased land.

Hypotheses 2: With the growth of leased area of agricultural land from individuals' increases the land rent.

In paper were used also qualitative methods used for the fulfillment of the research were

mathematic-statistical data analysis, regional comparative analysis of selected economic indicators.

RESULTS AND DISCUSSIONS

The scientific paper focuses on the analyses and evaluation of the impact of agricultural land lease relations in agricultural subjects in Slovakia. In Slovak republic as well as in other member states of EU belongs the ownership to agricultural land to private owners, but large group of land owners is not farming on their land by themselves, but is renting the land to the agricultural subjects (farmers or agricultural holdings). So the agricultural land rent market is more developed comparing to the market with agricultural land.

In terms of economic theory [4] may raise the question, to what extent will the owners be willing to lease their land and when they would be motivated by land rental market to utilize the agricultural land by themselves. Supply of agricultural land is by the owners, who are mainly individuals in productive age respectively working in other sectors of the national economy. Demand for rent of agricultural land is mainly by agricultural holdings and farmers, for whom the land is one of the basic factors of production. In Slovakia the agricultural holdings and farmers are farming on leased land and the fact is that the rent is relatively low. A minimum amount of rent is 1 % of the value of agricultural land according the law edict n.38/2005 Coll. But in practice it is possible to meet with the rents with amount 2.5% -to 3 % of the value of agricultural land. Amount of rent for agricultural land in Slovakia in 2012 ranged from 6.50 to 120.00 EUR.ha^{-1}. But even this is not very high, since the price of agricultural land in Slovakia in comparison with other EU countries is low. Despite the low amount of rent in respect of the current situation in Slovakia is the vast majority of owners willing to lease their land even at this price. There are many reasons. For example, the cost of management of small acreage (the vast majority of owners owns land with an area of less than 1 ha) are too high compared to income from land, so it is more profitable to lease land to take any additional income in addition to their main job, which primarily relates to other sectors of the national economy than agriculture.

It can be assumed that in the future more owners becomes interested in management on their own agricultural land, or it will increase the interest in the purchasing agricultural land. The main motivation could be the provided direct payments to farmers from the European Union. In the period 2000–08, a strong and persistent increase in land rental prices is observed in all new EU member states, which was especially strong around the period of EU accession. Studies [7] show that in new EU member states was a strong increase in land rental prices just after EU accession (mainly in Poland), which coincides with an increase in direct payments (DPs) in the same period. Hence, EU accession can be considered a quasi-natural experiment to estimate the impact of the increase in DPs on land rental prices. DPs have a positive and significant impact on land rents, indicating that there is rent extraction of government payments by landowners. This impact is not only statistically significant, but is also economically significant. An increase of one additional euro per hectare in DPs increases land rents by 13 to 25 EUR.ha^{-1}, corresponding to a capitalization rate of 13% to 25%. Since renting is widespread in several EU new member states and most landowners are absentee landowners who live in urban areas or who are no longer active in agriculture, the payments will flow out of the agricultural sector and are, to a large extent, missing their goal of improving the livelihoods of rural inhabitants[7].

Here, is important the question: When respectively under what conditions would a landowner be willing to start to manage the land and not to offer the land more to hire? Using microeconomic theory [5] it is possible to identify critical decision point. Critical point of deciding whether to rent or start own farming is when the profit form renting equals to profit that the owner would earn from

utilizing his own land. We need to consider with the added value from hectares of agricultural land, which is the difference between production and consumption, so the difference between revenues and costs related to agricultural production (taking into account the costs and benefits that would be concerned by owner who would be in case of farming own land forced to borrow respectively purchase the necessary resources or use the offer of agrarian services and not added value generally attained by farms). Next, we consider the value of direct payments and additional payments per hectare of land and the amount of property tax for this land. Calculation for Critical point: (added value + direct payments) – land tax = rent (1 ha). The critical point value means where the owner of the land begins to think about possibility to utilize the land by itself. If the left side of that relationship is greater than the rent of hectares of land, the landowner should be decided in accordance with the economic theory of self-management of their land. Otherwise, it will offer to rent. If the rent is higher than the contribution of its own management will the owner continue to rent the land. Conversely, if the rent is less than the benefit of its own management, this situation could motivate some owners to utilize own land. Then it might be expected that the current 90 % of the leased land will reduce and will increase the number of owners utilizing their land, especially those who own larger land area.

Correlation between total utilized area of the agricultural holding and the share of leased agricultural land.

The aim of the scientific paper was also to find correlation between total utilized agricultural land and leased farmland by agricultural holdings in Slovakia. The relation was evaluated by verifying the following hypotheses on a sample of selected entities working in agriculture, and especially for companies and small farmers.

Hypotheses: With the growth of the total area of utilized agricultural land in the farm also grows acreage of leased land.

The correlation was observed separately in selected agricultural holdings and particularly by small farmers underlying data set consisted of data observed by agricultural holdings in Slovak republic and from the FADN MPSR for 2012. As independent variables we have identified a total area of utilized agricultural land in the company which was the dependent variable and the share of area of leased land to the total area of the holding. Verifying of hypotheses for agricultural holdings was realized through regression analysis and is shown in figure 1.

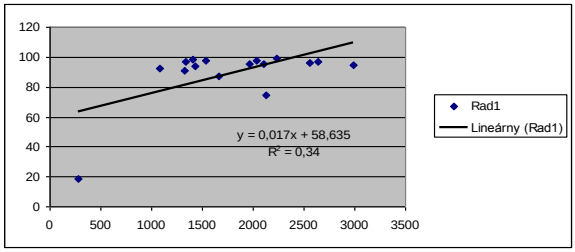

Fig.1. Correlation between total utilized agricultural area and share of rented land by agricultural holdings in Slovakia

Source: Author's calculations based on Survey data and FADN MPSR 2012

Figure 1 shows that based on regression analysis performed by agricultural holdings, the dependency ratio between the total utilized agricultural land and acreage of leased land equals to only 0.34, which indicates a weak statistical relationship between these indicators. Based on the above, we can conclude that if a legal person would increase total utilized land area of about 1 ha would the acreage of leased land increase on 0.017 hectares.

Verification of hypotheses for small farmers in Slovakia through regression analysis is shown in figure 2.

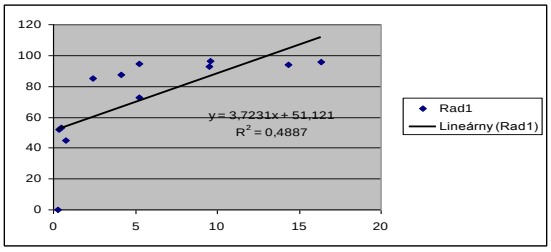

Fig.2.Correlation between total utilized agricultural area and share of rented land by small farmer in Slovakia

Source: Author's calculations based on Survey data and FADN MPSR 2012

Based on the results of the regression analysis performed for small farmers is the dependency ratio between the total utilized agricultural land and acreage of leased land equal to 0.48, which is a moderate correlation between these indicators. If the small farmer would increase the total area of utilized land of 1 ha would the acreage of leased land also increase by 3.7231 hectares.

Based on the research we can conclude that most of the agricultural holdings are farming primarily on leased land a percentage of 90-95%, regardless of the total area of utilized agricultural land, therefore the interdependence between them is very low. Partially different situation was observed for small self-employed farmers who are farming an average of 70-80% of leased land. This situation is connected to the process of restitution where has been returned the ownership to agricultural land to original owners. This was for many of small farmers' motivation for starting a business in primary agricultural production. For this reason, it is seen higher share of owned land comparing to leased land in case of small farmers, which was confirmed by 48% correlation between the total utilized land and acreage of leased land.

Correlation between the rent for agricultural land area and amount of leased land.

The observed correlation between the acreage of the leased land and the rent was realized on the sample of agricultural holdings, due to a more than 90% of the total utilized agricultural land is leased and thus are major participants in the agricultural land rent market. Based on the research as shown in Figure 3, we came to the conclusion that, as the acreage of leased land is increasing the price of rent for land increases also.

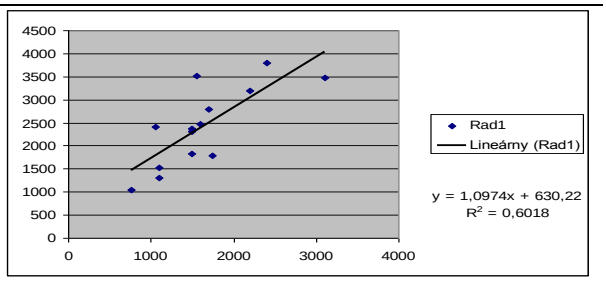

Fig.3.Correlation between the rent for agricultural land area and amount of leased land by agricultural holdings in Slovakia

Source: Author's calculations based on Survey data and FADN MPSR 2012

The figure 3 shows that the interdependence between the area of agricultural land leased from individuals and the amount of the rent for one hectare is quite strong, accounting for 60%. If the leased area in agricultural holdings will increase of 1 ha, thereby the rent is increasing of 1 EUR.ha^{-1}.

The comparison of rent for agricultural land in selected countries of the European Union

Holding structure, proportion of land farmed by the owner or rented land is different and varies from one EU Member State to another. In EU 11 757 000 000 all farms do manages nearly 171 603 000 hectares of agricultural land. In EU prevails the trend in increasing shares of leased land and decreasing share of land farmed by owners.

In the EU are the agricultural land prices and rent for agricultural land significantly different. The low amount of rent for agricultural land in Slovakia compared to EU countries is directly related to a lower level of agricultural production and also revenues, up about 30 to 40% per hectare of agricultural land. Regarding the relationship between leased and owned agricultural land, are among the EU Member States significant differences. Particularly high proportion of leased land was recorded in Germany, France and Belgium, where farmers farmed only about one-third of its own land and two-thirds of a lease. The smallest proportion of leased land was in Ireland, where such land was only a little over one tenth of the total agricultural land. In Austria, Finland and Italy farmers rented land about one -fifth and four-fifths

were their property. In other countries, the share of leased land ranged from less than one -third and more than a third. In Sweden approached the half and Luxembourg farmers lease more than half of the land on which farmed. Most agricultural land was rented in Belgium (67 %), France (64.9 %) and Germany (62.1 %). By comparing the rent per 1 ha of agricultural land in Slovakia with selected EU countries shows that in Slovakia is the rent 14 to 55 times lower. The rent of agricultural land in the selected EU counties in the year 2009 is shown in the figure 4.

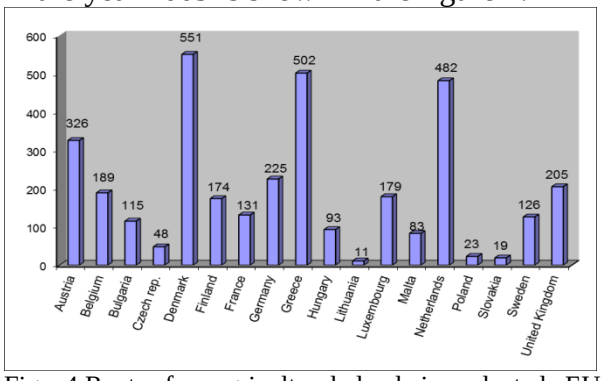

Fig. 4.Rents for agricultural land in selected EU member states in the year 2009 (EUR.ha^{-1})
Source: Eurostat data, 2013

The rent for agricultural land in individual EU countries varies significantly. While in some countries of northern Europe is the rent less than 200 EUR.ha^{-1}, so for example in Denmark, the Netherlands and Greece is well above 450 EUR.ha-1. Rent amount in most EU countries has grown slower than the market price. In some countries maintain a balanced amount of rent levels over the period 1999-2009 in some the rent had increasing trend (Denmark, the Netherlands, Austria, Hungary).

CONCLUSIONS

The aim of the scientific paper was to find correlation between total utilized agricultural land and leased farmland by agricultural holdings in Slovakia.

Based on the research we can conclude that most of the agricultural holdings are farming primarily on leased land a percentage of 90-95%, regardless of the total area of utilized agricultural land, therefore the interdependence between them is very low. Partially different situation was observed for small self-employed farmers who are farming an average of 70-80% of leased land. This situation is connected to the process of restitution where has been returned the ownership to agricultural land to original owners.

This was for many of small farmers' motivation for starting a business in primary agricultural production.

For this reason, it is seen higher share of owned land comparing to leased land in case of small farmers, which was confirmed by 48% correlation between the total utilized land and acreage of leased land. Based on the research we came to the conclusion that, as the acreage of leased land is increasing the price of land rent increases also. The correlation between the area of agricultural land leased from individuals and the amount of the rent for one hectare is quite strong, accounting for 60%.

In Slovakia the agricultural holdings and farmers are farming on leased land and the fact is that the rent is relatively low. Amount of rent for agricultural land in Slovakia in 2012 ranged from 6.50 to 120.00 EUR.ha^{-1}. The low amount of rent for agricultural land in Slovakia compared to EU countries is directly related to a lower level of agricultural production and also revenues, up about 30 to 40% per hectare of agricultural land. By comparing the rent per 1 ha of agricultural land in Slovakia with selected EU countries shows that in Slovakia is the rent 14 to 55 times lower. We can assume that the interest in rent of agricultural land will have a growing trend due to revenue arising from the implementation of direct payments under the CAP of the EU. In future it will be necessary to pay attention to the agricultural land market, which plays an important role also in the rural development.

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REFERENCES

[1]Ciaian, P., Swinnen, J.F.M. ,2009, Credit Market Imperfections and the Distribution of Policy Rents, American Journal of Agricultural Economics, 91(4):1124–1139.
[2]Kirwan, B.E., 2009, The Incidence of US Agricultural Subsidies on Farmland Rental Rates, Journal of Political Economy, 177(1):138–164.
[3]Latruffe, L., Le Mouël, C., 2009, Capitalization of Government Support in Agricultural Land Prices: What do we Know?, Journal of Economic Surveys, 23(4):659–691.
[4]Lazíková, J., Rumanovská, Ľ., 2012, Legal and economic issues of the agricultural land rent in Slovakia (Land rent in Slovakia,) Economics of Agriculture, 2012, 12 (3): 5-17
[5]Lazíková, J., Takáč, I., Novák, P., Rumanovská, Ľ., 2012, Legal and economical issues of the agricultural land rent in Slovakia, Economics of Agriculture, 3 :5-17
[7]Swinnen,J., Knops, L., 2013, Land, Labor and Capital markets in the European agriculture. Brussels: CEPS, 284 p. ISBN 978-94-6138-351-8
[8]Swinnen, J., Vranken, L.,2005, The development in rural land market in transition countries. ECSSD Report, The World Bank 2005 (5)
[6]Tatík, J., Kniebugel, P., 2012, *Comparism of market land prises and land rent in selected EU countries*. [cit. 2013-10- 15]. [online]: <http://www.mpsr.sk/slovak/spf/spfceny.htm>

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EFFECT OF STRAW AND GREEN MANURE ON BIOLOGICAL CONDITION SODDY-PODZOLIC SOILS

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Abstract

Estimation of changes of a biological condition (status) soddy-podzolic sandy soil under the influence of use of mineral fertilizers and biological resources (straw of a winter wheat and stubble green manure, separately and in a combination) was an objective of this research. Among the investigated kinds of fertilizers the strongest influence on the mortmass and mortmass carbon, number, activity of soil microflora and the content of soil microbial biomass have rendered straw in a combination with , postharverst green manure (intermediate culture), at the expense of increase in an input of the easily accessible for soil microflora organic matter. In this research mineral fertilizers without additives of organic materials essentially have not affected microbial activity

Key words*: biological activity, green manure, mortmass, nitrifying activity, number of microorganisms, soil microbial biomass, straw, soddy-podzolic sandy loam soils.*

INTRODUCTION

Under the conditions of a lack of manure and mineral fertilizers the most essential, annually completely renewed resource of organic matter and nutritious elements in arable soils are such biological resources of agrocoenosis - postharvest crop residue. In Russia it is annually made about 120 million т post-harvest residues of agricultural crops, to 80 % from them it is necessary on straw of grain and leguminous cultures. More than half residues real It is possible to use as fertilizer for retention and increasing the fertility of the arable soils. Thus in arable soils 36-90 kg nutrients (NPK) and 800-2000 kg of organic carbon counting on 1 ha-1 come back.

The green manure phytomass, including intermediate (stubble), grown up after cleaning of the basic winter grain culture (wheat, a rye or barley) can serve also as the important biological factor for improve of soils arable fertility.

The plant residues in agrocoenosis carry out various agroecological functions, including: serve as a substratum, a comfortable place of colonization, the basic accessible power material, a source of carbon and nutrients for soil microflora and are a major factor regulating microbiological activity in soils [1-5].

Results of scientific researches testify that inputs of phytomass of crop residues and green manure in soil improve biological, physical, agrochemical properties (are optimised), productivity of agricultural crops raises [6-8]. However in the scientific literature there are not enough the experimental data establishing quantitative parametres of changes of soil properties at use (entering) of straw in a combination with green fertilizers.

The work purpose - an estimation of changes of indicators of a biological condition of soddy-podzolic sandy soil at use on fertilizer of straw of a winter wheat and green manure biomass which has been grown up us stubble.

MATERIALS AND METHODS

The investigation took place in the long-term fertilization experiment located in Meshcherskaya Lowland (in the center of the East European Plain) (56° 03’ N, 40° 29’ E) at 150 m above sea level. The site is situated in the zone temperate continental climate,

average rainfall for the year - 599 mm, the average temperature for the year - 3.9° C. Soddy-podzolic sandy loam soil, are low in organic matter (C_{org} - 0.55-0.62 %) and nutrients, unstable water regime, acidity (pH_{kcl} - 4.5-4.9).

Researches spent in long-term field experience (in the practice ground of All-Russian Research Institute of Organic Fertilizers and Peat). Here (in this experience) since 1997 influence of application of straw of grain and leguminous cultures on reproduction of fertility of soddy-podzolic sandy soil and efficiency of cultures grain-row crop rotation is studied: a winter wheat - lupine - a potato - barley - annual grasses (lupine + oats).

In this article the experimental data received at carrying out of researches in a link of a crop rotation (3-rd rotation) discussed. Crop rotation: a winter wheat (*Triticum aestivum L.*) (2007-2008) - lupine (*Lupinus angustivolius L.*) (2008-2009). Harvesting of the grain winter wheat was spent in the beginning of August by means of the harvester Sampo-500 equipped with straw chopper, with crushing of straw till the length by of 7-10 cm, brought N30 (ammoniac saltpeter), disking with incorporation into soil of straw on depth 8-10 cm are spent and mustard white (*Sinapis alba*) are sowed. The vegetative period for mustard made 60-65 days. For this time the culture reached flowering phases. In the beginning of October made ploughing by a plough, thus the mustard phytomass together with winter wheat straw was in regular intervals distributed in a layer of earth 0-20 sm. Fertilizers brought under the scheme: 1. No treatment (0); 2. Mineral NPK-fertilizers (MF); 3. MF + winter wheat straw (WWS); 4. MF + WWS + postharverst green manure (GMa); 5. MF + WWS + GMs (in spring). Postharverst green manure brought in soil in a treatment with MF + WWS + GMa autumn before ploughing, in a treatment with MF + WWS + GMs - spring of next year.

Winter wheat straw and stubble green manure doses in are presented table 1. Mineral fertilizers (N30P60K60) brought in the spring, before seeding of lupine in the beginning of May.

Biological condition of investigated soil estimated on following parameters:to stocks mortmass (MM) - considered a decantation method, washing up of soil (from a layer of 0-20 cm) on a sieve of 0,25 mm [9]; number of the soil microorganisms participating in circulation of carbon and nitrogen - a crops and account method on nutrient mediums [10]; the microbial biomass C was measured by the rehydratation method based on the difference between C extracted with 0.5 M K2SO4 from dried soil at 65-700 C within 24 h and fresh soil samples with Kc coefficient of 0.25 [11]; nitrifying activity - on accumulation N-NO3 after 14 days incubation in laboratory conditions at optimum humidity of soil of 14 % (60 % WHC) and temperature 26 ° C.

For an estimation of a biological condition of soil counted also an integrated indicator of total biological activity **(TBA)** with use of a method of relative sizes: number of each group of microorganisms expressed in percentage, for 100 % accepted the maximum value. Relative values of variants and counted value of indicator **TBA** concerning a variant without fertilizers which accepted for 100 % are summarised. In tables and schedules in the samples of soil selected in 3 multiple frequencies from an arable layer (0-20 cm) from each allotment of experience average values of defined indicators are presented to two terms: in the spring before crops and in the autumn after harvesting.

Statistical analysis of experimental data and construction of schedules spent with use of computer programs Excel and Statistica 6,0.

RESULTS AND DISCUSSIONS

Incorporation into soil of winter wheat straw and mustard green manure has considerably increased receipt of organic substance and nutritious elements in soil (Table 1).

The quantity of the arrived vegetative material determines mortmass stocks in soil. Mortmass represents fossils of a vegetative, animal and microbial origin, fresh or initial transformation subjected. The considerable part of microbic populations, and also

character and intensity of biological processes, effective fertility and productivity is connected with this fraction biologically accessible nonhumicational organic substance [4].

Table 1. Receipt of organic substance and nutrient elements with a plant biomass into soil

Phyto-mass kind	C / N ratio	Inputs into soil				
		Dry substance, t ha^{-1}	C	N	P_2O_5	K_2O
			kg ha^{-1}			
Mustard biomass (elevated and roots)	16,2	2,48	950	58,7	24,8	61,4
Winter wheat straw	76,9	3,00	1200	15,6	5,8	20,7
Mustard biomass + winter wheat straw	28,9	5,48	2150	74,3	30,6	82,1

Agroecosystem security is defined by organic substance and energy sources mainly from mortmass stocks. Mineral fertilizers, increasing stocks of elements of a food in soil, cannot provide soil biota with necessary quantity of energy.

The received experimental data have shown high sensitivity of indicators of MM and C_{MM} to entering of straw and green manure. So, MM stocks in the arable layer of earth, made 3370 and 3040 kg ha^{-1} in treatment «0» and «MF» (accordingly), have increased to 5630 kg ha^{-1} at entering 3 t ha^{-1} WWS and to 6350 kg ha^{-1} in treatment «MF/WWS/GMa». The mortmass carbon stocks have increased approximately twice from entering of straw and stubble green manure (fig.1).

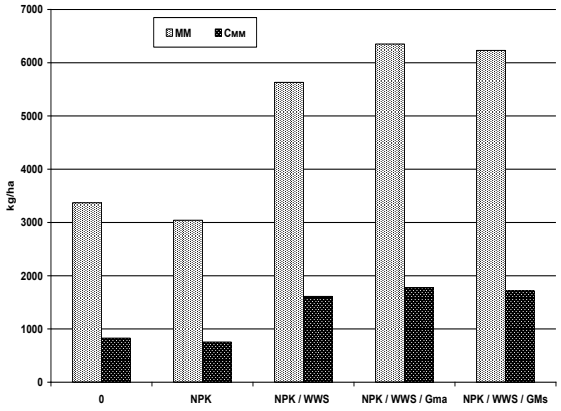

Fig.1. Mortmass stocks and C_{MM} in soil (0-20 cm)

The increase in stocks of easily transformed mortmass organic carbon at entering into soil of straw and green manure testifies security about to increase trophic resources, energy sources and humification in the soil biota. Winter wheat straw with wide parity C/N ratio =76,9 and mustard green with the high maintenance of nitrogenous connections represent contrast on biochemical structure and biological availability organic substrata. Taking into account it, use of straw of grain crops in a combination with green manure is more optimum in comparison with their separate entering. At a combination of straw with green manure and their joint applications the carbon and nitrogen parity in phytomass becomes more favorable (=28,9) for ability to live of soil microflora, therefore on the one hand - too high intensity of a mineralization green manure decreases, with another – difficultly decomposed lignino-cellulose complex in straw becomes more accessible to microflora.

Soil microorganisms are the major protagonists of organic matter decomposition and nutrient turnover in arable soils. It is known, that not only activity, but also number and a biomass of soil microorganisms can be essentially changed at addition of the plant residues in soil.

As a result of measurement of number of the soil microorganisms participating in transformation C - and N-containing connections, it is established, that after incorporation winter wheat straw into soil number agronomical useful groups of microorganisms has essentially raised: proteolitic - in 1,93 and 1,5; amilolitic - in 1,71 and 1,25; cellulolitic - in 1,94 and 1,57; nitrifying bacteria - in 1,88 and 1,38 times in comparison with a «0» treatment and «MF» treatment, respectively. Additional entering of mustard green manure, which characterised by higher maintenance of accessible organic substances with narrow parity C/N ratio as already it was mentioned above, has created more favorable conditions for soil saprophyte microflora. Therefore the soil was characterised by the maximum values of number of defined groups of microorganisms

and total biological activity (total relative biological activity) in a in a treatment with MF + WWS + GMa (in autumn before ploughing) (Table 2). The number increase anaerobe nitrogen fixation bacteria *Clostridium pasteurianum* in this variant in 10 times in comparison with nil treatment testifies that enrichment of an arable layer by organic substance of the vegetative rests in the form of straw and green manure promotes accumulation of biological nitrogen which can reach 2-15 kg on 1 т straw.

Stimulating action of straw and stubble green manure concerning microbiological processes and considerable growth anaerobe nitrogen fixation bacteria rivers *Clostridium* in vegetative and long-term field experiences on soddy-podzolic soils also observed Loshakov V. G et al (1995) and Emtsev V. T et al (1980) [13, 14]. Il'ina L.V.'s researches et al (1998) confirm value green manure as the factor providing interaction in communities of soil microorganisms in the course of decomposition of straw, and improving it fertilizing effect [6].

Decomposition of the vegetative residues in soil occurs to a mineralization of labile fractions of organic substance and microbial carbon formation [15].

Table 2. Parameters of a biological condition of soddy-podzolic soil at use on fertilizer WWS and GM

Variant of experience	CFU (Colony-forming unit), ths g^{-1} soils						TBA, %
	proteolitic	ammilolic	cellulolitic	micromicetes	nitrifying	Cl. pasteurianum	
0	5615	9700	19	58	8,2	175	100
MF	7200	13320	23	99	11,2	200	141
MF/WWS	10817	16584	36	83	15,4	508	175
MF/WWS/ GMa	13834	20308	42	106	21,0	1725	220
MF/WWS/ GMs	13484	19250	41 2.	100	20,7	950	213
LSD[1] 2800 3200 13 26 5,5 180							

(http://soilquality.org.au/factsheets/benefits-of-retaining-stubble-in-qld

Soil microbial biomass (bacteria, fungi and protozoa) is a measure of the mass of the living component of soil organic matter. The microbial biomass decomposed plant residues and soil organic matter to release carbon dioxide and plant available nutrients. Farming systems that increase plant residues tend to increase the microbial biomass).

The microbial biomass can serve as the important indicator characterized a biological condition of arable soils and representative diagnostic criterion of biological quality of soil organic matter [5].

As a result of the spent researches, content soil microbial biomass (C_{mic}) in a treatment «0» on the average for vegetative seasons of 2008-2009 of has made 312 μg g^{-1}. In our experiment application of mineral fertilizers was accompanied by insignificant growth C_{mic} to 348 μg g-1 (12 %). After entering of winter wheat straw C_{mic} has essentially increased on 68 μg g-1 (22 %). At joint entering winter wheat straw and green manure are noticed maximum in experience of value of the maintenance of a microbial biomass - 430 and 398 μg g^{-1}, that on 38 and 28 % above, in comparison with a nil treatment and treatment «MF», accordingly. The obtained data will be coordinated with results of researches in which substantial growth of microbial weight also is noted at entering of straw with full mineral fertilizer. In long-term field experiments in Denmark, Powlson et al. (1987) showed that straw manure could increase soil microbial biomass up to 45 % [5].

According to Fließbach A. et al (2000) if mineral fertilizers brought without carbon additives, they did not render positive influence on a microbial biomass whereas entering of straw in combination with mineral N-fertilizers has led to increase C_{mic} at 12 % in comparison with a background of alone mineral N-fertilizers [16].

Among the investigated fertilizer treatments, the combination of straw and green manure had the strongest impact on the microbial biomass. Similar data inform Kautz T. et al (2004) at entering of straw and green manure in sandy soils [17].

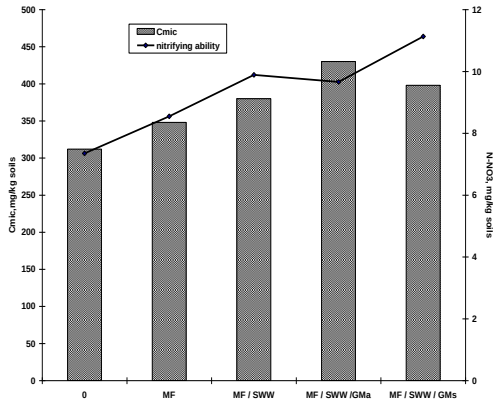

Fig.2. Content of a microbial biomass and nitrifying ability in an soil arable layer

Incorporation of straw into soil is often accompanied by such negative phenomenon, as decrease in ability of soil to nitrate formation as a result of an intensification biological nitrogen immobilization of the microorganisms, participating in its decomposition, especially in initial terms of decomposition.

In our researches, values nitrifying ability soils in the beginning of the vegetative period, before crops of cultures, in a «MF/WWS» treatment were above on 16 %, a treatment «MF / WWS / GMa» and «MF / WWS/GMs» - on 13 % and 30 % in comparison with a «MF» treatment (fig. 2). I.e. application of straw and stubble green manure has a little increased mobilization of nitric fund in soddy-podzolic sandy soil at the expense of additional receipt accessible nitrogen the containing organic substances and nitrifying bacteria activity.

CONCLUSIONS

Thus, use on fertilizer of straw of a winter wheat, separately and in a combination with stubble green manure entering at the expense of increase in an input and improvement of quality of the organic materials included in soil, has created more favorable conditions for soil microflora and substantially optimized a biological condition of soddy-podzolic sandy soil. soil. The mineral N-fertilization did not significantly effect biological properties of arable soils under this study.

REFERENCES

[1]Аристовская Т.В., 1988, Микробиологические аспекты плодородия почв, Почвоведение, 1988, 9:53-69.

[2] Берестецкий О.А., Возняковская Ю.М., Доросинский Л.М. et al, 1984, Биологические основы плодородия почв. М.: Колос, 1984. 287 с.

[3]Русакова И.В., 2013, Биологические свойства дерново-подзолистой супесчаной почвы при длительном использовании соломы на удобрение, Почвоведение, 2013, 12:1–9.

[4]Семенов В.М., Ходжаева А.К., 2006, Агроэкологические функции растительных остатков в почве, Агрохимия, 2006, 7:63-81.

[5]Powlson D.S., Prookes P.C., Christennsen B., 1987, Measurement of soil microbial biomass provides an early indication of changes in total soil organic matter due to straw incorporation, Soil Biology and Biochemistry, 1987, 19 (2):159-164.

[6]Ильина Л.В., Ушаков Р.Н., Возняковская Ю.М., Аврова Н.П., 1998, Использование растительной биомассы для повышения плодородия почв и продуктивности земледелия, Земледелие, 1998, 6:42-43.

[7]Lal, R.., 1995, The Role of Residues Management in Sustainable Agricultural Systems, J. of Sustainable Agricultural, 1995, 5 (4):51-78.

[8]Blanco-Canqui, H., Lal, R.., 2007, Soil structure and organic carbon relationships following 10 years of wheat straw management in no-till, Soil and Tillage Research, 2007, 95 (1-2):240-254.

[9]Власенко А.Н., Шарков И.Н., Шепелев А.Г., Самохвалова Л.М., Прозоров А.С., 2009, Баланс углерода в черноземе выщелоченном при использовании его в различных севооборотах лесостепи Приобья, Сибирский вестник сельскохозяйственной науки, 2009, 6:5-13.

[10]Практикум по биологии почв: Учеб. пособие / Зенова Г.М., Степанов А.Л., Лихачева А.А., Манучарова Н. А. - М.: Изд. МГУ, 2002, 120 р.

[11]Благодатский С.А., Благодатская Е.В. Горбенко А.А., Паников Н.С., 1987, Регидратационный метод

определения биомассы микроорганизмов в почве, Почвоведение, 1987, 4:71-81.
[12]Chèneby, D., Bru, D., Pascault, N., Maron, P.A., Ranjard L.,Philippot L., 2010, Role of Plant Residues in DeterminingTemporal Patterns of the Activity, Size, and Structure of Nitrate Reducer Communities in Soil, 2010, Applied Environmental Microbiology, 2010, 76 (21):7136–7143.
[13]Лошаков, В.Г., Иванова, С.Ф., Франк Эллмер, Синих Ю.Н., 1995, Изменение некоторых показателей плодородия дерново-подзолистой почвы в специализированных зерновых севооборотах и при бессменном возделывании зернофуражных культур с использованием пожнивного сидерата и соломы в качестве удобрения, Известия ТСХА, 1995, 1:3-15.
[14]Емцев В.Т., Ницэ Л.К., Покровский Н.П., Брук М.Х., 1980, Развитие микрофлоры и урожайность сельскохозяйственных растений при внесении соломы в почву, Известия ТСХА, 1980, 2:93-104.
[15]Jacinthe, P.A., La,l R., Kimble, J.M., 2002, Effects of Wheat Residue Fertilization on Accumulation and Biochemical Attributes of Organic Carbon in A Central Ohio Luvisol, Soil Sciens, 2002, 167 (11):750-758.
[16]Fließbach, A., Mäder, P., 2000, Microbial biomass and sizedensity fractions differ between soils of organic and conventional agricultural systems, Soil Biology and Biochemistry, 2000, 32 (6):757–768.
[17]Kautz, T., Wirth, S., Ellmer, F., 2004, Microbial activity in a sandy arable soil is governed by the fertilization regime, European Journal of Soil Biology, 2004, 40:87-94.
http://webdoc.sub.gwdg.de/pub/agrar/2006/kautz/microbial.pdf

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AGRARIAN ACCOUNTANCY IN THE VISUAL CONE OF INTERNATIONAL ACCOUNTING STANDARDS

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Abstract

After a long period during which agriculture did not have a standard of its own and applied for that matter the IAS 2 rules regarding inventories; IAS 16 regarding property, plant and equipment and IAS 18 regarding revenues, one last standard is being born – IAS 41. The late appearance of this standard is compensated by the great attention granted from the IASC, as agriculture is very important for those countries in course of development. IAS 41 is operative for those financial statements starting with the 1 of January 2003. The current standard is applied to account those elements regarding agricultural activities. IAS 41 is does not deal: with genuine exploiting activities, with harvested agricultural products, which are non biological products, or with the agricultural production, which is incorporated in the processing process. The activity will follow the financial reporting guidelines imposed by IAS 41 if: (a)the plants or animals, that represent the object of the activities, are living and suitable for transformation; (b) the change must be controlled, a fact which implies a range of activities like ground fertilizing and crop cultivation, feeding and medical assistance while breeding animals;(c)there have to exist fundamentals for evaluating changes like: the degree at which plants ripen, the animals weight, the trees circumference. The most important feature of this standard is the request for evaluating the biological assets at each balance sheet date at its fair value. Taking into consideration the limited framework of the current standard, beside of the explicit exceptions, all IAS must also be applied in agriculture.

Key words**:** *agriculture, accounting, biologic, cost, standard*

INTRODUCTION

Taking into account the trend of globalization, companies want to apply a uniform accounting system. IASB and FASB have closed an agreement to perform together a new conceptual accounting framework. The controversy standards (rules) based on principles or rules is not only a confrontation between the European and American area of thinking, but even among specialists on the same side of the Atlantic. [7]

MATERIALS AND METHODS

The paper is based on a large documentation regarding International Accounting Standards and reviewed all the important aspects in the author's critical opinion about their application in Agricultural Accounting.

RESULTS AND DISCUSSIONS

The first standard is exclusivity addressed to agricultural activity and it is IAS 41, approved by the IASC International Accounting Standards Committee in December 2000.

This standard comes with a variant to the pattern, traditional costs bringing the model of *fair values* in agriculture accounting.

The given standard will be applied to agricultural activities where biological production factors overstep as life duration the periods of reference, There is no processing of products obtained after harvesting.

IAS 41 is not being applied to agricultural products passed of harvesting period, to areas where biological assets grow, regenerate or degenerate, to incorporeal assets joint to agricultural activity (licenses), to agricultural activities which are not administrable (such as oceanic fishing).

