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## TOMATO PRODUCTS' MARKET POTENTIAL AND CONSUMER PREFERENCE IN IBADAN, NIGERIA

Iyabo ADEOYE<sup>1</sup>, Olaide ADERIBIGBE<sup>1</sup>, Ifeoluwapo AMAO<sup>1</sup>, Fisayo EGBEKUNLE<sup>1</sup>, Idris BALA<sup>2</sup>

<sup>1</sup>National Horticultural Research Institute, P.M.B 5432, Idi-Ishin, Ibadan, Nigeria, Email: iyabs1@gmail.com

<sup>2</sup>National Horticultural Research Institute, Bagauda, Kano, Nigeria

**Corresponding author:** iyabs1@gmail.com

### Abstract

*The paper analyzed Tomato Products' market potential and consumer preference in Ibadan, Nigeria. Primary data on socioeconomic characteristics of consumers, willingness to buy as well as pattern of consumption of Tomato products were collected from 215 randomly selected consumers in 5 Local Government Areas in the metropolis. Data were analyzed using descriptive statistics, T- test and Chi square. Most of the consumers were female (86.5%) with average age of 31.5 years. Majority of the respondents had household size of 1-5 individuals (67.4%) while 79.1% had tertiary education. Most of the respondents showed preference towards Tomato paste (86.05%), Tomato Ketchup and Whole Peel Tomatoes in Bottle (3.72%), Dried Tomato and Tomato Powder (1.86%) while the least preferred was the Tomato juice and Sauce (1.40%). Findings revealed that 52.56% and 59.53% of respondents purchased tomato products at least once a week in the peak and lean season of tomato production. An average of 293.3g and 397.6g of tomato products was purchased weekly in the peak and lean season of tomato production. Household size, age and educational level showed a significant relationship with frequency of purchase. Although Tomato paste is the most patronized, intensive awareness efforts may help to enhance the market potentials of other products.*

**Key words:** consumption pattern, potential, tomato product, usage, willingness

### INTRODUCTION

Tomatoes are an outstanding vegetable with global per capita consumption of 20 kilograms per year and represents about 15% of world average total vegetable consumption [10]. Tomatoes production represents about 4.8 million hectares of harvested land area globally with an estimated production of 162 million tonnes [9]. Nigeria has a world share of 1.3% in tomato production [8]. Tomato is one of the most important and major vegetable grown in Nigeria. The country is the 14<sup>th</sup> largest producer of tomato in the world and 1<sup>st</sup> in sub Saharan Africa [8,18].

Tomato is an essential cooking ingredient in the country. It is a valuable raw material in processed products such as juice, puree, paste, ketchup/sauce, dry slices, powder and canned or bottle whole. It is widely cultivated due to the economic and nutritional importance of the crop. It is a profitable horticultural crop and provides income to farmers and agents involved in production and marketing [20].

The production of Tomato has improved the livelihood of most rural and peri urban farmers [2]. Tomato farming is potentially a 100 Billion Naira market in Nigeria [15].

Tomato consumption per capita reached 10.9 kg in 2013 in Nigeria [12]. Nigeria's domestic demand for tomato is 2.3 million tonnes annually while only 1.8 million tonnes is produced [21]. This has led to importation of an average of 150,000 metric tons of tomato concentrate per annum at a staggering value put at \$170 million [21]. It has been reported that 50% of tomato produced are lost after harvest [16], partly due to poor infrastructure for processing, inadequate packaging facilities [6,13] and inadequate storage facilities [11]. There is seasonal glut and inconsistent year round supply [18], lack of adequate processing facilities as well as cheap imports that consumes the country foreign exchange that could have been saved in the sector. Importation has deprived the economy's foreign reserve and employment opportunities. This calls for diversified value addition of the

raw produce to make tomato available in different forms all year round.

With increasing population, Nigeria has a large market for tomato products. In an effort to improve tomato availability in the country and reduce importation cost, the Federal Government has initiated a new Tomato policy. The Policy objectives are targeted at increasing local production of fresh tomato fruit required for fresh fruit consumption and processing. It is also targeted at increase local production of tomato concentrate and reduces post-harvest losses. The policy is expected to reduce wastages by 40% and create 60,000 jobs for stakeholders in the commodity chain [19].

Consumer preference is a marketing term, defined as the subjective (individual) tastes, as measured by utility, of various bundles of goods by different consumers while market potential is the entire size of the market for a product at a specific time.

Analyzing these will go a long way in ensuring sustainability of developed product. Due to increasing standards of living in the cities and the rapid urbanization taking place in the rural areas, consumption of tomato based products is expected to continue to go up steadily. Furthermore, the government of Nigeria identified tomato as one of the target crop for value chain development and several state governments and private organizations are investing in tomato processing. The development of tomato for industrial use is currently gaining momentum in Nigeria.

Most empirical research has been on fresh tomato; for example, marketing analysis of tomatoes [3, 4, 5, 11], Production efficiency [1, 7], post-harvest losses [5]. To the best of the authors' knowledge there is no study on Tomato products market potential and consumer preference in the study area.

Currently, emphasis is placed on up scaling local tomato paste production in Nigeria. Tomato products made in Nigeria are better in biochemical quality [17].

Little attention is given to other tomato products like juices, ketch-up and powder. In order to make greater progress in tomato processing industry it is important to start from the consumer's point of view. Understanding

consumers' needs, preferences and constraints shall help to map ways for the development and diversification of tomato products.

Thus this research aimed to evaluate tomato market potential and consumer's preferences. This will help processors improve product attributes, competitiveness, and marketability by using knowledge about product attributes that consumers demand. Specifically, the objectives of the study were to:

- (i) Examine consumers' awareness and willingness to buy/ use tomato products;
- (ii) Identify tomato products preferred;
- (iii) Evaluate the characteristics and frequencies of usage of tomato products;
- (iv) Examine the pattern of consumption of tomato products in peak and lean season of fresh tomato.

## MATERIALS AND METHODS

The study area was Ibadan; the state capital of Oyo State, Nigeria with a population of over 3 million, it is the most populous city in the state, and the third most populous city in Nigeria, after Lagos and Kano.

It is located in south-western Nigeria, 128 km inland northeast of Lagos and 530 km southwest of Abuja, the federal capital. It is a prominent transit point between the coastal region and areas in the hinterland of the country.

It lies completely within the tropical forest zone but close to the boundary between the forest and the derived savanna.

There are eleven Local Government Areas in Ibadan Metropolis consisting of five urban and six semi-urban Local Governments Areas. The city is a major center for trade in cassava, cocoa, cotton, timber, rubber and palm oil. The city and its environs is home to several industries such as Textile, Food processing, Health Care and Cosmetic, Tobacco processing and Cigarette manufacturing, Leatherworks and furniture making.

The main economic activities engaged in by the Ibadan populace include Agriculture, Trade, Public service employment, Factory work, Service sector/Tertiary production.

A multistage stage sampling approach was adopted to select a sample of 215 consumers from the city.

The first stage of selection included five local government areas namely; Ido, Ibadan Northwest, Oluyole, Ibadan southwest and Ibadan North. Ibadan northwest, Ibadan southwest and Ibadan North are urban local government areas in the metropolis while Ido and Oluyole are peri urban Local Government Areas.

Four wards were randomly selected from each of the local government in the second stage and in the final stage a total number of 43 respondents were randomly selected from each of the Local Government Areas giving rise to the 215 respondents for the survey.

Descriptive statistics such as frequency, mean and percentages were used to analyze the socio economic characteristics of the respondents, consumers awareness and use of the products while T –test was used to analyze the relationship between the consumption of Tomato products in the peak and lean season of tomato production.

Chi square was also used to measure the degree of association between socio economic characteristics and products attributes.