We can acknowledge a biologic asset or an agricultural product in the balance sheet if:

-it belongs to the patrimony that is the company has right of ownership or control over the asset - on outcome of previous events;

-future economic profits determined by, the patrimonial asset should go to company;
-the cost or fair value the asset being estimated in a credible way.
A biological asset must be assessed for the initial acknowledgement and to its fair value for each balance sheet, less the costs estimated from the selling point.
Costs from the selling point include brokers and dealers commissions, taxes enforced by regulation bodies and by stock exchange and transfer as well as customs taxes.
Costs exclude shipping and other necessary costs for selling assets on the market.
Finding the fair value of the asset is done in a different way in conformity with certain conditions existed or not:
- if there is an active market for a biological asset or agricultural product then the market price comes as the basis of determining a fair value;
- when there is no brisk market we have as determination basis of the fair value:
- dealing price the most recent one;
- market price for similar assets;
- sector samples (the value of an orchard– number of seedlings on ha., a herd – hg. of meat).
The fair value is being related either as loss or gain in the profit - loss account. A loss might come up at the first acknowledgement when estimated selling costs exceed the fair value of the goods in their present state. [5]
The change of the value between two balance sheets in seen either as a loss or gain.
Governmental subsidies may be conditioned or not according to this they must be admitted as an income during different periods and ways:
· unconditioned subsidies in relation to biological assets to their fair value minus costs estimated at the selling point, must be considered as income only when governmental subsidies become creations,
· conditioned subsidies in relation to biological assets assessed to their fair value minus costs estimated at the selling point must be considered as income when terms imposed for granting subsidies are being accomplished. [6]
Accounting information can be viewed as a specific "legal" product because the production, presentation and diffusion must be regulated. Optimizing financial communication means controlling the quantity-quality/price report, in terms of accounting information.
International harmonization/convergence in accounting is considered to reduce disparities between national accounting rules.
Accounting normalization is the process of blending the presentation of the summarizing documents, accounting methods and terminology, taking into consideration three fundamental goals :
. obtaining a homogeneous information about the company;
. validating accounting information by external users (comparison over and space);
. contributing to a better allocation of financial resources of a the country.
Accounting harmonization/convergence and normalization are necessary because of the economic agents diversity which helps defining supply or demand for accounting information and because of the imbalances that may exist between supply and demand. [8]
In order to prevent these imbalances, the nominators, in their capacity referees of the accounting game must find solutions to lower the inherent "the use" the organization's accounting system.
The fundamental question of accounting harmonization/convergence is also related to the credibility note given to accounting. The claim is based on the confidence level of users towards the same public company, for the same period in different countries having different images of the size of equity and outcomes as a result of compliance with the rules of those countries. [4]
Among the above mentioned, harmonization/convergence of international accounting represents a positive phenomenon whose realization is determined by current developments in the economic life in general and accounting in particular.

But, like any process, accounting normalization has some limits of applicability, based on the following issues:

· against harmonization/convergence it can be shown that it breaks social balances, it does not take into account the specific role of accounting in each country. Realizing it essentially involves costs undertaken by SMEs, while most of the benefits go to large companies;

· another issue is that of defining/determining the space in which the harmonization/ convergence will manifest, if it shall take into consideration all companies or limit itself to some, especially listed companies, capital companies or those with more than a certain threshold;

·for some companies, harmonization/ convergence involves significant costs. A change in method can change the image of the company's financial condition and therefore will require informing the user accounts about the effects produced by these changes. Internally the company supports training and information adaptation costs. In general, accounting costs are relatively more important for small companies than for large ones, because these latter may allocate these costs (partially fixed) on a larger number of transactions.

Harmonization/convergence can not be fully achieved unless the social and economic environment exists (tax legislation, company law, financing arrangements, company management systems).

IASB and FASB have closed an agreement to perform together a new conceptual accounting framework. The project launched by the two international standardization bodies, does not cover the complete restoration of the conceptual framework as a reference matrix for accounting, but to update some of its architectural elements and integrate relatively new concepts which have appeared in standards like the fair value.

Countries that have adopted the conceptual framework are mostly English speaking countries: United States, Canada, New Zealand, Australia, United Kingdom of Great Britain and Northern Ireland. However, attempts and achievements have appeared in countries with traditional legislative and centralized accounting approaches (Germany, Japan, France etc')'

In connection with the unique framework there should be noted that representative regulators of the whole world work on this new image of the accounting constitution so that based on it global standards for financial reporting based on principles can be developed'

CONCLUSIONS

The accounting system of a country is, as we might recognize a social construction dependent on the nature of society and its development. Beyond this accounting gene, the system of a country depends on the emergence of particular phenomena, and the exchanges i1 is developing with other countries. We are almost convinced that large enterprises of one country, large groups and multinational companies are attracted by the magnet of globalization. What is sad however is that SMEs have little chances not to be crushed under this huge mixer. It is, perhaps, the only hope to find accounting oasis on economic and social level in which to breathe the air and peculiarities of national culture. [9]

REFERENCES

[1]Noile Reglementdri Contabile ediţia a IX-a 2014

[2]Epstein, B. J., Jermakowicz, E.K., IFRS 2007, lnterpretarea si aplicarea Standardelor lnternationale de Contabilitate gi Raportare Financiard, BMT Publishing House, Bucuregti.

[3]Feleagă, N., Feleagă Liliana, 2007, Contabilitate financiara. O abordare europeana si internationala, Volumul legi II, Editura Economica, Bucuresti.

[4]Feleagă, N., 2007, Sisteme contabile comparate, Volumul l, ll si lll, Editura Economici, BucureSti.

[5]Hennie van Greuning, 2007, Standarde Internationale de Raportare Financiara (Ghid practic), Editura Irecson, Bucuresti,

[6]Pântea, I.P., Bodea, G., 2007 Contabilitatea financiara romaneasca, conform cu Directivele Europene, Editura lntelCredo, Deva

[7]Ristea, M., Dumitru Corina, 2007, Politici si tratamente contabile privind activele imobilizate, Editura Tribuna Economicd, Bucuregti
[8]Ristea, M.(coord), 2005, Contabilitatea financiara a intreprinderii, Editura Universitara, Bucuresti
[9]Ristea, M.(coord), Olimid Lavinia, Calu Daniela Artemisa, 2006, Sisteme contabile comparate, Editura CECCAR, Bucuresti
[10]Simtion Daniela - *Agriculture – The last IAS*, Journal of Central European Agriculture Croatian Society of Agricultural Economists University of Zagreb Faculty of Agriculture: 35-42.

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METHOD OF ANALYSIS FOR POPULATION LIMITATION OF THE LEPIDOPTERA PEST IN FRUITERS (LEPIDOPTERA: TORTRICIDAE) IN SIBIEL VILLAGE, SIBIU CITY IN CONDITIONS OF YEAR 2013

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Abstract

In the present work is described an experiment in Sibiel, made in an apple orchard of 1,50 ha surface, which was kept under observation in order to combat the Cydia pomonella L. pest. It was used a pheromone trap as a combat method, for the application of the plant treatments in time.

***Key words*:** *Cydia pomonella L, ecosystem, factors, Lepidoptera*

INTRODUCTION

The codling moth (*Cydia pomonella*) is a member of the *Lepidopteran* family *Tortricidae*. They are known as an agricultural pest, their larva being the common apple worm or maggot. It is native to Europe and was introduced to North America, where it has become one of the regular pests of apple orchards. It is found almost worldwide. It also attacks pears, walnuts, and other tree fruits [8,9,10,11].

In our country *Cydia pomonella* L. „the apple worm" is one of the most important pest of the apple tree, which can be found in every fruit-growing area where this fruit-growing species are cropped[13].

In the soil and climate conditions that we can encounter in Sibiu, pest *Cydia pomonella* L. has two generations per year, generations against which is absolutely necessary to apply plant treatments at the right moment, with chemical substances that are approved, or biological treatments (using pheromone traps, natural predators, vegetal biological concoction, biological products based on *Bacillus thuringiensis*, light traps, belt traps). In order to achieve economic control of the „apple worm" it is very important forecast the mass appearance of the adult pest.

In order to warn about the plant treatment against pest *Cydia pomonella* L. in the present experience, it was used the complex method of warning, in which were gathered the data about insects` biology, the flight dinamics (after catches on pheromone traps), the climate conditions that are specific to the area which was studied, phenological phases of the soils, the existing biological protection [4,5,6].

As a control method for this specific pest we used sexual pheromone traps beacause these traps can be used as a means of biological control as well as a means of establishing the right moment of the butterflies appeareance in spring and also to monitor the biological evolution of the pest in natural conditions, in order to apply the plant treatments at the right moment. In Romania, the sexual feromon atraPOM is synthesized by the "Raluca Ripan" Institute of Chemistry in Cluj-Napoca, from where it was purchased by the Phytosanitary Direction of Sibiu.

MATERIALS AND METHODS

This larva (Figure 1) is the infamous "worm in the apple" of cartoon and vernacular fame; it is not related to the earthworm.

The codling moth is greyish with light grey and copper stripes on its wings, and has an average wingspan of 17 mm. The females lay

eggs on fruit or leaves and the black-headed yellow larvae attack the fruit immediately upon hatching. Each larva burrows into the fruit, eats for around three weeks, then leaves the fruit to overwinter and pupate elsewhere. Most nourishment is obtained by feeding on the proteinaceous seeds [13].

Fig. 1. Larva *Cydia pomonella* L. (original)

The experience has been installed in a private orchard in Sibiel village, which is in Sibiu county, more specifically in a apple orchard of 1.50 ha, in which was monitored the evolution of ther biological stages of the *Cydia pomonella* L. pest. For this surface it was necessary to lay out just one trap with pheromones. To be mentioned the fact that in this orchard were not applied any other chemical treatments for any other apple tree crops pest before. Codling moth infestations are often managed with pesticides. Successful synthesis of codlemone, the codling moth female sex pheromone blend, has led to behavior-based monitoring and management. Pheromone traps are used to capture male moths for monitoring and setting which is the time of first flight for codling moth[3].

Biofix is used with weather data to run degree day models which predict with excellent accuracy the phenology of the population in the field, thereby allowing growers to time their management actions to target codling moth when they are most susceptible[17]. A kairo one, which is a feeding attractant, can be used to capture males and females. Mating disruption can be used to effectively manage codling moth populations in many cases. Mating disruption involves the use of a pheromone-impregnated release device, typically made of plastic or rubber. Dispensers are distributed throughout the orchard and emit female pheromone at a high, relatively constant rate[1]. The mechanism by which mating disruption affects males is poorly understood; it may increase the time required for males to find females, thus reducing fecundity, or it may simply mask the position of females (Figure 2) to searching males, reducing mating substantially. The codling moth is not a great candidate for biological pest control, as the larvae are well protected within the fruit for the majority of development [14]. However, their eggs are susceptible to biological control by *Trichogramma* wasps. The wasps deposit their eggs into codling moth eggs, and the developing wasp larvae consume the moth embryo inside[2]. Another method for control and sampling, trunk banding, consists of wrapping a corrugated cardboard strip around the tree trunk. Larvae making their way down the tree to pupate after exiting the infested fruits will use bands as pupation sites. Bands may then be removed and burned[15].

Fig. 2. Females *Cydia pomonella* L. (original)

The trap was laid out in the shape of a apple tree head at a height of 1.6 meters above the ground, at the beginning of the third decade of April 2013, before the appearance of *Cydia pomonella* L.

In general, in order to give a correct warning of the plant treatments there should be used 3 or 4 pheromone traps per ha, laid out at about 50 meters between them

THE TRAP- for the pheromone– (Fig. 3) consists of two plastic elements which fold out and symmetrically assemble by dint of a reinforcing steel or even plastic. Thus folded like this the two valvae have the knob toward the exterior, providing a , a relatively closed

space, the distance between them is about 3-4 cm. The inner surface of the vulva is provided with a special adhesive film, non-drying, odorless, and off color.

The Sexual Attractant CAPSULE is a impregnated cork. The sexual attractant capsule is placed on the inner bottom of the trap with the building pit upward.

On this pheromone capsule are attracted the Lepidoptera males because the sexual attractant is the pheromone that the females discharge in the period when she is sexually.

In the period of time in which were made observations there were taken into account the following:

There were used clean tweezers (sterile) for placing the capsule in the trap and for eliminating the captured males.

The placing of the capsule with pheromone on the trap (plastic material or adhesive) was made directly on the crop in the moment of attaching it to the tree [7].

Fig. 3. The Trap for the pheromone (original)

The replacement of the capsule with pheromone and the lower bottom was made in 6 weeks from the settlement. There were eliminated from the crop the capsules and the effetes bottoms.

The pheromone capsules were kept in the refrigerator before they were laid out.

Catch record – was made tree times a week (Monday, Wednesday, Friday). The butterflies were eliminated from the glue at every observation in order not to influence the following observations. If there were recorded more captures, and the botom with glue was dirty this was replaced with another one.

RESULTS AND DISCUSSIONS

Data interpretation– the warning of the first treatment was given depending on the maximum flight of the monitored generation, meaning between 3 and 4 days in reference to the flight curve, and also to the climate conditions (Table 1).

The plant treatment will be made undelayed in the following 2-3 days in the biologic phase of the pest. In this period of time will be combated the adults as well as the eggs that have been deposited, and the following treatment will be done 10 days later, after the first one is finished, against that specific generation (G-I or G-II). At the second treatment for the next generation are controlled the adults as well as the deposited eggs in this period of time that are in a phased called “the red ring”.

In the big orchards, where the plant treatments are done “at warning”, the treatments against this pest are segregately done on lots, depending on the existing biological save, meaning for captures on an average/ trap/ week.

At 2-3 captures on a average/ trap./ week corresponds a risk attack(frequence attacked fruits) of de 2%.

"Warning Bulletin” for the first generation was given on 20th of May 2013, with the optimum period to make the chemical treatment is 22nd-26th of May 2013. Recommended substances were: Sinoratox 35CE 0,1%, Carbetox 37 CE 0,4%, Calypso 480SC 0,02%, Cipertrin 10EC 0,015%.

Table 1.The climatic data in Sibiu

Mont	Atmospherical Temperature ^{0}C				Atmospherical Humidity %		Atmospherical Condensation L/MP
	Max	Min.	Med. 2012	Med. last 10 years	Med 2013	Med. last 1o years	
April	25.1	-1.6	10.9	10.0	68	70	78.4
Mai	27.1	3.5	14.0	15.3	76	69	56.8
June	30.2	8.6	18.1	18.4	78	75	64.8
July	33.7	7.8	20.0	19.8	81	77	188.4

CONCLUSIONS

For the second generation of the pest the "Warning Bulletin” gave in 13th of June 2013, the optimum period for making the chemical treatment starting with 15th-19th of June 2013.

Recommended substances: Karate Zeon 0,015% and Actellic 50EC 0,05%.

To be mentioned that for both generations of the pest was recommended to repeat the plant treatment at 8-10 days after the first one is finished.

Centralizing data on the registered captures at the pheromone trap in order to apply the plant treatment against the *Cydia pomonella L* pest.

REFERENCES

[1]Berca, M., 2000, Ecologie generală şi protecţia mediului, Editura Ceres, Bucureşti
[2]Botnariuc, N., Vădineanu, A., 1982, Ecologie, Editura Didactica şi Pedagogica, Bucureşti
[3]Davidescu, D., 2002, Conservarea biodiversităţii speciilor vegetale şi animale, Editura Academiei Române, Bucureşti
[4]Ionescu, M.A., 1962, Entomologie, Editura Didactică şi Pedagogică, Bucureşti
[5]Lăcătuşu Matilda, Pisică, C.,1980, Biologia dăunătorilor animali, Editura Didactică şi Pedagogică, Bucureşti
[6]Manolache, C., Boguleanu, Gh.,1967, Entomologie Agricolă, Editura Didactică şi Pedagogică, Bucureşti
[7]Oltean, I., Perju, T., Timuş, A.2001, Insecte fitofage ale plantelor cultivate, Editura Poliam, Cluj-Napoca
[8]Perju, T. et al.,1984, Entomologie agricolă, Editura Didactică şi Pedagogică, Bucureşti
[9]Perju, T.1995, Entomologie agricolă componentă a protecţiei integrate a agosistemelor, Editura Ceres, Bucureşti.
[10]Perju, T., Ghizdavu, I., 1979, Lucrări practice de Entomologie Horticolă, Institutul Agronom, Cluj-Napoca, Atelierele de Material Didactic, Cluj
[11]Perju, T., Ghizdavu, I., Muset, D., 1982, Lucrări practice de Entomologie Agricolă, Tipografia Agronomia Cluj-Napoca
[12]Rákosy, L., Goia, M., Kovacs, L., 2003, Catalogul lepidopterelor României. Societatea Lepidopterologică Română Cluj-Napoca [1]Roşca, I. 1999, Entomologie generală pentru agricultori, Editura Ceres
[13]Roşca, I. şi colab.,2001, Entomologie horticolă specială, Ed. didactică şi pedagogică, Bucureşti.
[14]Teodorescu, I., 1999**,** Insectele, Editura Petrion, Bucureşti
[15]Teodorescu, I., 1999, Ecologie, Editura Constelaţii, Bucureşti
[16]Vădineanu, A., 1995**,** Dezvoltare durabilă, Editura Universităţii Bucureşti
[17]Vădineanu, A., 2004**,** Managementul dezvoltării o abordare ecosistemică, Editura Ars Docendi, Bucureşti

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MANAGEMENT ECOSYSTEM IN DUMBRAVA SIBIULUI FOREST ON THE EVOLUTION OF SPECIES MACROLEPIDOPTERA SIBIU DURING THE YEARS 2000-2012

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Abstract

It was studied the ecology and phenology, the flight periods of the Macrolepidoptera during the period 2000-20012 in the Natural Park „Dumbrava Sibiului". The natural conditions and the specific features were mentioned in my previous papers (Stancă-Moise, 2000, 2002, 2003, 2004, 2007, 2010, 2011, 2012). There is no doubt that the appearance of the different species of Macrolepidoptera in different periods of time is in a direct relation with the succession of the climatic conditions. The flight periods express the biological specific feature of each species of Lepidoptera, being in direct connection with the activity of feeding and reproduction of imagos.

Key words **:** *Macrolepidoptera, "Dumbrava Sibiului" Forest, factors, ecosystem, biodiversity.*

INTRODUCTION

"Dumbrava Sibiului" Forest ecosystem consists of a community of living organisms to their environment, the interaction and interdependence between them. Currently little is known role played by biodiversity on the functioning of this ecosystem [1, 2].

It is also difficult to say what role each component lies in preservation of this ecosystem, what role species a Macrolepidoptera out numbered against other species of insect dominant character.

This theme aims knowledge of the biological resources. The study of macrolepidoptera species inventory and host plants relative to the protection of this ecosystem man- treating problem important in Sibiu. Study and the data they provide are not another problem has been resolved only in part will not cercatările stop here but will continue in the future. Microlepidoptera species we still being studied and inventoried, but participating with other insect species in this system is complex ecosystem "Dumbrava Sibiului" Forest.

Following the International Convention in Rio de Janeiro, Brazil in 1992, where he and Romania joined the focus on biodiversity conservation species plants and animals. Since 1998 began a study biodiversity through inventory plant species subject to human aggression and the measures necessary for their preservation. In 1999, the research fauna inventory covers the territory of Romania, subject to bullying anthropogenic or other factors, and measures must be taken to its preservation [3].

Biodiversity is a multifaceted concept and interpretation of data analysis may give rise to discussions or debates. Biodiversity in the "Dumbrava Sibiului" Forest is a broad concept, the effects of scientific, social and economic implications of daily life Say the local community.

Some species of Macrolepidoptera reported in the study area have a high importance to science and agricultural practice, it is known that butterflies are pollinating insects.

Human activities, tourism, urbanization, are occupations that are practiced "Dumbrava Sibiului" Forest ecosystem within which often have aggressive action on it and the population of the Macrolepidoptera.The analyzes performed over time was found to reduce the number reported species, migration

or disappearance that had some role in the balance this ecosystem [4,5].

MATERIALS AND METHODS

During the research work running on a material of 1596 samples, there were identified 243 species of Macrolepidoptere, belonging to 162 Genera and 17 Families [12].

The length of the periods whem the active imagos of different species of Macrolepidoptera could be found, is fluctuating in limits rather large estabilished by specific features of the biological cycle of development (monovoltine, bivoltine, trivoltine, Table 1) correspondingly to climate conditions, first of all, to the temperature.

Table 1. Number of identified species by type

MONOVOLTINE	BIVOLTINE	TRIVOLTINE
149 species	84 species	10 species

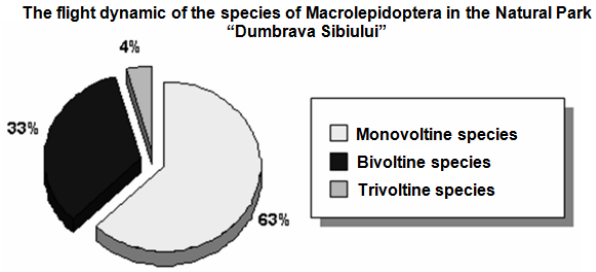

Fig.1. The flight Dynamics of the species of Macrolepidoptera in the Natural Park "Dumbrava Sibiului"

In the systematic table (Stancă-Moise, 2003) there are mentioned all the data obtained by studying the biological material from the collecting field activity and also data about flight periods.

These data were completed (supplemented) with information from the consulted bibliography by some species [6,7,8].

Some data are valid only for the studied area, and in connection with specific enviromental conditions.

The personal data could be not considered definitive, specially for species which I registered too little phenological observations[13].

Table 2. The flight period of the Macrolepidoptera families from Natural Park „Dumbrava Sibiului"

FAMILY	MONTH										
	1	2	3	4	5	6	7	8	9	10	11
I. LASIOCAMPIDAE					■	■	■	■	■	■	
II. LEMONIDAE									■	■	
III. SATURNIIDAE			■	■	■	■	■				
IV. DREPANIDAE					■	■	■	■	■		
V. THYATIRIDAE			■	■	■	■	■	■	■	■	
VI. GEOMETRIDAE					■	■	■	■	■	■	
VII. SPHINGIDAE				■	■	■	■				
VIII. NOTODONTIDAE					■	■	■	■	■		
IX. LYMANTRIDAE					■	■	■	■			
X. ARCTIIDAE					■	■	■	■			
XI. CHENUCHIDAE			■	■	■	■	■	■	■	■	
XII. NOCTUIDAE				■	■	■	■	■	■		
XIII. HESPERIIDAE			■	■	■	■	■	■	■	■	
XIV. PAPILIONIDAE			■	■	■	■	■	■	■		
XV. PIERIDAE				■	■	■	■	■	■	■	
XVI. NYMPHALIDAE			■	■	■	■	■	■	■	■	
XVII. SATYRIDAE			■	■	■	■	■	■	■	■	
XVIII. LYCENIDAE				■	■	■	■	■	■		

RESULTS AND DISCUSSIONS

Concerning the general dynamics of the flight period, I can consider that the majority of the species of Macrolepidoptera are active in the months June-July, because of the great number of species collected during this period [9,10,11].

The studied material was collected during the flight periods mentioned in the Tab. 2. It could be observed that they are families with a short flight period of only 2 months like the species of families LEMONIDAE, other families have the flight period of 4-6 months, like the species of the majority of the studied families. The majority of species (Tab. 2, fig. 1) have the flight period in April-August. In the situations when species have more generations during one year, it is possible to be two or three generations a the same species, during one year, for example at the Fam. LYCAENIDAE (*Lycaena phlaes* L., 1758, *Arcinia agestis agestis* Den.& Schiff., 1775; Fam SATYRIDAE (*Caenonympha pamphilus* L., 1758), Fam NYMPHALIDAE (*Clossiana dia dia* L., 1767, *Issoria lathonia* L., 1758); Fam PIERIDAE (*Pieris brassicae brassicae* L., 1758; *Pieris rapae rapae* L., 1851). In the studied area only 84 species have two generatious in one year and only in

the favourable meteorological conditions. About the general dynamics of the flight period, we can see that the majority of the studied species are active during the period April-May and June-August.

The species *Archiearis puella* sensu L'homme Fam. GEOMETRIDAE on 2.III.2001 could be considered the earliest species and *Operophtera brumata L.*, 1758 Fam. LARENTIINAE was collected by W. Weindel on 2.XII. 1956 in 17 samples in the Park „Dumbrava Sibiului"

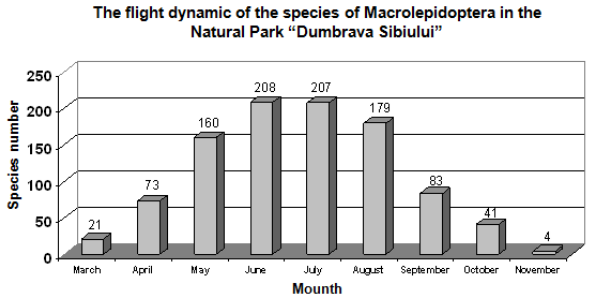

Fig.2. The flight Dynamics of the species of Macrolepidoptera in the Natural Park "Dumbrava Sibiului" by month

On the whole, the periods when maximum of species are flying is June (208) followed by July (207), then August (179), May (160), September (83), April (73), October (41), March (21) and November (4).

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CONCLUSIONS

The current appearance of the Dumbrava Sibiului is mostly the result of human action which has occurred over time through: cutting, drainage, replanări and systematization.

Among the most severe human interventions in the late nineteenth and twenty-first century include:

• commissioning of Sibiu - Rasinari tram line that runs across the entire length forest north-east and south-west;

• upgrading of access roads to village inari (parallel to the tram line) and into Cisnădioara common, as they are both high traffic roadways to travel and recreational areas;

• Construction and commissioning of textile enterprises located in the central part of the forest on the left bank of Valea Aurie;

• construction of a tourist complex with zoo, motel, camping inn in the NE near Sibiu;

• establishment of an open-air ethnographic museum with an area of 100 hectares, located near the tourist complex ;

• construction of a residential area behind the Hilton Hotel;

• clearing a lane NS direction for high voltage line;

• placing military objectives;

• Creating three recreational lakes and the river located in the Valea Aurie, Ethnographic Museum and Zoo.

In all the above may be added the influence of grazing, due to proximity to and regular crossing flocks of forest villages and Poplaca Rasinari.

Parallel to these negative influences, in some cases, were conducted and protective actions initiated mainly by foresters. Such measures have been taken to prevent grazing in the forest and avoiding unplanned cutting through fencing and perimeter arrangement of grooves that prevent access. The perimeters were established with the role of seed reserves, were performed cleaning and replanting [14].

As a conclusion to the above it can be stated that the territory is strongly Dumbrava Sibiului, especially the U.S. which is in the vicinity of Sibiu. This negatively influenced the life and work Mcrolepidopters by the disappearance of the favorite habitats host plants. Therefore, over the years some species have not been reported, others are very rare or even extinct long. The warning signs drawn by naturalists and various tourism and environmental organizations and not least by the protectors of the forest, foresters were decided by the Council of Sibiu County Resolution No. 12 of 28 September 1994, the

Dumbrava Sibiului- Natural Park Sibiu to be declared under the Forest administrative shortcomings in Sibiu, judgment is necessary to have a more authentic to avoid the extinction of this wonderful corner of nature Sibiu nine worthies left our ancestors.

REFERENCES

[1]Ciochia, V., Stancă-Moise Cristina, 2000, Contribuţii la studiul structurii şi activităţii entomofaunei epigee într-o pădure de stejar Dumbrava Sibiului, Lucr. celei de a 5-a Conf. Naţ. ptr. Prot. Med. prin Met. şi Mij. Biol. şi Bioteh. şi a Celei de a 2-a Conf. Naţ. de Ecosan. 26-27 Mai, Braşov, p:320-328

[2]Ciochia, V., Stancă-Moise Cristina, 2001, Contributions to the knowledge of the Macrolepidoptera from natural complex "Dumbrava Sibiului", Ananlele Universităţii "Al. I. Cuza" Iaşi, p:125-131

[3]Davidescu, D., 2002, Conservarea biodiversităţii speciilor vegetale şi animale, Editura Academiei Române, Bucureşti

[4]Rákosy, L., Goia, M., Kovacs, L., 2003, Catalogul lepidopterelor României. Societatea Lepidopterologică Română Cluj-Napoca

[5]Rákosy L., 2003, Lista roşie pentru fluturii diurni din România (Rote Liste der Tagfalter Rumäniens) Bul. inf. Soc. lepid. rom. 13(1-4):7-18

[6] Stancă-Moise Cristina, 2002, Contribuţii la studiul structurii şi activităţii Macrolepidopterelor din Complexul natural Dumbrava sibiului şi reflectarea presiunii antropice asupra acestora", Universitatea Bucureşti, Facultatea de Biologie, teză de doctorat (258 p)

[7] Stancă-Moise Cristina, 2003, Structura şi dinamica Macrolepidopterelor din Complexul Natural Dumbrava Sibiului, Lucrările celei de a 6-a Conf. Naţ. ptr. Prot. Med. prin Met. şi Mij. Biolog. şi Bioteh. şi a Celei de a 3-a Conf. Naţ. de Ecosanogeneza, Braşov, p: 293-301

[8]Stancă-Moise Cristina, 2003, Influenţa factorilor antropici asupra evoluţiei Macrolepidopterelor din Pădurea Dumbrava Sibiului, Lucrările celei de a 6-a Conf. Naţ. ptr. Prot. Med. prin Met. şi Mij. Biolog. şi Bioteh. şi a Celei de a 3-a Conf. Naţ. de Ecosan. 31 Mai 2003, Braşov, p: 309-311

[9]Stancă-Moise Cristina, 2004, Importanţa Macrolepidopterelor în cadrul ecosistemului pădurii de stejar „Dumbrava Sibiului", Oltenia. Studii şi Comunicări Ştiinţele Naturii, Editura Sitech Craiova, p: 219-222

[10]Stancă-Moise Cristina, 2007, Biodiversitatea faunei de Macrolepidoptere (Insecta, Lepidoptera), din ecosistemul Pădurii "Dumbrava Sibiului" în perioada anilor 2001-2006, Lucrarile celei de a 8 Conferinţă Naţională pentru Protecţia Mediului prin Biotehnologii şi a 5-a Conferinţă Naţională de Ecosanogeneză, p:64-66

[11]Stancă-Moise, Cristina, Tănase Maria, 2010, Method of analysis for population limitation of the Lepidoptera pest in fruiters (Lepidoptera, Insects) in Sibiel village, own orchard, conditions of year 2009, Acta Universitatis Cibiniensis, Seria Ştiinţe Agricole, vol. 1, nr. 1(1)/2010, Editura Univ. „Lucian Blaga" din Sibiu, 97-102

[12]Stancă-Moise Cristina, 2011, The protected species of Lepidoptera in the oak forest "Dumbrava Sibiului", Romania, Buletin USAMV Agriculture, 68(1)/:216-223

[13]Stanca Moise Cristina, 2012, Macrolepidopterele din Dumbrava Sibiului, Editura Universitatii Lucian Blaga din Sibiu, p:271

[14]Székely L., 2003, Istoricul cercetărilor lepidopterologice din sud-estul Transilvaniei, Lucrările celei de a 6-a Conferinţe Naţionale pentru Protecţia Mediului prin Metode şi Mijloace Biologice şi Biotehnice şi a celei de a 3-a Conferinţe Naţionale de Ecosanogeneză. 31 Mai. Braşov. 318-322

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ANALYSIS OF TOURISTIC DEVELOPMENT POTENTIAL OF SOME NATURA 2000 SITES

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Abstract

This paper performs the analysis of the tourism development potential of two sites in the Natura 2000 network. SWOT analysis concerning the potential of tourism development is made, indicating opportunities for lovers of ecotourism: visitors interested in bird species, visitors interested in flora and fauna. It also describes the potential development of tourism services under the concept of "slow tourism". It describes the possible forms of tourism that can develop in this area, presenting a positive or negative impact on the environment and describe the type of interested visitors. The paper describes the main objectives of tourism development that should be included in the local development strategy promoted by the GAL's in the area.

Key words**:** *biodiversity, conservation, durable tourism, ecotourism, heritage*

INTRODUCTION

"Natura 2000" is a network of nature conservation areas in the European Union, created to ensure the survival of the most valuable species and habitats in Europe. Designation sits is designed to accommodate rich and representative habitats and species, but also to ensure dispersal ability of organisms to function as a true ecological corridor. Natura 2000 is at the heart of EU policy concerning nature and represents Europe's commitment to work towards the conservation of biodiversity for future generations.

Natura 2000 is a European network of protected natural areas comprising a representative sample of wildlife and natural habitats of Community interest. It was created not only for nature protection, but also to maintain these natural resources in the long term to ensure socio-economic resources. [1]

The analyzed area is represented by SCI Podisul Sighisoara – Tarnava Mare and SPA Podisul Hartibaciului, it falls in Podisul Tarnavelor and partially in Podisul Hartibaciului, these areas have a relief characterized by hills, terraced valleys and meadows well individualized. The current appearance of the landscape is highly fragmented plateau valleys - corridors remain generally around 500-550 m and only exceptionally reach values of about 700 m (Padurea Dumbrava, 642 m, a maximum altitude of 839m – Dealul Pietris). According to the Community/national law, the 267 438 ha of protected area Hartibaciu – Tarnava Mare – Oltului overlap following Natura 2000 sites: Podisul Hartibaciului ROSPA 0099, Sighisoara Tarnava Mare ROSCIO227. [2]

This area is characterized by the existence of very large meadows that are the object of farming. Flora and fauna are extremely varied, including many international endangered species mentioned in the Directive 'Habitats' of the European Union, over 40 species listed in Annex I to Directive "Birds," and more than 50 species of cultivated plants, which put particular importance to agro-biodiversity.

More than 1,000 plant species have been identified. in the area, representing about 30% of the flora of Romania. Most of these species are rare or threatened in Europe, this aspect gaining particular importance for conservation strategies with the enlargement of the European Union.

Traditional methods of pasture and hay turn led to the development of meadows which

covers most of the pilot area. Species-rich meadows contain a mixture of steppe flora, Mediterranean and Carpathian flora. Wild flora meadows are also a resource for future genetic selection of forage crops, particularly alfalfa, clover and other legumes. Dry grasslands containing more than 20 species included in the Red List of Romania and at least 9 of them are listed in Annex 2 of the Habitats Directive.

The traditional use of the land retained a high biological diversity. The area is of international importance, since probably last large grasslands in Europe are perfect ecologically functional. The traditional management established a balance between human activities and nature, which remains unchanged since the Middle Ages.

MATERIALS AND METHODS

To collect information for the analysis of the current situation of the Natura 2000 site visitors Sighisoara - Târnava Mare were used the following methods and information sources : questionnaires sent to all local authorities within the protected area, consultation with tour operators and non-governmental organizations involved in projects to promote sustainable tourism development, National Spatial Plan - Section tourist areas (Districts Sibiu, Mures and Brasov), the County of Statistics Sibiu, Mures and Brasov; Masterplan for tourism in the District Sibiu, Brasov Development Strategy, the chapter on tourism , culture, heritage, agricultural development priorities and strategies for the development of tourism of GAL Podisul Hartibaciului and GAL Podisul Secaselor, analysis of traffic on the main roads running through the protected areas.

Alse many visits have been made in the representative farms in the area.

RESULTS AND DISCUSSIONS

Public transport access to several points in the periphery of the site, but unfortunately it is very poorly developed within the site.

Air transport is possible by the cities Sibiu and Târgu Mureș. Trains are running on the rout Bucharest – Budapest – Vienna with stops in stations Brașov, Sighișoara, Mediaș. International trains run on routs Brașov – Sibiu, Sighișora – Sibiu and Brașov – Mediaș, the personal trains stop in small stations as well. A local bus runs between the main towns and villages, but their frequency is low and the timetable is not easily accessible for external visitors.

An exciting opportunity for the development of public transport (especially tourism) within the site is the reopening of the narrow railway Sibiu - Agnita known as Mocanița Hârtibaciului.

Although the analyzed site has a very large surface area, the infrastructure is poorly developed because - except for a few points, such as Sighișoara - this area has not been one of the traditional destinations of visitors from Romania and abroad.

In order to develop the touristic use of the site or it's immediate vicinity are:

-Two information centers for cultural heritage (Sighisoara, Str. Muzeului no. 6 and Sibiu, Str. Cetatii no. 3-5);

-One tourist information center (Saschiz, Fundatia Adept);

-One Information point for Rezervatia Stejarilor Seculari Breite, Sighisoara;

-Four thematic routes (unmarked): drumul Verde al Aşezărilor Săseşti [3]; traseul Cultural Brukenthal [4]; Bike Trails in Transylvania – trails for ciclotourism [5]; routs for horseback riding [6, 7].

-Parking spaces in all areas within the site, but there are not special parking spaces for visiting natural areas of interest.

SWOT analysis of the tourism development potential Natura 2000 site Sighișoara - Târnava Mare

Strengths:

-Traditional rural landscape;

-Medieval History (including legends and myths surrounding the historic character Vlad Tepes and fictional character Dracula);

-Built cultural heritage (fortified churches, traditional houses and farms, mansions and castles of nobility);

-Floral and faunal biodiversity;
-Cultural and ethnic diversity;
-Heritage of agricultural, food and gastronomy;
-International access via Sibiu and Târgu Mureș airports, international train route Bucharest-Budapest-Vienna;
-Recent promoting of cultural medieval heritage (medieval festival Sighișoara, Sibiu with a rich cultural program promoted internationally).

Weaknesses:

-Declining and aging rural population, which entails the abandonment of traditional agricultural practices and land, with serious consequences for the integrity of the landscape;
-Lack of proper infrastructure for public transport (train, bus) within the protected area;
-Degradation of cultural heritage - tangible and intangible - that leads to loss or alteration of historical substance medieval and traditional communities;
-Pollution of the natural environment - both visible (rubbish in nature, especially PET) and invisible (groundwater pollution from animal droppings, industrial pollution, etc.)
-Worsening problem disadvantaged and marginalized social groups;
-Lack of local entrepreneurial base in the field of sustainable tourism. From the point of view of promoting the stands quite well, especially due to Sighisoara and Sibiu city, and through the work of international organizations (Mihai Eminescu Trust, Adept, GTZ, WWF etc.), But there are not enough local private entrepreneurs who provide tourist services;

Opportunities:

-Highlighting the specific qualities of the site: countryside, traditional lifestyles, medieval heritage and biodiversity;
-Development of ecotourism:

a) For visitors interested in the species of birds (bird watching)

Due to the rural landscape mosaic, with a low human impact and high habitat heterogeneity in this area is 50% of nesting avifauna of Romania.

Forests are structural heterogeneous, the health of the forest habitats is clear due to the large number of species of woodpeckers reported here. Thus, of the 10 species of woodpeckers in Romania, nine are present in this area.

Because alternating with open and forest habitats, the area is very rich in species of predator birds of day and night. Day raptors were observed here eight species, and 6 species of night raptor birds.

b) For visitors interested in the flora

Complex orography with hills with different altitudes, inclinations and exhibitions, the existence of active floodplains and maintaining traditional use of land make this area to be a treasure trove for fans of flora species. Numerous plant species xerofile, mesophilic and hydrophilic can be seen in this picture, which hosts over 30% of the flora of Romania.

Within that 10 plant taxa are endangered in Europe, being included in the annexes of the Habitats Directive and the Bern Convention, and 77 taxa are protected at national level, being included in the Red List of Romania.

c) For visitors interested in trees

A special component of this traditional countryside are grasslands with secular oaks, whose genesis began in the Middle Ages. The value of these meadows with secular trees - some estimated age of 700 years - is cultural-historical and aesthetic, recreational and ecological.

d) Development of tourism services under the concept of "slow tourism"

This form of tourism focuses on the quality (not quantity) of the visitors experience and runs a reduced rate, allowing interaction with local communities on a deeper level.

Sustainable use of local resources (accommodation in traditional households, eating local food, transport by wagon or horseback).

-Develop greenways (pilot route has already been launched, Drumul Verde al Așezărilor Săsești) [8].

-Development of thematic routes that highlight the natural heritage within and in close proximity to Natura 2000 sites, such as a meadow with trees (Breite, Sighișoara) footsteps of bear and wolf, a large wetland

(ponds from Bradeni) an area glimee (Sona): a flood plain (Olt between Crihalma and Halmeag), an area with valuable open habitats (Luncile Saesului) an alluvial corridor (Valea Hârtibaciului between Altana and Nocrich) forest values (Oak Forest at Dosul Fanatului).

-Development of thematic routes that highlight the cultural heritage within and in the immediate vicinity of Natura 2000: UNESCO World Heritage monuments (Sighisoara citadell, fortified churches in Natura 2000 sites and in their immediate vicinity - Biertan Dârjiu, Saschiz Valea Viilor, Viscri);

-Other valuable fortified churches (Alma Vii Apold, Archita, Copşa Mare, Dealu Frumos, Drăuşeni, Hosman, Ighisu Nou, Mălâncrav, Moşna, Richiş etc.). Noble heritage (Dumbrăveni Apafi castle, castle Bethlen from Cris, Castle Sükösd -Bethlen Racoş, mansion Apafi from Mălâncrav, House Gerendi from Alțâna, summer residence and park Samuel von Bruckenthal Avrig).

-The ruins of medieval castles (Rupea Saschiz, Făgăraș, Slimnic)

-Heritage belonging to other minorities in Transylvania (Sighişoara and Medias synagogues, Armenian church Dumbrăveni).

-Route Mocăniţa (formerly narrow railway Sibiu - Agnita – Sighişoara, built between 1895 and 1910, rehabilitated and partial reopening for tourism is one of the development priorities of Sibiu. Besides its historical and cultural route Mocăniţa also follows Valea Hârtibaciului alluvial corridor and a number of valuable open habitats that can attract ecotourism.

Threats:

-Degradation of communities, loss of traditional practices and historical substance.

-Degradation of natural habitats and landscape, where tourism development is not carefully monitored and not strictly followed national and European legislation regarding any investment.

-Increasing trend of unsustainable tourism activities: motorized tourism (SUVs, ATVs, etc.) Construction of hotels and hostels that do not respect the rules of engagement in the landscape or are located outside the city, in semi-natural or natural habitats;

-Development of road infrastructure at the expense of public transport development.

Among the possible forms of tourism that can develop in the future, we present the most important, the positive and negative impact on the environment:

a) short relaxation

The main visitors are nearby residents or out for a day picnic, fishing, hunting, swimming or sunbathing. Usually these trips are made with private car.

Such activity has on the one hand the positive impact in that it provides local opportunities for relaxation and contact with nature. The impact is positive as far as visitors go on foot or by bike trekking in the surrounding landscape of small towns, and / or encourage the appreciation and consumption of local traditional products, such experiences can be positive.

The negative impact is to light the fire in deserted areas, garbage pollution, noise pollution, high fuel consumption, degradation of natural habitats, collecting / injury / killing of species of wild animals and plants.

b) Week-end travel and experience - an event

Visitors are Romanian from Bucharest and other major cities of the country who come to cities like Sibiu and Sighisoara to spend the weekend. Usually, they either remain always in town or they are visiting several villages surrounding the run, with theyr own car. The visit may be linked to certain events that take place at fixed dates (medieval festival in Sighisoara, ethnic festival, theater festivals, film and jazz in Sibiu, etc.)

Positive impact: the local economic contribution to income growth (but usually concentrated in a small number of hotel operators) or promoting certain locations within or in the vicinity of the protected area.

Negative impact: high consumption of fuel and energy resources, concentration of income in a small number of beneficiaries, the small number of overnight stays, large weekly and seasonal fluctuations.

c) Cultural Tourism

Visitors are mainly tourists from abroads, especially coach traveling, staying overnight in Sibiu and Brasov, and quickly visit several cultural objectives (Sighisoara, Biertan etc.). This "conventional" cultural tourism offers visitors an superficial experience (eg, visits to museums, traditional dance performances, commercial souvenirs etc.) Tourists usually spend 5 days in the same place, eat local products and interact with the locals. They organize tours for small targets inside and outside the village usually means non-motorized transport (walking, wagon, horseback, etc.) A more sustainable concept, anthropological, cultural tourism has a strong interest from visitors in the know and learn the local culture in all its manifestations (including the life of communities).

Positive impact: economic contribution to revenue growth of a small number of local beneficiaries (hotel operators, souvenir sellers), the promotion of cultural heritage of the area internationally, tourists consume local products and interact with the locals, the economic profit is distributed widely in the local community.

Negative impact: small number of overnight stays, large seasonal fluctuations, in many cases, this type of cultural tourism "consumer" degrades the authentic cultural traditions of local communities (through trade, they become kitsch) the risk that the economic gap of visitors and locals to affect relations between them and the values and aspirations of local communities. Impact the restoration and/or lighting of monuments (fortified church towers) and on the species (bats).

d) Ecotourism

So far less developed in our area, ecotourism is - according to the definition adopted by IUCN in 1996 - a form of environmentally responsible visitation to natural areas, in order to appreciate nature (and accompanying cultural forms) that promotes conservation, has little impact and provide local benefits through active involvement.

For example, in this category can enter scientific and research trips, vacations voluntary purpose, thematic visits about learning traditional customs of local communities (especially those related to sustainable use of natural resources).

Positive impact: contributes directly to protect natural areas (eg additional funding, volunteering, etc.) Directly contributes to the welfare and benefit of local communities (eg, create new jobs, use local products, etc..) increase awareness and education of visitors and locals on environmental protection and biodiversity conservation, encourages and motivates the declaration of new protected areas or increase support for existing ones, increase scientific information by publishing studies.

e) Outdoor active experience

Various outdoor activities that include a certain degree of exercise: walking hiking, horseback riding and tours, bike tours, archery, gliding, activities and type orienteering competitions, "team building", scouts, ski and biathlon, canoeing, hot air ballooning.

Positive impact: Healthy immerse visitors, contribute to economic growth of local revenues (if they offer the necessary infrastructure), increased interest in nature.

Negative impact: some activities involve fuel or degrade natural habitats (eg paintball) Ignite fires or the abandonment of waste in nature.

f) Motor sports: Off-road, motorcycle, ATV, boats.

Positive impact: economic contribution to revenue growth of a small number of local beneficiaries.

Strong negative impact on the environment by natural and noise pollution, degradation of natural habitats, disruption of wildlife species and high fuel consumption.

g) Hunting and fishing

Holidays of a week or more.

Hunting or fishing, usually addresses to foreign tourists or Romanians from other parts of the country. These activities are covered by the management plan and must comply with legislative requirements and restrictions applicable to such activities.

Positive impact: economic contribution to revenue growth fund of the hunting managers and a small number of private farms.
Negative impact: increasing pressure on wild populations of animals, encouraging the introduction of predatory fish species, poaching proliferation.

h) Holiday Theme

Especially for foreign tourists interested in certain activities, such as photography, painting, drawing, gastronomy, learning a craft or folk custom, participation in traditional activities.
These can enter natural themes and related activities such as bird watching, botanical tours, after the bear / wolf etc.
Positive impact: number of overnight stays, usually in rural areas, use of non-motorized transport, using a local guide or instructor and interaction with the local community, promotion of artistic, cultural and natural destinations worldwide.
Negative impact: if local guides and organizers do not know very well the fragility of natural habitats can cause some degradation.

i) Educational Camps for children

Camps for children usually have a character slowly, being accommodated in the same place for at least a week and assuming many outdoor activities.
Positive impact: ecological, public awareness, increase environmental education, increasing interest in nature, large number of overnight stays.
Negative impact: disturbing the peace, abandoning waste in nature.

j) "Summer Guests"

This is also a special category of visitors, namely Saxons returning from Germany to spend a few weeks - a month in their villages, usually in July-August. "Summer Guests" spend most of their time in the same locality and participate fully in community life.
Positive impact: interaction with the local community, revitalization of traditional festivals, eating local products.
Negative impact: the risk that the economic gap between visitors and locals to affect relations between them and the values and aspirations of local communities.

CONCLUSIONS

The main general objectives of the protected area analyzed overlap with Natura 2000 objectives: stopping the decline of biodiversity, conservation of habitats and species living in the habitats [9, 10, 11].
Existence of Natura 2000 does not exclude people, but it encourages harmonious coexistence between man and nature by conducting sustainable traditional existence of many valuable habitats and species is dependent on the continuation of traditional ways of land use;
Among the arrangements for tourism, it is essential they practice ecotourism and agritourism with a minimum of disruption to habitats and species and is focused on promoting the historical, cultural and natural values of the area, and the use of local services; [12]
Basic activities must target the production and marketing of traditional organic products (milk, honey, wine, fruit, etc.). the small producers are encouraged.
The number and origin of visitors in Natura 2000 sites Sighișoara - Târnava Mare - Hârtibaciu are extremely difficult to estimate, due to shortcomings of existing public statistics. [13] These data are unlikely due to the fact that they are watching the situation in the city or county level and make no reference to Natura 2000 site boundaries analyzed.
However, they learn some general conclusions:
Sighisoara attracts the largest number of visitors, 160,000 per year, mainly interested in the medieval city.
World Heritage Villages like Saschiz, Viscri and Valea Viilor also attract over 5,000 visitors every year.
Most other common do not receive more than 1,000 visitors annually (some even below 100).
Length of stay is short, averaging 1-2 days except "summer visitors" (Saxons living in

Germany) who usually spend a week in their home village.

The main tourist services used are accommodation (usually in hostels) and catering, followed by facilities like fishing and hunting, guide services, riding centers and bicycle hire.

Activities of visitors currently focuses either on quick visit of cultural objectives (churches, castles, museums) or outdoor activities (fishing, hunting, walks and occasional bike riding or horseback riding).

Tourism development objectives are:

1.Rural ecotourism development based on the integration of visitors in the daily life in households and traditional communities;

2.Medieval natural and cultural heritage;

3.The promotion of non-motorized transport;

4.Growth of entrepreneurial base in local communities and diversification of opportunities for sustainable tourism;

5.Consecration Târnava Mare - Hartibaci as the most important destination in Medieval Rural Europe nationally and internationally.

All activities will be implemented in the future. In order to achieve these objectives will be subordinated to the primary objective of nature conservation.

REFERENCES

[1] www.natura2000.ro
[2] Plan de comunicare SCI Sighișoara-Târnava Mare și SPA Podișul Hârtibaciului, 2013, furnizat de Administrația celor două situri
[3] www.saxongreenway.ro
[4]http://www.hosman-urabil.org/traseul_cultural.html
[5] http://www.reky-travel.de/transylvaniantrails
[6] www.equus-silvania.com
[7] www.merlelor.com
[8] www.drumulasezarilorsasesti.ro
[9] Strategia şi planul de dezvoltare a Judeţului Sibiu pentru perioada 2006 - 2007 - 2013 http://www.cjsibiu.ro/portal/sibiu/cjsibiu/portal.nsf.strateg.doc
[10]Strategia de Dezvoltare Durabila A Judetului Brasov - orizonturi 2010-2020-2030 http://www.addjb.ro/fileadmin/user_upload/Documente_pdf/PODCA/Directii._Obiective_si_masuri.pdf
[11] Programul de dezvoltare a judeţului Mureş 2007-2013, http://www.cjmures.ro/Programe_actiuni/Strategie_2007_2013
[12] MASTERPLAN pentru dezvoltarea turismului in județul Sibiu

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PROMOTING NATURA 2000 NETWORK BENEFITS FOR LOCAL COMMUNITIES BY PRACTICING ECOTOURISM AND AGROTOURISM

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Abstract

This paper presents the benefits of the local communities across Natura 2000 sites. Human activities in these areas should take into account the economic, social, cultural, and environmental protection. It examines the most common problems encountered in forests, pastures and hayfields in the area of Natura 2000 sites. There are some examples of good practice exemplified by the activities of farmers living on the radius of Natura 2000 sites in different European countries. Natura 2000 sites are suitable for development of eco-tourism and agro-tourism based on tradition and organic products, which may lead to a brand. Tourism and specifically eco-friendly tourism industries (ecotourism, agrotourism, etc.) are encouraging development areas at regional and national Natura 2000 sites as a sustainable opportunity for people and nature.

Key words**:** *benefits, communities, Natura 2000, rural development, tourism*

INTRODUCTION

Natura 2000 is a network of protected areas in Europe, whose aim is to find solutions to allow "environmentally friendly" economic activities and simultaneously protect biodiversity, but without limiting the right to property, without banning human activities and free movement of people.

Natura 2000 sites ensures the development of ecotourism activities, grazing and mowing in moderation, organic agriculture, which increases the value of local products. In Romania have been reported so far 530 Natura 2000 sites. [8]

Natura 2000 aims at maintaining or restoring the natural habitat types. [10]

Each State member shall contribute to the expansion of Natura 2000 in proportion to the representation within its territory of the natural habitat types and the habitats of species.

Declaration of Natura 2000 sites does not mean strict protection but the promotion of sustainable development and support to enable conservation. [7]

Natura 2000 network provides an excellent basis for funds and allows labeling of natural products in an area (site logo) and will probably help increase sales of these products.

Declaring an area as a Natura 2000 site is evidence that the area has a great natural value and can generate revenues from ecotourism and other associated activities.

Hunting, fishing, tourism and other recreational activities can continue if they are conducted in a sustainable manner and do not affect rare species and habitats.

Ecotourism is a model of rational and sustainable exploitation of tourism resources. Unlike other forms of tourism, ecotourism provides a direct and close connection with the natural and cultural history. [4]

Rural tourism in specificity, largely meets the ecotourism requirements.

The relationship between tourism and the environment is required to be placed under the sign of harmony, meaning protection, conservation and restoration of the tourism potential.

MATERIALS AND METHODS

Methods used in this research are documented study, theoretical analysis and synthesis of information. This type of documentation aimed to identify and review the main issues that arise in the management of Natura 2000 sites, with direct reference to the issue raised by forests, pastures and hay included in Natura 2000.

RESULTS AND DISCUSSIONS

Under the Habitats Directive implementation process of Natura 2000 should take into account the economic, social and cultural rights, promoting development of economic activities of Natura 2000 sites.

Natura 2000 designation creates certain obligations, but offers a number of benefits and opportunities for local communities and landowners.

Benefits:

-ecological label for local products and services;

-support to access EU funds;

-creating jobs;

-extra income by promoting eco-tourism;

-sustainable use of resources.

Duties:

-avoid activities that could significantly affect the species or habitats for which the area was designated;

-take measures necessary for the conservation of species and habitats.

Main message is that the Natura 2000 network does not mean scrapping the land, but to preserve the traditional agro-pastoral and forestry practices that do not harm existing heritage.

There are differences depending on the type of the area. In the following we will present details of forest areas for grazing and hay.

Forest areas

Forest Natura 2000 implementation does not make changes to forest norms in force, but will bring changes to their application.

The principle of sustainable development is incorporated into forest areas carried out at the base unit as production units on the massive complex of forests with large areas [5].

Regulations to planning studies - conducted on small areas where forests belonging to individuals – they cannot answer satisfactorily any requirements that impose functional principles of continuity and effectiveness , nor the specific principle of conservation of biodiversity of forest ecosystems.

Forest management remains focused on promoting natural regeneration of trees, a prerequisite to maintaining forest biodiversity and main production functions. In this way the natural forests will promote intensive treatment and natural regeneration. [6]

Forest certification in Natura 2000 sites - assessment is a very costly process and condition of timber export to the European Community –they are supported in accessing funds from the European Union.

Grazing practice will be in accordance with the law to avoid over-grazing and to protect habitats of interest.

Pursuant to the exploitation of timber from certified forests no 1% fee is charged by the Environment Fund Administration, calculated as the value tendered / negotiated.

Measures will be taken to prevent damage to habitats and wild species listed in Annexes of the Habitats and Birds. In this way, any investment will be preceded by impact on habitats and community species for which the site was declared of European interest.

Hunting

Hunting activities will still take place respecting the Law of hunting base for crops to remain true between optimal number and the ratio of the true number of individuals.

In some species such as carnivores, the proposed harvest will be increased compared to the last two years, based on new assessment methodologies.

Will significantly increase the proportion of revenues from hunting tourism, Natura 2000 sites with carnivores offering great opportunities.

Forest products

Through good promotion interest on wild fruits and mushrooms will grow, interest in more efficient use of resources of medicinal

plants based on accurate assessments without populations being significantly affected.

Increments the value of rapsbarry honey, harvested from areas in Natura 2000 sites are considered natural, without pollution.

Government Emergency Ordinance no. 139/2005 on the forests of Romania approved with amendments and completions by Law no. 38/2006 stipulates that by ownership, forest districts are:

a) state forest districts - the set of institutions of state. They provide forest management of public property and ensure forestry or forest management services to other owners on contract;

b) private forest districts - the set of administrative units, legal entities or individuals. They provide forestry services and public property forest management administrative units and private forests to those who have established and for other owner, on a contract basis. Many owners may associate to establish a detour on the principle of effectiveness.

For all forests are that subject to forest development, forest management plans are made.

(2) Forest management plans are drawn at the base unit.

(3) The forest is of two types:

a) arrangement of type I - made a single arrangement for all forest properties smaller than 100 ha/owner, contained in the administrative territory of a municipality;

b) Type II arrangement - made by a forest management plan for each property exceeding 100 ha/owner or owners of each surface resulting from the association if it is greater than 100 ha.

Article 6. - The central public authority responsible for forestry support from state budget expenditures for the development of forest management, under the law, as follows:

a) for all plannings type I;

b) Type II plannings if fitted surface comes from properties of individuals and/or businesses associated with forest management purposes, if each property is less than 100 ha.

Pasture and hay

The main problems encountered are:

-Overgrazing - with serious implications for biodiversity loss of habitats due to the impact of degrading specific anthropomorphic zoogen, the load lands much organic matter from manure, the soil erosion is often skeletal, in this case creating ago rainfall drainage gullies, etc. In this sense, species characteristic of natural grasslands are replaced by Nardus stricta [2].

Since 1999 pastures were taken back by local councils after they had been administered by the forestry based silvopastoral management plans which regulated grazing.

By taking by local councils, management plans silvopastorale provisions have not been complied with. Pastures began to be sublet by their managers, persons other than the owners. Pastures administrators have not been able to exercise effective control of these activities, which often led to overgrazing.

Not grassing - in pastures where this activity is traditional, while developed high specific biodiversity including many species that need protection. Without this practice, these habitats tend to become forests and many species disappear after habitat modification;

Clearing junipers and wooded meadows by shepherds and locals;

Burning junipers caused by shepherds;

Shepherds complain that the natural extension of junipers is not unjustified, given their protective role and that large areas of mountain pine was liquidated during time caused by deforestation and fires;

Grazing before 1 May [3], the vegetation is tender and easily destroyed by animal hooves before this date (popular says that the lawn cools);

Mowing before 15 June, if this activity is done too early rare species do not get to exploit, and if practiced too late weeds grow on hays;

Transformation of grassland to arable land;

Lack of consistent management of these habitat types;

Replacement of cows with sheep and goats (significant change in land use), occurring risk of overgrazing and grassland degradation, leading to loss of biodiversity;

All these problems can be solved by placing them in the management plans of Natura 2000 sites.

Examples of good practice for including ecotourism and agrotourism in the circuit of Natura 2000 sites in different European countries

Germany

Prackendorfer Moos in northeastern Bavaria [9] was the last one of the largest and best preserved bogs in Germany. In time, however, most of the peat was extracted for use as a fuel or was affected by other land uses. The past 50 years did not offer economic advantages and it appears that peat is no longer attractive. However, even in this stage of degradation it continues to be an important wildlife sanctuary, capable of regeneration.

As Natura 2000, the peat bog could be financed through a LIFE project to regenerate the natural hydrology. Although the peat bog did not bring economic gains, people opposed the project from the beginning, they did not understand why so much effort and money should be put into this "barren" and fearing that an increased level of water would make access to the area harder.

The project decided to deal with these fears. Locals had known only the degraded peat bog, so the project wanted to show them how it was in the past and its importance in the region. They collected information about local history and have published a book - the first book about the area, illustrating the natural diversity of this country that is part of the Natura 2000 ecological network. The result was that the project began to organize guided tours and the area began to be increasingly well integrated in tourist circuits. Locals began to see the benefits of peat lands and farmers in the area have agreed to reduce the intake of fertilizers to help regenerate the area.

Finland

The combined area of all Finland's Natura 2000 areas measures 49,000 sq. km or 15% of Finland's territory. Almost 80% of the area covered by the motion is state-owned and maintained by Metsähallitus.

Conservation of Natura 2000 areas can be ensured by governmental legislation, by administrative orders or by voluntary agreements. For the most part conservation leans on the Nature Conservation Act and the Wilderness Act, but nature is also conserved with laws such as the Forest Act, the Water Act, the Outdoor Recreation Act, the Land Use and Building Act and the Earth and Soil Act. Any activity which does not compromise conservation efforts can be permitted in these areas. [11]

In central Finland is the biggest timber industry in this country. Most forests are privately owned and any restrictions on logging derived from the designation of Natura 2000 are received with great reluctance. So in the beginning of the implementation of Natura 2000, the regional environmental authority has decided not to start directly with restrictions, but preferred an indirect variant, requiring landowners to obtain operational approval. They then made a partnership with the Forest Centre to test this procedure in 10 Natura 2000 sites through an EU project.

The project offered the advantage to forest owners to achieve their management plan that takes into account the natural values of the area. This brought a clear picture of what is allowed and approved in advance of the works they wanted to perform.

Project staff chatted with each forest owner to walk along the plot and show the owners how to preserve the natural characteristics and implications that need conservation. Although this work was demanding time and effort, this exercise was an important result: increased confidence, the owners were relieved to learn that Natura 2000 meant not decommissioning the entire forest.

Great Britain

For this country we present some details about Peak National Park - Natura 2000 site. EU funds have helped to develop an ecological quality brand specific to the area ensuring better marketing of local products. This mark also increased farmers and small entrepreneurs access to financial incentives and agri-ecological sustainable development of EU funds.

Oates family - Oates family is a farming family with a long tradition that lives inside a chain of Natura 2000 sites. They ménage to work a large arable land and sell dairy and beef premium products for having access to a land that meets organic standards because management that takes into account biodiversity values, as a special area of bird conservation. In addition to traditional production with European funds, the family managed to diversify its business and to open their own store with natural products. In this way goods can be directly capitalized, their customers are both locals and tourists who make tours of "safari" in the Natura 2000 sites. [12, 13]

Another example is related to the Fal estuary. It is a Natura 2000 site, sea estuary on the south coast of Cornwall region . By linking to other boat operators tourism and leisure industries, River Links project aims to promote car -free travel in the estuary, to access restaurants , beaches and other tourist areas. Links River project has received financial support to assist in the interpretation of the natural environment and some of its main attractions such as the Maritime Museum Falmouth received support from the European Structural Funds. [14]

Another example is the Mead family who lived on the same farm for generations, but they managed to add extra value to their product mainly milk by producing high quality cheeses that are distributed at national and international level. With the help of EU structural funds they have built a new production facility and storage, high standard and quality through careful monitoring and maintaining environmental standards in their farm, they managed to promote a strong brand image that has brought many awards. [15]

Austria

"Opportunities for Nature and Economy: Steirische Grenzmur" is the title of a grandiose project that is developed in this country with the aim of highlighting the Natura 2000 sites. [16]

Austria has fulfilled its obligations to implement two European Directives related to nature, declaring most valuable natural areas as part of the European network Natura 2000. Approximately 16 % of Austrian territory was included in Natura 2000.

The border areas are often the most favored regions of Europe in terms of biodiversity. There are well-preserved natural values and landscapes, the influence of economic activities being limited a one. One of these examples is along the border between Austria and Slovenia, an area of 2,122 hectares, of great European ecological importance. It is part of the corridor of 1,000 km of flood plain of the rivers Mur, Drava and Danube. This Natura 2000 site contains pictures with a huge diversity of plants and animals: eight habitat types, 13 species of birds, 26 species of animals, all included in the annexes of European nature.

But this region is not only a natural gem, but where many people live their lives. Their income situation is not easy. There are a few ways to find a job and economic growth is weak. The big challenge is to harmonize the interests of both parties, both those related to nature protection and economy. Cost-benefit analyzes in other border areas in Austria showed that Natura 2000 sites can bring positive momentum for long-term economic development. This concept is used as Natura 2000 environmental policy and incorporated into regional development strategies and community.

Local companies are involved in planning and implementation, and locals are actively involved. In ”Steirischen Grenzmur” future is in ecotourism. It leverages the trend of weekend holidays and health tourism. Routes in the Natura 2000 information materials and exhibitions contribute to educational activities and tourism of ”adventures in nature”.

The region is of national importance to the white stork, and therefore brings together the energies of species protection and tourism, the festival stork or the idea of ”region certified to observe storks”. These synergies are used in agriculture: organic market is growing and the brand Natura 2000 can contribute to the development of direct marketing and the promotion of regional products. An example is the pumpkin used for years and years as

food for humans and animals. By promoting traditional products, developing new recipes and innovative marketing, pumpkin is considered a trendy food that tourists are willing to pay for.

CONCLUSIONS

To solve problems related to grassland management in our country we made following conclusions:

-Lack of chemical fertilizers on meadows and pastures resulting in products that are ecologically pure; these products are very popular on the European Community market and the prices are much better.

-Traditional grazing and hay led to a development of grassland which covers most of the important areas as protective aspect. In this case the land use and operating practices that have existed until now, traditional grazing methods and procedures for obtaining hay meadows led to the current development. The richness of species in meadows contains a mixture of Mediterranean flora, Carpathian flora and steppe flora;

-Combined with traditional practices planning pastures and hayfields (pruning bushes and shrubs) are required to maintain grassland in favorable condition.

-A particular threat is the poor state of the local agricultural economy. Traditional farming is unprofitable, massive emigration of rural population led to the abandonment of marginal land and intensification of use of easily accessible land. Because biodiversity of grasslands is dependent on traditional land use, land use changes have the effect of biodiversity degradation and loss of many threatened species of flora and fauna. In this respect, Sighisoara ADEPT implemented many projects to inform the local population about the inestimable value of the potential of natural grasslands.

The area of Sighisoara SCI-Târnava Mare ADEPT:

-created local producer groups, supporting people in making the step from domestic production to commercializing, making, packaging and labeling, and making connections between producers and local market;

-solar dryers designed and built using a simple technology that will improve the preservation of fruit and vegetables and provide products that can be made available on the market. These dryers are built by local carpenters;

-has formed Slow Food groups in the area, bringing consumers (hotels, restaurants, international buyers) and farmers and local producers together;

-contribute to the development of a "box scheme" (daily delivery direct to home) that provides small local producers markets for the sale of fruit and vegetables;

-contribute to the production of quality cheeses to add value to cow and sheep milk, the main source of cash income in the area. Survival depends on the continuation of livestock pastures.

However, the activities in order to create a brand image we have to try to create an identity to symbolize the connection in the minds of residents and consumers of nature conservation and prosperity of communities, and the proper management of the environment and high-quality local products. [17]

Management plans of Natura 2000 sites should include a range of agronomic and traditional rules. In the old arrangement silvopastorale pastures were divided into functional categories. Pastures in the category I had restrictions for soil protection. Grassland category II was established during the grazing season, the number and duration of grazing cycles, during vegetation restoration, loading, grazing capacity, etc.. These criteria can become sustainable grazing management recommendations.

Natura 2000 sites are suitable for development of eco-tourism and agro-tourism based on tradition and organic products, which may lead to a brand.

On the example of other countries the local community can create multiple niches so geared every family to be part of an well-oiled tourism and promoting mechanism. Together, these families can promote their best services national and international, traditions and the

natural environment nearby. In this example we mention the tourist village Sibiel or examples from Austria, Britain and Germany.
It requires the creation of protected areas where conservation grasslands and mountain meadows must rely on a management plan.
Practices must cease deforestation and burning of juniper trees.
On these surfaces must be rational grazing practice as silvopastorale studies.
It is always preferable meadowa to be converted into hay lands, their biodiversity is higher.
Alpine pastures are poor in species, while the lower attitude is richer in species. In this respect, hayfields from under the mountain are of community interest to them requiring management aplication that leads to conservation.
Mountain meadows between 500 and 1000 m altitude show a very high biodiversity and habitats that are found in many species of orchids, many protected, the hay land can be an attraction for tourists [8].
For people who carry out activities in Natura 2000 sites as well to ensure a guaranteed minimum price for milk-based products that ensure minimum profitability for manufacturers, with annual correction in the inflation rate.
To support livestock farmers should be paid by direct payment of subsidies per head (at least 50% compared to the system that has been practiced in the EU), and the correlation after 2014, the level of these grants with the EU practice (full) by 2014. It is also necessary to maintain these subsidies in parallel with subsidies provided by the EC LFA, the unit area, at least until the number of animals provided, normally covering area from existing natural pastures and hayfields. [18].
Disinterest factor involved for possible losses of biological diversity is high. Ways have to be found for people to understand and want to be involved in grasslands conservation measures. This should be correlated with factors involved in discussions with a potential tourism development in the area.
Grasslands cannot be separated from the cultural landscape, they constitute themselves as historical and integrated element. The sites with the most rare and interesting plants, eg. grazing steep slopes are kept clean by burning. Salvia nutans grassland and Linum flavum have low diversity (about 10 species surveying), but a priceless ecological role and conservation at European level. The number of red list species should not be the only consideration of community or habitat value assessment. [1]
Meadows throughout Europe underwent drastic changes in management and are in a state of flux. Extensive meadows still have their important role in agriculture in our country. Such areas are rare in Europe, are therefore extremely valuable for research and interpretation of the variety.
Protection is necessary to attract investors in certain areas - which would mean a lot in terms of the image of Natura 2000 sites.
Following a study completed in 2013 on how people perceive the Natura 2000 network, the results show that effective communication of the benefits of the Natura 2000 network includes:
-development of ecotourism activities (bird watching, boat tourism)
-development projects may be authorized (fishponds, local crafts)
-labeling of food (cheese, honey, wine, etc.)
-attracting European funds for agriculture/rural development/environment (establishment of Local Action Groups thru the program LEADER +).
-increasing the number of employees in rural areas.
-messaging involvement of opinion leaders for each city / region (eg, mayors, directors of parks, NGO leaders)
-face to face communication (bidirectional, interactive and participatory - adults learn best through dialogue)
-to link culture and nature: how to plant and animal species found represented in the local culture (eg. art, traditional gastronomy)
-use of messages and communication methods tailored to the target group (locals, tourists, investors, etc.)
-creating of innovative and creative communication campaigns that address

NATURE as perspective of a brand to be promoted and "bought" by the public.

The conclusions drawn from this study completed the assessment of communication and information on the Natura 2000 network show that [19]:

• Information events and visits must be continued for representatives of the institutions as an opportunity for networking and exchange of experience.

• Facilitating institutional collaborations - creating a model of meetings that focus mostly on establishing relationships for future collaboration.

• Updating communicated information, wooden language is not to use, signaling better SCI and SPA communities to inform the population.

• Making of materials and online version for communication / information.

• The information campaign should focus on the benefits of protecting biodiversity, economic and social benefits.

• Some tools of information / communication as documentary series and the database must be more publicized.

• Involvement of schools and public libraries in the information campaign: teaching materials for teachers, information specific to students etc.

• Advocacy for stabilizing the legal framework regarding the status of protected sites.

REFERENCES

[1]Antofie Mihaela, 2011, Lista roşie a varităților plantelor de cultură din România, Editura Universității ”Lucian Blaga” din Sibiu.

[2]Ciortea Gligor, 2013, Folosirea pajiştilor prin păşunat, capitol aparut în Agricultura durabilă pentru zona montană. Editura Universității ”Lucian Blaga” din Sibiu.

[3]Drăgulescu Constantin, Bănăduc-Curtean Angela, 2002, Conservarea biodiversităţii. Entităţi naturale protejate, Edit. Mira Design, Sibiu.

[4]Niță Maria, Niță, C., Niția Ilie, 2006, Ecoturismul în spațiul rural, lucrare publicată în volumul Conferinței Internaționale ”Turismul rural românesc. Actualitate şi perspective”, Vatra Dornei, Editura Tehnopress, Iași.

[5]http://greenly.ro/biodiversitate/natura-2000-optiunea-verde-pentru-bunastarea-romanieiin-bucuresti]

[6] [greenly.ro/arii-protejate/reteaua-natura-2000]

[7] http://apmis.anpm.ro/docfiles. Rețeaua Natura pe înțelesul tuturor.