## RESULTS AND DISCUSSIONS

### Socioeconomic Characteristics of Respondents

Results of the analysis (Table 1) showed that majority of the respondents were female (86.5%); married (69.8%) were aged between 31-40 years (33%) indicating that they are still young and active and will be willing to exploit new products.

This is also the age group that may want products that will be convenient and save time in their respective domestic activities. Findings revealed that majority of the respondents had tertiary level of education (79.10%) which is expected to improve their consideration and evaluation of new products. Household size of 1-5 persons was prevalent in the study area (67.40%).

Most of the respondents had monthly food expenditure of ₦11,000- ₦20, 000 (32.10%). Only 5.6% of the respondents spent between

₦51,000 - ₦60,000 monthly on food in the study area.

Table 1. Socioeconomic Characteristics of Respondents

| Variable                          | Frequency | Percentage  |
|-----------------------------------|-----------|-------------|
| <b>Sex</b>                        |           |             |
| Female                            | 186       | 86.5        |
| Male                              | 29        | 13.5        |
| Total                             | 215       |             |
| <b>Marital Status</b>             |           |             |
| Single                            | 61        | 28.4        |
| Married                           | 150       | 69.7        |
| Divorced                          | 1         | 0.5         |
| Widowed                           | 3         | 1.4         |
| <b>Age</b>                        |           |             |
| <20                               | 7         | 3.3         |
| 21-30                             | 63        | 29.3        |
| 31-40                             | 71        | 33.0        |
| 41-50                             | 42        | 19.5        |
| 51-60                             | 25        | 11.6        |
| 61-70                             | 7         | 3.3         |
| Mean                              |           | <b>31.5</b> |
| <b>Educational Level</b>          |           |             |
| No formal Education               | 4         | 1.9         |
| Primary                           | 13        | 6.0         |
| Secondary                         | 28        | 13.0        |
| Tertiary                          | 170       | 79.1        |
| <b>Household size</b>             |           |             |
| 1-5                               | 145       | 67.4        |
| 6-10                              | 70        | 32.6        |
| Mean                              |           | <b>5</b>    |
| <b>Monthly food expenditure ₦</b> |           |             |
| <10,000                           | 55        | 25.6        |
| 11,000-20,000                     | 69        | 32.1        |
| 21,000-30,000                     | 37        | 17.2        |
| 31,000-40,000                     | 23        | 10.7        |
| 41,000-50,000                     | 19        | 8.8         |
| 51,000-60,000                     | 12        | 5.6         |
| Mean                              | 17,554    |             |

Source: Field Survey, 2016

### Willingness to buy and use Tomato Products

Findings revealed that most of the respondents bought Tomato products regularly (99.07%); indicating the strength of the market potentials for Tomato products in the study area (Table 2). The following reasons were given by the respondents for purchasing Tomato products; used to augment fresh tomatoes in soup and dishes (45.58%), substitute for fresh tomatoes (28.83%), ease of use (26.04%). The usual high prices of fresh tomatoes during the off season were also cited as a major reason influencing the demand for Tomato products (2.79%). The result of the study revealed that majority of the respondents were aware about Tomato paste (98.60%), Whole Tomatoes in bottle (43.26%), Tomato Ketch up (41.86%), Tomato juice (39.07%), Tomato dry slices (37.67%) while

23.26% of the respondents were aware about Tomato powder and Whole Peel Tomatoes respectively.

Table 2. Willingness to buy and use Tomato Products

| Variable  | Frequency | Percentage |
|---|-----------|------------|
| <b>Do you Tomato Products</b>                           |           |            |
| Yes   | 213       | 99.07      |
| No  | 2         | 0.93       |
| <b>Reasons for buying tomato products (n=222)</b>       |           |            |
| Ease of use   | 56        | 26.04      |
| Combine with fresh tomatoes                             | 98        | 45.58      |
| Substitute for fresh tomatoes                           | 62        | 28.83      |
| High price of fresh tomatoes                            | 6         | 2.79       |
| <b>*multiple responses</b>                              |           |            |
| <b>Awareness about Tomato Products (n = 703)</b>        |           |            |
| Tomato Paste  | 212       | 98.60      |
| Tomato Powder   | 50        | 23.26      |
| Tomato dry slices                                       | 81        | 37.67      |
| Chopped Tomatoes  | 43        | 20.00      |
| Tomato Juice  | 84        | 39.07      |
| Whole Peel Tomatoes                                     | 50        | 23.26      |
| Whole Tomatoes  | 93        | 43.26      |
| Tomato Ketch Up   | 90        | 41.86      |
| <b>*multiple responses</b>                              |           |            |
| <b>Willingness to use Tomato Products (n = 173)</b>     |           |            |
| Tomato Paste  | 189       | 87.91      |
| Tomato Sauce  | 65        | 30.23      |
| Dried Tomato  | 60        | 27.91      |
| Chopped tomato  | 43        | 20.00      |
| Tomato Powder   | 64        | 29.77      |
| Tomato Juice  | 66        | 30.70      |
| Tomato Ketch Up   | 87        | 40.47      |
| Tomato Dry slices                                       | 37        | 17.21      |
| Whole Peel Tomatoes                                     | 45        | 20.93      |
| Whole Tomatoes in Bottles                               | 57        | 26.51      |
| <b>*multiple responses</b>                              |           |            |
| <b>Which of Tomato Products have you used (n = 611)</b> |           |            |
| Tomato Paste  | 195       | 90.70      |
| Tomato Sauce  | 63        | 29.30      |
| Dried Tomato  | 56        | 26.05      |
| Chopped Tomato  | 39        | 18.14      |
| Tomato Powder   | 25        | 11.63      |
| Tomato Ketch UP   | 102       | 47.44      |
| Tomato dry slices                                       | 41        | 19.07      |
| Whole Peel Tomatoes                                     | 21        | 9.77       |
| Whole Tomatoes in bottles                               | 22        | 10.23      |
| Tomato Juice  | 47        | 21.86      |
| <b>What tomato products is used for (n = 468)</b>       |           |            |
| Stew  | 169       | 78.60      |
| Soup  | 115       | 53.49      |
| Salad   | 15        | 6.98       |
| Rice  | 124       | 57.57      |
| Sandwich  | 34        | 15.81      |
| Snack   | 11        | 5.12       |

Source: Field Survey, 2016

Majority of the respondents were willing to use Tomato Paste (87.91%), followed by Tomato Ketch up (40.44%), tomato juice (30.70%),

tomato sauce (30.23%) while only 17.21% of the respondents were willing to use Tomato Dry Slices. This showed that Tomato Paste was the most patronized in the study area followed by Tomato Ketch up while consumers were least aware of Tomato Powder and Whole Peel Tomatoes.. This supports the findings that Tomato pastes are consumed everyday by many homes [20]. Similarly, order of the most used tomato products in the study area were Tomato paste (90.70%), Tomato Ketch up (47.44%) while the least used products was whole peel Tomatoes (9.77%). Tomato products are majorly used in stew preparation (36.1%), Rice (26.5%), Soup (53.49%), Sandwiches (15.81%) Salad (6.98%) while it was least used in snack preparation (5.12%). This is expected because Tomato is a major component of daily dishes (Ibitoye *et al*, 2009) and it is a common event to use stew in every home around the study area [14].

#### Tomato products Preferred, Consumption pattern and processing potentials

Most of the respondents preferred Tomato paste (86.0%), Tomato Ketch up (40.47%) and Whole Peel Tomatoes in Bottle (3.72%), Dried Tomato and Tomato Powder (3.72%) while the least preferred was the Tomato juice and Sauce (1.40%) (Table3). The reasons attributed to the preference of Tomato paste were the addition of flavor and taste by the paste (35.80%), ease of use (30.23%), affordability (12.56%), availability (11.16%) and storability (10.23%). Availability may be an important reason because products such as Tomato ketch up, sauce and juice are mostly common in supermarkets and most housewives visit the major markets in the purchase of their food items. Tomato paste is by far the most prevalent of all the products especially in urban markets. This implies that there is ready market for tomato paste and there is the need to create awareness for other products in order to enhance their market potentials. Characteristics considered by consumers before they purchase tomato products they prefer includes taste (60.93%), colour (41.86%) and the least is price (26.05%).