[8] Legea 38/2006.

[9]Legea nr. 347/2004 Legea muntelui.

[10]http://www.geo-coaching.net/template_ oberpfaelzer

[11]http://www.metsa.fi/sivustot/metsa/en/

[12] www.rosuick.co.uk

[13] http://www.foodfromcornwall.co.uk/

[14] www.falriverlinks.co.uk

[15] www.lynherdairies.co.uk

[16] http://www.verwaltung.steiermark.at/

[17]Fundaţia ADEPT Transilvania, 2012, ”Cum să adaugi valoare produselor tradiționale”, prezentare realizată cu ocazia Seminarului “Susţinerea agriculturii ţărăneşti – bune practici româneşti”, Sibiu, 14 decembrie 2012.

[18]Rezolutia Formului Montan din Romania, http://alpinet.org/main/articole/show_ro_t_rezolutia-forumului-montan-roman_id_1942.html;

[19] http://infonatura2000.cndd.ro/documents/Anexa-1-Evaluare-activitati-comunicare-informare-InfoNatura2000-august-2013.pdf

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STRUCTURE AND DEVELOPMENT OF THE RURAL TOURISM NETWORK „BIENVENUE A LA FERME"

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Abstract

This paper presents the main rural tourism networks in France and the forms of rural tourism encountered in this country. In the data presented lies a bibliographic study on the development of rural tourism network "Bienvenue a la ferme" between 1996 and 2013. Data analysis presented highlights rural tourism forms with the most dynamic development in the period considered, given that France is the first European country where the level of organization, diversification and promotion of rural tourism took place.

Key words**:** *agrotourism, Bienvenue a la Ferme, development, structure*

INTRODUCTION

Mark of the French Chambers of Agriculture, "Bienvenue a la ferme" is a network, which includes approx. 6,200 farmers and 122 farm rooms. The network includes 10 forms of tourism areas. People who choose this network have done it to ensure quality customer service they provide. All adherents are obliged to follow the rules imposed by the network and accept regular checks.

Network "Bienvenue à la Ferme" consists of: more than 6200 farmers, network "Bienvenue à la Ferme" consists of regional and departmental and every department in 20 regions, provides technical assistance to farmers, ensuring the quality of products and activities, providing brand promotion, Agricultural Chamber of the French service whose goals are to develop the brand "Bienvenue à la Ferme", partnership development, national brand communication, network animation. [3]

MATERIALS AND METHODS

To collect the necessary information for dynamics analysis types of tourist activities carried out within the network "Biennevenue a la ferme", was made in consultation documentation of scientific papers published in the literature and in consultation with the Association website. Also, we used information collected by Mounntanology specialization students at the University "Lucian Blaga" who had practical experience in this tourist structures within this network in France.

RESULTS AND DISCUSSIONS

In France the rural tourism experienced the peak of organization, diversification and promotion. Much of the accommodation in rural areas in this country can be called rustic houses are controlled, approved and reserved by National Federation "Gites Ruraux" which currently includes approx. 37,000 tourist structures. [3]

In 1995 the French Federation was founded Green Travel Holidays and then the National Federation of Gites de France or the National Federation of Housing and Inns of France.

Rural tourism activities conducted by farms are supported either in terms of organizational or legislative. [3]

Classification is done in this country according to the degree of comfort and convenience, set specific rules regulated by the Decree issued by the Ministry of Tourism.

The widespread network of rural tourism is "Bienvenue à la Ferme", created by the Chamber of Agriculture, provides a direct link between farmers' needs and market requirements on rural tourism and agrotourism.

1. Fig.1 – The widespread network of rural tourism is "Bienvenue à la Ferme"
2. http://www.bienvenue-a-la-ferme.com/

The main forms of tourism areas in the network are: gastronomy, accommodation, leisure and products to farmers.

All farms that are part of this network, are required to exhibit on the frontispiece of the house the network logo. The logo is a guarantee to tourists that the services provided are in the standard of quality that awaits them. It thus ensures that the quality of products and services bearing the mark, and expert advice and promotion for all members of the network.

Forms of rural tourism practiced in France could be synthetically as follows: [7]

-tourism which is engaged in the accommodation: camping at the farm, the farm guest rooms, accommodation for a set period or holiday accommodation on the farm of "rural gîtes"

-gastronomic tourism: farm inn tasting products made on the farm, selling farm products.

-Leisure / the "discovery" open farms, the "discovery" teaching farms, equestrian farms.

Accommodation in a farmhouse type "rural gîtes" - concept defines a house, apartment or room for rent for a weekend, a week or more in household housekeeping is done by tourists, which has the possibility of preparing food in within these spaces. They are generally located near a farm or village. They can be rented for the weekend or an entire vacation. Classification is done using ears of corn, from 1 to 3 ears. Investing in such activity generally rises to 46,000 euros. The presence of the owners is just on the arrival and departure of customers. [2]

Guest rooms in old mansions, castles - the rooms are in old buildings that belonged to the French nobility. The rent for one or more nights, guests can take advantage of the charm of these buildings. The investment amounts to 9,000 euro per room. It is a summer activity, rooms are occupied on average 50 days per year. The price per room varies between 70 and 120 Euro per night.

Rooms for guests on the farm - there may be a number up to 6 special rooms, type "hotel room" with multiple facilities. They can be rented for one or more nights, guests benefit from the calm and pleasant specific structures of these rooms.

Accommodation for a set period or for a stay - for a set period: Enables hosting tourists in hiking or go through different routes or bike ride to make a stop on their circuit. to stay: mainly addresses known groups or families who wish to spend together a weekend or a holiday.

Camping on the farm - offers tourists accommodation in the countryside, on a shaded plot. Farms that have camp capacity amounts from 6 to 25 seats, and the area under this activity must be at least 500 square meters. Farmers may propose the addition to accommodation, catering and entertainment. Classification is done by giving flowers sun. The investment is modest, around 2,000 euros.

Gîtes d'enfant (accommodation for children) - during school holidays students are getting in the middle of rural families, they provide accommodation, meals and the opportunity to discover the country life and participation in activities related to the agricultural world. Families which have the right to accommodate children are very carefully selected, so that the overall number is lower. Groups of children come accompanied by an animator in charge of children's leisure. The investment is between 6,000 and 15,000 euros.

Farm inn - is an " inn " is found in a farm , which serves traditional cuisine of the area , given that 80 % of the products served must

come from the farm . It is mandatory that one of the owners to be a farmer. The inn offers only the possibility of serving meals, not the possibility to accommodate tourists and has a maximum capacity permitted by the law of 60 seats, working only on a reservation of seats. Dishes served must be simple, but refined. [8]

Preparation specialties is achieved only by the owner, he has no right to have a cook employed.

In general workforce in such activities is represented by family members, who must have knowledge of agriculture and tourism, especially about the sights, being able to provide customers answers to questions.

Customer category endorsed by inns is large, it is generally made up of two types: one individual and one group. Individual clientele includes couples, families.

It is well to provide children's menus with attractive names and have a presentation that urge children to consume, generally known that children are picky.

The second category is represented by people taking part in trips organized by various associations, means of travel is the bus.

The customer group can enter and family members who come to celebrate an important event (wedding, christening, anniversary).

Tabel 1-The dynamic of the number of "Ferme auberge" from France, between 1996-2013

Year	Number of "Ferme auberge"
1996	655
2001	632
2005	506
2013	380

Source: Ungureanu D., 2007 and www.bienvenue-a-la-ferme.com

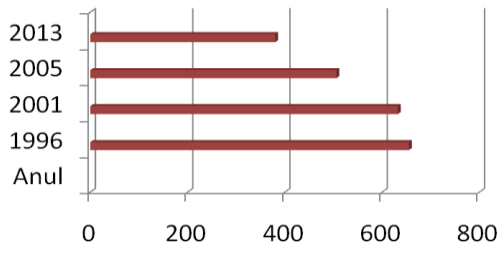

Fig. 1.The dynamic of the number of "Ferme auberge", between 1996-2013

Although this class brings high income and fast, yet we must not forget what the purpose and functioning of peasant inn.

Customers coming from neighboring regions are to be informed of the activities they organize at the inn.

For the people who came once to return to the inn and always be in the attention of potential customers is better to organize various activities within it: various exhibitions that promote new artist, traditional music and dance evening, etc.

The difference between a peasant inns are ultimately the quality of services, and it depends on personality, goals and ideals of the owner.

The investment required for setting up a rustic inn is about. 90,000 euros.

Each host is privileged and personalized. Evolution of farm inn in France, between 1996-2013, is presented in table and graph below. [9, 8]

Tasting of products produced on the farm - is at around 4 PM and product tasting is accompanied by a beverage that is made by a local manufacturer. This activity is conducted only by reservation.

For the period considered, the dynamic farms opportunity of "tasting products" is presented in Table 2.

Tabel 2 The dynamic of Tasting of products realized on the farm between 1996-2013

Year	Number of farms which make tasting products
1996	256
2001	220
2005	168
2013	151

Source: Ungureanu D., 2007 and www.bienvenue-a-la-ferme.com

The investment is modest, the tasting room must meet sanitary requirements, however, there are modest incomes. This activity is more than the farmers realized desire to make known their products made on the farm. After tasting products there may be the possibility of visiting the farm or conduct recreational activities.

Selling products made by farmers - is an activity that shoppers can enjoy the flavor of fresh made within a farm.

Between the buyer and the manufacturer is a dialogue, the manufacturer giving the customer answers to all questions about the products. Point of sale is found on the farm. Evolution of the tourism form "farm products" is shown in the chart below.

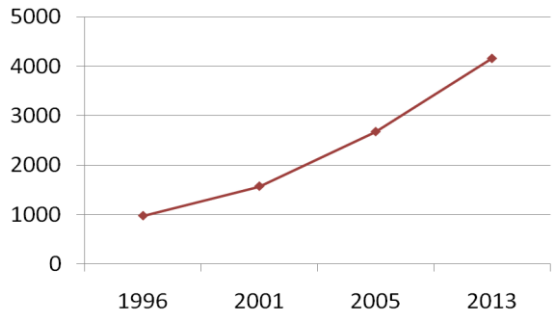

Fig. 2.The dynamic of farms which are selling products, between 1996-2013

Number of farmers who offer "farm products" in 2013, in the network varies by category. The fruit growers are 1035, 811 producers of vegetables, meat and fish producers are 1835, 1151 are the producers of cheese, wine and spirits producers are 1236, 646 producers of juices and drinks, bakery manufacturers are 1919 and 489 produce non alimentary products.

Farms of "discovery" (open farms) - tourists coming from urban area through this type of farm, have the opportunity to know the full potential of agricultural holdings: human, economic and natural. By practicing this activity farmers show tourists the agricultural universe.

This farm is addressed to any age group. Visitors are families and groups. The investment is to achieve reception rooms and toilets.

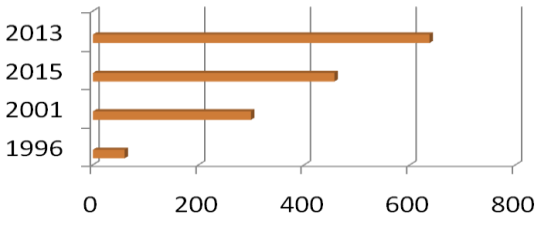

Fig. 3.The dynamic of farms of "discovery" (open farms), between 1996-2013

For the period considered, this form of rural tourism has evolved dramatically, as evidenced by the data in the chart below. Observe that if in 1996 60 farms were "open for visits" in 2013, their number was 10 times higher, which proves the interest of the urban population to know the country life and farm activity.

Teaching farms - are intended specifically for children and adolescents. They complement the curriculum or part of the recreational activities of tourists. The program presented is focused on nature, life on the farm, flora, local life of the region. The presence of animals has a positive effect on children.

These educational farms may carry lessons about life and earth sciences, enterprise management, economic and social issues, the environment and sustainable development.

Equestrian farms - propose one or more activities that take place in nature. Existence of an authorized person is required to work with horses. Between 201-2013, the number of farms has remained relatively constant, which is observed in the following table.

Table 3 – The dynamic of equestrian farms, between 1996-2013

Year	No. of Equestrian farms
1996	177
2001	234
2005	207
2013	232

Source: Ungureanu D., 2007 and www.bienvenue-a-la-ferme.com

These farms can perform the following types of activities: introduction to horse riding, horseback riding or carriage, competitions or research activities and better knowledge of horses.

Other networks operating in the tourism of French countryside are [4,10,11]:

-**Clevacances** - a network that proposes that only those activities related to housing and generally has adherents in rural areas , finding more in the seaside**;**

-**Accueil paysan** - a network that refuses the idea of rurality and rural tourism development without trying to better respond to the requirements of tourists;

-**Gîtes de France** - founded in 1951, was the first network of agritourism in France. It brings together 43,000 structures, of which 30 % are located in rural areas. Rank structures is the spice of wheat from 1 to 4 for the ear more efficient structure.

You can rent rooms, houses over a period of three days, a week or more. The houses are generally rented 16.5 weeks / year, average duration of stay was 1.5 weeks. Rooms for rent that are found in old houses of nobles, are occupied on average 14 weeks per year and the average length of stay is 3 nights. Network publishes national, regional and departmental guides.

In addition to these networks, there are others who exploit and select existing quality housing in rural areas, supporting the development of means of receipt by providing the necessary equipment: International Café - Connett, ”Nids Vacances", ”Fédération Nationale des Gîtes de France","Cleconfort France","Maison de la Rendonnée"etc.. [5]

CONCLUSIONS

The main networks operating in rural tourism in France are: "Bienvenue a la farms", Gîtes de France, Clevacances, Accueil paysan. They have a good distribution network, throughout France.

The number of farmers adherents demonstrate that they are aware of the potential 's capitalization surplus of accommodation, manufactures and land near the farm.

New demands arise among visitors, and tourism service providers.

The higher number of equestrian farms, discovery farms and those who sell directly is observed.

In France developed a series of activities aimed at multi farm business whose core remains the agricultural economy. Pluriactivity can help support small farms, bringing them additional income. Generalized conclusion is that that agriculture alone generally is not able to satisfy the needs of farmers, who often are forced to give up land and agricultural activities.

REFERENCES

[1]Creţu Romeu Cătălin, 2007, Experienţa legislativă din domeniul agroturismului în câteva ţări europene, Volumul Conferinţei Internaţionale ”Turismul rural românesc”, Editura Performantica, Iaşi, p. 145-156.

[2]Dobrila Aurelia, 2007, Raport de stagiu de practica. Universitatea „Lucian Blaga” din Sibiu.

[3] Ionescu Dumitriţa, Pascariu Liana – *Turismul rural în ţările europene*, în volumul Turismul Rural Românesc, Editura Performantica, Iaşi, 2007, pg. 126-136.

[4]Niculescu Cristina, 2007, Mediul rural ca destinaţie turistică în Uniunea Europeană, Volumul Conferinţei Internaţionale ”Turismul rural românesc”, Editura Performantica, Iaşi, p. 137-144;

[5]Stanciu Mirela, Agroturism, 2010, Editura Universităţii ”Lucian Blaga” din Sibiu.

[6]Ungureanu Dănuţ, 2007, Aspecte ale dezvoltării activităţilor agroturistice, prin punerea în valoare a resurselor locale şi a produselor tradiţionale, în regiunea franceză France-Comte, Volumul Conferinţei Internaţionale ”Turismul rural românesc”, Editura Performantica, Iaşi, p. 181-186.

[7]Ungureanu Dănuţ, Cantenot Yves, 2007, Repartizarea geografică a reţelei de turism rural ”Binevenue a la ferme” în Franţa, Volumul Conferinţei Internaţionale ”Turismul rural românesc”, Editura Performantica, Iaşi, p. 187-194.

[8]Les guide national des ”Ferme auberges, Bienvenue a la ferme”, 2005.

[9] http://www.bienvenue-a-la-ferme.com

[10] http://eurogites.com

[11] http://gites-de-france.com

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ASPECTS OF OBSTACLES FOR APPLYING TARGET COSTING: A SURVEY OF MANUFACTURING FIRMS IN EGYPT

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Abstract

The present investigation aims to determine the aspects of obstacles for applying Target Costing(TC) system in Egyptian case and the significant differences among effects of these obstacles . The study used the survey method to describe and analyze the obstacles in some Egyptian firms. The population of the study is Egyptian manufacturing firms. Accordingly, the number of received questionnaires was 388 (21 Egyptian manufacturing firms) in 2013. Finally, the study found that there is a significant divergence among obstacles for applying Target Costing (TC) system in Egyptian manufacturing firms (Internal and external).The external dimensions are the most influence of internal dimensions, where the weakness of the competition is the highest effect in the external dimensions case but resistance top management is the highest effect in external dimensions case.

***Key words*:** *Egyptian firm, manufacturing, target costing*

INTRODUCTION

During the last decade US firms adopted new managerial approaches such as Total Quality Management (TQM) and Just-In-Time(JIT) production control.
TQM and JIT along with others have substantially enhanced the effectiveness and efficiency of shop floor operations. Nonetheless, there is still a huge mine of further improvement in the product development function. According to Clark and Fujimoto (1991), competitive advantage of successful automobile manufacturers stems from product development which generates well balanced cars meeting customers' needs. Many studies imply that even greater improvement of firm performance than what has been accomplished by TQM and JIT at shop floor might be expected from better product development processes.
Target Costing (TC) is a management process to reconcile the discrepancy between two levels of product cost from different perspectives: the cost that allows a firm to sell its product to customers within market competition; the cost at which the firm can supply its product given the firm's technology without sacrificing profitability.
Cooper (1994) claims that Target Costing (TC) is more effective in reducing product cost than what he calls the conventional western approach.
The main objectives of the research are to determine the aspects of obstacle for applying Target Costing (TC) system in Egyptian firms; furthermore and to determine the extent of similar effects between these obstacles.

MATERIALS AND METHODS

The authors used the survey method to describe and analyze the aspects of obstacles for applying Target Costing (TC) system in Egyptian firms. The population of the study was Egyptian manufacturing firms.

Definitions of Target Costing (TC) in past Research:

Past research of Target Costing (TC) encompasses a fundamental limitation. The limitation stems from the definitions of Target Costing (TC). There are two definitions, one narrow and one broad. Neither is satisfactory

to properly define the intrinsic characteristics of Target Costing (Helmy,2009).

Cooper (1994) presents the narrow definition: "a structured approach that uses the expected selling price of a product under development and its desired margin to determine the cost at which the product must be manufactured". The definition is narrow because it focuses on how the Target Costing (TC) is set without explicit reference to how the target is achieved.

By contrast, Sakurai (1989) defines Target Costing (TC) more broadly as: "a cost management tool for reducing the overall cost of a product over its entire life cycle with the help of the production, engineering, R and D, marketing, and accounting departments." The definition is broader since it comprehends various activities of the value chain. Moreover, Sakurai even extends the time line to the entire product life cycle.

Japanese researchers prefer Sakurai's definition to Cooper's since the former reflects the target costing's function of integrating development activities of different business functions. Interestingly, direct translation of the Japanese term genka-kikaku is not target costing but cost planning; the latter connotes a broader range of activities than the former. Indeed, some Japanese researchers (e.g., Okano 1995 and Tani 1995) use the English expression target cost management instead of simple target costing in order to emphasize the comprehensive nature of the cost approach. They contend that Cooper's definition referring to one aspect of the cost system, how the cost target is set, is too narrow.

Kobe University (1992) employs similar definition of Target Costing(TC).

From that, Target casting's principle can be explained by a simple equation as follows:

Selling price =
Total cost + profit margin.....1

Ideally, the left hand side of the equation reflects external factors of business.

Selling price should primarily be determined by customer demand and market competition. The right hand side of the equation represents internal factors of business. Total cost must include expenditures necessary for all business functions to sustain the supply of the product. Profit margin should be set at the level to fulfill the required return on assets. Nevertheless, in reality it is rare that the equation holds when each variable is determined by the corresponding forces. Demand and competition tend to push selling price downwards whereas there is an upwards pressure on total cost and profit margin due to the firm's limited capability and shareholder's requirement.

Target Costing (TC) takes selling price and profit margin to be given, and derive the total cost satisfying the equation. This total cost is set as a target for developing a product.

Alternatively, a firm taking conventional western approach (conventional approach, hereafter) develops the product first to project the total cost (Worthy, 1991). Designers and engineers attempt to minimize the total cost but no target is set in advance. Then, total cost is subtracted from the plausible selling price to obtain profit margin. If the resulting profit margin is not satisfactory, the proposed product is dropped.

Another version of the conventional approach, cost-plus principle, is to add up projected total cost and desired profit margin to obtain selling price. If the resulting selling price is not competitive in the market, the product is abandoned as well.

There are two major differences between the principles underlying target costing and the conventional approach. In target costing the target of total cost is given in advance before a product is developed, whereas in the conventional approach no explicit cost guidance is set although designers and engineers try to minimize total cost (Cooper 1994). Second, in target costing the launch of product to the market is a premise, while the conventional approach reserves the alternative of dropping the prospective product.

A modification is necessary to the above picture of Target Costing(TC). Although in principle every cost is expected to be taken into account, in almost every case, the focus is

on manufacturing cost incurred by direct labor, parts and materials, equipment and tooling depreciation, and other manufacturing overhead.

Expenditures for R and D, marketing, distribution, sales and administration are not the subject of target costing. Accordingly, the present chapter mainly limits its scope to manufacturing cost. The chapter, however, refers to other costs, especially development cost, when they are relevant.

Target Costing (TC) process steps:

Just as there is no a general accepted definition of Target Costing (TC), there is no single Target Costing (TC) process. Each company has evolved its own organizations and practices. Consequently, some variations of Target Costing (TC) have been developed and are being used in different countries. Target Costing (TC), like many other business management practices and philosophies that has its specific environment, thus, it is expected to find variations in the target costing process in Japan or western companies.

The Target Costing (TC) process is closely linked to the strategic planning and product development cycle of a company (Ansari et al. 1997). This linkage forms the foundation of the target costing process. The strategic planning process defines the goals that a company must attain to satisfy market demands and remain profitable. While the product development cycle provides the other context for target costing.

Target costing manages cost and profit during the product development cycle stages (Kato,1993 ; Monden,1995 and Sakurai,1996) . The opportunity to use product design as a vehicle for cost management typically applies only to new product (Kato, 1993; Ansari et al., 1997 and Everaert, 1999). However, target costing can be used for existing products when these products or their manufacturing processes are being rapidly redesigned (Ansari et al., 1997;Shank and Fisher, 1999 and Monden, 2000).

Target Costing (TC) plays a key role during the product planning, concept, and design stages of the development cycle. Once production begins, target costing assumes that a backseat and continuous improvement (Kaizen Costing) takes over the cost management role. According to Ansari et al. (1997), the product development can be described as a continuous cycle divided into four phases (Fig. 1):

- Product strategy and profit planning: the development cycle starts with the strategic planning at the company level. The result of this phase is plans of a business, product, and profit that spell out the particular market segments a company intends to sell in and the products it intends to produce for this chosen niche. Also, these plans spell out the planned market shares and required profit margins from the various products.
- Product concept and feasibility: the next step in the product development cycle is to translate product and profit plans into specific concepts. Product concepts are developed using customer input and competitive intelligence. Product feasibility is determined by making preliminary life cycle cost estimates, evaluating the technology needed, computing the required investment, and estimating the available capacity.
- Product design and development: once a product concept is accepted and its feasibility tested, it goes into full-fledged design and development. Detailed specifications for manufacture and assembly are developed at this step. Manufacturing processes are concurrently designed and suppliers are called in to provide design and process improvement ideas.
- Production and logistics: the start of full-fledged production and distribution marks the culmination of the product development cycle. Service and support plans are achieved. Market results and customer responses are monitored to provide information for continuous improvement or redesign of the existing or next generation products.

Taken as a whole the four phases involve the determination of a target cost with the cycle

being repeated in order to ensure attainment of the target cost.

Thus, the Target Costing (TC) process occurs in two key phases that correspond to the product development cycle.

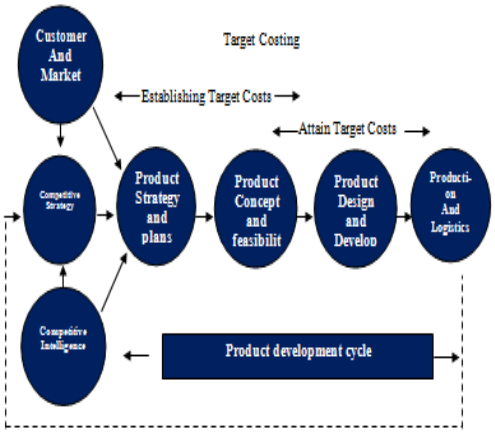

Fig. 1. Target Costing (TC) process within the strategic planning and product development cycle (Modified from Ansari et al., 1997).

Ansari et al. (1997) called them the establishment phase and the attainment phase. Fig.2 shows the two phases of the Target Costing (TC) process in relation to the product development cycle and strategic planning. The establishment phase occurs during the product planning and concept development stages of the product development cycle and involves setting a Target Costing (TC). While the attainment phase occurs during the design development and production stages of Target Costing (TC) and involves achieving the target cost.

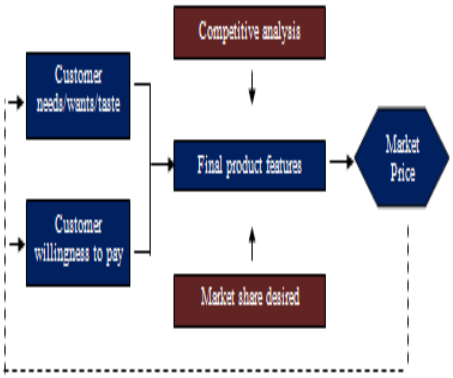

Fig. 2.Setting prices in target costing (Ansari et al., 1997)

In literature, many studies (e.g. Cooper, 1995; Cooper and Slagmulder, 1997; Ansari et al., 1997 and Monden, 2000) introduced many steps to establish and attain Target Costing (TC).

Research variables

The model of study includes main independent variables which represent obstacles for applying Target Costing (TC) system in Egyptian firms.

The following function was used:

$$Y = f\ (X_1, X_2, X_3, X_4, X_5, X_6).....2$$

where:

Y: Obstacles for applying Target Costing (TC) system,

X_1: Resistance top management,

X_2: Resistance Middle management,

X_3: Weaknesses in the accounting information system,

X_4: The weakness of system accounting,

X_5: The costs of design and application system,

X_6: The weakness of Competition,

X_7: Characteristics of the market.

Data

The authors used the questionnaire instrument in addition to the test approach to confirm the correctness of views collected. The number of questionnaire instruments sent was 441 and the number of the received questionnaires was 388 with a response percentage of 87.98%.

Methods of data analysis

The study used a Statistical Package for the Social Sciences (SPSS) for application of reliability, descriptive and inferential statistics.

RESULTS AND DISCUSSIONS

Statistical analysis

1.Reliability

The correlation coefficient between the dimensions (Obstacles) was significant (at level 1%) and the Cronbach-Alpha Coefficient was 83.71.

2.Descriptive

Table 1 shows the mean values and Standard Deviation (S.D.) of survey dimensions (Obstacles).

The descriptive statistics of dimensions impact showed that the mean values for the weakness of competition (3.8146) > resistance top management (3.7075) > weaknesses in the accounting information system (3.6314) > the costs of design and application system (3.4515) > the weakness of system accounting (3.1041) > characteristics of the market (2.5411**)** > resistance middle management (1.8981).

Table 1.Descriptive statistical values

No.	Dimension	Mean	Std. Deviation
1	Resistance top management*	3.7075	1.0865
2	Resistance Middle management*	1.8981	2.9786
3	Weaknesses in the accounting information system*	3.6314	1.8766
4	The weakness of system accounting*	3.1041	1.6301
5	The costs of design and application system*	3.4515	1.3812
6	The weakness of competition**	3.8146	1.2900
7	Characteristics of the market**	2.5411	2.3414

*Internal dimension
**External dimension
Source:SPSS output

3.Inferential statistics

Table 2 shows output of Kruskal-Wallis Test values.

Table 2.Output of Kruskal-Wallis Test

	V
Chi-Square	2299.928
df	6
Asymp.sig.	.000

Source:SPSS output

From Table 2, it may be observed that there are significant differences among the aspects of obstacles for applying Target Costing (TC) system in Egyptian firms.

CONCLUSIONS

The study found that there is a significant divergence among obstacles (dimensions) for applying Target Costing (TC) system in Egyptian manufacturing firms (Internal and external obstacles). The external dimensions are the most influence of internal dimensions, where the weakness of the competition is the highest effect in the external dimensions case but resistance top management is the highest effect in external dimensions case.

REFERENCES

[1]Ansari, S., Bell, J., Cypher, J., J.Dears, J., Dutton, J., Ferguson, M., Hallin, K., Marx, C., Ross, C., Zampino, P, 1997, Target costing: The next frontier in strategic cost management. New York: McGraw-Hill.
[2]Clark, K. B., Fujimoto, T., 1991, Product development performance: Strategy, organization, and management in the world auto industry. Boston, MA: Harvard Business School Press.
[3]Cooper, R., 1994, How Japanese manufacturing firms implement target costing systems: A field-based research study. Working paper, Claremont Graduate School, Claremont, CA: 135.
[4]Cooper, R.,1995, When lean enterprises collide: Competing through confrontation. Harvard Business School Press, Boston, Massachusetts: 112-162.
[5]Cooper, R., Slagmulder, R.,1997, Target costing and value engineering. productivity Press, Portland, Oregon: 79,130,357-367.
[6]Everaert, P., 1999, The impact of Target Costing on cost, quality and time-to-market of new products: Results from Lab Experiments. Doctoral Dissertation, University of Ghent: 34.
[7]Helmy, K. M. A., 2009, The role of target cost to increase the competitive capacity for Egyptian establishments by appling on industrial sector. Master Dissertation, Faculty of Economic Studies, University of "Aurel Vlaicu", Arad, Romania.
[8]Kato, Y., 1993, Target Costing support systems: Lessons from Leading Japanese companies. Management Accounting Research, 4(4): 33-56.
[9]Kobe University Management Accounting Research Group, 1992, Genkakikakuno jittaichosa (The present state or target cost management). In Japanese. Kigyo-ktzikei, 44 (5-7): 86-93, 74-81, 84-89.
[10]Monden, Y., 1995, Cost reduction systems: Target Costing and Kaizen Costing. Productivity Press, Portland, Oregon: 98,217-222.
[11]Monden, Y., 2000, Japanese cost management. Imperial College Press, London:6.
[12]Okano, H., 1995, Target cost management and product development at Toyota. Paper read at International Motor Verode Program Annual Sponsors Meeting, at Toronto, Ontario, Canada.

[13]Sakurai, M., 1989, Target costing and how to use fit. Journal of Cost Management, 3 (2): 39-50.
[14]Sakurai, M.,1996, Integrated cost management: A companywide prescription for higher profits and lower costs. Productivity Press, Portland, Oregon 518: 40-124.
[15]Shank, J., Fisher, J., 1999, Target Costing as a strategic tool. Sloan Management Review, Fall, 41(1):73.
[16]Tani, T., 1995, Interactive control in target cost management. Management Accounting Journal, 6 (4): 399-414.
[17]Worthy, F. S., 1991, Japan's smart secret weapon. Fortune, August 12: 48-75.

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THE COMPARATIVE ANALYSIS OF THE AGRICULTURAL PRODUCTION VALUE STRUCTURE DURING THE PRE AND POST ROMANIA'S EU ACCESSION PERIOD.

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Abstract

The agriculture development needs measures, and one of the main indicators that quantifies the results obtained is the value of agricultural production. In the present paper is studied this indicator through its structure in the vegetal, animal and agricultural services sector. It is also studied the impact of EU accession on agricultural production value. To capture the structural differences, the results are divided into two periods: the period 2001-2006, representing the period before EU accession and the period 2007-2012, representing the period after EU accession. To these data were added statistical calculations using the mean, the standard deviation and coefficient of variation to determine the homogeneity of the data.

***Key words*:** *agricultural production branch, agricultural services, animal production, crop production*

INTRODUCTION

After Romania joined the EU, the restructuring and approaching process to other countries agriculture progressed slowly without visible consequences in terms of structural and functional compatibility of the agricultural sector.

Besides the insufficient level of adaptation of the common agricultural policy in Romanian agriculture due to reduced capacity for absorption of both policies, viewed from the standpoint of increasing structural and functional compatibility, as well as from a financial standpoint (funds absorption for rural development) still need added the inadequacy adaptability of Romanian supply to the European market.

We wanted to study, however, changes occurred in the agricultural production sector value internally, observing oscillations during the post accession to EU in order to assess the impact of EU integration.

MATERIALS AND METHODS

Agricultural branch production is determined according to the Eurostat methodology on "Economic Accounts for Agriculture" and includes: the value of all agricultural production (including the production of wine produced in agricultural units that have no wine industrial installations), and the agricultural services performed by units specialized. Production of agri culture is expressed in basic prices (producer prices plus subsidies on products and less taxes on products) of each year [4].

The agricultural branch production value includes the value of crop production, livestock and services, at current and comparable prices.

Vegetal production volume is the production value (global yield of cultures) agricultural, which is expressed in current and comparable prices. For animal production volume is determined by the size of the live weight breeding and increasing reared young animals obtained under one year of growth, in the weight of mature animals obtained after fattening them and the quantity of milk, wool, eggs and other livestock products produced in the household of animals and birds use , which are not related to their killing.

Livestock production volume is expressed in current and comparable prices.

The global production at current prices also includes services for the value market (with pay), provided by enterprises serving agriculture and agricultural enterprises, households producing agricultural production and non-market services rendered by budgetary institutions and organizations.

In this paper we also used the following indicators: the arithmetic mean, standard deviation, coefficient of variation and statistical significance of these indicators.

The formulas used to calculate these indicators are presented below [2], [5]:

For arithmetic mean = $\overline{x} = \frac{\sum xi}{n}$; in which : $\overline{X}$ = arithmetic mobile mean ; Xi = average production values on a number of year (i);
n = the number of years taken into account.

For standard deviation = $\partial = \sqrt{\frac{\sum(\bar{x}-xi)^2}{n-1}}$; where: ∂ = standard deviation ; xi = average production values over a number of years, n = the number of years taken into account.

For the variation coefficient = $C = \frac{\delta}{\overline{X}} x100$,

where: C – the variation coefficient (expressed in percent). The coefficient of variation can be: between 0-10% - low variation, between 10-20% - middle variation, over 20% - large variation.

The data used have had as source: Statistical Yearbook of Romania, statistics from Eurostat, data from the specialized literature.

RESULTS AND DISCUSSIONS

1.The Pre-accession period of Romania to European Union 2001-2006.

A first aspect of the investigation was focused on the value control compared to the total production, which for 2001-2006 is shown in Table 1, with significant annual variations. It is found that crop production has the highest oscillation to the total, this level ranging between 57.26% and 68.87%. Animal production delineates to total agricultural production shares between 30.42% and 41.60%, the annual trends being also variable. Agricultural services through annual percentage levels means the lowest values , the tendency being of decrease in the period (2001-2004), followed by growth (2005-2006).

Table 1. The agricultural production value structure at the country level for the period 2001-2006

Specification	2001	2002	2003	2004	2005	2006
	%	%	%	%	%	%
Vegetal	*62.79*	*57.26*	*64.14*	*68.87*	*60.07*	*61.85*
Animal	*36.08*	*41.60*	*34.93*	*30.42*	*39.07*	*37.21*
Agricultural Services	*1.13*	*1.14*	*0.93*	*0.71*	*0.85*	*0.93*
Total	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: Romanian Statistical Yearbook, 2003-2013; Agricultural statistics from Eurostat [1][3]

A detailed analysis is given below in Table 2, the annual indicators being presented in million Euro and % compared to 2001, with the completion of statistical indicators.

Table 2.The value evolution, at the country level, for agricultural production, in the period 2001-2006

Specification	MU	2001	2002	2003	2004	2005	2006	Average 2001-2006	Standard Deviation	Coef de var.
								mil €	mil €	%
Vegetal	mil €	6716	5786	6901	9399	7716	8888	7568	1376	*18,2*
	%	*100,0*	*86,1*	*102,8*	*139,9*	*114,9*	*132,3*	x	x	*x*
Animal	mil €	3859	4204	3759	4151	5019	5348	4390	646	*14,7*
	%	*100,0*	*108,9*	*97,4*	*107,6*	*130,0*	*138,6*	x	x	*x*
Agricultural Services	mil €	121	116	100	96	109	134	113	14	*12,5*
	%	*100,0*	*95,4*	*82,5*	*79,7*	*89,8*	*110,9*	x	x	*x*
Total	mil €	10697	10105	10760	13647	12844	14371	12071	1780	*14,7*
	%	*100,0*	*94,5*	*100,6*	*127,6*	*120,1*	*134,3*	x	x	*x*

Source: Romanian Statistical Yearbook, 2003-2013; Agricultural statistics from Eurostat [1][3]

The period values levels indicate a successive increase of total agricultural production value, in comparison to 2001 (in 2006 it reached 134.3%).Analyzed by components of this value structure (the vegetal, animal, service), you can find the same upward trend. Standard deviation (in million Euros) and the coefficient of variation (expressed as a percentage), delimits both overall and in the structure medium variations 10-20% (the coefficient of variation amplitudes being between 12.5%% for service and 18.2 for vegetal production).

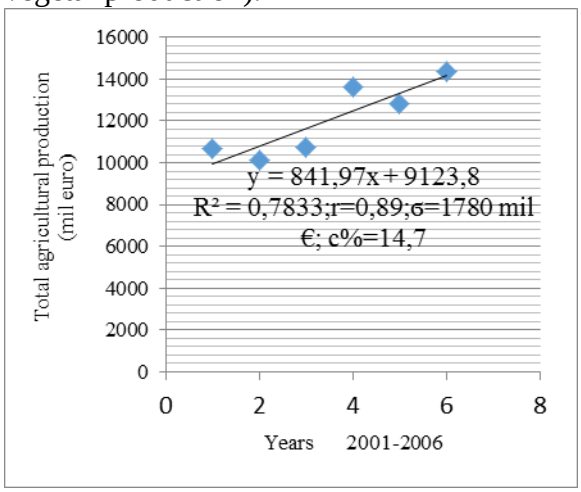

Fig.1.Total agricultural production evolution, at the country level, for the period 2001-2006

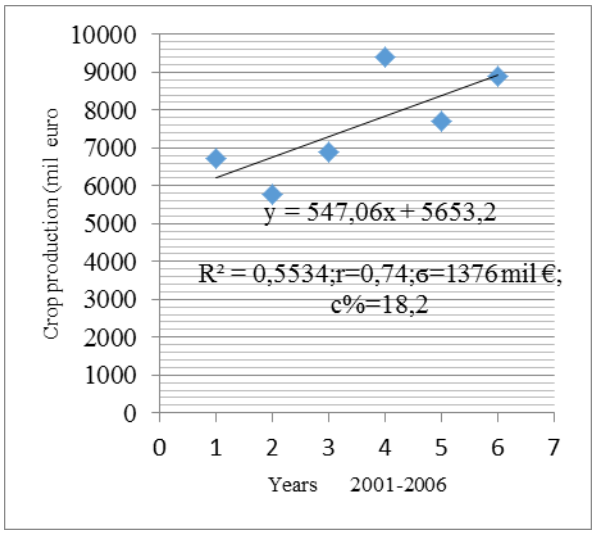

Fig.2. The crop production evolution, at the country level, for the period 2001-2006

These variation annual levels, were one of the reasons that further were used the regression equations at which the resulting factor is represented through the total agricultural output and production structure components (the vegetal, animal, services). In the Fig. 1 through the function is given the total agricultural production evolution (Y = 841.97 x + 9123.8), with the correlation report (r = 0.89), that is considered significant. In the fig. 2, the crop production evolution (y = 547.06 x + 5653.2) , the correlation report (r = 0.74) is also significant.

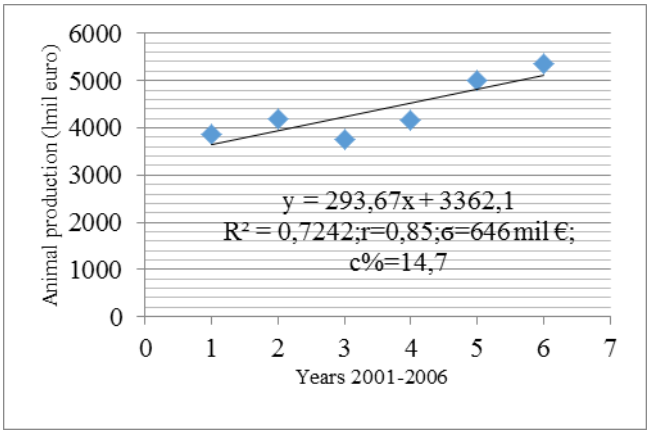

Fig. 3. The animal production evolution, at the country level, for the period 2001-2006

In Figure 3 is shown the animal production function (y = 293.6 x +3362.1) being also noticed the representative interpretation of correlation report (r = 0.85).

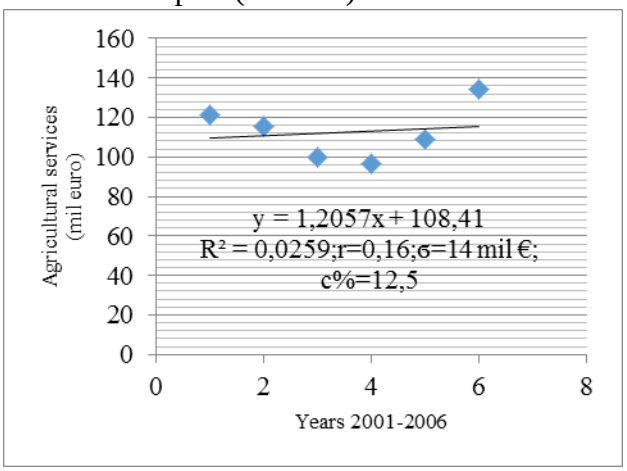

Fig. 4. The agricultural services evolution, at the country level, for the period 2001-2006

The function of the service sector shown in Fig. 4 (y = 1.2057 x +108.41) signifies an insignificant correlation report (r = 0.16).
It can be mentioned that the analysis of the correlation coefficient values is performed

with an amplitude between 14.7 and 18.2 which is a very small variation.

2. The period after-accession of Romania to European Union (2007-2012)

For Romania the evolution of agricultural production in value according to the structure shown in Table 3 of the main sectors reflects the varying levels of post-accession period.

On the whole country and vegetal sector there is a growing tendency, both in absolute terms and in comparison with 2007.

Animal production even if increases during 2008-2009, continues by a decrease.

The services for the entire period recorded decreasing levels (the decrease in 2012 compared to 2007 is -39.6%).

At the same time annual changes determine a coefficient of variation also differentiated: a small variation (0-10%) in animal production; variation middle (10-20%) in the total production and vegetal production; great variation at agricultural services (over 20%).

The evolutionary form of these levels was evaluated further by the tendency revealed according to some functions shown in Fig. 5 total agricultural output, Fig. 6 production vegetal, Fig. 7 animal production and Fig. 8 agricultural services.

Table.3.- The agricultural production value evolution at the country level for the period 2007-2012

Specification	MU	2007	2008	2009	2010	2011	2012	Average 2007-2012	Standard Deviation	Coef of var.
								mil €	mil €	%
Vegetal	mil €	8607	12421	8468	10161	12689	9294	10273	1868	*18,2*
	%	*100,0*	*144,3*	*98,4*	*118,1*	*147,4*	*108,0*	x	x	*x*
Animal	mil €	5481	5576	5555	4768	5102	5450	5322	321	*6,0*
	%	*100,0*	*101,7*	*101,3*	*87,0*	*93,1*	*99,4*	x	x	*x*
Agricultural Services	mil €	205	194	178	130	127	124	160	37	*23,1*
	%	*100,0*	*94,9*	*86,8*	*63,5*	*62,2*	*60,4*	x	x	*x*
Total	mil €	14293	18191	14201	15059	17918	14868	15755	1813	*11,5*
	%	*100,0*	*127,3*	*99,4*	*105,4*	*125,4*	*104,0*	x	x	*x*

Source: Romanian Statistical Yearbook, 2003-2013; Agricultural statistics from Eurostat [1][3]

The resulting correlation as the coefficient of correlation signifies that there is a correlation only for agricultural services.

CONCLUSIONS

The analysis on the value of agricultural production for the two periods generated the following conclusions:

1.For the total agricultural production we conclude that the pre accession period had registered spectacular increases over the years, but the impact of EU accession is positive, the data trend being an ascending one, the years average in the second period surpassed the first with 3683 million euro. The data shows a middle variation in both periods, we find however that after accession, the data have greater homogeneity.

2. Regarding the crop production, the average for the period 2007-2012 brought a plus of 2705 million compared to the average of the period 2001-2006 and the analysis by calculating the coefficient of variation shows a degree of scattering data with the same value for the two periods 18.2%, ie a middle variation.

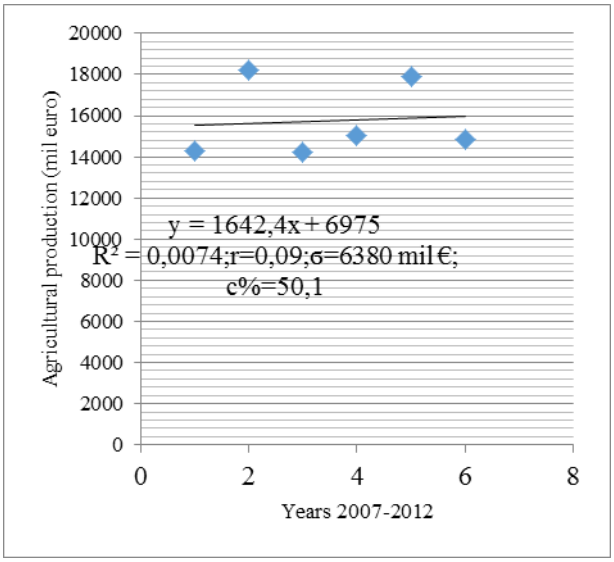

Fig. 5. The total agricultural production evolution, at the country level, for the period 2007-2012

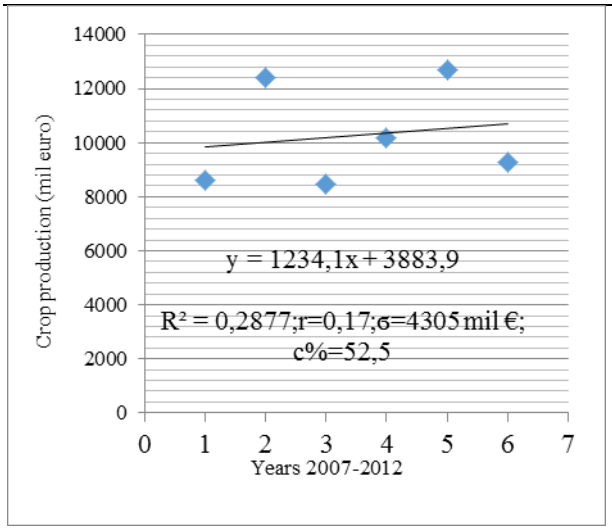

Fig.6. The crop production evolution, at the country level,for the period 2007-2012

3.The animal sector in the period 2007-2012 shows a slightly decreasing trend, with a small degree of data scattering, the coefficient of variation fits up to 10%, which demonstrates the increased stability of animal products capitalization.

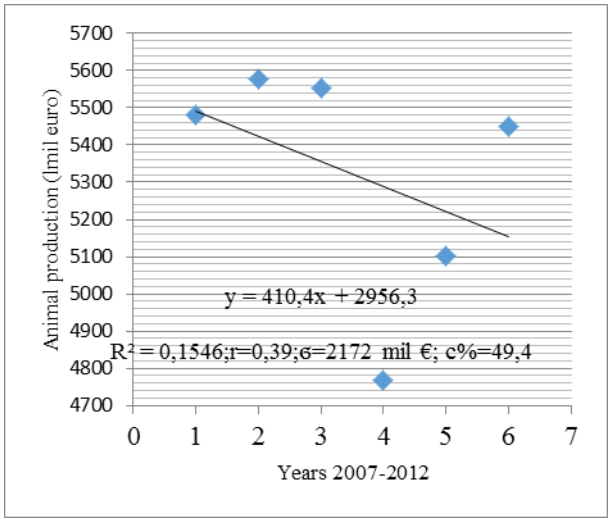

Fig.7. The animal production evolution , at the country level,for the period 2007-2012

4.The largest declines we see at agricultural services sector, the post-accession meaning a decline, especially between 2010-2012.

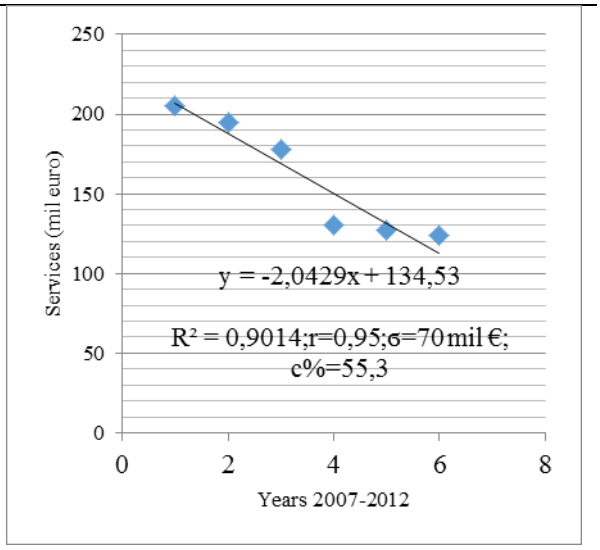

Fig.8. The agricultural services evolution , at the country level,for the period 2007-2012

REFERENCES

[1] Agricultural statistics, 2013 http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

[2]Ceapoiu, N., 1968, Applied statistical methods in agricultural experiments and statistical Ed.Agro-Silva, Bucharest 1968

[3]Romanian Statistical Yearbook, INS, 2003-2013.

[4]The production value in agricultural branch, National Institute of Statistics, the Press Office, Press Release, no. 176 of July 24, 2013

[5]The demographic growth, http://www.dictsociologie.netfirms.com/_IndDem/IndReproducere.htm

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THE AGRICULTURAL HOLDINGS STRUCTURAL ANALYSIS FROM EUROPEAN UNION AND FROM ROMANIA BY CHARACTERIZING THEIR MAIN INDICATORS.

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Abstract

This paper aims to study in detail the indicators for characterizing the agricultural holdings in the European Union and in Romania, to highlight the disparities between our country and the countries with a strong assimilation and development of agriculture. Standard gross margin and other indicators calculated for crop and animal production for their use at farm level, required the understanding of their content, the calculation and use in the evaluation activities at farm level. In the European Union, as well as candidate countries to Integration, including Romania, farms are numerous and varied as they are complex reality. To facilitate the unitary analysis of the structural and economic results is necessary to use proper terms.

Key words: *agricultural holdings, gross value added. standard gross margin, standard production*

INTRODUCTION

Agriculture along with industry, is one of the sectors which had suffered most from the transition period: excessive fragmentation of land the unemployed of industrial restructuring reprofiled in agriculture (but without sufficient preparation), lack of interest in the means of mechanization and existing irrigation as well as the modest equipping with modern technologies have led to a subsistence agriculture, underperforming Given the existing potential and towards the European agriculture.

The existence of this high agricultural potential (among the most important in Europe) was one of the main factors of interest excitement of EU enlargement and the inclusion of a country with strong development gaps and offsets visible from the community, as it is Romania [3].

MATERIALS AND METHODS

Standard gross margin, an indicator of the assessment,substantiation and analysis of the agricultural holding production activities. In agricultural production, SGM is defined [7] as the difference between the standard value of gross production per hectare of crop or livestock (including the subsidies related to products and / or area) and the standard amount of variable costs of obtaining this production . According to the types of crops and livestock from the farm, SGM is determined for each farm.

Economic size of the holding in the total SGM of the holding, expressed in ESU, 1 ESU is equivalent to 1,200 euros.

Gross value added. Value added at gross basic prices corresponds to production value (at basic prices) less the value of intermediate consumption. The basic price is defined as the price received by the producer, after deduction of all taxes on products but including all subsidies on products.

The standard Gross production represents the average production per hectare or animal head averaged over five years, without subsidies. Expressed in euro per hectare or animal head [6].

To interpret the data we used the following statistical indicators: the mobile arithmetic mean, standard deviation, coefficient of variation, average annual growth rate and the statistical significance of these indicators.

The formulas used to calculate these indicators are presented below [2], [8]:

For arithmetic mean = $\overline{x} = \frac{\sum xi}{n}$, where:

$\overline{X}$ = arithmetic mobile mean; Xi = average production values on a number of year (i);
n = the number of years taken into account.
Average annual growth rate [1]

= $r2000-2008 = \sqrt[8]{\prod(p1/p0)} - 1$.

r2005-2010 = average annual growth rate;
∏p1/po = chained growth indicators

For standard deviation = $\partial = \sqrt{\frac{\sum(\overline{x}-xi)^2}{n-1}}$,

where:

∂ = standard deviation ; xi = average production values over a number of years,
n = the number of years taken into account.

For the variation coefficient = $C = \frac{\delta}{\overline{X}} x100$,

where:

C – the variation coefficient (expressed in percent)

The coefficient of variation can be: between 0-10% - low variation, between 10-20% - middle variation, over 20% - large variation.

The data used have had as source: Statistical Yearbook of Romania, statistics from Eurostat, data from the specialized literature.

RESULTS AND DISCUSSIONS

1.The standard gross margin (SGM). This notion is represented by the standard gross margin, which is the basic dimensional delineation indicator of agricultural holdings. SGM unit value is calculated, both by area and by villages, on agricultural holdings at medium potential level and extrapolated to high and low potential.

Table 1 –The agricultural holdings structure on technical economic profile, based on SGM, in some EU countries, years 2005-2010

TYPE OF FARM	Bulgaria		Germany		Spain		France		Italy		Hungary		UK	
CEREALS AND OLEAGINOUS	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010
FIELD CROPS	2,7	4,9	11,9	11,9	13,3	16,6	13,7	16,8	16,5	17,7	10,1	12,9	7	10,8
PROTECTED VEGETABLES	7,3	12,2	12,4	12,4	9,1	9,7	7,7	9,3	17,8	15	4,7	7,8	18,1	18,1
FIELD VEGETABLES	0,4	1,1	1,8	1,4	2,8	2,5	1	1,1	1,2	1,5	1	1,1	1,1	0,6
OF VEGETABLES	1,1	3,4	0,5	0,3	3,1	1,6	1,2	1,3	0,6	0,8	0,3	0,4	0,3	0,1
VINEYARD	0,3	0,4	1,1	1	0,3	0,4	0,9	0,8	0,6	0,9	0,7	0,2	0,5	0,4
OF FRUIT	2,9	4,9	5,3	5,2	9,2	8,7	14,5	13,7	13,2	17,4	7,5	6,2	0	0
MIXED PERMANENT CROPS	1	3,1	2	1,9	22,1	20,7	2,9	3	10,5	12,2	5,8	6,5	1	0,8
SPECIALIZED DAIRY BOVINE	0,4	0,6	0,6	0,7	5,3	5,3	0,7	0,6	10,8	8,2	1,2	2,1	0	0,2
SPECIALIZED MEAT BOVINE	11,9	12,5	19,8	22,1	3,5	3	11,1	9,9	3,1	2,9	0,9	0,8	7,1	7,2
MILK AND MEAT BOVINE	0,5	0,4	9,1	9,2	5,9	7,1	13,3	12,2	2,4	2,8	0,1	0,2	13,7	18,5
SHEEP, GOATS AND OTHER GRAZING LIVESTOCK	4,2	1,3	3,3	3,3	0,5	0,4	3	2,1	0,5	0,5	0,1	0,1	1,1	2,8
SWINES	7,5	9,7	9,3	9,1	6,7	6,5	11,1	11,3	3,3	4,8	2,4	3,1	27,6	30
POULTRY	1,8	1,8	5,1	5,5	1,8	2,1	1,2	1,2	0,5	0,4	10,2	6,4	1	1,1
MIXED GRANIVORES	2,8	1,5	0,7	0,9	0,6	0,8	2,2	2,4	0,4	0,3	15,2	20,1	2,5	1,7
POLYCULTURE	7,2	4,4	0,2	0,1	0,5	0,5	0,7	0,5	0,1	0,1	15,9	9,5	0,2	0,1
MIXED HERBIVORES ORIENTATION	2,7	3,9	1,3	1,3	6,3	5,8	2,4	2,5	11	9	2,7	2,8	0,5	0,5
MIXED GRANIVORES ORIENTATION	12,3	7,6	3	2,1	2,1	1,1	2	1,3	0,7	0,3	1,5	1,4	0,9	0,9
MIXED LARGE CULTURE - HERBIVORE	10,3	6	1,8	1,4	0,6	0,5	1,3	1,1	0,2	0,1	1,5	1,4	0,7	0,6
MIXED VARIOUS CROPS-LIVESTOCK	6,9	5,6	6	5,9	1,2	1,3	5	5	0,9	1	0,6	0,7	2,9	3,6
UNCLASSIFIABLE	15,8	14,4	4,7	4	4,4	3	4,2	3,5	3,9	2,1	14,5	12,9	1,2	1
TOTAL	0,2	0,3	0,2	0,2	0,7	2,2	0,1	0,4	1,8	2	3,2	3,5	12,5	1
	100,2	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: own calculations after data from Eurostat [4]

In Table 1 is shown a structure of agricultural works based of SGM in some EU countries for the period 2005-2010. It finds differences in farm structure both on countries but also the existence of differences for 2005 and 2010. There is a priority for field crops, specialized dairy bovine animals, mixed granivores and herbivores, mixed crop / livestock (various crops and livestock). It appears particularly for the countries considered developed a restriction phenomenon mixed farms in favor of those specialized.

The structural knowledge of farms is rendered further also for Romania through the agricultural holdings. The predominance is for field crops, poultry, mixed granivores, mixed with herbivorous orientation and mixed, field crops that in 2010 cumulates 61.8% of the total.

For the period 2005-2010 on total country there is a decrease in the number of holdings (with -10.03% fewer farms in 2010 compared to 2005).

Table 2.The agricultural holdings structure on technical economic profile, based on SGM, in Romania, years 2005-2010.

TYPE OF FARM	2005		2007		2010	
CEREALS AND OLEAGINOUS	522,710	12.3	430,860	11.0	354,760	9.2
FIELD CROPS	612,740	14.4	623,070	15.8	561,370	14.5
PROTECTED VEGETABLES	9,320	0.2	10,540	0.3	9,180	0.2
FIELD VEGETABLES	11,700	0.3	13,870	0.4	9,500	0.2
OF VEGETABLES	1,260	0.0	1,630	0.0	5,230	0.1
VINEYARD	48,860	1.1	49,050	1.2	92,940	2.4
OF FRUIT	39,770	0.9	37,420	1.0	63,490	1.6
MIXED PERMANENT CROPS	4,690	0.1	4,190	0.1	11,310	0.3
SPECIALIZED DAIRY BOVINE	160,680	3.8	171,230	4.4	108,950	2.8
SPECIALIZED MEAT BOVINE	7,370	0.2	6,890	0.2	11,200	0.3
MILK AND MEAT BOVINE	61,060	1.4	69,340	1.8	37,760	1.0
SHEEP, GOATS AND OTHER GRAZING LIVESTOCK	226,100	5.3	221,910	5.6	233,800	6.1
SWINES	56,030	1.3	65,690	1.7	172,010	4.5
POULTRY	465,800	10.9	355,600	9.0	407,020	10.5
MIXED GRANIVORES	192,100	4.5	177,880	4.5	395,680	10.3
POLYCULTURE	161,680	3.8	179,700	4.6	125,140	3.2
MIXED HERBIVORES ORIENTATION	486,270	11.4	365,060	9.3	389,900	10.1
MIXED GRANIVORES ORIENTATION	55,920	1.3	33,820	0.9	95,000	2.5
MIXED LARGE CULTURE - HERBIVORE	277,680	6.5	252,140	6.4	42,850	1.1
MIXED VARIOUS CROPS-LIVESTOCK	811,160	19.1	775,650	19.7	632,120	16.4
UNCLASSIFIABLE	43,280	1.0	85,830	2.2	99,840	2.6
TOTAL	4,256,180	100.0	3,931,370	100.0	3,859,050	100.0

Source: own calculations after data from Eurostat [4]

The most significant decrease is registered for the type of field crops, grain or oleagenous, cattle specialized in the production of milk, meat and milk, mixed large culture and herbivores. At the same time it is also found an amplification of units, with reference to the type of vegetable farms, vineyards, orchards, mixed permanent crops, swines, mixed granivores.

2.**The standard gross production (euro / ha).** The standard gross production expressed in EUR / ha for the period 2005-2010 in some European countries is shown in Table 3 from where it is apparent the differentiation level achieved in agricultural production.

Table 3. The standard production evolution (euro / ha) in some European countries for the period 2005-2012.

Country	MU	2005	2007	2010	Average /rythm
UK	euro/ha	1,172	1,105	1,158	1,145
	% from 2005	*100*	*94.3*	*98.9*	X
	% in chain		0.94	1.05	*-0.60*
Bulgaria	euro/ha	850	759	567	725
	% from 2005	*100*	*89.2*	*66.6*	X
	% in chain		0.89	0.75	*-18.33*
Germany	euro/ha	2,607	2,611	2,484	2,567
	% from 2005	*100*	*100.1*	*95.3*	X
	% in chain		1.00	0.95	*-2.39*
Italy	euro/ha	3,173	3,181	3,847	3,400
	% from 2005	*100*	*100.2*	*121.2*	X
	% in chain		1.00	1.21	*10.11*
Romania	euro/ha	756	736	783	758
	% from 2005	*100*	*97.3*	*103.5*	X
	% in chain		0.97	1.06	*1.77*
Spain	euro/ha	1,353	1,340	1,439	1,377
	% from 2005	*100*	*99.1*	*106.3*	X
	% in chain		0.99	1.07	*3.13*
Hungary	euro/ha	1,154	1,101	1,118	1,124
	% from 2005	*100*	*95.4*	*96.9*	X
	% in chain		0.95	1.02	*-1.57*

Source: own calculations after data from Eurostat [4]

If developed countries (England, Germany, Italy, Spain and Hungary), performed over 1100 euro / ha, countries such as Bulgaria and Romania obtained below this level (between 736 and 850 euro / ha). The variation characterization by dynamic rhythms made for 2005-2010 signifies a growing trend for Italy, Romania and Spain (which can be played by growth rate oscillations between 1.77 and 10.11) and a decrease in other countries (the rate of - 0.60 and -18.33).

3.The gross value added of agricultural production

It appears the necessity for knowing the variational level evolution for the GVA diferentiated calculated at the selling prices by the producer (of farmgate) and at prices that intervenes the intermediate (prices at processor). For the period 2005-2012 is analyzed for some European countries, the gross value added evolution through absolute indicators, relative resulting from comparisons, but also statistics.

Regarding the evolution of gross value added of agricultural production in European countries for the period 2005-2012 (through farmgate prices), is presented in Table 4, for some countries in Europe.

Table 4. The gross value added evolution of agricultural production in European countries for the period 2005-2012 (farmgate prices).

Country	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Average /rythm*	Standard deviation (mil euro)	Coef var(%)
Germany	mil euro	12812	13169	16031	16975	13163	13949	15265	17468	14854	1717	*11.56*
	% in chain		*1.03*	*1.22*	*1.06*	*0.78*	*1.06*	*1.09*	*1.14*	*4.53*	x	x
Bulgaria	mil euro	1544	1479	1227	1886	1296	1356	1624	1686	1512.2	205	*13.57*
	% in chain		0.96	0.83	1.54	0.69	1.05	1.20	1.04	*1.26*	x	x
France	mil euro	28842	26152	29010	26761	22639	27840	28832	30955	27629	2339	*8.47*
	% in chain		0.91	1.11	0.92	0.85	1.23	1.04	1.07	*1.02*	x	x
Hungary	mil euro	2215	2189	2273	2687	1679	1979	2926	2597	2318.1	377	*16.26*
	% in chain		0.99	1.04	1.18	0.62	1.18	1.48	0.89	*2.30*	x	x
Italy	mil euro	25979	25541	25796	26230	23607	23607	25161	25500	25178	955	*3.79*
	% in chain		0.98	1.01	1.02	0.90	1.00	1.07	1.01	*-0.27*	x	x
Portugal	mil euro	2671	2714	2453	2455	2432	2418	2152	2126	2428	197	*8.10*
	% in chain		1.02	0.90	1.00	0.99	0.99	0.89	0.99	*-3.20*	x	x
Romania	mil euro	6189	7017	6244	8362	6392	6507	8023	6255	6874	804	*11.69*
	% in chain		1.13	0.89	1.34	0.76	1.02	1.23	0.78	*0.15*	x	x
EU-27	mil euro	148749	143615	156478	153301	131304	145305	154424	159412	149074	8427	*5.65*
	% in chain		0.97	1.09	0.98	0.86	1.11	1.06	1.03	*0.99*	x	x

Source: The National Strategic Framework for the sustainable development of the agri-food sector and Romanian rural area during 2014 - 2020 (National Strategic Rural Framework) CRPCIS, 2012 [5]

Regarding the annual levels of GVA, there is an increase in the period dynamics for all countries (except Italy and Portugal, where this gross value added decreases). For the whole EU in 2012 compared to 2005, it is registered an increase of 7.17%.

Regarding the average rate we found the existence of positive values, with the exception of the two aforementioned countries ,where are values of -0.27 and -3.20 respectively. The existence of these oscillations annual gross added value for all countries shows differential levels of the coefficient of variation (as an indicator of scattering).

It is reported the existence of a small variation (0-10%) for some countries (France, Italy, Portugal and total EU) oscillations being between 3.79 and 8.19, along with medium variation (10-20%) for other countries (Germany, Bulgaria, Hungary, and Romania) where the oscillations are between 11.56 and 16.26.

The prices at the processor amplifies the gross added value, situation that for the same structure of EU countries (presented in Table 5) brings differentiated arguments.The annual levels reflect, for the EU-27 increases, excepting the years 2008 and 2009. The average growth rate records a value of 2.69, standard deviation of the sequence data for EU total being of 10397 million euro.

We see a negative value at Portugal, where the average rate records a -1.94 annual decline of gross value added. In the period dynamics, Bulgaria and Hungary have the lowest values, with the annual growth rates lower than the rest of the countries.

Table 5. Evolution of GVA of agricultural production in European countries for the period 2005-2012 (processor prices)

Tara	MU	2005	2006	2007	2008	2009	2010	2011	2012	*Average /rythm*	Standard deviation (mil euro)	Coef var(%)
Germany	mil euro	12919.7	13162.9	16043.2	17101.8	13245	13967	15282	17485	14900.8	1715	*11.51*
	% in chain		*1.02*	*1.22*	*1.07*	*0.77*	*1.05*	*1.09*	*1.14*	*4.42*	x	x
Bulgaria	mil euro	1544.3	1478.8	1168	1811	1198.9	1276.5	1536	1613.8	1453.4	208	*14.33*
	% in chain		*0.96*	*0.79*	*1.55*	*0.66*	*1.06*	*1.20*	*1.05*	*0.63*	x	x
France	mil euro	21374.8	23688.9	26531	24218.7	20169.9	26659.9	27721.3	29912.1	25034.6	3071	*12.27*
	% in chain		*1.11*	*1.12*	*0.91*	*0.83*	*1.32*	*1.04*	*1.08*	*4.92*	x	x
Hungary	mil euro	1800.4	1846.3	2036.9	2616.2	1619.8	1909.6	2830.6	2493.3	2144.1	413	*19.26*
	% in chain		*1.03*	*1.10*	*1.28*	*0.62*	*1.18*	*1.48*	*0.88*	*4.76*	x	x
Italy	mil euro	24357.4	24723.5	25332.5	25815	23100.4	23210	24851.4	25187.4	24572.2	913	*3.72*
	% in chain		*1.02*	*1.02*	*1.02*	*0.89*	*1.00*	*1.07*	*1.01*	*0.48*	x	x
Portugal	mil euro	2200.7	2421.9	2232.4	2252.1	2194.4	2176.8	1881	1918.2	2159.7	166	*7.71*
	% in chain		*1.10*	*0.92*	*1.01*	*0.97*	*0.99*	*0.86*	*1.02*	*-1.94*	x	x
Romania	mil euro	6003.1	6825.3	5933.1	7856.4	5980.7	6449.9	8022.9	6255.3	6665.8	786	*11.79*
	% in chain		*1.14*	*0.87*	*1.32*	*0.76*	*1.08*	*1.24*	*0.78*	*0.59*	x	x
EU-27	mil euro	129329	134304	148393.8	145223.2	123208.6	140154.1	149839.8	155707.7	140770.1	10397	*7.39*
	% in chain		*1.04*	*1.10*	*0.98*	*0.85*	*1.14*	*1.07*	*1.04*	*2.69*	x	x

Source: The National Strategic Framework for the sustainable development of the agri-food sector and Romanian rural area during 2014 - 2020 (National Strategic Rural Framework) CRPCIS, 2012 [5]

Amplified variations and annual gains were maintained at a low level (coefficient of variation> 10%) for Germany, Italy and Portugal, and the environment (coefficient of variation between 10.1% and 20%) for Bulgaria, France, Hungary and Romania.
The variations magnified and the annual amplifications are maintained at a low level (coefficient of variation< 10%) for Germany, Italy and Portugal, and at medium level (coefficient of variation between 10.1% and 20%) for Bulgaria, France, Hungary and Romania.

CONCLUSIONS

The main resultative problem of the assembly presented is given by the degree of compatibility of the Romanian agriculture with the one in the EU, which is still low. From the analysis of the degree of (in) compatibility and (non) convergence of Romanian agriculture and rural economy with the European (EU) one it arises the differences or the discrepancies between Romania and the EU.

In terms of agricultural performance and rural development, the real current stage of the Romanian agriculture is similar to the stage it was the agriculture in the EU-6 fin the years 1965-1970, with reference to the following [5]:
- The value of primary production per hectare obtained by Romanian farmers (about 800-900 €/ha) is 2-2.5 times lower than the one obtained (European average) of their colleagues in the EU (1800-2000 € / ha);
- The intermediate consumption, as a level expression of production technology financial support, of the structure and degree of agricultural production intensification, with direct impact on yields in the EU Member States, records differences still significant from one country to another. Thus, Romania has an intermediate consumption of 715 euro / ha, compared to the Netherlands - 8369 euro / ha, Belgium - 3987 euro / ha, Denmark - 2843 euro / ha;
- The gross added value in Romanian agriculture is half of the EU-15 one, which leads to a final agricultural production of about 1400-1500 € / ha in Romania, compared to 2400-2600 € / ha in the EU-15;

The main incompatibility generating factors: the technological gap, the poor access to European funds through projects EAFRD, the shortage of intellectual capital, human, generally, the institutional incompatibility caused by market functionality, the structural and institutional functionality etc..

REFERENCES

[1]Buhociu Liviu, Buhociu Cătălin-Adrian ,Water and agriculture in human development perspective, http://www.anif.ro/cnrid/contributii/20100322-APA%20SI%20AGRICULTURA..pdf
[2]Ceapoiu, N., 1968, Aplied statistical methods in agricultural and statistical experiments, Ed.Agro-Silvica, Bucharest
[3]Stanef Mihaela Roberta, 2010, Romanian agriculture in front of EU demands, Ed. ASE
[4] Agricultural statistics,2013, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database
[5]The National Strategic Framework for the sustainable development of the agri-food sector and Romanian rural area during 2014 - 2020 (National Strategic Rural Framework) CRPCIS, 2012
[6]Règlement (CE) N°1242 /2008 du 8 décembre 200 sur Production brute standard (PBS)
[7]The typology and economic size of agricultural holdings, year 2005, INS, 2007.
[8]The demographic growth ,http://www.dictsociologie.netfirms.com/_IndDem/IndReproducere.htm

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STRUCTURE AND SHARES IN THE ROMANIAN INTERNATIONAL TRADE

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Abstract

An analysis of a wider range of external trade sector of Romania was carried out in this paper. Main purpose of the paper was identification of the products which have submitted during the period 2002-2011 a wide dynamic with regard to trade of Romania, the total and in particular with the EU countries. The methodology used in this respect was detailed analysis of the data, of the structure of imports and exports and the dynamics of these exchanges during the ten years. Thus, we have identified productions which have had a production upward or downward trend in the structure of total trade. It is a case of grain, milk and seeds and oleaginous fruits and tobacco, which has had a positive development in imports and exports. Tobacco and meat products for the imports and live livestock and vegetables for the exports have registered a decreased share.