Table 3. Tomato products Preferred, Characteristics and Frequencies of purchase

| Variable   | Frequency | Percentage |
|--|-----------|------------|
| <b>Most Preferred Tomato Products</b>  |           |            |
| Tomato Paste   | 185       | 86.05      |
| Dried Tomato   | 4         | 1.86       |
| Tomato Juice   | 3         | 1.40       |
| Tomato Ketch Up  | 8         | 3.72       |
| Tomato Powder  | 4         | 1.86       |
| Whole Peel Tomatoes in Bottle  | 8         | 3.72       |
| Tomato Sauce   | 3         | 1.40       |
| <b>Reason for Preference</b>   |           |            |
| Add flavour and taste  | 77        | 35.8       |
| Ease of use  | 65        | 30.23      |
| Availability   | 24        | 11.16      |
| Storable and Preservable   | 22        | 10.23      |
| Less expensive   | 27        | 12.56      |
| <b>Characteristics desired in tomato product (n = 277)</b>                       |           |            |
| Colour   | 90        | 41.86      |
| Taste  | 131       | 60.93      |
| Price is Ok  | 56        | 26.05      |
| *multiple responses  |           |            |
| <b>Frequency of Purchase of Tomato products in Peak season of fresh tomatoes</b> |           |            |
| Daily  | 59        | 27.44      |
| At least once a week   | 113       | 52.56      |
| Few times in a month   | 43        | 20.0       |
| <b>Frequency of Purchase of Tomato products in Lean season of fresh tomatoes</b> |           |            |
| Daily  | 51        | 23.73      |
| At least once a week   | 128       | 59.53      |
| Few times in a month   | 36        | 16.74      |
| <b>Prevalent period of purchase</b>  |           |            |
| Peak Period  | 36        | 16.74      |
| Lean Period  | 74        | 34.42      |
| Both Period  | 105       | 48.83      |
| <b>Quantity Purchase of Tomato Product during Peak Period (g)</b>                |           |            |
| 70-350   | 170       | 79.07      |
| 420-700  | 37        | 17.21      |
| 770-1050   | 8         | 3.72       |
| <b>Quantity Purchase of Tomato Product during Lean Period (g)</b>                |           |            |
| 70-350   | 161       | 74.88      |
| 420-700  | 40        | 18.60      |
| 770-1050   | 14        | 6.51       |
| <b>Source of Purchase</b>  |           |            |
| Neighborhood   | 115       | 53.49      |
| Urban market   | 98        | 45.58      |
| Supermarket  | 65        | 30.23      |
| *multiple responses  |           |            |
| <b>Preferred Package for Tomato Products</b>                                     |           |            |
| Tin Can  | 73        | 33.95      |
| Tetra pack   | 105       | 48.83      |
| Bottle   | 22        | 10.23      |
| Plastic Container  | 15        | 6.98       |
| <b>Reasons for Preferred package</b>   |           |            |
| Handy  | 39        | 18.14      |
| Better preserved   | 17        | 7.91       |
| Consumption safety   | 125       | 58.14      |
| Ease of use  | 34        | 15.81      |

Source: Field Survey, 2016

Moreover, 52.56% and 59.53% of the consumers purchased tomato products at least

once a week in the peak and lean season of fresh tomato availability.

This is an indication that more of the consumers purchase the product in the lean season. In the peak season of fresh tomato production, majority of the respondents (79.07%) purchased 70 – 350 grammes of tomato products per week, 17.21% purchased 420 – 700g of tomato products weekly while only 3.72% purchased 770 – 1,050 g weekly. During the lean season, purchase of tomato products by consumers followed a similar pattern to that observed in the peak season. Most of the respondents (74.88%) purchased 70-350g of the products per week; 18.60% and 6.51% purchased 420-700g and 770-1050g respectively. This result implies that regardless of season, respondents are used to consuming tomato products as only a slight difference is seen in the pattern of purchase in both seasons. Findings on the source of purchase of tomato products revealed that 53.49%, 45.58% and 30.23% of the consumers purchase the products from the neighborhood, urban markets and supermarkets respectively. Also, this finding shows that the mostly preferred tomato products usually consumed by respondents were within their reach.

In addition, most consumers preferred tetra pack (48.83%) and tin can (33.95%) as packaging materials for tomato products. Only a few respondents preferred bottles (10.23%) and plastic container (6.98%). This could be due to the changes in packaging technology and enlightenment level of consumers on the health implications of packaging materials. The reason for the preferred packaging materials were safety (58.14%), handy (18.14%), ease of use (15.18%) and better preservation (7.91%).

### Tomato Consumption in the Peak and Lean Season

Findings revealed that household with an average of 5 individuals consume averagely 293.3g of tomato products in the peak season while in the lean season an average of 397.6g was consumed by the respondents (Table 4). There is significant difference in Tomato consumption in the peak and lean seasons of fresh tomato production. This indicates that more tomato products are consumed in the lean

season of tomato production. This shows that despite the fact that there exists similar pattern in the consumption of tomato products by consumers in both peak and lean seasons of fresh tomato supply, differences observed in the quantities consume are significant.

Table 4. Tomato Consumption in the Peak and Lean Season

| Variable            | Value      |
|---------------------|------------|
| Mean peak           | 293.3      |
| Mean lean           | 397.6      |
| Standard deviation  | 421.76251  |
| Mean                | -103.70370 |
| Standard error mean | 46.86250   |
| T value             | -2.213     |
| Sig                 | 0.03       |

Source: Field survey, 2016

### Socioeconomic Characteristics and Consumption Pattern of Tomato Products

Chi-square results revealed that household size, age and educational level showed a significant relationship with frequency of purchase of tomato products in the peak season (Table 5).

This is an indication that an increase in household size, age and education, leads to increase the frequency of purchase of tomato products.

Furthermore, in the lean season, educational level, household size, income level showed a significant relationship with respondents' frequency of purchase of tomato products.

This result implies that education of the respondents and household size are important factors that determined frequency of purchase of tomato products.

Table 5. Relationship between Socioeconomic Characteristics and Consumption Pattern of Tomato Products

| Variables             | Group                    | N   | P Value (Peak Season) | P Value (Lean Season) |
|-----------------------|--------------------------|-----|-----------------------|-----------------------|
| Frequency of Purchase | Sex                      | 215 | 0.212                 | 0.625                 |
|                       | Marital Status           | 215 | 0.550                 | 0.844                 |
|                       | Age                      | 215 | 0.024**               | 0.118                 |
|                       | Educational level        | 215 | 0.000***              | 0.000***              |
|                       | Household size           | 215 | 0.000***              | 0.006***              |
|                       | Income level             | 215 | 0.647                 | 0.024**               |
|                       | Monthly Food Expenditure | 215 | 0.103                 | 0.385                 |

Source: Field survey, 2016, Note \*\* significant at 5% \*\*\* significant at 1%

## CONCLUSIONS

Findings revealed that most of the respondents bought Tomato Products regularly in the study area (99.07%). Most of the respondents showed preference towards Tomato paste (86.0%), followed by Tomato Ketch up (40.47%) and Whole Peel Tomatoes in Bottle (3.72%), Dried Tomato and Tomato Powder (3.72%) while the least preferred was the Tomato juice and Sauce (1.40%). Household size, age, educational levels are the factors related to consumption of tomato products in the study area. There is great market potential for processed Tomato products in the study area. However, it is important to create awareness on the other tomato products such as tomato sauce, juice, whole peel tomato in bottles and tomato powder.