Key words**:** *dynamics, European Union, international trade, Romania, structure*

INTRODUCTION

During the 20 last years, from point of view of the international trade, Romania has been described as an net importer country. Still, the Romanian foreign trade has been growth in volume, especially with the EU countries. Concerning the development of the economy and in the assurance of consumer's needs (Popescu, 2013), stated that the food trade has become more and more important. Romania, as almost all the new member states, has constantly focused in exported the agri-food raw materials and imported the agri-food processed products, so this process goes to a decrease in their comparative advantage after accession (Torok and Jambor, 2012). Yet, it remains important to promote agricultural export, drive employment of rural labor, help farmers to increase their income and optimize industrial structure of agriculture (Shan, Chao and Linhai, 2011). On the other side, the process of globalization leads countries to adjust their agricultural policies toward more competitive markets (Türkekul B., Günden C., Abay C. and Bülent M., 2010). And in agriculture, the most important production factor, land, is an important input into agricultural production and represents a significant contributor to the cost of producing agricultural products (Dale Colyer, 2005). Therefore, free commerce is thought to be crucial for a developing economy since it stimulates economic growth, ensures access to the world market and also improves access to several goods and services (Neculita, Sarpe, Cristea, Xiaoshuan and Moga, 2011).

MATERIALS AND METHODS

The statistical data on the Romania's foreign trade and agro-food trade, which are analysed here, were provided by the National Institute for Statistics and refer to the period 2002-2011.

To analyze this data we used mainly the index, share and comparison methods based on export, import and trade balance. Calculation and analyze of the trade structure on the main groups of goods was also another method for this paper.

RESULTS AND DISCUSSIONS

The Romanian imports has been increased during the analysed period 2002-2011 from an

amount of 1172.8 mil $ to a maximum of 6133.3 mil $ in 2008. After a slow decrease in the next years, on the background of the financial crises, in 2011 the imports reached a value of 5556.9 mil $ (Fig.1). The imports from EU countries show a similar trend, with a higher dynamics started from 2007.

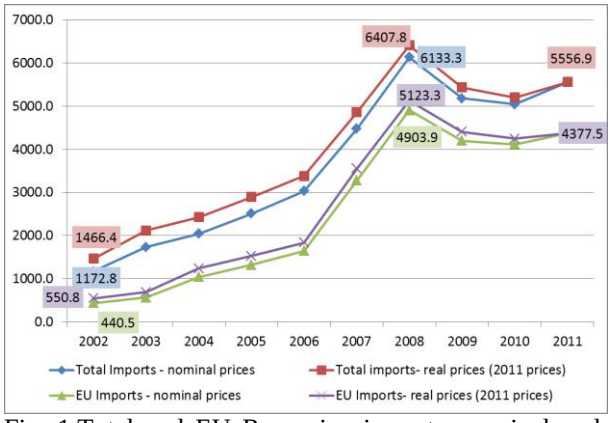

Fig. 1.Total and EU Romanian imports, nominal and real values (in 2011 prices), during 2002-2011 periods (millions US$)

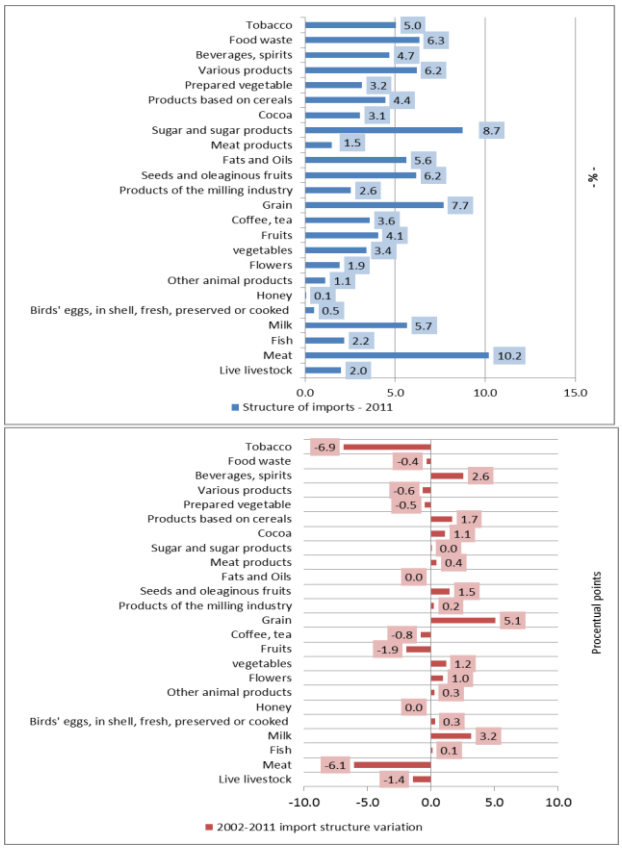

Fig. 2.Romanian import's structure in 2011 on main group of goods and 2002-2011 structure variation (real values)

In 2011, the most imported goods were: meat (10.2%), sugar (8.7%), grain (7.7%), food waste (6.3%), various products (6.2), seeds and oleaginous fruits (6.2%), milk (5.7%) and fats and oils (5.6%) (Fig.2).

Compared with 2002, the changes in imports structure show an increase of the importance of grain (5.1 pp), milk (3.2 pp) and beverages (2.6 pp). Also we may observe a decrease of the importance of, in order, tobacco (6.9 pp), meat (6.1 pp) and fruits (1.9 pp) in the imports structure. pp – Percentage points

In real terms (without the price pressure), the values of imports of this goods presented a higher variation for meat, grain, beverages and various products (Table 1).

Table 1.Mean, minimum and maximum – Romanian imports values on main group of goods, during 2002-2011 periods (real values)

Items	Mean	Min	Max	Variance
Live livestock	80.4	27.0	157.5	130.5
Meat	635.6	229.2	1071.1	841.9
Fish	97.5	30.5	150.5	120.0
Milk	171.1	36.4	315.1	278.7
Birds' eggs, in shell, fresh, preserved or cooked	18.4	2.7	39.9	37.2
Honey	1.3	0.1	3.4	3.3
Other animal products	44.2	12.9	66.0	53.2
Flowers	62.7	14.1	107.4	93.3
Vegetables	132.5	32.5	227.0	194.5
Fruits	218.5	87.7	363.5	275.8
Coffee, tea	135.7	64.6	199.8	135.2
Grain	286.1	38.2	440.3	402.1
Products of the milling industry	95.9	34.1	180.6	146.5
Seeds and oleaginous fruits	174.1	59.8	345.7	285.9
Fats and Oils	181.1	75.9	338.1	262.2
Meat products	55.5	15.6	101.3	85.8
Sugar and sugar products	270.1	127.5	485.3	357.7
Cocoa	99.2	28.4	170.2	141.8
Products based on cereals	154.5	40.8	281.3	240.5
Prepared vegetable	153.8	53.2	270.1	216.9
Various products	253.2	100.0	402.3	302.3
Beverages, spirits	158.9	31.2	347.5	316.3
Food waste	227.3	98.2	383.3	285.1
Tobacco	267.1	175.2	364.0	188.8
Total imports	3974.7	1466.4	6407.8	4941.4

For the most majority of the goods, the highest dynamics took place after 2007. As it is presented in the following figure, the real value of imports were increasing compared with 2002 more than 50 times for various

products and more that 20-30 times for tobacco, eggs, meat, sugar, fats and oils, cocoa, seed and oleaginous fruits.

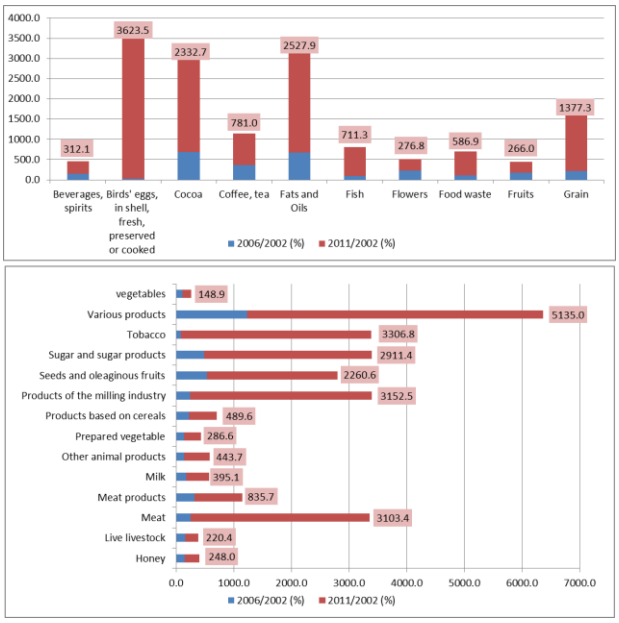

Fig. 3.Romanian imports dynamics for main group of goods (real values)

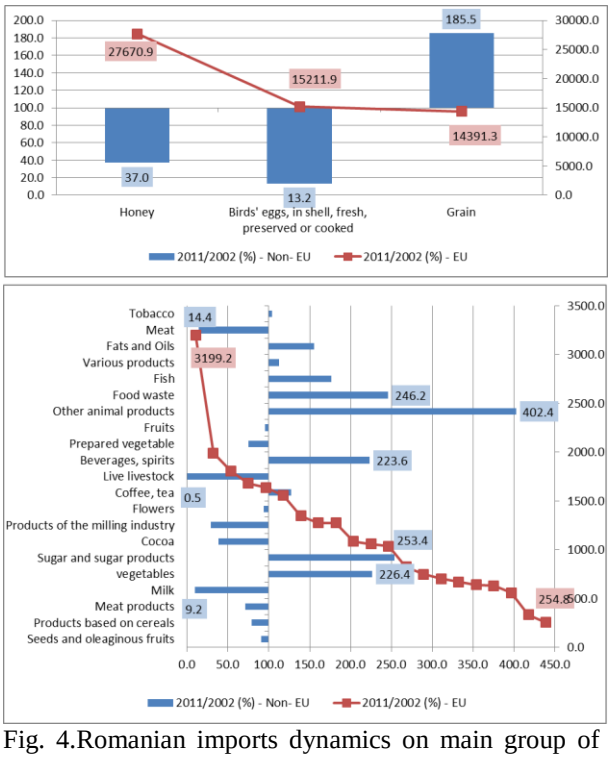

Fig. 4.Romanian imports dynamics on main group of goods, from EU and Non-EU destinations (real values)

Next, we have focused on another aspect concerning the changes in imports destinations (Fig.4). For honey, eggs and a bit less for grain, we may observe a more evident preference for the EU countries, even this tendency it is also maintained for all goods, in the same period.

Also, for some products like other animal products, food waste, vegetable and beverages the imports from non-EU countries increased the value of imports for these goods from EU countries were higher and increasing.

The preference for the EU countries is more evident presented in the next figure, where we can observe that the share of the imports from these countries were increasing with more than 60% for eggs, live livestock, grain, seed and oleaginous fruits, meat products and products based on cereals. Also we may observe that with exception of sugar, food waste and other animal products, the most part of imports are coming from the EU countries.

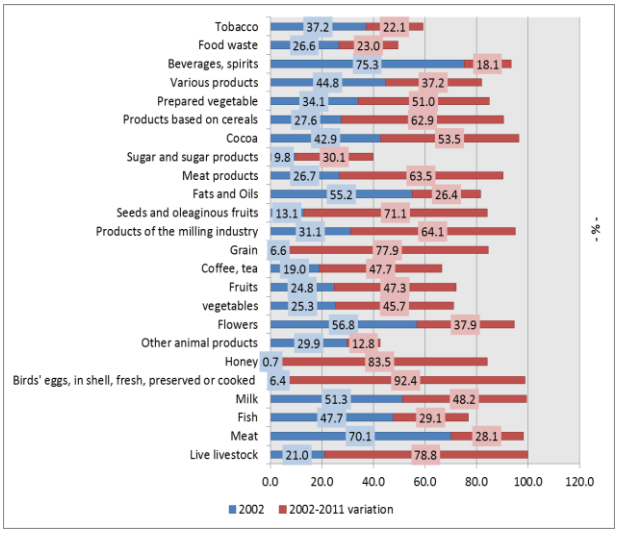

Fig. 5: Romanian imports from EU share in total imports, in 2002 and during 2002-2011 periods (real values)

The exports had a similar trend like the imports until 2008, but they had an ascending trend even in the next years reaching a maximum of 5017.2 mil $ in 2011. In these conditions, in real terms, the Export/Import index has increasing from a value of 0.38 in 2002 at 0.9 in 2011.

The most exported goods in 2011 were grain, seed and oleaginous fruits and tobacco (Fig. 7). Compared with 2002 there was an increase of importance in structure of exports for seeds and oleaginous fruits, grain and tobacco. Also, we have pointed out here a major decrease of

the importance of livestock in exports structure 2002-2011 (-18.4 pp), while this product have had a share of 6% in 2011.

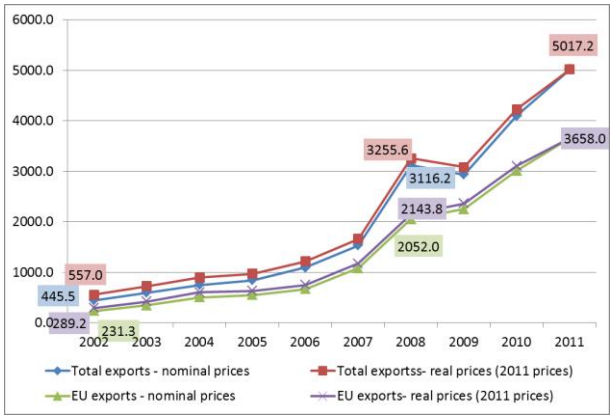

Fig. 6.Total and EU Romanian exports, nominal and real values, during 2002-2011 periods (millions US$)

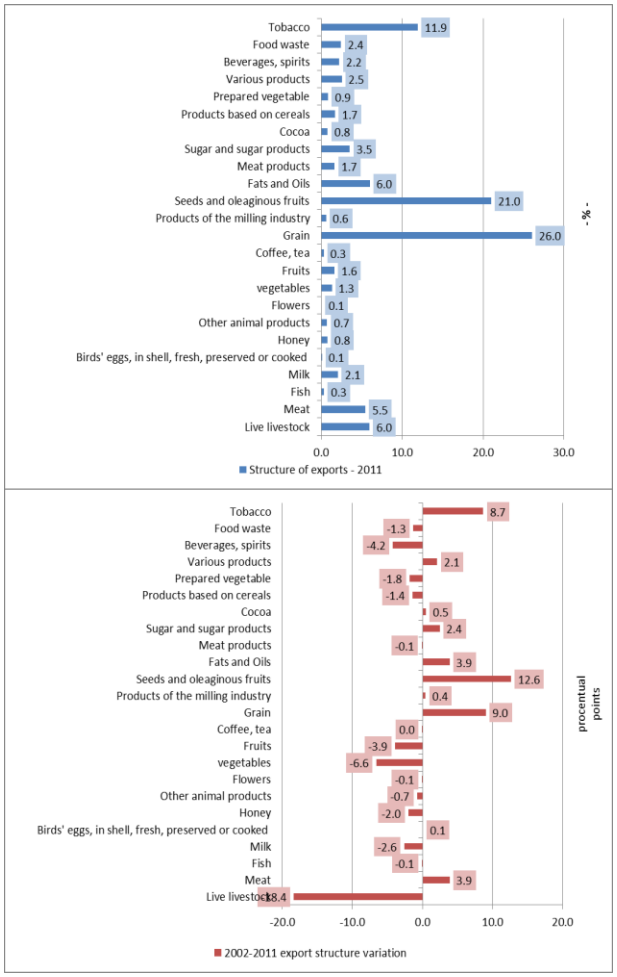

Fig. 7.Romanian export's structure in 2011 on main group of goods and 2002-2011 structure variation (real values)

In the next table (Table 2), it was presented the higher variation of the exports value (in real terms), during the 2002-2011 periods for the grain, tobacco, seeds and oleaginous fruits.

Thus, by means of some descriptive variables (mean, minimum, maximum and variance) and for all groups of goods analysed, it was emphasized the differences among these.

Table 2.Mean, minimum and maximum – Romanian exports values on main group of goods, during 2002-2011 periods (real values)

Items	Mean	Min	Max	Variance
Live livestock	225.1	135.7	299.2	163.5
Meat	73.2	8.8	273.6	264.8
Fish	6.4	2.2	16.9	14.7
Milk	60.5	26.1	103.5	77.3
Birds' eggs, in shell, fresh, preserved or cooked	2.9	0.0	8.8	8.8
Honey	27.9	14.4	43.3	28.9
Other animal products	14.8	6.9	36.4	29.5
Flowers	2.0	0.9	3.4	2.5
vegetables	59.1	44.2	85.2	41.0
Fruits	55.8	31.1	82.6	51.5
Coffee, tea	7.8	1.8	15.3	13.5
Grain	509.7	24.0	1306.7	1282.7
Products of the milling industry	9.2	1.0	30.0	29.0
Seeds and oleaginous fruits	401.5	46.5	1052.2	1005.6
Fats and Oils	121.8	11.9	300.7	288.8
Meat products	39.9	10.0	83.3	73.4
Sugar and sugar products	46.6	4.0	177.2	173.2
Cocoa	16.5	1.7	39.8	38.1
Products based on cereals	48.0	17.4	85.4	68.0
Prepared vegetable	30.0	15.1	43.1	28.1
Various products	45.0	2.5	127.3	124.9
Beverages, spirits	72.9	36.0	136.0	99.9
Food waste	56.2	20.9	122.8	101.9
Tobacco	228.4	4.6	597.1	592.4
Total	2161.0	557.0	5017.2	4460.1

The exports also have shown a real development after the integration in EU in 2007. The good that present a real increasing trend after 2007 are: fruits, meat, vegetables, eggs, fish, milk, product based on cereals and beverages.

The exports to the EU had also an increasing trend on 2002-2011 periods, especially for fats and oils, various products, eggs, milling industry products and sugar (Fig. 9).

This evident orientation of exports to EU destinations can be better observed in the share changes of the EU exports during 2002-2011 periods (Fig.10). For sugar as example, despite the EU export increasing, the non-EU countries remain the main destinations.

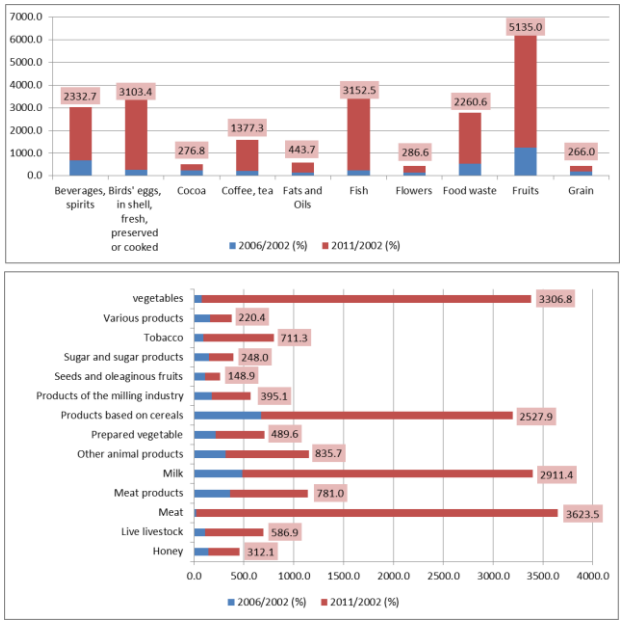

Fig. 8.Romanian exports dynamics for main group of goods (real values**)**

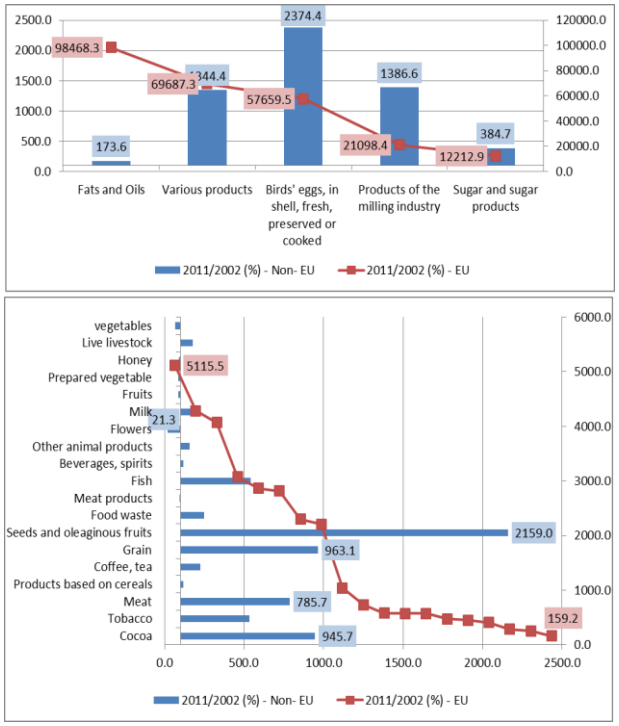

Fig. 9.Dynamics of the Romanian exports on main group of goods, from EU and Non-EU destinations (real values)

So far, in the figure above (Fig. 10), there was shown that for all the other products the trend pointed out above is relevant.

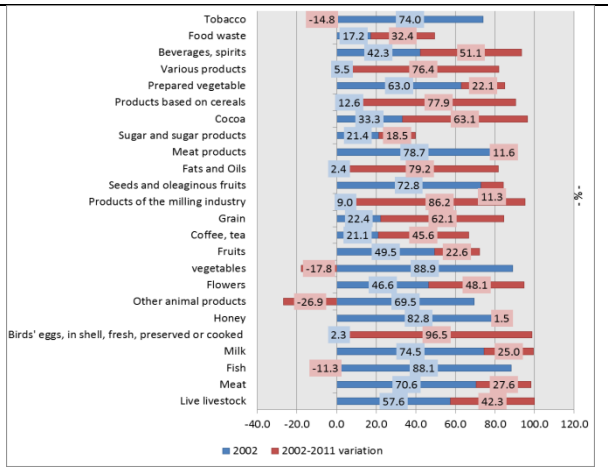

Fig. 10: Romanian exports to EU share in total exports, in 2002 and during 2002-2011 periods (real values)

CONCLUSIONS

Findings of this paper highlight the ways in which the international trade of Romania have turned after 2007 to the countries of the European Union. In particular in this work, it has been shown that as regard the structure of the imports, grain and milk had a positive development in the period under consideration. Products which have had a negative part of share in the structure of the imports were tobacco and meat. The analyze of the exports structure revealed that seeds and oleaginous fruits and tobacco have had an increase share in the structure during the period 2002-2011, and live livestock and vegetables have recorded a decrease share in trade structure.

REFERENCES

[1]Berna Türkekul, Cihat Günden, Canan Abay and Bülent Mira, 2010, The competitiveness of Turkish olive oil on the world market, WFL Publisher, Journal of Food, Agriculture & Environment Vol.8 (2)/2010, p. 68-73

[2]Colyer Dale, 2005, Land and agricultural competitiveness, WFL Publisher, Journal of Food, Agriculture & Environment Vol.3 (1)/2005, p. 220-225

[3]Lijie Shan, Chao Cui and Linhai Wu, 2011, Analysis of potential affecting factors of China's agricultural trade, WFL Publisher, Journal of Food, Agriculture & Environment Vol.9 (3&4): 923-925, p. 923-925

[4]Neculita Mihaela, Sarpe Daniela A., Victor Cristea, Zhang Xiaoshuan, Moga Liliana M., 2011, Modeling the impact of Romania's accession to European Union on trade of live animals, WFL Publisher, Journal of

Food, Agriculture & Environment Vol.9 (1): 428-431, p.428-431
[5]Popescu Agatha, 2013, Agro-food trade position in Romania's foreign trade, Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development 13.3, Bucharest, Romania
[6]Torok Aron, and Attila Jambor, 2012, Changes in Agri-Food Trade of the New Member States since EU Accession–A Quantitative Approach, Selected poster prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil

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ENTERTAINMENT SERVICES IN RURAL AREAS – PART OF TOURISM ACTIVITIES

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Abstract

The work aims to highlight the niche forms of tourism (active tourism and ecotourism), showing similarities and differences between them. However it argues the need to introduce the occupation of rural tourism entertainer, showing the main tasks incumbent upon it to organize leisure tourists. The research was conducted by studying the latest articles in the field and by consulting specific websites.

Key words:*entertainment services, Romania, rural areas, tourism*

INTRODUCTION

Sport and tourism, two vital forces in the service of mutual understanding, culture and developing countries contribute to enhancing relations between people and between nations, relationships that when they are cordial and mutually respectful, is an open door to peace and harmonious coexistence.

Over time there have been various concepts that have defined the sport and tourist activities. Now, at the beginning of the millennium, the spread throughout the world of different sports and tourism, made these terms to be understood interchangeably: movement.

Active tourism is an ideal means to both preventive and curative health preservation and is a school, sometimes rough, which requires: discipline, courage, dedication and team spirit. Respect the equality, the right to participation and free speech, claiming winning mentality, team spirit, friendship and consideration for others, valuing the education phenomenon, the diversity and competitiveness.

Among the forms of tourism that are best suited to rural are we mention active tourism and ecotourism.

MATERIALS AND METHODS

The methods used in this work are: documented study, theoretical analysis and synthesis of information. Theoretical documentation sought to identify and review the state of knowledge in the field of active tourism, as a form of spending free time in the rural area.

RESULTS AND DISCUSSIONS

Active tourism is a new travel philosophy that combines adventure, ecotourism and cultural aspects of a journey of discovery. Active tourism aims to combine recreation and education and brings benefits to both tourists and visited areas.

Active tourism and ecotourism have many common aspects and also intersect in some with adventure tourism activities. There are many aspects in common between all forms of tourism mentioned, but there are major differences. The active tourism can be defined as a form of tourism that involves traveling to areas that require protection in the preservation of biodiversity, including important elements of recreation and education, respect and contemplation, action, exercise and active involvement in the company a local expert, a guide with specific training. [8]

Active tourism consists of sports in rural context, with the basic principles: high

quality, responsible attitude and sustainable management that makes that activity compatible with the context in which it is deployed. This concept is opposed to 'passive' tourism, represented by mass tourism and other practices deemed to affect the environment and local culture.

Interconnected with ecotourism, ecological tourism and adventure tourism, active tourism adds cultural interests related to history, art, crafts and architecture. Among the main specific activities include: air activities (paragliding), terrestrial activities (biking, horseback riding, trekking, also known as mountain hiking, climbing, Nordic walking, flying fox), water activities (kayaking, canoeing, rafting and skiing) and snow activities (skiing, snowboarding, mushing and snowshoeing). This tour requires (as its name suggests) the active involvement of visitors, both physically and emotionally. [10]

Tourists must interact with the environment and culture of the place, to learn from them and respect them. [1]

Ecotourism [4] is a form of tourism involving visiting fragile natural areas, clean, relatively undisturbed, with a reduced negative impact and is a small alternative to mass tourism. Its purpose would be to educate travelers, to provide funds for ecological conservation, to directly benefit the development and political empowerment of local communities, and to promote respect for different cultures and human rights. Ecotourism focuses on social tourism, responsible, personal development, and environmental sustainability. [5, 6]

Ecotourism typically involves travel to destinations where flora, fauna and cultural heritage are the prime attractions.

Ecotourism is intended to offer tourists insight into the impact of humans on the environment and to promote a greater appreciation of our natural habitats. [9, 10].

Responsible ecotourism includes programs that minimize the negative aspects of conventional tourism on the environment and enhance the cultural integrity of local people. Therefore, in addition to evaluating environmental and cultural factors, an integral part of ecotourism is the promotion of energy efficiency, water conservation, and creating opportunities for local communities.

In addition, there are also other forms of tourism: green, agrotourism, farm and forest tourism. [3]

Another classification of different forms of tourism [11, 12] shows that depending on the motivation of travel, we can distinguish the following types of tourist traffic: leisure tourism is a frequent form, providing a good opportunity to know new places, history and customs, in this regard, it interferes with the so-called cultural tourism; tourism leisure and recreation has a less dynamic, stay slightly longer tied to a particular location, specific, tourism therapy and spa treatment is a specific form of leisure tourism which has grown so large not because of a desire to prevent certain diseases, and especially, increasing burnout and illness caused by the pace of modern life.

Therefore, it involves more than some resorts known for their therapeutic mineral, thermal waters, for sludge, situated in a climate of mercy; active tourism is another form of movement very favored by certain categories of the population. Basically he can cover all types of sports, from water and skiing to climbing, hunting, fishing; scientific tourism is referring to occasional participation in congresses, visiting some industrial, agricultural areas of hydropower objectives. From a scientific point of view of special interest is the visiting caves, nature reserves, nature monuments, tourism shopping, caused by occasional travel to other locations (countries) to purchase products on terms more favorable than those offered local (national) or products that are not offered by the local market.

Most of these forms of tourism require an animator to coordinate the spare time of tourists.

In our view, the animator of the rural touristic pensions is the person responsible within groups of tourists, especially young people, to whom it proposes to spare time activities, games, manual activities, outputs, facilitating relationships between members of a group, emulation, arousing interest etc.

Animator missions are: [13]

-Ensures the security of participants in activities
-Stimulates voluntary participation in activities, conduces animation activities and develops positive behavior of participants
-Manages the daily time of tourists
-Develops draft board stay for tourists
-Develops specific activities
-Sets objectives and teamwork activity
-Contents design activities during the stay and sets out the types of animation activities
-Develops the materials needed to conduct the activities and spaces arranged for their ongoing
-Monitors the respect for the lifestyle of participants and evaluates group work
-Establishes and provides the necessary material resources for the stay.
Identifies the location and environment particularities
-Promotes projects and activities of the organizer and of the location.
In implementing the program and supply for tourism activity must see the following aspects:
-establish the itinerary based on the time allocated to that activity and the steps to the pursued objectives;
-establishing the itinerary should take into account the attractiveness of tourist objectives and target at least 1-3 major goals per day;
-trips have to vary greatly depending on the traveling mode
-route planning has to be done according to the accommodation and supplying, which have to be fully known before leaving for the trip;
-establishment of leisure as a supplement is essential for tourist programs ;
- any tourism program should not be a race between objectives and therefore should be established early on leisure.
When organizing an active type activities organizer, guide or animator is: [2]
-ensuring the achievement of program objectives (must respect the budget allocated for each tourist in part, depending on circumstances that may occur;
-tourist activities performed outside the program-they are done according to the objectives expressed by clients or personal organizer proposals, but in full agreement with the tourists, without disturbing the original program, the organizer of the activity is one that resolves the crisis promptly and in the interest of tourists and provides a daily program of tourist by observing the time spent by tourists for each activity;
-activity organizer must be able to provide information on: location and characteristics of the desired objective, to capture the attention of the tourist or group of tourists, to stimulate interest and offer tourists enough interesting information on the objectives and areas visited;
-to offer this type of information, sports activities organizer prepares documentation sheet for each objective, with real data and objectives based on the studied materials and known route. Providing information must be made on the correct time and in different stages of the course of the trip, correct and complete, using clear expressions.

CONCLUSIONS

The most important forms of entertainment in rural areas are: pure relaxation, cultural animation, shows, maintaining physical balance, maintaining mental balance, historical entertainment, commercial, gastronomic and even professional animation.
Active tourism activities should provide the best tourism practices and planning in terms of nature conservation and sustainable development. This tour must be planned and implemented so as to reduce the impact on nature, to preserve and highlight the natural and cultural environment in which it is performed, the recognition and enforcement practices characteristic to sustainable tourism.
There is a keen interest in adventure tourism, ecotourism, cultural tourism, agrotourism and rural tourism, which may lead to a revival of this form of tourism. This provides a chance for survival of small and medium hospitality industry and the revival of economic activities in the local areas. Their orientation towards active tourism activities which exploit both the natural landscape and opportunities in

rural areas, is a possibility to resize and reposition the Romanian tourism offer.

Animation must fulfill the function of leisure during the tourist activity, namely relaxation and recreation, amusement and entertainment, and personal development of the tourist. It embodies all the aspects that contribute to a pleasant and interesting holiday, a relaxing atmosphere, different centers of interest, an attractive, equipment adapted to their needs, but especially animation today concerns new types of tourism products, active holidays, namely thematic tourism.

Due to the natural environment in which the rural entertainment has a very adequate "infrastructure" which contributes to achieving results.

The animation in this context can contribute directly to a revival of rural tourism.

REFERENCES

[1] Andrei Ion, 2012, http://academiacomerciala.ro/Actualitati si tendinte in turismul activ.pdf

[2]Camarda Adina Liana, Stoican Mirela, 2013, Animația – cheia succesului în turismul rural. Lucrare apărută în volumul conferinței ”Turismul rural românesc în contextul dezvoltării durabile”, vol XXX. Editura Tehnopress, Iași.

[3]Nica Ana-Maria, 2013, Serviciile turistice de animație în zonele rurale ale României – comportamentul tinerilor turiști. Lucrarea apărută în volumul conferinței ”Turismul rural românesc în contextul dezvoltării durabile”, vol XXX. Editura Tehnopress, Iași.

[4]Nistoreanu Puiu, Țigu Gabriela, Popescu, Delia, Ecoturism și turism rural, Editura ASE București, 2003

[5]Stanciu Mirela, Ciortea Gligor, Georgescu Nicolaie, 2004, ”Turismul rural, agroturismul şi ecoturismul – componente ale dezvoltării durabile în spaţiul rural”, A IX-a Sesiune de comunicări ştiinţifice cu participare internaţională “Ştiinţa şi învăţământul fundamente ale secolului al XXI-lea”, Sibiu, 25 – 26 noiembrie 2004, Academia Forţelor Terestre “Nicolae Bălcescu”, Sibiu

[6]Stanciu Mirela, 2009, “The role of ecotourism in sustainable rural development”, Scientific Papers, seria D, vol. LII Animal Science, The 38th International Session of Scientific Communications of the Faculty of Animal Science, Bucharest, Romania, Total Publishing, 2009, pp. 323-328.

[7]Ungureanu Dănuț, Ungureanu Dana Alina, 2012, Turismul activ – garanția unei vacanțe reușite petrecute în mediul rural. Lucrare apărută în volumul conferinței ”Turismul rural românesc în contextul dezvoltării durabile”, vol XXVII. Editura Tehnopress, Iași.

[8]Valentin Mihai si colab., 2012, Servicii suport de găzduire pentru turismul eco-activ. Curs aplicativ realizat în cadrul unui proiect POD-DRU.

[9] http://www.active-tourism.com

[10] http://www.ecotourism.org

[11] http://www.unwto.org

[12] http://www.wttc.org

[13] http://www.apivs.ro/formareanimatori

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ORIENTATIONS REGARDING THE SUPPORT OF ROMANIAN MOUNTAIN AREA BETWEEN 2014 - 2020, THROUGH SPECIFIC OBJECTIVES

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Abstract

From the perspective of the proposal for a Regulation (EC) on the support for rural development 2014-2020 granted from the European Agricultural Fund for Rural Development (EAFRD), in order to fundament the programming process for 2014-2020 was considered an analysis regarding the support for mountain areas and the priorities to be included in the future policy, in accordance with the stipulations of the proposed regulation, was considered. The objectives aim at sustainable development of mountains, through the capitalization of resources, population stabilization, maintenance of cultural identity, increasing local economic power, while maintaining the ecological balance and the protection of the natural environment.

Key words**:** *mountain areas, rural development, specific objectives*

INTRODUCTION

Delimitation of less favored mountain areas is conducted under art. 18 of Regulation (EC) no. 1257/1999 regarding the support from the European Agricultural Guidance [1] and Guarantee Fund (EAGGF) for rural development and for amending and repealing certain Regulations. Financial support is granted as specified in Annex 4A of the NRDP 2007-2013 [8], which includes the list of administrative territorial units (ATUs) included in less favored areas (LFAs), according to Regulation (EC) no. 1698/2005 on support for rural development from the European Agricultural Fund for Rural Development (EAFRD) - Article 36 (a) (i) and (ii) [2]. Thus, LFMA – Less favored mountain areas (measure 211 from the NRDP) include: Administrative-territorial units located at altitudes higher or equal to 600 m, the limits of which are those of physical blocks (identified in the Integrated Administration and Control System) that belong to the ATU; Administrative-territorial units located at an average altitude between 400-600 m and an average slope equal to or greater than 15%, the limits of which are those of physical blocks (identified in the Integrated Administration and Control System) that belong to the ATU [6],[9].

MATERIALS AND METHODS

This article proposes to consider a few specific elements of the mountain area, the evolution of some indicators of recent years and the main directions followed in the next programming period .
The study aims to highlight and present the followings:
- Analysis of the current state of mountain agriculture;
- Present the situation of the mountain population and the main economic activities in the mountains areas;
- Identify the main needs of mountain economy;
- Several main directions of development in the new programming period for the economic development of mountain areas.

RESULTS AND DISCUSSIONS

According to delimitation, Romanian mountain areas cover 657 ATUs (NUTS 5),

representing 20% of ATUs existing in Romania and a total area of 71.341 square kilometers and 30% of the territory (238,391 square kilometers) [8],[10].

The representation of the mountain area at county level, depending on the number of ATUs that are found in the mountains and its surface, is shown in the diagrams below:

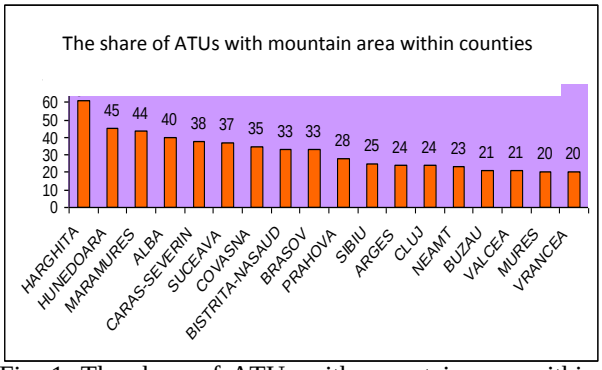

Fig. 1. The share of ATUs with mountain area within counties

Inside the mountain counties the mountain area include a smaller or larger surface. The Counties with the highest mountain areas are: Harghita, Suceava, Hunedoara, Caraș - Severin, Maramureș, ș.a [3],[10].

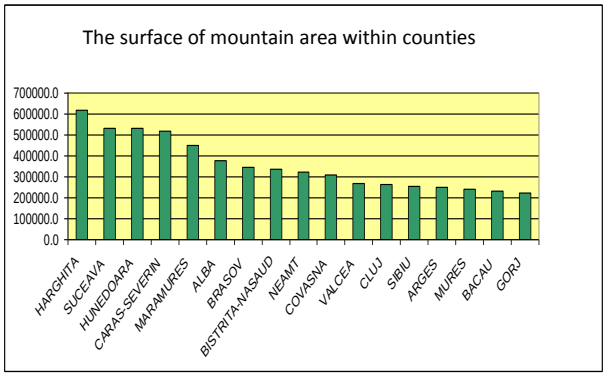

Fig. 2.The surface of mountain area within counties

The agricultural surface of the mountain areas represents 18.63% of the total agricultural surface of Romania, 37.41% of the total area of the grasslands, 59.47% of the total surface of hayfields. The surface covered by forests and other forest lands in the mountain area is of 4,003,417 ha (59.24% of the surface covered by forests and other forest lands - Romania)[3].

In the Romanian mountain areas, according to the latest RGA data, 22% of cattle are currently bred, 19% of sheep, 15% of goat population and 16% of country's horses, which use the valuable areas of natural grasslands and produce large quantities of products with high biological value [3].

Table 1. The use of agricultural lands in the mountain area (hectares)

	ROMANIA	Mountain areas	OTHER AREAS	%
Agricultural surface	14,684,963	2,748,270	11,936,693	18.71
Arable lands	9,422,529	549,940	8,872,589	5.84
Orchards and nurseries	205 ,221	45,032	160,189	21.94
Vineyards and nurseries	215,382	3662	211,720	1.70
Grasslands	3,313,785	1,240,252	2,073,533	37.43
Hayfields	1,528,046	909,384	618,662	59.51

The agri-zoo-pastoral activities in the mountains have preserved the centuries-old traditions which even today are reflected in management and products, constituting a living cultural heritage [10].

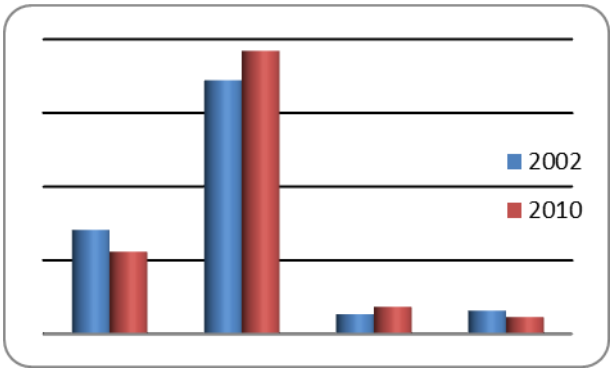

Fig. 3. Evolution of livestock in the mountains

A first analysis of livestock regarding the breeds that are representative for mountain areas shows that in the period 2002 - 2010 the downward trend was significant, except for sheep, where there was a slight increase in the number.

In the mountain areas 19.7% of the utilized agricultural area can be found, 18.5% of the labor force directly involved in agriculture, 17.6% of the total number of farms and 19.5% of animals. The average farm size is of 3.9 ha (third lowest of the mountain countries).

Farming is mostly (65%) practiced in small and very small farms (less than 2 ha), animal husbandry (cows, sheep, goats), for milk and to a smaller extent meat, being the main activity [3].

Table 1. Mountain population

In the mountain areas 3,293,654 people are registered (15.36% of Romania's total population), of which 1,728,383 live in the rural mountain area (52.47%). In recent years, in the mountains of Romania, there has been recorded a negative natural increase and migration. 17.66% of the total unemployment is registered in the mountains. [7],[10].

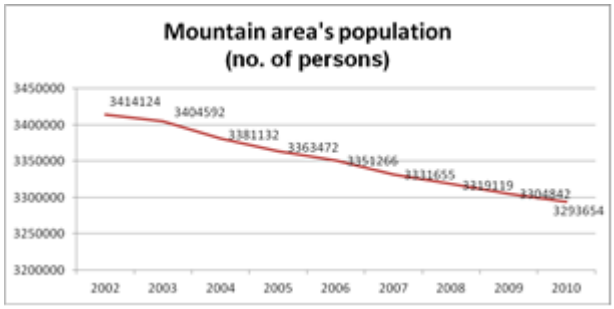

Fig.4. The population of mountain areas

The rural population of mountain areas

The rural population of the mountain areas represents 52.47% of the total population of mountain areas while Romania's rural population represents 44.94% of country's total population. The share of rural population in less favored areas is of 51.55% (2,663,851 persons).

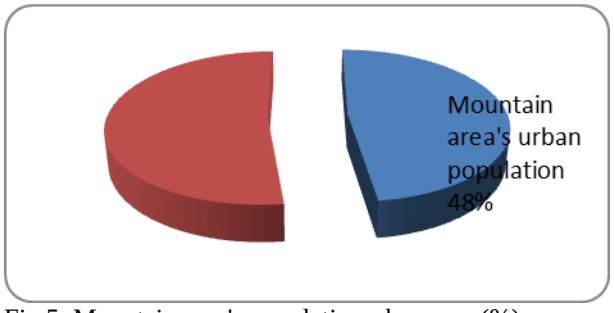

Fig.5. Mountain area's population - by areas (%)

Mountain area's economy

Considering the specificities of mountain areas, the followings can be considered as having a significant impact [4], [10]:

- small agricultural farms, due to fragmentation of property;
- aging population and the risk of depopulation;
- high natural value of farmlands, ensuring a high quality of agricultural products;
- high potential for animal breeding;
- extensive forest areas with high value and the existence of forest by-products (berries, herbs, mushrooms, etc..);
- low level of labor productivity, low value-added for agricultural products and underdeveloped entrepreneurial culture leading to low incomes;
- low level of knowledge and skills and limited access to information, counseling and consultancy;
- cultural heritage (eg crafts, gastronomy, traditional architecture) and high tourism potential;
- limited access to basic services and inadequate infrastructure.

Specific objectives for mountain development

Reviving the Romanian mountain villages and preserving the cultural heritage [5],[9], [11]

- Ensuring the infrastructure and access to basic services (complementary with FEDER financing – roads for valorising areas potential, water supply, sewerage, electricity)
- - Valorising natural and cultural heritage of the villages (preserving the local traditional architecture, cultural sites, for promoting Romanian villages values, traditional art, local traditions, as well as local cultural and natural heritage)
- Basic services and village renewal in rural areas
- Diversification of economic activities in rural area (handicrafts, agro-tourisms, support services for agriculture, information centres for tourism promotion and promotion of mountain traditional values)
- Business start-up aid for non-agricultural activities, micro and small enterprises
- Investments in non-agricultural activities for micro and small enterprises

Farms development and competitiveness increasing [5],[9], [11]

- Facilitating market access for farmers in rural areas (small farms): Young farmers scheme; Small farmers scheme; Farm

investments (small projects for building and/or farm modernisation); Processing, marketing or/and diversifying the range of agricultural products – the support shall be conditioned by applying to quality schemes – traditional products, „mountain products" or organic products; Training and advisory services for farmers; Short supply chain (from production to market)

- Increasing the competitiveness in agro – food sector: Farm investments (shall be conditioned by research, innovation or cooperation actions for added value by ensuring a better linkage between research and practice); Investments in infrastructure related to the development and adaptation of agriculture including access to farm , land consolidation and improvement, energy supply, water management;
- Improving the processing and marketing of forestry products: Investments in new forestry technologies, in processing and marketing of forest products; Investments in necessary infrastructure for development and adaptation of forestry including aces to forest land, land consolidation and improving energy supply, water management;

Sustainable management of natural resources and maintaining traditional landscape [5],[9], [11]

- Encouraging the use of agricultural land by compensatory payments for mountain areas facing natural or specific constrains;
-Promoting the extensive agricultural practices with reduce impact for environment by agri-environment payments and organic farming (management of HNV areas, traditional agricultural practices, species and habitats protection, water and soil protection)

Promoting local initiatives targeting the development of mountain communities (LEADER) with accent on developing the entrepreneurship [5],[9], [11]

- Diversification of economic activities and decreasing the population dependence of agricultural activities
-Financing specific initiatives for socio-economic and environment development of mountain area by prioritization specific actions without correspondence in classical actions of RDNP
- Increasing the attractiveness of mountain area by creating local brands
-Encouraging the initiatives based on innovation and cooperation

CONCLUSIONS

The existence of human settlements characterized by a rich cultural heritage (crafts, gastronomy, traditional architecture), the potential of tourism, high nature value land in mountain area which provides high quality products and the environmental benefits for the whole society, justify an integrated approach for these areas. Through an integrated approach in the measures financed by the EAFRD, the strategy for sustainable development of rural mountain area in the period 2014-2020, should be based on the implementation of specific mechanisms that contribute to reducing disparities, compared to other areas.

REFERENCES

[1] Council Regulation, 1999, (EC) No 1257/1999
[2]Council Regulation, 2005 (EC) No 1698/2005
[3]General Agricultural Census, 2010
[4]General Secretariat of the Government (SGG) - National Strategic Orientations for Sustainable Development of the Carpathians (2014 - 2020)
[5]Managing Authority of NRDP social-economic analysis in the perspective of rural development 2014-2020 -draft III, July 2013
[6]Mountain Areas in Europe – Nordregio, Report 2004:1
[7]National Institute for Statistics, 2010
[8]National Rural Development Programme 2007-2013
[9] National strategic framework for the sustainable development of rural Romanian 2014 - 2020 to 2030
Regulation (EU) No 1305/2013 of the European Parliament and of the Council
[10]Socio-economic Analysis of mountain areas - CEFIDEC Vatra Dornei, 2013, Documents work
[11]Support for mountain area by RDNP 2014 - 2020, Documents work

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POTATO CROP EVOLUTION IN ROMANIA

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Abstract

This document presents the development of potato production in the period 2006-2012 in Romania. The study is based on the statistical data taken from the website of the Ministry of Agriculture, APIA and FAO website. As indicators for this study were: area planted with potatoes in Romania, Potato production obtained in Romania, consumption potatoes, potatoes price. In the analyzed period the area under potatoes has decreased from 283 ha in 2006 to 229 ha in 2012, a decrease of 18% compared to the base year; Potato production is also down from 14.18 kg / ha in 2006 to 10.76 kg / ha in 2012, representing a decrease of 24%; consumption is 98.3 kg / capita in 2006 and 92 kg / person in 2012 (decrease of 6.4%); the price of potatoes is up from 1.2 lei / kg in 2006 to 1.6 lei / kg in 2012, growth of 33% reflected in decline of production and exploitation of the obtained. In conclusion, the potato crop in Romania is found both in households, small and large farms, as a culture relatively easy to care for, the weather is favorable, farmers are open to contribute to the expansion of cultivated areas, but that the state must help intensify its financial support.

Key words**:** *acreage, consumption, price, potato marketing, production*

INTRODUCTION

Agriculture is one of the most important sectors of the Romanian economy, farming is a basic trade since ancient times. The contribution of agriculture, forestry, fisheries in gross domestic product stands around 6%, while the EU Member States is approximately 1.7%. Potato has a relatively long tradition in Romanian agriculture, the main references are recorded in the eighteenth century in Transilvania. In time, the importance of culture increased, potatoes being considered the second bread of Romania. For potato were established following growing areas: very favorable in the north of Moldova, throughout Transylvania (not plain), eastern Banat, Oltenia high hilly and Muntenia; favorable for plateau of Moldova, Muntenia and Subcarpaţii Olteniei and the northwestern part of Transilvania Currently potato decreased in the total agricultural area, the main reason being the weather conditions that may affect the crop, the lack of interest of farmers to grow potatoes as inadequate use of proper production and imports tend to dominate the food market.

Present and future objectives

To solve the problems of Romanian potato crop in the present economic and climatic conditions, the scientific research has the following objectives:

1)Development of potato breeding and genetic researches through new genomic and technological approaches, to obtain genotypes, which correspond to present and future requirements regarding the production of healthier foods, with high qualities, suitable for ecological agriculture and which permit utilization of new protective technological methods more friendly for environment, with conservation potential to regenerate natural resources.

2) Development of clean technologies types "from farm to fork" in accordance with sustainable agricultural principles, increasing food and safety security, respecting general and specific requirements of the market.

3) Promoting alternative technologies for potato crop to obtain ecological products. [1]

For Romania is imposed the respect of the developed strategies by ICPC Brasov concerning the creation of the variety and producing the material of plantation.

Creating the necessary planting material from Romanian varieties, productive and better

adapted to the environmental conditions of the country.[2]

MATERIALS AND METHODS

To analyze the evolution of the potato crop, the following indicators were used: area planted with potatoes in Romania, potato production obtained in Romania, consumption potatoes, potatoes price, export and import of potato in Romania. The analyzed period is between 2006-2012. Data were taken from the Ministry of Agriculture, Agency for Payments and Intervention in Agriculture and FAO, the indicators are analyzed and interpreted in order to observe the oscillation of potato culture and identify the causes that led to these fluctuations.

RESULTS AND DISCUSSIONS

Romania is the third largest potato grower in Europe, as surface after Germany and Poland and on six place as productive after Germany, Poland, Holland, France and the UK. Potato acreage is in a declining percentage recorded was 18% and 54 ha from 283 ha in 2006 to 229 ha in 2012, a result of difficult market conditions, especially cheap imports that have brought to bankruptcy farmers cultivated areas where large areas. For example, potato (basic culture in Harghita) began to decline in recent years because manufacturers had difficulty in valuing crop. In Harghita surfaces were reduced by almost 5,000 acres, reaching more than 10,000 ha in 2013, manufacturers focusing on alternative culture. Areas planted with potatoes in 2013 nationally amounts to about 41,000 ha, according to APIA, compared to 250,000 ha in 1989. As seed lots, currently we have only 103 ha to 13,000 ha in 1990.

A similar situation is encountered in the production of potatoes produced per hectare crop where it can be seen swinging in Table 1. The potato production decreased by 24%, from 14.18 kg / ha in 2006 to 10.76 kg / ha in 2012, a result reflected the reduction in cultivated area, weather factors, increasing production costs, crop restriction locally, increasing imports, and especially the reduction of profit for farmers. Also in Romania decreased interest in seed potatoes. Areas of seed lots have been dramatically reduced in recent years and it seems that they will continue to decrease in future production of seed potatoes in 2012 was 60 tons of seed potatoes on 15 ha. A solution for achieving higher production quantity and quality to withstand competition on the European market and world production is modernizing by introducing measures that may increase and its improvement in terms of ensuring economic efficiency.

Table 1. The evolution of the potato in the years 2006-2012

Year	2006	2007	2008	2009	2010	2011	2012
Potato acreage (thousand ha)	283	272	259	260	246	248	229
Production (tonnes / ha)	14,18	13,62	14,08	15,38	13,29	16,41	10,76
Potato consumption (kg / capita / year)	98.3	97.2	101.6	95.8	98,2	98,2	92
Price (lei)	1,2	1,2	1,16	1,2	1,3	1,6	

Source: Own calculation on the basis of data from Tempo on line data base 2006-2012, NIS

Potato consumption in Romania is 95.1 kg, Romania ranks 4th in European nations where the limits are 127 kg and 39 kg. In the analysis, consumption is 98.3 kg / capita in 2006 to 92 kg / person in 2012 (decrease of 6.4%). Romanian potatoes are high quality because they do not have loads of chemical residues like imported products. However, farmers do not have access to supermarkets and hypermarkets, locations that sell large quantities of potatoes imported. The decrease may be due to the adverse effects of excessive consumption of potatoes (prepared in various forms, some toxins that attack the nervous system and increases the chances of digestive cancer).

Regarding the price of potatoes from a manufacturer, it increased from 1.2 lei / kg in 2006 to 1.6 lei / kg in 2011, an increase of 33% (Fig. 1). The market price is almost double, so that growers are increasingly less motivated to grow and appeal to foreign

markets. The fact that farmers face every year potato crop problems, question whether or not it is profitable to grow further. Thus, a rich harvest entails the need for storage space, reduced prices and can even recover its full costs. So, price increase is due to costs for the establishment and maintenance of a hectare of potatoes, the application of high technology and less ethical methods applied by wholesalers and retailers.

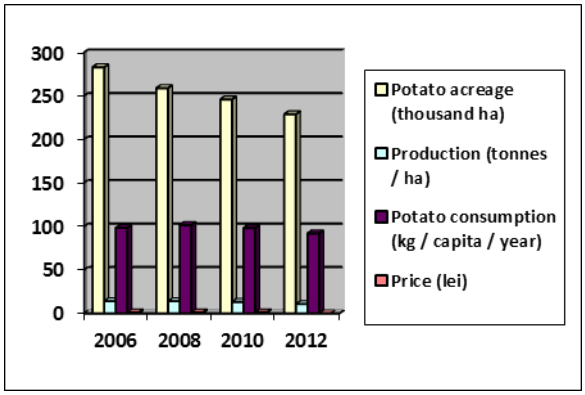

Fig.1. Share of the the evolution of the potato in the years 2006-2012

Potato trade is done arranged food markets, where it sells its own production or production acquired from farmers or producers of potatoes. The price is very low, usually they practice a price far below that of intermediaries, although merchandise may be the same or better quality than. In hypermarkets, supermarkets only meet intermediaries who sell potatoes from specialist manufacturers or imported.

Regarding foreign trade, Romania joins the list of countries which produce important potato production due to its favorable conditions for this crop. Although its production is good, we often find potatoes imported in the market, which look very nice, but they are unhealthy (the modern technology applied in other countries includes substances that hasten the culture and get the desired result). It is worrying that many Romanians prefer imported potatoes, without considering other issues such as valuing indigenous culture, health impacts, contributing to the economy. Romania occupies a middle position regarding the export of potatoes, the trend is upward, from 4,740 tonnes in 2006 to 11,526 tonnes in 2011, so potatoes are appreciated in the Romanian and foreign market. Import is decreasing from 144, 584 tonnes in 2006 to 89,597 tonnes in 2011, the main countries importing potatoes in 2013 were Germany (37%), the Netherlands (25%) and Austria (13%).

Table 2. Romania's trade balance

Anul	2006	2007	2008	2009	2010	2011
Import (tonees)	144584	46234	51988	51444	64706	89597
Export (tonees)	4740	6883	6745	5220	20257	11526
Trade balance (import-export)	139844	39351	45243	46224	44449	78071

Source: Own calculation on the basis of data from Tempo on line data base 2006-2012, FAOSTAT

For consumption needs to be covered entirely in Romanian production of potatoes, the state should take action on lower quantities of imported potatoes. Some of these measures should be stricted rules and standards of quality for imported potatoes coming on one hand and, on the other hand, to support and subsidize prices of potato crop by the Romanian State aid for refurbishment, all of which serve to stimulate the growth of production volume and quality, and most importantly increased consumption of own production.

CONCLUSIONS

Potato ranks fourth in production volume bet on food crops in the world (after rice, wheat and maize). The three main producers are China, Russia and India. Romania is also a major producer of potatoes in Eastern Europe, it produces about 4 million tonnes per year. Acreage reduction brought about and decrease in production per hectare, 10.76 kg / ha in 2012.

Potato is present on the Romanians' table at least once a week, prepared in various forms, consumption was 97.4 kg /capita, the average obtained in the analized period.

Potato cultivation in Romania is achieved both in households, small and large farms, as a culture relatively easy to care for. Cultivated

area (229 ha in 2012) varies depending on the production in previous years, the existing demand, the availability of farmers to invest in culture, obtained grants and motivation.

The research conducted for this report showed overall good prospects for potential exporters of potatoes as Romanian products are of high quality because they charge chemical residues and imported products.

REFERENCES

[1]Morar, G., 1999, Potato crop, The RISOPRINT, Cluj-Napoca, 197
[2]Iosif, G. N., 2007, Production costs, Tribuna Economică,No.5
Bucureşti
[3]Chiru, S.C., Olteanu, G.., Asanache, L.E., 2008, History, statistics and trends in Romanian potato industry, National Institute of R-D for Potato and Sugar Beet Brasov
[4]MADR
[5]APIA
[5]FAOSTAT

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ACCOMMODATION PREFERENCES OF FOREIGN TOURISTS IN ROMANIA

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Abstract

The present work is a study on indicators that define tourism in Romania. Analysis focused on indicators of the number of tourists and tourist arrivals in accommodation establishments in Romania, in total and in agro-touristic boarding houses on four macro-administrative units and by category of comfort in our country. The methodology used to track the preferences of foreign tourists in accommodation establishments in Romania was to analyse the dynamics of the mentioned indicators, the seasonality of arrivals and forecasting the arrivals of foreign tourists. The data used are from the Statistical Yearbook of Romania, covering the period 2010-2013; some of them are quarterly data. The results have indicated a preference of the arrivals especially in Q3 of each year, in macro-regions M3 and M1, for foreigners and in the macro-regions M1 and M2 for the Romanian tourists. Another results designed the preferences of tourists related to the degree of comfort, which has decreased in time with the increasing levels of comfort; over time, the tourist's number increases on the total from year to year; in particular, in the agro hostels this number is growing slowly.

Key words**:** *overnights stays, preference, Romania, tourism*

INTRODUCTION

Because various forms of relief existing in our country, tourism in Romania is a phenomenon that takes place throughout the entire year. Romania has accommodation and catering capabilities for the development of tourism activities in the mountains, in the hills and in the coastal area. But the Romanian tourist profile is some different. According to statistics from Eurostat (http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=tabl), in 2012 the largest number of trips by purpose for the Romanian tourists is in personal interest and visits to friends or relatives (60 %). The fewer trips made by the Romanian tourists are those in professional and business interests (about 2.5 %). However, studying the evolution of tourism in a country with tradition, means bringing new elements important in making decisions about adapting accommodation capacity in different areas or on anticipation of tourists to certain stringent requirements. At the same time, be introduced to the preferences of tourists to certain areas involves encouraging operators to those places or creating new services or tourist attractions where they are lacking. In our case, the analysis of preferences for accommodation of foreign tourists from accommodation units, may means, if this phenomenon shows stability over a long period of time, adapting tourism supply to maintain a flow of tourists in established areas and, possibly, of new tour offers a new segment of tourists. From another point of view, although the economic aspect is important and contributes to the development of tourist areas, developing intercultural exchange through tourism is neglected because it is an essential vector in the transmission of perception on the areas visited. And as Pipike J. (2012) said, "The concept of tourism emerged as people travelled to new locations to partake activities and experiences". Still, we don´t have forget, as Hussein R and Ennew C. and Kortam W. (2012) noted that "innovation adoption has been conceptualized in different ways and studied from several perspectives".

MATERIALS AND METHODS

The methodology used in the present study was to analyse the dynamics of the arrivals of tourists in Romania's macroeconomic areas and the number of accommodation days in Romania. The touristic establishments have been analysed, according to statistics, on total level and in agro-touristic boarding houses. Then we studied for Romanian tourists and foreign tourists, by additive method, some elements related to the seasonality of the tourism in Romania. Projection of future data for the years 2014 and 2015, has been showed a decreasing trend of foreign tourists in Romania in the category of 5-star comfort, the other indicators analysed have had a positive projection. Some of the data and reported results were achieved and depending on the comfort level of tourist accommodation. According to statistics published by the National Institute of Statistics, the 4 macro-regions of Romania are: Macro-region 1, with North-western and Central Region, Macro-region 2, with the North-east and South-east regions, Macro-region 3, with South Muntenia Region and Bucharest-Ilfov and Macro-region 4, with the South West region and Western region.

RESULTS AND DISCUSSIONS

First, we present in the following the number of trips by purpose in EU countries in 2012. From here we see countries where tourists have had a strong professional orientation or personal trips.

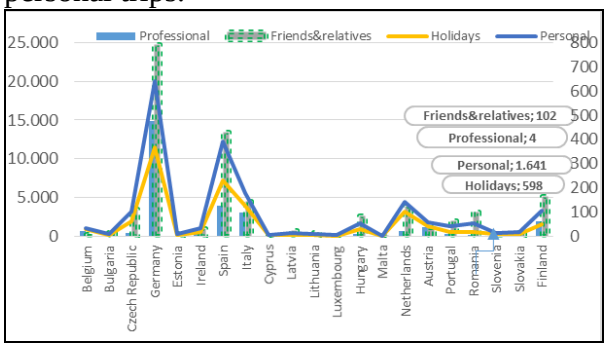

Fig. 1.Number of trips by purpose, 2012, ´10000units
**Denmark, Greece, France, Poland, Sweden, United Kingdom- countries with non-available data on Eurostat database*

We have continued to analyze the dynamics of the data on the arrivals for the Romanian and foreign tourists in the agro-touristic boarding houses, monthly data during 4 years (2010-2013).

The chart below, shows the preferences of Romanian tourists for agro touristic pensions which occurred mainly in summer; from June to August are the months in which Romanian tourists arrived heavily in the tourist areas. We note also the increasing trend of this indicator for the period.

Regarding foreign tourists arrivals, these have made occurred especially in winter, where it can be assumed that they often come in tourist accommodation in mountain areas.

It has to be noted for this indicator less fluctuation than the similar growth rate for Romanian tourists.

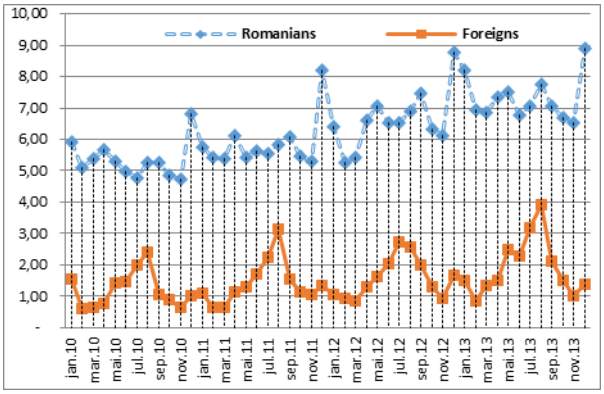

Fig. 2.Arrivals in the agro-touristic boarding houses, % of the total arrivals

If we remain in the analysis of the number of arrivals in agro-hostels, monthly data represented on the Romanian four macro-regions, we have the situation shown in the figure below.

Thus, we see that the number of arrivals is in all macro-regions marked by an increase in the winter months, where we assume that these arrivals were from the mountain areas.

Because we have found it interesting to analyze the preferences of foreign tourists in Romania, it is presented in the chart that follows the number of tourist arrivals, according to macro-regions and the type of tourists (foreign and Romanian).

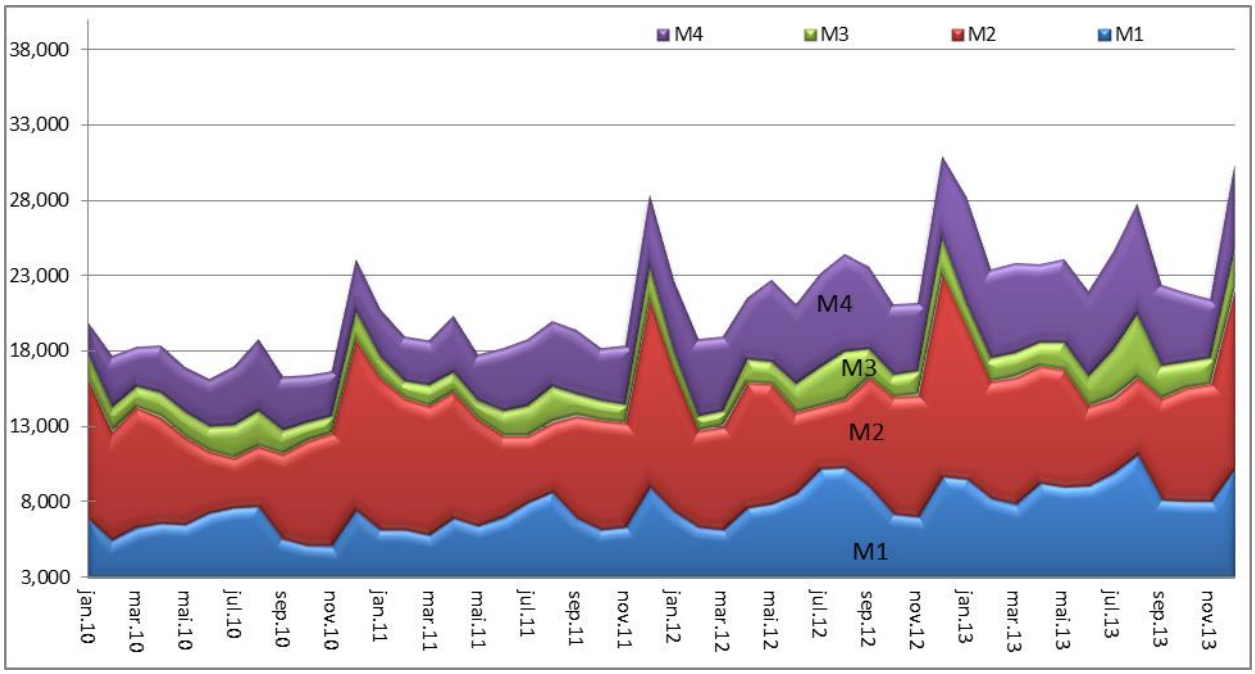

Fig. 3.Arrivals in the agro-touristic boarding houses, macro-regional level, 2010-2013

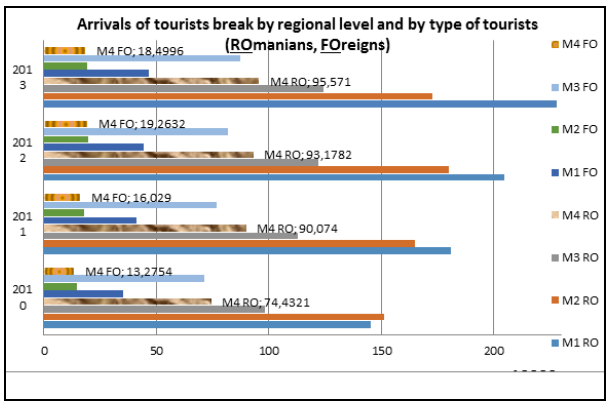

Fig. 4.Arrivals of tourists break by regional level and by type of tourists

From the previous presentation, which certainly can be seen is that in terms of foreign tourists, during the four years analyzed and according to the four macro-regions, the tourists have overall preferred coming in Romania in macro-region 2 and 4, the number of arrivals in macro-regions 1 to 3, is relatively equal. Notable differences will emerge from the analysis overnight stays in the establishments of touristic reception, by category of comfort. This information is presented in the table below, break by Total and by agro-touristic boarding houses categories.

Table 1.Overnight stays in the establishments of touristic reception, by category of comfort (number)

Establishments of touristic reception	Category of comfort	2010	2011	2012	2013
Total	5 stars	639.245	874.924	932.362	957.593
	4 stars	2.370.528	2.908.362	3.500.755	3.778.047
	3 stars	4.223.286	5.704.871	6.614.492	7.443.889
Agro-touristic boarding houses	5 flowers	134.510	185.620	221.290	206.520
	4 flowers	722.250	1.179.800	1.418.580	1.701.880
	3 flowers	2.356.800	3.213.530	4.520.880	5.046.060

Source: www.insse.ro
*flower is the ranking category for the agro-touristic boarding houses, 5 flowers – the highest level, 1 flowers- the lowest level

The table above resume the number of overnight stays on whole, breaking by the category of comfort. So, we can see that at total level the large majority of tourists stayed in the establishments of touristic reception of 3 stars comfort; this number increased constantly during the analyzed period. The equivalent of some 50% of this volume stayed in the 4 stars touristic establishments and 15% in the 5 stars touristic establishments. Concern the agro-touristic boarding houses, we also founded an increased number of the overnight stays for the 4 last years, the great majority of the tourists has been staying in the 3 flowers category of comfort. Still, the number of

tourists in the 5 flowers did not increased as rapidly as the 3 flowers overnight stays.

Table 2: Overnight stays in the establishments of touristic reception, by category of comfort and type of tourists (number)

Establishments of touristic reception	Category of comfort	2010	2011	2012	2013
Total	5 stars	639.245	874.924	932.362	957.593
	of which Foreigns (%)	*68,96*	*62,07*	*60,35*	*64,74*
	4 stars	2.370.528	2.908.362	3.500.755	3.778.047
	of which Foreigns (%)	*37,97*	*35,86*	*33,60*	*32,87*
	3 stars	4.223.286	5.704.871	6.614.492	7.443.889
	of which Foreigns (%)	*22,02*	*18,79*	*17,29*	*15,87*
Agro-touristic boarding houses					
	5 flowers	13.451	18.562	22.129	20.652
	of which Foreigns (%)	*30,59*	*20,22*	*15,96*	*12,22*
	4 flowers	72.225	117.980	141.858	170.188
	of which Foreigns (%)	*10,11*	*9,69*	*12,38*	*10,51*
	3 flowers	235.680	321.353	452.088	504.606
	of which Foreigns (%)	*6,57*	*6,56*	*6,35*	*7,90*

Source: www.insse.ro, own calculations

Breaking down by type of tourists, the previous database has been presented in the table above. So we have founded more than 60% of foreign tourists, from the total number of tourists, in the 5 stars tourist establishments and around 15% - 22% in the 3 stars. As for the agro-touristic boarding houses, the data has been also shown that 12% - 30% of the total tourists are foreign staying in the 5 flowers category of comfort; still, this share has been decreased constantly. We so mark for the two other categories (4 and 3 flowers) a constant share of foreign tourists. The last part on this paper concern the seasonality analysis. We have taken into consideration data on the arrivals in the agro-touristic boarding houses, breaking by type of tourist (Romanians and foreign) at the Total level, and the second series data on the overnights stays in the 3, 4, 5 stars category of comfort. The results are presented in the table below.