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## EVALUATING THE PARTICIPATION LEVEL OF FISH FARMERS IN AGRICULTURAL INSURANCE IN ONDO STATE, NIGERIA

Solomon Adedapo ADESOJI, Oluwafunmilola Olawunmi OLAYODE,  
Aminat Olajumoke OGUNDEJI

Obafemi Awolowo University, Department of Agricultural Extension and Rural Development, Ile Ife, Nigeria, Phone: +234803560506, +2348062507894, +2348168295858, E-mails: dapadesoji@yahoo.co.uk, wefotex@yahoo.com, ogundejiolajumoke3@gmail.com

**Corresponding author:** dapadesoji@yahoo.co.uk

### **Abstract**

*The study assessed the level of awareness and determined the level of participation of fish farmers in Agricultural Insurance Scheme (AIS) with a view to improving on the level of awareness and consequently participation. The study adopted the survey method of research. The study population comprised all the 1,728 registered fish farmers in Ondo State. Only 295 respondents were sampled from the population using the Raosoft sample size calculator. Multi-stage sampling procedure was adopted to distribute the sample population among the Local Government Areas (LGAs). Two Local Governments Areas (LGAs) were purposively selected from each of the four zones based on the prominence in fish farming. Second stage involved random selection of two communities each from the selected LGAs. At the last stage, fish farmers register was used to proportionately distribute the farmers to LGAs. The results showed the mean age of fish farmers to be  $44.6 \pm 10.1$  years and majority (83.4) were married. The mean household size was  $5 \pm 2$  and about 96% was able to read and write. The mean years of fish farming experience was  $13.54 \pm 11.9$  and all of them were smallholders. About 70.5% were aware of AIS but only 15% were under fish policy cover for the last five years. Majority (82.3%) had moderate participation level with only 4.4% with high level of participation. There was strong correlation ( $R = 0.759$ ) between the variables investigated and level of participation. Also three variables age, contact with extension and awareness regressed positively while number of information sources and household size regressed negatively with level of participation. It was concluded that despite the high level of awareness, level of participation was low.*

**Key words:** evaluation, participation level, fish farmers, insurance scheme

### **INTRODUCTION**

Agricultural production faces myriad of risks than most other enterprises [9]. Risks in Agriculture in most parts of the world are certainly not independent of nature. This is because they go beyond all the well-known and researched entrepreneurial hazards and uncertainties of modern world. Nevertheless, two major risks are of concern to the agricultural sector; these are price risk which is caused by potential volatility in prices and production risk resulting from uncertainty about the levels of production that primary producer can achieve from their current activities. It is likely that these major risks will increase in the future- price risk due to liberalization of trade and production risk caused by the effects of climate change [27]. Production risks include the vagaries of nature, inclement weather conditions such as drought,

excessive rains, storms and hurricanes, pests and diseases along with flood and fire outbreaks and these cause heavy losses to farmers. Disasters can often not be prevented from happening but they can, to some extent, be predicted and arrangements can be made to reduce their impact. However, in some cases, disasters cannot be predicted and farmers will have to cope with major losses after the occurrence of the event. [21] and [24] opined that risks in Nigeria have been identified to include natural and environmental, gender, conflict, labour market, life events and macroeconomic risks. In explaining these categories of risk, [10] opined that the major sources of production risks are weather, pests, diseases, interaction of technology with other farm and management characteristics, excessive/insufficient rainfall and extreme temperatures and climate change. According to [5], climate change has serious implications for

global fisheries and aquaculture. Besides the physical and financial drivers, climate is a major driver that enhances the aquaculture sector growth and sustainability. The variability of temperature, air humidity and total rainfall shows negative signs to aquaculture production in ponds system.

Agricultural Insurance, in its widest sense may be defined as the stabilization of income, employment, price and supplies of agricultural products by means of regular and deliberate savings and accumulation of funds in small instalments by many in favourable time periods to defend some or few of the participants in bad time periods [6]. Insurance is simply “a risk management strategy”. Agricultural insurance is especially geared to covering losses from adverse weather and similar events beyond the control of farmers. It is one of the most quoted tools for managing risks associated with farming. Many pilot programmes have been developed over the years, targeting especially small-scale farmers in developing countries, but agricultural insurance remains primarily a business which involves farmers in the developed countries. Insurance spreads risk across the farming industry or the economy or, to the international sphere in the case of international reinsurance. Insurance is sold and bought in a market. The purchasers must perceive that the premiums and expected benefits offer value; the sellers must see opportunity for a positive actuarial outcome, and profit over time. Insurance is not the universal solution to the risk and uncertainties that farmers face. It can only address part of the losses resulting from some perils and is not a substitute for good on-farm risk-management techniques, sound production and farm management practices and investments in technology [13]. Therefore, any nation with a clear vision for boosting its agricultural production must meet the food needs of its populace and the input requirements of its industries must of necessity put in place mechanisms that would reduce these risks and uncertainties to a bearable minimum. The need therefore, for a mechanism that functions specially to keep the farmers in business cannot be over-emphasized. [15] defines insurance as a social

device providing financial compensation for the effects of misfortune, the payment being made from the accumulated contributions of all parties particularly in the scheme. Agricultural insurance scheme serves as securities for banks, as indemnification for financial losses suffered by farmers and those in the agricultural value chain resulting from damage to their products, and also provides funds for servicing such loans. In Nigeria, Agricultural Insurance Scheme was designed to promote agricultural production; provide financial support to farmers in the event of losses arising from natural disasters; increase the flow of agricultural credit from lending institutions to the farmers and minimize the need for emergency assistance provided by the government during periods of agricultural disaster (Nigerian Agricultural Insurance Company [17].

#### **Agricultural Insurance Scheme in Nigeria**

The Agricultural Insurance Scheme (AIS) was launched in Nigeria by the Federal Government on the 15th December, 1987 and Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) on June, 2011 as part of governments’ efforts to enhance food production in Nigeria. According to [18], the scheme is immensely beneficial to the farmers and hence the Nation as a whole in so many ways. Some of the benefits include: Assurance of security, where the insured is confident that in case of a loss, NAIC will indemnify them. In addition, is the adoption of technology which is a compulsory major requirement for all the insured to practice. This leads to better yield and improved farm income for the insured farmer. Generation of wealth, the accessibility of greater credit facilities would result in an increase production, thus given rise to increased income for the farmers which in turn, will lead to high farm employment, more wealth generation and general improvement in quality of life of the citizenry. Provision of Extension Services, the insured farmers benefit immensely from technical advisory services which are provided by staff of the corporation in the various areas of agriculture and risk management during monitoring visits to insured farm projects and potential beneficiaries of the scheme. These

extension services are provided free of charge. Furthermore, the personnel involved are highly reliable and tested professionals in their fields which include crop scientists, veterinary surgeons, seasoned insurance experts, soil scientist, etc. This translates to the basic fact that the farmer can save his hard-earned money which he ordinarily would have spent on consultants most of which may turn out to be fakes. Assistance in Agricultural loans recovery, banks whose clients have been covered under the Nigerian Agricultural Insurance Scheme have continued to find it easy to recover loans disbursed thereby leading to more farmers enjoying credit facilities from such repayments. They also provide financial support to farmers in the event of losses arising from natural disasters, increase the flow of agricultural credit from lending institutions to the farmers and minimize or eliminate the need for emergency assistance provided by government during period of agricultural disasters.

More than ever before, insurance cover for Nigerian farmers has become imperative in view of the increased risks they face in the present day. Agricultural economists say that this is particularly so because farmers often sustain losses from a variety of factors, which were totally unforeseen at the onset of each farming season. Experts identify such risks associated with agriculture as floods, vagaries in weather conditions, fire disasters, communal clashes, market failure, price changes, unsteady rainfall pattern, policy changes, land losses as well as pest and disease attacks [22]. [14] opined that Nigerian farmers are increasingly faced with risk and uncertainties which pose serious threat to the success of farming enterprise in Nigeria. [12] stated that fish farming is a high risk business, not only because it is based on biological processes or survival of large numbers of living organisms in captivity but because of its dependence on human skills, efficiency of machines and clemency of the physical forces of nature. [26] and [7] opined that since farmers cannot predict the probability of occurrence of any of these and cannot bear these risks and uncertainties alone, they are faced with the option of transferring or sharing the risks

involved in the day-to-day management of their farms with one or more individuals or firms. Agricultural insurance looks into how risks and uncertainties can be effectively managed to the advantage of the farmers in the present and also in the future. Agricultural insurance is a necessary part of the institutional infrastructure essential for the development of agriculture, which is mainly a high risk enterprise. It also control lending environment for banks in which the agricultural value chain is well structured [8]. Despite the challenges such as extreme climatic conditions, flood, water pollution, lack of adequate technology, fish diseases, problems of preservation, poor marketing, high cost of inputs and inadequate extension contact, confronting fish farming in Nigeria, and Agricultural Insurance Scheme being one of the strategies put in place to mitigate these challenges, the need for this study hinged on the fact that; there is dearth of information on participation of fish farmers in Agricultural Insurance Scheme. The specific objectives of the study are to assess the level of fish farmers' awareness of the Agricultural Insurance Scheme in Ondo State; and determine the level of fish farmers' participation in the scheme.

## **MATERIALS AND METHODS**

### **The study area**

This study was conducted in Ondo State of Nigeria, which is made up of four agricultural zones, three agro-ecological zones, nine administrative zones, and eighteen Local Government Areas (LGAs). Ondo State is geographically located in the Southwestern zone of Nigeria. The State covers a land area of 14,793 square kilometers with its administrative capital at Akure. The State lies between latitudes  $5^{\circ} 45'$  and  $7^{\circ} 42'$  north of the equator and longitude  $4^{\circ} 20'$  and  $6^{\circ} 05'$  East of Greenwich Meridian. It is bounded by Ekiti and Kogi States in the north; Edo State in the east; Ogun and Osun States in the west and the Atlantic Ocean in the south. The population of the State in the 2006 census was 3,441,024. Ondo State is located entirely within the tropics. The tropical climate of the State is broadly of two seasons: rainy season (April-

October) and dry season (November - March). The temperature throughout the year ranges between 21°C and 29°C and humidity is relatively high. The annual rainfall varies from 2,000 mm in the southern areas to 1,150mm in the northern areas of the State. The soil is derived from well drained loamy clay with a medium to fine texture. There is a maze of numerous rivers, creeks and lakes in and around Ondo State with very prominent rivers like Owena, Ala, Oluwa, Oni, Awara, Ogbese and Ose. Generally, the land rises from the coastal part of Ilaje, Ese-Odo and Okitipupa areas to highlands and inselbergs to the northern parts of the State [28].

#### **The study population and sample size**

The study population comprised all the 1,728 registered fish farmers in Ondo State. The population includes men, women and youths. Only 295 respondents were sampled from the population using the Raosoft sample size calculator at 5% error margin and 95% level of confidence [29]. Multi-stage sampling procedure was adopted to distribute the sample population among the LGAs. Ondo State was divided into four agricultural zones namely; Ondo zone, Owo zone, Ikare zone and Okitipupa zone. At the first stage, two Local Government Areas (LGAs) were purposively selected from each of the four agricultural zones based on their pronounced investment in fish farming. The second stage involved a random selection of two communities from each of the eight selected LGAs making a total of sixteen communities. The last stage was a proportionate distribution of the sampled fish farmers in the sixteen communities. Registered fish farmers were used because they were easy to trace.

#### **Data instrument**

Structured and validated interview schedule was used to elicit quantitative data from the respondents. Information collected included respondents' personal and socio-economic characteristics and their membership of associations, level of awareness of agricultural insurance scheme and level of participation in Agricultural Insurance Scheme. Data collected were summarized with descriptive tools such as percentages, mean, standard deviation. Inferential statistical tools such as Chi-square,

correlation and regression analyses were employed to draw inferences.

#### **Measurement of variables**

Two types of variable were considered in this study; they were the dependent and independent variables. The dependent variable for this study was level of fish farmer's participation in Agricultural Insurance Scheme in Ondo State. The dependent variable was measured by asking the farmers to indicate their subscription to a set of ten peril cover provided by Agricultural Insurance scheme (AIS). This was measured based on a 5-year participation of the farmers in fish policy and a six point scale of zero to five was used to measure fish farmers' participation in the scheme. Maximum obtainable score was 50 and minimum score was 0.

The mean score ( $\bar{X}$ ) and the standard deviation ( $\sigma$ ) for all the respondents was calculated and categorized as high, moderate and low. The level of participation was determined by finding the range of scores obtained when the standard deviation was added to and subtracted from the mean scores calculated ( $\bar{X} \pm \sigma$ ). High level (values  $> \bar{X} + \sigma$ ), moderate level (values within  $\bar{X} \pm \sigma$ ) while low level (values  $< \bar{X} - \sigma$ ). In case of independent variables, most of them were recorded as obtained from the respondents. For example, age of the respondents was the number of years the respondents had lived on earth. It was recorded as provided. Sex was coded as male 1 and female 0. Experience in fish farming was recorded as provided by the respondents and household size was also recorded as provided by the respondents. Awareness was measured by yes (1) when aware and no (0) when not aware. A relationship will be established between the dependent and independent variables using a regression equation as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_0$$

where:

Y = Dependent variable (level of fish farmers' participation in Agricultural Insurance Scheme)

X<sub>1</sub> = age

X<sub>2</sub> = household size

$X_3$  = number of sources of information about AIS

$X_4$  = frequency of contact with extension agent

$X_5$  = number of years of awareness

$X_6$  = awareness

$a$  = regression constant

$b$  = regression coefficient

$e_0$  = error term.

## RESULTS AND DISCUSSIONS

### Farmers' demographic characteristics

The results in Table 1 show that 33.3 per cent were above 50 years of age, 26.9 per cent were between ages of 41 and 50, 31.7 per cent were between ages of 31 and 40 years, while 8.1 per cent of the respondents were below 31 years of age. The mean age of fish farmers in Ondo State was  $44.6 \pm 10.1$  years. The findings showed that above average (58.6%) of fish farmers in Ondo State were still in their active and productive years of life in which they could still contribute to the socio-economic wellbeing of the society. This age could make them participate in Agricultural Insurance Scheme as young people are ready to take risks. This finding is in line with [20] and [19], who reported that most fish farmers were middle aged, agile and active to withstand the rigors of fish farming and that most of them participate in agricultural insurance. This could be explained by their higher venturesomeness, innovativeness and more risk proneness. Also, about 78 per cent of the respondents were male. The result indicated that there were more men in fish farming than women in the study area. This finding is similar to [1] findings that 80 per cent of fish farmers were men. Since most of the fish farming activities requires time and energy which women might not be able to effectively cope with because of other responsibilities as home keepers. About 94 per cent and 4.7 per cent of the respondents were Christians and Muslims, respectively while very few (1.0%) practiced traditional religion. This implied that Christianity might be the dominant religion in the study area. Religion affiliation could be a useful indicator in identifying and mobilizing fish farmers for meaningful participation in agricultural insurance. This is because farmers could easily

interact with people of their faith and in doing so; they could discuss ideas related to agriculture.