Table 3.Index of seasonality, the additive model

			Arrivals in the agro-touristic boarding houses		**Overnight stays 3 stars**	**Overnight stays 4 stars**	**Overnight stays 5 stars**
			Romanians	Foreign			
1	Gross **seasonal deviations**	Q I	(29.941)	(4.167)	(3.547)	(1.521)	(276)
		Q II	(2.451)	724	702	358	(88)
		Q III	39.388	5.355	3.703	1.706	516
		Q IV	(11.217)	(2.496)	(2.021)	(667)	(43)
2	**Average of Gross seasonal deviations**		(1.055)	(146)	(291)	(31)	27
3	**Corrected seasonal deviations**	Q I	(28.886)	(4.021)	(3.256)	(1.490)	(303)
		Q II	(1.396)	870	993	389	(116)
		Q III	40.443	5.501	3.994	1.737	489
		Q IV	(10.161)	(2.350)	(1.730)	(636)	(70)

Source: own calculations

From the data analysis, we can say that for quarters 1, 2 and 4 of each year, the seasonal factor led the Romanian tourists arrivals in agro-touristic boarding houses, to a decrease from the trend line. The most pronounced decreased was for Q1, with 28886 units. For the category of foreign tourists arrivals in agro-touristic hostels, during the Q1 and Q4, the seasonal factor caused also a decrease from the trend line. Increases were recorded in the other two quarters, especially in Q2.

In terms of total overnights stays, breaking down by category of comfort, there was a decreased from the trend line due to the seasonal factor, for quarters 1 and 4; but for the 4-star category of comfort, there were decreases in Q2.

The increase from the trend line, imposed by the seasonal factor was, as we have already shown, in the 3rd quarter. The largest increase was in the 3 stars accommodation units. Quarterly forecasts for the next two years by the number of overnights stays in the 5 stars is decreasing, except for the 3rd quarter, which is positive, but still fits on a downward trend (Fig. 5).

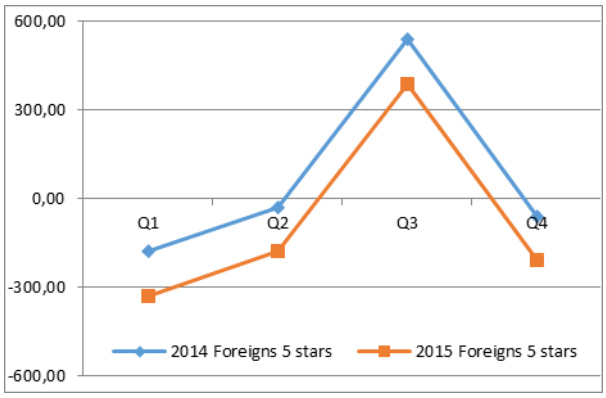

Fig. 5.Forecasting 2014, 2015 overnights stays of the foreign tourists in Romania; Q1-Q4 are the four quarters

CONCLUSIONS

Ideas with which we conclude the present study are the following. In terms of the number of stays in accommodation according to the category of comfort, between foreign and Romanian, the total and rural locations, we saw that on Total, the percentage of foreign tourists is much higher compared to that of Romanians; the percentage increases with the category of comfort, but decreasing during the four years analyzed (2010-2013). Regarding agro-touristic boarding houses, comply with the same preference increasing, with increasing category of comfort and represented the majority of foreigners; the differences between the weights of the three categories of comfort (3 to 5 flowers) are not so great. In the comfort category 3 flowers, during the four years, the share is almost constant (6-7%) and 9-12 % for 4 flowers category of comfort. Category 5 flowers, where the share of foreigners is twice higher than in the two other set forth together, yet only 30 % between categories of tourists, witnessed a sharp drop of more than 50% in the four years analyzed.

Regarding the arrivals in agro-touristic boarding houses, foreign and Romanian tourists, analyzed by categories of comfort, the seasonal deviations obtained were positives during Q3, for all mentioned indicators; the same results were founded for Q2, except for the Romanian arrivals and at total level for foreign tourists staying in 5 stars category of comfort.

The largest deviations seasonal pullback were obtained for the 1st quarter period. For 2014 and 2015, forecasting arrivals are increasing in rural locations and at Total level, for the 3 analyzed categories of comfort, there were recorded increases in quarters 1, 2 and 4, except for the category of comfort 5-star; in Q3 forecasts remain positive but decreasing.

REFERENCES

[1]Hussein, R., Ennew, C., Kortam, W., 2012, The Adoption of Web-Based Marketing in the Travel and Tourism Industry: An Empirical, Investigation in Egypt IBIMA Publishing Journal of Innovation Management in Small & Medium Enterprises http://www.ibimapublishing.com/journals/JIMSME/jimsme.html, Vol. 2012 (2012), Article ID 143325, 23 pages, DOI: 10.5171/2012.143325.

[2]Pipike, J., 2012, Comparative study between Fiji and Papua New Guinea tourism development: Lessons to learn from Fiji, Science Direct, Procedia - Social and Behavioral Sciences 65 (2012) 192 – 198, International

Congress on Interdisciplinary Business and Social Science 2012.
[3] www.insse.ro
[4] www.madr.ro
[5] www.eurostat.ro

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DYNAMICS AND ROMANIA´S PARTNERS IN TRADE OF LIVE ANIMALS

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Abstract

The paper was focused on the sector of trade and meat consumption in Romania. Data are presented at national level and covers a period of 10 years; they come from the Ministry of Agriculture and the National Institute of Statistics of Romania. We presented an analysis of the trade in live animals, according to Romania's main trading partners, the dynamics of household consumption of three types of meat and we present a detailed analysis of the three most important sectors in the trade with live animals. The methodology has also included the study of seasonality of total import and export of live animals and separate of Live cattle trade sector. The findings were that, although the trade in live animals in Romania shows a positive balance, looked in detail, the sector has a significant imbalance between the different categories of animals. So, we could appreciate the fact that the positive balance of the entire trade in live animals is, in fact, supported only by exports of cattle, the other directions having a slight contribution. In terms of seasonality, we identified for imports, positive seasonal deviations in the 2nd quarter and for exports in the 3rd and the 4th quarter.

Key words**:** *dynamics, live bovine, partners, Romania, trade*

INTRODUCTION

We have been focused in the present paper to analyze the trade in live animals made by Romania in total and detailed in three categories. The items in the database were classified according to the Official Journal of the European Union ((EC) No 1214/2007), Annex I from the Combined Nomenclature, into six categories: (0101) Live horses, asses, mules and hinnies, (0102) Live bovine animals, (0103) Live swine, (0104) Live sheep and goats, (0105) Live poultry, ducks, geese, turkeys and guinea fowls, (0106) Other live animals. Meanwhile, it has been studied the trade with the EU. In this respect we presented imports and exports with live animals cattle, swine and Live poultry, ducks geese, turkeys. Meat consumption in Romania is in between the average levels for Europe, but meat consumption structure differs from other countries in the region. Therefore, we thought that there may be a connection between the Romanian trade in live animals and meat consumption. In terms of trading partners, we mention that Romania has a number of enhanced contacts and at least in recent years, partner countries are largely the same. In order to present the main purposes related to the situation of Romanian commerce, we have presented below several statements about this subject. Thus, Lijie S., Chao C. and Linhai W., (2011) had comments on the aims of trade as "It is important to promote agricultural export, drive employment of rural labor, help farmers to increase their income and optimize industrial structure of agriculture". Other authors were concerned about their own country and studied the consumption of meat; thus, Rossi P. and Kagatsume M., stated in 2009 that "The goal of the measure is to ensure Argentine consumers have adequate supplies of beef at affordable prices". A paper in which has been studied live animals trade, Neculita M., Sarpe D.A., Cristea V., Xiaoshuan Z. and Moga L.M., (2011), affirmed that, "Concerning the evolution of the current account balance and Romania's trade balance, it is a known fact that in the countries where the customs protection is extensive and the

strategies for the substitution of imports do not succeed in achieving their goals, the abolishment of the customs fee will inevitably result in a significant increase in imports". There were some other authors who studied from a more general point of view the trade, like Berna T., Cihat G., Canan A. and Bülent M., (2010) "The process of globalization leads countries to adjust their agricultural policies toward more competitive markets…and therefore, firms or countries need to adapt their future production and commercial strategies according to these developments". At the same approach, Kuppusamy J. and Anantharaman R.N., (2012) stated that "Due to the high linkage between the measures of export development with export performance, it is proposed that export performance might influence export development direction in the future". At their turn, Hausmann C. and Patrick S., (2013) have been seen that "Trade also is likely to facilitate matters in the world by making better use of stressed and finite resources to feed a growing and more prosperous population as experts predict more extreme weather events across the globe".
Viorică E.D., (2012) has had a more applied study and stated that "For the foreign trade, the gravity model analyses the determinants of bilateral trade flows, the goal being the development of more precise predictions on the bilateral trade".

MATERIALS AND METHODS

The methodology used in the present study was to analyse the dynamics of the live animals trade. There were also some representations on the trade and the Romania´ trade partners. Presentations on the database have been made on the trade with the European country. The last part of this paper is focused on the seasonality of the trade with live animals on the global level. And because of its structure and due to the fact that the majority of the exports are made with these products, there was also an approach on the cattle trade level.

RESULTS AND DISCUSSIONS

We approached the first phase of work analysis on the dynamics of trade in live animals at global level, and what you can see in the chart that follows is that during the period, the volume of imports exceeds exports, and this generates a positive balance. This is one of the few categories of trade surplus in Romania, knowing that overall our country is seen as a net importer of food products.

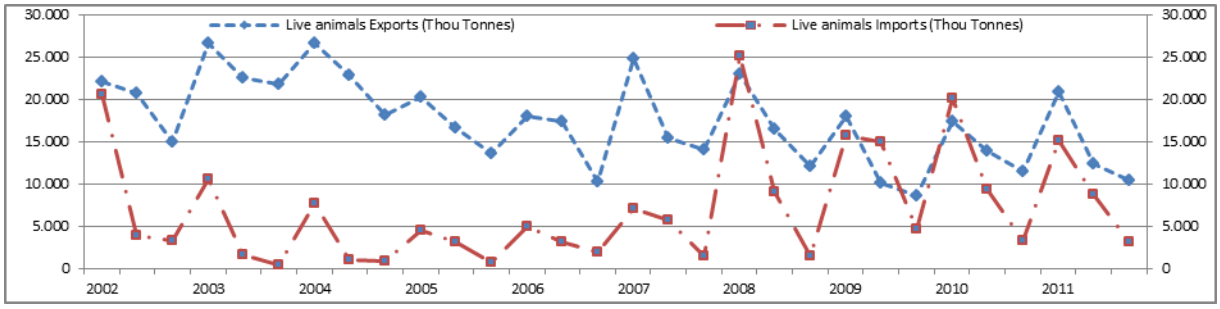


Fig. 1.Romania´s Live animals trade, 2002-2011

Regarding Romania's trading partners for trade of live animals, these are detailed in the following graphs (Fig. 2 and Fig.3). Thus, we estimate that there are 12 partners with whom our country develops its trade, especially with live cattle. Croatia is ranked first with a volume of 128.129 thou tonnes, Syria (76.874 thou tonnes), Greece (62.719 thou tonnes), Italy and Spain, each with a volume of 32 million tonnes of live bovine animals.

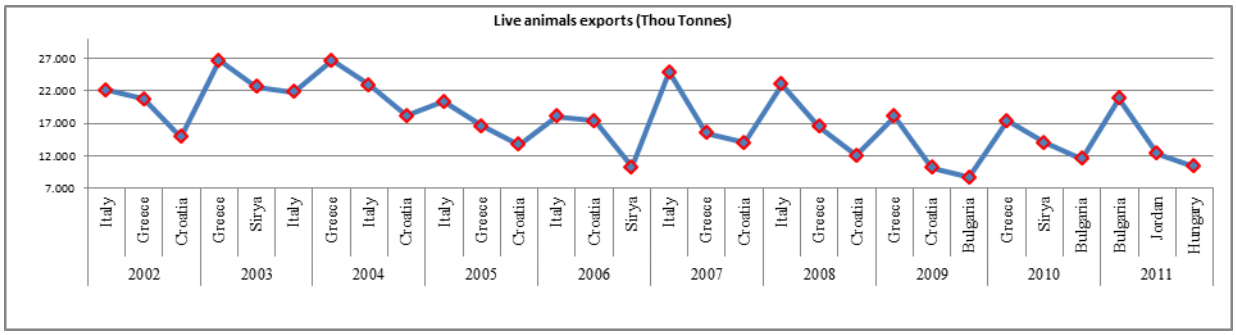


Fig. 2.Romania´ Trade partners in Live animals exports, 2002-2011

We thus find here a number of partners because they are present constantly and so we can talk about strengthening trade relations with these countries. Regarding imports, traditional partners of our country are Hungary (129.693 thou tonnes), with all kinds of live animals, the Netherlands (57.161 thou tonnes), Germany (20.066 thou tonnes), with imports especially cattle and pigs on entire period. We have also recorded the Czech Republic (10.707 thou tonnes) by 2007 imports of pigs and chickens and after this year, France (5.679 million tons) with cattle imports until 2007 (the year of our country's accession to the E.U.) and pigs after this year.

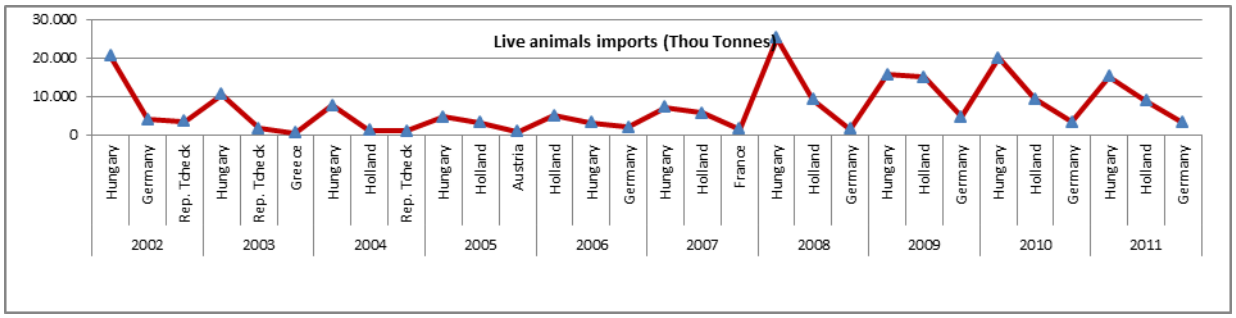


Fig. 3.Romania´ Trade partners in Live animals imports, 2002-2011

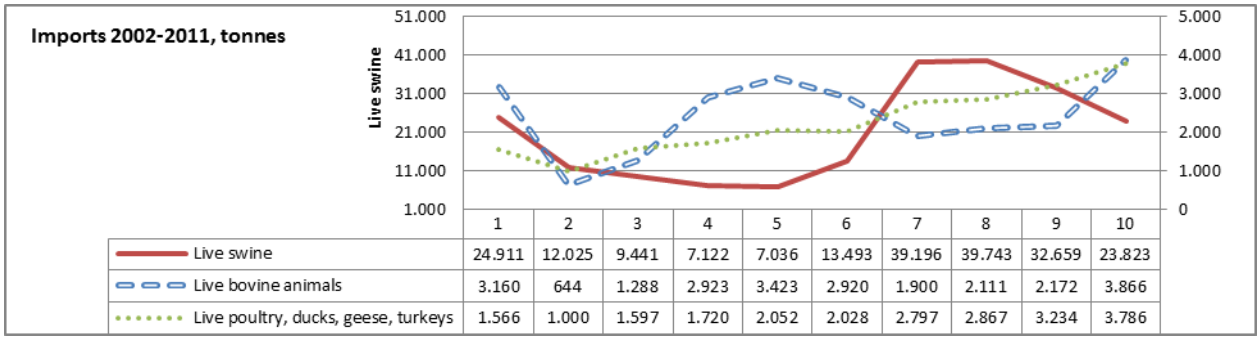
When referring to the value of trade, exports top three ranking countries are : Italy totalling in the 10 years analyzed worth U.S. thou $ 421991, Greece-U.S. thou $ 397170 and Bulgaria with U.S. thou $ 205443. Hungary imports country ranks first in the standings with a value of U.S. thou $ 288.932, followed by the Netherlands (U.S. thou $ 172069) and Germany (U.S. thou $ 45748). In order to define a more complete picture of link to livestock sector, we have presented in the following (table 1) the average monthly consumption of meat per person in Romania. The largest consumption is for chicken growing in the period 2002-2012, it reached 1.544 kg per person. Next in descending order, meat products, pork, fish and finally, the lowest category of meat that is consumed by the Romanians is beef.

Table 1.Average monthly consumption of food per person, Romania (Kg)

Main categories of meat consumption	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Poultry	1,062	1,121	1,098	1,198	1,262	1,34	1,418	1,499	1,52	1,522	1,544
Meat	0,839	0,894	0,945	0,958	1,003	1,05	1,111	1,106	1,068	1,023	1,038
Pork	0,720	0,790	0,859	0,761	0,799	0,869	0,899	0,891	0,904	0,939	0,986
Fish	0,363	0,376	0,426	0,467	0,505	0,547	0,596	0,636	0,665	0,643	0,631
Beef	0,277	0,295	0,33	0,322	0,34	0,393	0,405	0,366	0,325	0,28	0,274

Source: www.insse.ro

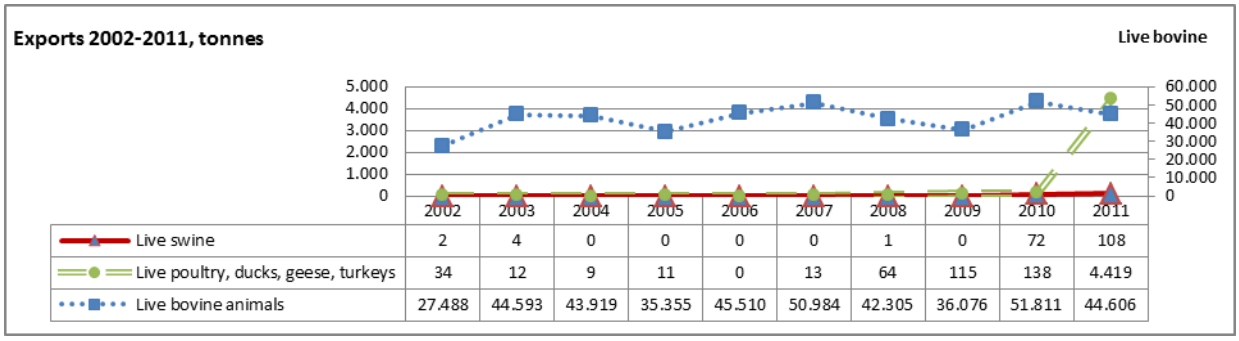
The latter is relatively constant throughout the period, and we may assume then, that in the last 11 years, consumer preferences related to this product have not changed very much.
Regarding the same database on the meat consumption, but spitted by the residences area, the meat consumption is a bit more higher in the urban than in the rural areas (www.insse.ro). In the next part of the paper, we have focused on the three main categories (bovine, pork and poultry), volume of the total trade and the trade with the European Union during the 2002-2011 periods. As it has shown below, after the European adhesion, the volume of the imports has registered a different trend as the one before the 2007 year. Among the three categories, only the Live poultry, ducks, geese, turkeys increased constantly its volume. Live bovine decreased a bit the volume for a year (2008) and after has become to growth.



	1	2	3	4	5	6	7	8	9	10
Live swine	24.911	12.025	9.441	7.122	7.036	13.493	39.196	39.743	32.659	23.823
Live bovine animals	3.160	644	1.288	2.923	3.423	2.920	1.900	2.111	2.172	3.866
Live poultry, ducks, geese, turkeys	1.566	1.000	1.597	1.720	2.052	2.028	2.797	2.867	3.234	3.786

Fig. 4.Volume of Live animals imports, Romania, 2002-2011

If for the imports, the volumes are quite dynamic, the exports of the three categories chosen to be studied here, recorded a quite particular trend. In fact, Live poultry and live swine is almost nonexistent, live cattle exports grow continuously getting to double the volume until 2007, then fluctuates, but still remains high (with the exception of 2009).



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Live swine	2	4	0	0	0	0	1	0	72	108
Live poultry, ducks, geese, turkeys	34	12	9	11	0	13	64	115	138	4.419
Live bovine animals	27.488	44.593	43.919	35.355	45.510	50.984	42.305	36.076	51.811	44.606

Fig. 5.Volume of Live animals exports, Romania, 2002-2011

As part of Romania's total trade with food products, exporting live animals entered a downward slope from 2003 until 2006, after growing for a year and then fall back on the downward trend. Imports accounted for a share slightly increasing since 2003, until 2009, then follows a slightly downward trend.
As a share of total trade with food products, the trade of live animals developed with European countries, of course it will curve similar to that of total trade in live animals.
Since it is a fairly consistent part of the total trade between Romania and EU countries, this has features similar to the evolution of total trade in this category. We can see in the figure below (Fig. 8), imports from EU countries on three categories.

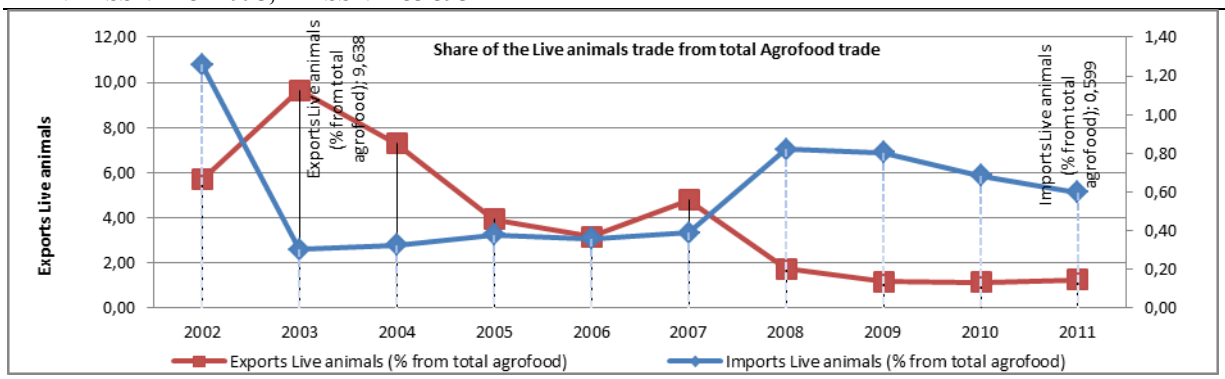


Fig. 6.Share of Live animals trade from the agrofood trade, 2002-2011, %

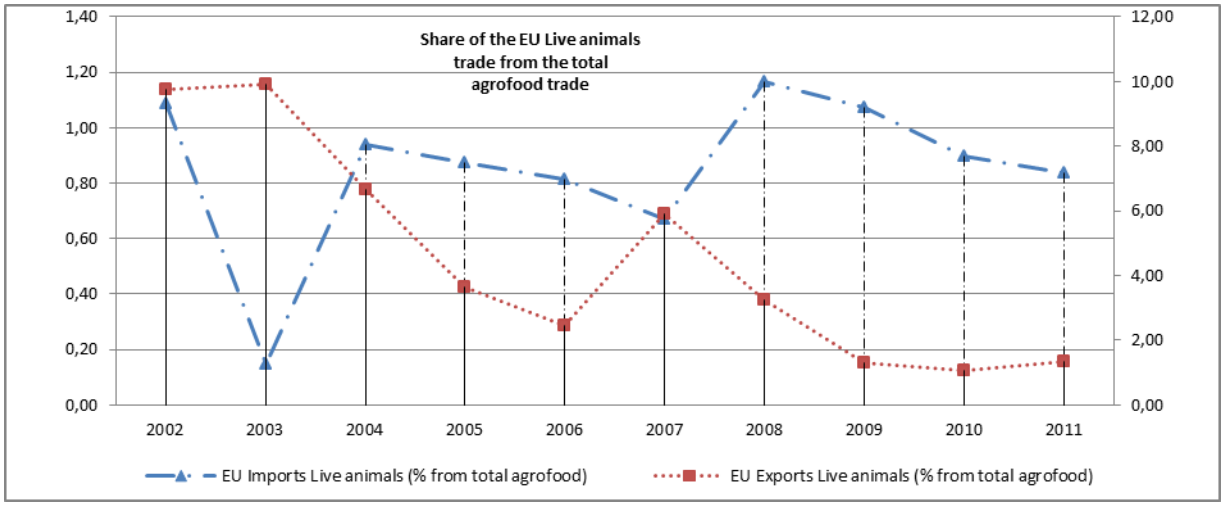
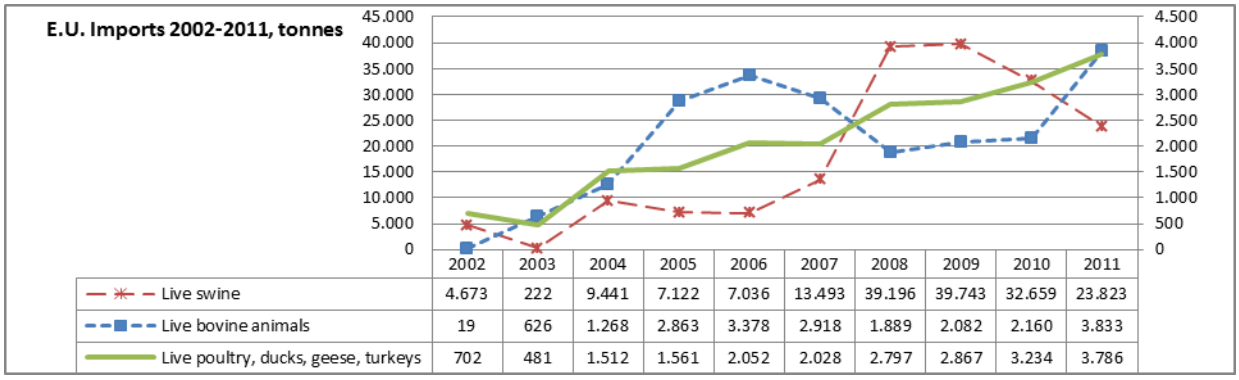
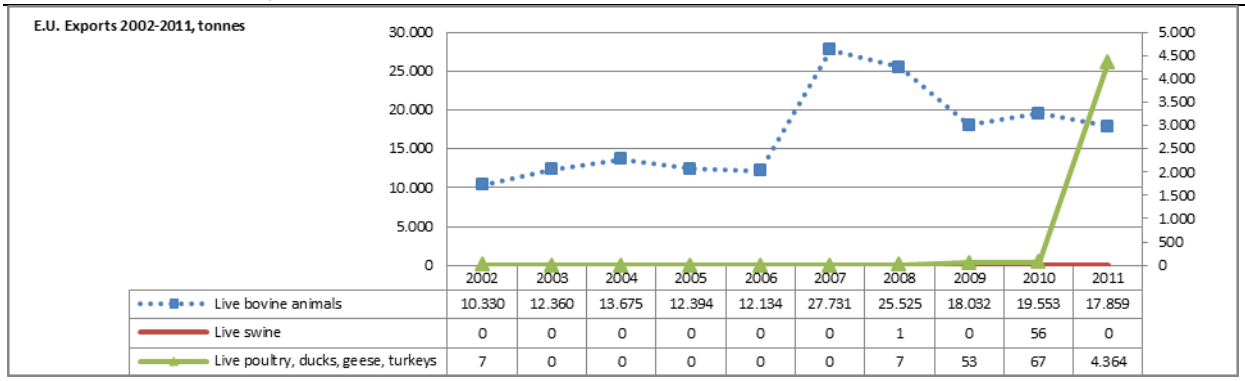


Fig. 7.Share of E.U. Live animals trade from the total agrofood trade, 2002-2011, %



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Live swine	4.673	222	9.441	7.122	7.036	13.493	39.196	39.743	32.659	23.823
Live bovine animals	19	626	1.268	2.863	3.378	2.918	1.889	2.082	2.160	3.833
Live poultry, ducks, geese, turkeys	702	481	1.512	1.561	2.052	2.028	2.797	2.867	3.234	3.786

Fig. 8.Volume of EU imports, 2002-2011, tonnes



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Live bovine animals	10.330	12.360	13.675	12.394	12.134	27.731	25.525	18.032	19.553	17.859
Live swine	0	0	0	0	0	0	1	0	56	0
Live poultry, ducks, geese, turkeys	7	0	0	0	0	0	7	53	67	4.364

Fig. 9.Volume of E.U. exports, 2002-2011, tonnes

The last part of this paper is devoted to the analysis of seasonality. This was done using two methods (additive method, AM and multiplicative method, MM) for total Live animals and for the Live cattle category. We chose this category because it is the only one of interest here with the volume of trade that is really important. In fact, if these trade flows shows a positive balance, this is because of the volume of live cattle trade, the other having a not important weight.

Table 2.Seasonality index, Live animals and Live bovine, 2002-2011, Additive (AM) and Multiplicative (MM) Method

Seasonality Index (Additive model and Multiplicative method)					
	Quarter	Imports		Exports	
		Live animals	Live bovine	Live animals	Live bovine
Average of gross seasonal deviations (AM)		-57.7	-14.2	-39.3	17.1
Corrected seasonal changes (AM)	Q I	-619.6	30.1	-7,852.0	-1,653.4
	Q II	138.5	39.5	-701.1	-94.6
	Q III	562.7	-140.7	4,893.4	126.5
	Q IV	-81.5	71.1	3,659.7	1,621.5
Average of gross seasonal indicators (MM)		0.97	0.72	0.97	0.99
Changes in seasonality (MM)	Q I	-10.6	-6.0	-32.0	-15.3
	Q II	9.0	56.08	-0.30	-0.1
	Q III	9.6	-14.6	24.4	1.3
	Q IV	-6.3	-20.2	18.5	16.6

Source: own calculations

Graphical representations of the results obtained from the analysis of seasonality are presented in the following graphs (Fig.10 and Fig.11).

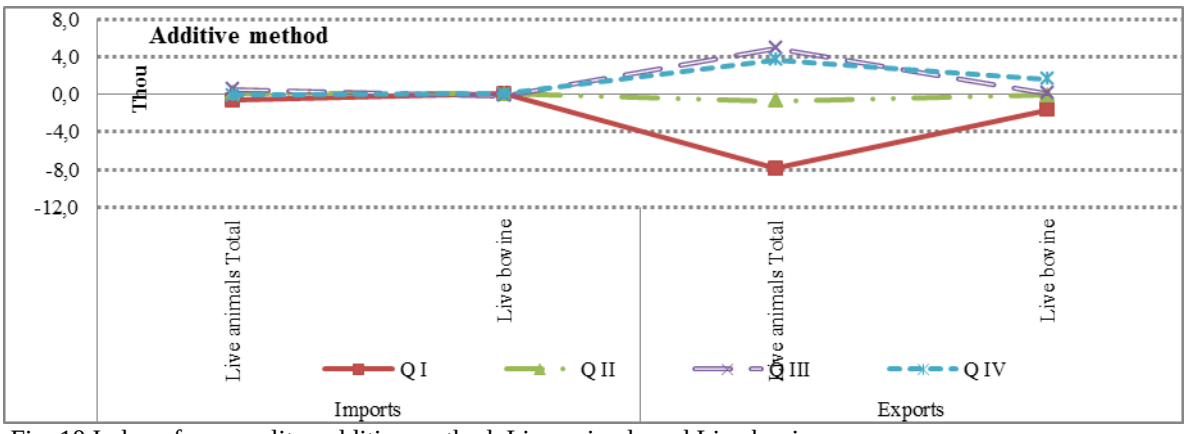


Fig. 10.Index of seasonality, additive method, Live animals and Live bovine

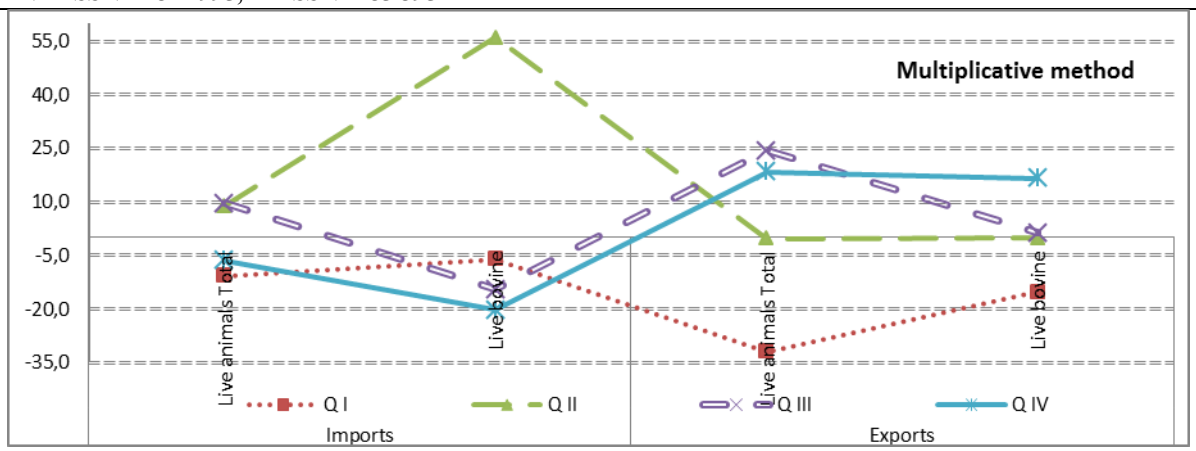


Fig. 11.Index of seasonality, multiplicative method, Live animals and Live bovine

CONCLUSIONS

From the analysis results we concluded the following. Romania 's traditional partners are well consolidated in terms live animals trade. While the analysis of trade in live animals shows that imports are made mostly engaged with live swine, there is also active an imports with live cattle and poultry, ducks, geese and turkeys. These last two sectors are each one, a relatively constant volume over the 10 years analyzed. Regarding exports, the situation is different. Of the three categories analyzed, only live bovine animals is enormously important and is done mainly the basis of the positive balance of the entire trade of live animals. Over the 10 years analyzed, the volume of imports of cattle recorded an average growth rate of 3.4 % per year, and exports an average rate of increase of 6.23 % per year. Seasonality analysis pointed us for exports (live animals and live cattle) negatives seasonal adjustments in the first and second quarters. Imports of live animals have positive adjustments, by additive method, in second and third quarters, while imports of live cattle, average adjustments from the trend are negative only in the third quarter.

REFERENCES

[1]Berna, T., Cihat, G., Canan, A., Bülent, M., 2010, The competitiveness of Turkish olive oil on the world market, WFL Publisher Science and Technology , Journal of Food, Agriculture & Environment Vol.8 (2):68-73.2010.

[2]Hausmann, C., Patrick,S., 2013, Contingency Planning: Trade´s Role in Sustainable World Food Security, Aquatic Procedia, Volume 1, 2013, pg.20-29, Selection from the 2012 World water week in Stockholm, http://dx.doi.org/10.1016/j.aqpro.2013.07.003

[3]Kuppusamy, J., Anantharaman, R.N., 2012, The Link between Export Performance and Export Development: Does Managements' Motivation Play a Role?, IBIMA Publishing Journal of Organizational Management Studies, Vol. 2012,Article ID 645053, DOI: 10.5171/2012.645053, http://www.ibimapublishing.com/journals/JOMS/joms.html.

[4]Lijie, S., Chao, C., Linhai, W., 2011, Analysis of potential affecting factors of China's agricultural trade, Journal of Food, Agriculture & Environment, Vol.9 (3&4):923-925.2011, WFL Publisher Science and Technology.

[5]Neculita, M., Sarpe, D.A., Cristea, V., Xiaoshuan, Z., Moga L.M., 2011, Modeling the impact of Romania's accession to European Union on trade of live animals, WFL Publisher Science and Technology, Journal of Food, Agriculture & Environment Vol.9 (1):428-431.

[6]Rossi, P., Kagatsume, M., 2009, Beef export restrictions in Argentina: Impact on the beef industry and national Welfare, WFL Publisher Science and Technology, Journal of Food, Agriculture & Environment Vol.7 (2):122-130.2009.

[7] Viorică, E.D., 2012, Econometric Estimation of a Gravity Model for the External Trade of Romania, IBIMA Publishing Journal of Eastern Europe Research in Business & Economics, Vol. 2012 (2012), Article ID 854058, DOI: 10.5171/2012.854058, http://www.ibimapublishing.com/journals/JEERBE/jeerbe.html

[8] www.insse.ro