Majority (83.4%) of the respondents were married, while 14.2, 2.0 and 0.3 per cents were single, widowed and separated, respectively. This implied that majority of the respondents were married and were expected to be responsible [16]. Marriage is considered as respected institution where married people are regarded as mature and responsible with divorce being a culturally rare occurrence due to the stigmatization attached to it [11]. Family members have being a source of labour especially in fish farming operations, they could be a source of information and they could even be persuaded to participate in the scheme. About 68 per cent of the respondents had household size of less than 6 members, while 31.5 per cent had size between 6 and 10 members while very few (1.0 percent) had above 10 members. Mean household size was approximately  $5 \pm 2$  people. The result indicated that most of the respondents had household size of less than 6 members. This might be as a result of the economic situation of the country, education and high rate of unemployment leading many people into family planning so as to reduce birth rate. It might also be due to the fact that the traditional orientation of marrying more than a wife at a time and bearing as many children as possible as a sign of wealth is constantly fading away in the study area. A considerable amount of labour could be derived from within the household to provide help on fish farm when needed.

About 96 per cent of the respondents could read and write. Also, about 10.8 per cent of the respondents had less than 7 years of formal education; about 72 per cent had post-secondary school education. This means that majority of the respondents had one form of formal education. This high level of literacy could enhance their participation in NAIS. This finding corroborates [4] that high level of literacy could be regarded as an advantage for the choice of source of information for fish production.

Table 1. Distribution of respondents by demographic characteristics

| Demographic characteristics             | Frequency | Percentage | N=295                       |
|---|-----------|------------|-----------------------------|
| <b>Age</b>                              |           |            |                             |
| Below 31                                | 24        | 8.1        | Mean 45<br>SD= ±10          |
| 31-40                                   | 92        | 31.7       |                             |
| 41-50                                   | 78        | 26.9       |                             |
| Above 50                                | 96        | 33.1       |                             |
| <b>Gender</b>                           |           |            |                             |
| Male                                    | 225       | 78.0       |                             |
| Female                                  | 65        | 22.4       |                             |
| <b>Religion</b>                         |           |            |                             |
| Christian                               | 274       | 94.5       |                             |
| Islam                                   | 13        | 4.5        |                             |
| Traditional                             | 3         | 1.0        |                             |
| <b>Marital status</b>                   |           |            |                             |
| Single                                  | 42        | 14.2       |                             |
| Married                                 | 246       | 83.4       |                             |
| Separated                               | 1         | 0.3        |                             |
| Widow (er)                              | 6         | 2.0        |                             |
| <b>Household size</b>                   |           |            |                             |
| Below 6                                 | 195       | 67.2       | Mean 5<br>SD= ±2            |
| 6-10                                    | 92        | 31.7       |                             |
| Above 10                                | 3         | 1.0        |                             |
| <b>Level of formal education</b>        |           |            |                             |
| No Formal Education                     | 5         | 1.7        |                             |
| Adult Education                         | 19        | 6.4        |                             |
| Completed Primary Education             | 26        | 8.8        |                             |
| Uncompleted Secondary Education         | 7         | 2.4        |                             |
| Completed Secondary Education           | 25        | 8.5        |                             |
| Tertiary                                | 213       | 72.2       |                             |
| <b>Years of fish farming experience</b> |           |            |                             |
| Below 11                                | 169       | 58.3       | Mean= 14<br>years<br>SD=±12 |
| 11-20                                   | 59        | 20.3       |                             |
| 21-30                                   | 27        | 9.2        |                             |
| Above 30                                | 35        | 11.9       |                             |

Source: Field survey, 2015

About 58.6 per cent of the respondents had at most 10 years of fish farming experience, 20.3 percent had between 11 and 20 years of fish farming experience. The mean years of fish farming experience was 13.54±11.91 years. This is in support of the view of [24] that above average (56%) of fish farmers in Ondo State had been into fish farming for over 10 years.

The reasons might be due to new agricultural programmes such as agricultural transformation agenda which might encourage youth to take agriculture and the recent discovery that fish farming is a lucrative enterprise. Also, unemployment rate might make most youth to drift to fish farming.

Some of the farmers, especially those in the riverine area of the State must have started fish farming since their early days. Since about 59 percent of the respondents had more than 10 years of fish farming experience, they would have encountered one or more challenges associated with fish farming and this would prompt them to take agricultural insurance policy which is one of the strategies put in place to cushion these challenges.

Results in Table 2 show that 74.8 percent of the respondents had less than 1 hectare of fish farmland, 14.5 percent had between 1 and 2 hectares of land, 9.0 percent had more than 2 hectares of land used for fish farming. The mean land size used for fish farming by the respondents was 1.32±0.63 hectares. From the field survey carried out, it was further revealed that most of the farmers had more farmland used for other farming enterprise. About 93 per cent of the respondents had less than 11 ponds, 5.1 percent had between 11 and 20 ponds, 2.0 per cent had above 20 ponds located in different sites. The mean number of ponds was 6±4. The small size of fish farms implies that majority of the respondents were smallholder fish farmers. This is in line with [2] and [20] that most of the fish farmers were smallholders. Also [1] revealed that majority (73.3%) of fish farmers in Ondo State had less than 1 ha of fish farm and made use of earthen pond (88.1%).

Majority (70.2%) of the respondents earned below ₦501,000; 18.3 and 6.1 percent earned between ₦501,000 and ₦1,000,000 and ₦1,001,000 and ₦2,000,000, respectively while only 5.4 percent earned above ₦2,000,000. The mean annual income earned by respondents from fish farming was ₦563,850 ± ₦487,530. Results in Table 2 further revealed that 76.3 per cent and 45.8 per cent of the respondents got capital they used for fish farming from personal savings and cooperative societies, respectively. Also, 19.7

per cent, 12.9 per cent and 9.2 per cent got capital from *Esusu*, bank loan and friends and relations, respectively while 1.4 per cent got capital from fadama/MDG. The results showed that few farmers patronize commercial banks for agricultural loan. It is compulsory for those that obtain bank loan to participate in insurance scheme; premium for the insurance is deducted from the loan.

Table 2. Distribution of respondents' income, farm size and cosmopolitanism

| Socio-economic characteristics                    | Frequency | Percentage | Mean  |
|---|-----------|------------|---|
| <b>Farm size (ha)</b>                             |           |            |   |
| Below 1   | 222       | 17.3       | Mean=<br>1.32<br>SD=<br>±0.63                 |
| 1-2   | 47        | 15.9       |   |
| Above 2   | 26        | 9.0        |   |
| <b>Income from fish farming (₦)</b>               |           |            |   |
| Below ₦ 501,000                                   | 207       | 70.2       | Mean=<br>₦<br>563,850<br>SD=<br>±₦<br>487,530 |
| ₦ 501,000 - ₦ 1,000,000                           | 54        | 18.3       |   |
| ₦ 1,001,000 – ₦ 1,500,000                         | 7         | 2.4        |   |
| ₦ 1,501,000 – ₦ 2,000,000                         | 11        | 3.7        |   |
| > ₦ 2,000,000                                     | 16        | 5.4        |   |
| <b>**Source of capital</b>                        |           |            |   |
| Bank loan   | 38        | 12.9       |   |
| Cooperative                                       | 135       | 45.8       |   |
| Personal Savings                                  | 225       | 76.3       |   |
| Relations/Friends                                 | 27        | 9.2        |   |
| Ajo/Esusu   | 58        | 19.7       |   |
| Fadama/MDGs                                       | 4         | 1.4        |   |
| <b>Frequency of contact with extension agents</b> |           |            |   |
| Below 6   | 244       | 82.7       |   |
| 7-12  | 27        | 9.2        |   |
| Above 12  | 24        | 8.1        |   |

Source: Field survey, 2015

Also, 82.7 per cent of the respondents had contact with extension agents at most 6 times within the last one year, 9.2 per cent had contact with extension agents between 7 and 12 times while 8.1 per cent had contact with extension agent more than 12 times within the last one year to discuss issues relating to fish farming. The low extension contacts in Nigeria contribute to factors of food insecurity. Fish farmers would have gotten useful information on Agricultural Insurance Scheme if contacts with extension were regular.

#### **Awareness of Agricultural Insurance Scheme and Sources of Information**

Results in Table 3 revealed that 70.5 per cent of the respondents were aware of Agricultural Insurance Scheme (AIS). The finding is contrary to [25] and [3] assertions that most farmers were not aware of AIS. Also the result shows that out of the 70.5 per cent of the respondents that were aware of AIS, only 18.3 per cent heard from their fellow farmers, 48.5 per cent and 24.7 per cent got to know about AIS from electronic media and extension agents, respectively.

Table 3. Distribution of respondents by awareness, period of awareness and source of information about Agricultural Insurance Scheme

| Variable                      | Frequency | Percentage | Mean                          |
|-------------------------------|-----------|------------|-------------------------------|
| <b>Awareness</b>              |           |            |                               |
| Yes                           | 208       | 70.5       |                               |
| No                            | 87        | 29.5       |                               |
| <b>*Source of information</b> |           |            |                               |
| Family Members                | 68        | 23.1       |                               |
| Friends                       | 72        | 24.4       |                               |
| Fellow Farmers                | 54        | 18.3       |                               |
| Neighbours                    | 59        | 20         |                               |
| Local Formal Organization     | 66        | 22.4       |                               |
| Extension Agents              | 73        | 24.7       |                               |
| NAIC Officials                | 63        | 21.4       |                               |
| Print Media                   | 69        | 23.8       |                               |
| Electronic Media              | 143       | 48.5       |                               |
| <b>Period of awareness</b>    |           |            |                               |
| <10 years                     | 247       | 83.7       | Mean=3.66<br>years<br>SD±2.55 |
| 10-20 years                   | 44        | 14.9       |                               |
| >20 years                     | 4         | 1.4        |                               |

\*\* Multiple responses

Source: Field survey, 2015

About 23.8 per cent and 24.4 per cent heard from print media and friends, respectively. This implies that the major source of information to the respondents was electronic media. This might be due to the fact that electronic media transmission is air-borne and therefore far reaching since majority of the farmers were in possession of transistor radio powered with batteries in case there is no electricity within their vicinity. In addition, most of the farmers in the study area were educated and might likely have access to internet facilities through their mobile phones.

About 83.7 percent of the respondents only got to know about AIS less than 10 years ago and very few, 1.4 percent knew about AIS more than 20 years ago. The mean year of awareness was  $3.66 \pm 2.55$  years.

#### Awareness of the procedures of Agricultural Insurance Scheme

Results from Table 4 revealed that about average (51.2%) of the respondents heard about collection of proposal form from NAIC based on projects to be insured, 33.6 per cent were not aware while 15.3 per cent experienced it. Also, very few (15.3%) of the respondents experienced that NAIC educates or enlightens their client on how to complete the form and also the terms and conditions of the policies whereas, 38.6 per cent and 46.1 per cent of the respondents were not aware and had

heard about it, respectively. As regards computation of appropriate premiums based on the estimated cost of production or sum insured of the project, only 15.3 per cent experienced it, 51.2 heard about it while 33.6 per cent were not aware of it. Also, equal percentage (38.6%) of the respondents were not aware of issuance of debit note to facilitate premium payment and issuance of certificate of provisional insurance cover as a proof of OFFER of provisional cover, 46.1 per cent heard about it while 15.3 per cent experienced both procedures. About 38.6 per cent of the respondents were not aware of insurance policy documents for the insured's use and documentation, 46.1 per cent and 15.3 per cent heard about and experienced it, respectively.

Table 4. Distribution of respondents by awareness of the procedures of AIS

|   | Not Aware<br>F (%) | Heard about<br>F (%) | Experienced<br>F (%) |
|---|--------------------|----------------------|----------------------|
| <b>FOR INSURANCE COVER:</b>   |                    |                      |                      |
| Collection of proposal form From NAIC based on projects to be insured.  | 99(33.6)           | 151(51.2)            | 151(51.2)            |
| Education or enlightenment on how to complete the form and also the terms and conditions of the policies.   | 114(38.6)          | 136(46.1)            | 45(15.3)             |
| Computation of appropriate premiums based on the estimated cost of production or sum insured of the project.  | 99(33.6)           | 151(51.2)            | 151(51.2)            |
| Issuance of debit note to facilitate premium payment.   | 114(38.6)          | 114(38.6)            | 45(15.3)             |
| Issuance of Certificate of Provisional Insurance Cover (CPIC) as a proof of offer of provisional cover.   | 114(38.6)          | 136(46.1)            | 45(15.3)             |
| Issuance of policy document for the insured's use and documentation.  | 114(38.6)          | 136(46.1)            | 45(15.3)             |
| <b>FOR CLAIM SETTLEMENT:</b>  |                    |                      |                      |
| <b>NOTIFICATION:</b>  |                    |                      |                      |
| Sending of E-mail to headclaimre@naic.com.ng or notification either by insured or their agent through telephone or through the nearest NAIC Branch Managers.  | 98(33.2)           | 152(51.5)            | 45(15.3)             |
| <b>CLAIM INSPECTION:</b>  |                    |                      |                      |
| On receipt of notice of loss, the claim officer carrying out an on the spot inspection of the reported loss in the presence of the insured/bank officials to have first-hand information and details of the loss. | 99(33.6)           | 151(51.2)            | 45(15.3)             |
| <b>CLAIM DOCUMENTATION:</b>   |                    |                      |                      |
| Completion of claim form and submission of other supporting documents required by the client.   | 99(33.6)           | 151(51.2)            | 45(15.3)             |
| Time within which claim is adjusted and offer made.   | 114(38.6)          | 136(46.1)            | 45(15.3)             |

Source: Field survey, 2015

Furthermore, only 15.3 per cent of the respondents notified loss by sending of e-mail or notification either by insured or their agents through telephone or through the nearest NAIC branch managers whereas 51.5 per cent and 33.2 per cent of the respondents heard about it and were not aware of it, respectively.

Also, equal number (15.3 %) of respondents experienced claim inspection and claim documentation by completion of claim form and submission of other supporting documents required by the client to NAIC officials. Lastly, just 61.4 per cent of the respondents were

conversant with the time within which claim was adjusted and offer made.

### Level of awareness of Agricultural Insurance Scheme

Level of awareness of AIS was measured based on farmers' awareness of certain procedures for Agricultural Insurance cover and claims settlement discussed above.

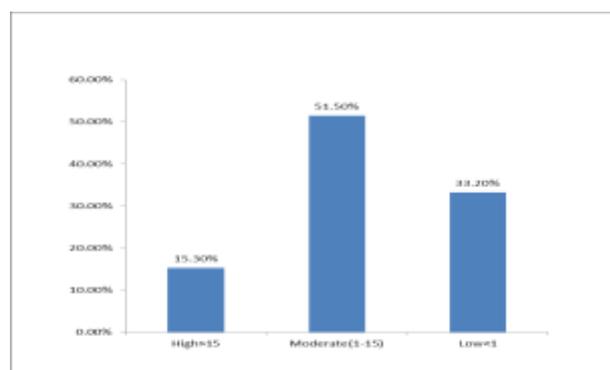


Fig.1. Level of awareness of AIS  
 Source: Field survey, 2015

Results from Figure 1 revealed that about average (51.5%) of the respondents had

moderate level of awareness, 15.3 per cent had high level of awareness, while 33.2 per cent low level of awareness.

The implication of this finding is that majority of the respondents had a moderate level of awareness of AIS, although most of the respondents had heard about the scheme but they did not know the nitty-gritty of Agricultural Insurance Scheme.

### Farmers' participation in Agricultural Insurance Scheme

The study considered participation in Agricultural Insurance Scheme/ policies for a period of 5 years that is, from 2011 to 2015 when data were collected.

Results in Table 5 showed that only 15 per cent of the respondents subscribed to fish policy. This implies that very few (15%) of the respondents were under fish policy cover for the last 5 years.

Table 5. Distribution of respondents by participation in Agricultural Insurance Scheme

| Fish policy cover         | No participation<br>(number of times within the last five years) |             |             | Participation<br>(number of times within the last five years) |            |            |
|---------------------------|--|-------------|-------------|---|------------|------------|
|                           | 0  | 1           | 2           | 3   | 4          | 5          |
| Outbreak of diseases      | 251<br>(85.1)  | 19<br>(6.4) | 11<br>(3.7) | 7<br>(2.4)  | 5<br>(1.7) | 3<br>(1.0) |
| Outbreak of pests         | 252<br>(85.4)  | 18<br>(6.1) | 10<br>(3.4) | 7<br>(2.4)  | 5<br>(1.7) | 3<br>(1.0) |
| Drought/dryness of pond   | 268<br>(95.9)  | 12<br>(4.1) | 6<br>(2.0)  | 4<br>(1.4)  | 3<br>(1.0) | 2<br>(0.7) |
| Lightning/thunderstorm    | 283<br>(95.9)  | 9<br>(3.1)  | -           | -   | 1<br>(0.3) | 2<br>(0.7) |
| Heavy rainfall/flood      | 260<br>(88.1)  | 17<br>(5.8) | 8<br>(2.7)  | 5<br>(1.7)  | 3<br>(1.0) | 2<br>(0.7) |
| Storm/wind                | 285<br>(96.6)  | 6<br>(2.0)  | 3<br>(1.0)  | -   | -          | 1<br>(0.3) |
| Pilfering/theft           | 252<br>(85.4)  | 18<br>(6.1) | 10<br>(3.4) | 7<br>(2.4)  | 5<br>(1.7) | 3<br>(1.0) |
| Fire incidence            | 275<br>(93.2)  | 18<br>(6.1) | 3<br>(1.0)  | 2<br>(0.7)  | 3<br>(1.0) | 2<br>(0.7) |
| Death of fishes           | 252<br>(85.4)  | 18<br>(6.1) | 10<br>(3.4) | 7<br>(2.4)  | 5<br>(1.7) | 3<br>(1.0) |
| Collapse of fishpond dyke | 255<br>(86.4)  | 18<br>(6.1) | 10<br>(3.4) | 6<br>(2.0)  | 4<br>(1.4) | 2<br>(0.7) |

Source: Field survey, 2015

The table showed that fish farmers' subscription to insurance cover was found to be high in six out of ten policy cover for the first year, 2011 and these were; outbreak of diseases (6.4%), outbreak of pests (6.1%), collapse of fish pond dyke (6.1%), death of fishes (6.1%),

theft (6.1%), and heavy rainfall or flood (5.8%). Also, subscription of fish farmers were also found to be high in outbreak of diseases (3.7%), outbreak of pests (3.4%), death of fishes (3.4%), collapse of fish pond (3.4%) and theft (3.4%) for the second year, 2012. It was

further revealed that just 2.4 per cent of the respondents took cover under outbreak of pest, theft and death of fishes for only three years, 2011 – 2013, while 1.7 per cent took cover for outbreak of pest and diseases, theft and death of fishes for four years. Lastly, very few (1.0%) of the respondents took policy cover under outbreak of pests, theft and death of fishes for the fifth year.

The results revealed that the percentage of the participants in all the fish policy was getting reduced since 2011 till 2015 when the data were collected.

This could be that the respondents have acquired enough knowledge and skill from the experiences in the enterprise as to skip the policy the following years after the first year of the policy.

This is to say that when the respondents have acquired the skill and knowledge to guide against an incidence, they would thrust that the risk would be maximally reduced, thus bear the risk themselves.

#### Level of farmers' participation in Agricultural Insurance Scheme

Results in Figure 2 further revealed the categorization of participants by their participation in NAIS.

Majority (82.3 %) of the respondents had moderate participation level, only 4.4 per cent of the respondents had low participation level while about 13.3 per cent had high participation level. This implies that NAIC officials and extension agents still need to improve on enlightening fish farmers to participate in the policies since only about 15 per cent of them participated in the scheme.

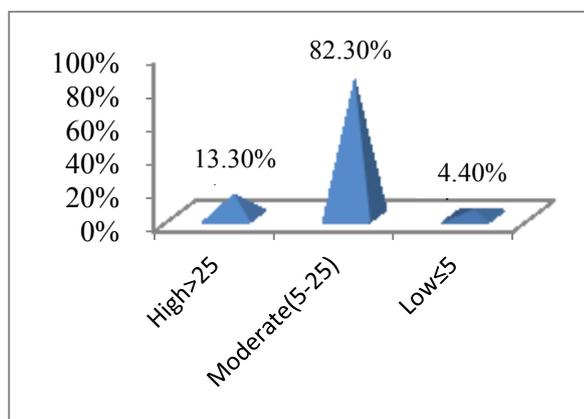


Fig. 2. Level of farmers' participation in Agricultural Insurance Scheme.

Source: Field survey, 2015

#### Result of multiple regression analysis

Results in Table 6 showed that of all the variables subjected to multiple regressions, only six were found to be significant predictors. These variables were age, source of information, household size, frequency of contact with extension agent, period of awareness and awareness. The R and R<sup>2</sup> values of 0.759 and 0.576, respectively indicated that the selected variables had strong correlation on the level of fish farmers' participation in AIS; R<sup>2</sup> value was 0.576 which means 57.6 per cent change in the dependent variable were caused by the variance of the independent variables mentioned. The F-value was 19.967 which mean that the variables explained by the regression model were not due to chance. Age (b=0.141; p ≤ 0.05), this shows that the more the age the more the level of participation in AIS. This could be linked with the experience of the fish farmers, the experienced ones would want to remain in business, thus look for every avenue to remain in business. Frequency of contact with extension agent (b=0.092; p ≤ 0.05), this shows that the more the extension contact, the better the level of participation in AIS. Numbers of years of awareness (b=0.329; p ≤ 0.01) and awareness of AIS (b= 0.582; p ≤ 0.01) were significant and positively contributed to the level of fish farmers' participation in AIS. The better the level of awareness, the better the participation in AIS. While number of sources of information (b= -0.251; p ≤ 0.01) and household size (b= -0.160; p ≤ 0.01) were significant and negatively contributed to fish farmers' participation in AIS. This implies the larger the household size, the lesser the participation in AIS which may be due to the fact that the bigger the household size, the bigger the responsibility (most especially financial responsibility) that might be drifting the respondents away from participating in the scheme. Since the scheme would also draw money from the household, thus they would want to reduce their spending. These six variables are crucial in explaining fish farmers' participation in Agricultural Insurance Scheme (AIS). This implies that anytime level of fish farmers' participation in AIS would want to be determined, these six variables should be carefully considered.

Considering the magnitude of regression for each of the significant variable, a relationship is thus formed from the equation

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_0$$

$$Y = 1.909 + 0.141(0.042) - 0.160 (0.155) - 0.251(0.118) + 0.092 (0.056) + 0.329(0.081) + 0.582 (0.056)$$

Table 6. Regression analysis

| Model                                     | B        | $\beta$  | T        | p-value |
|---|----------|----------|----------|---------|
| Constant                                  | -4.693   |          | -2.459   | 0.015   |
| Attitude                                  | -0.005   | -0.019   | -0.343   | 0.732   |
| Number of sources of information          | -0.606   | -0.251** | -5.151   | 0.000   |
| Household size                            | -0.427   | -0.160** | -0.160** | 0.006   |
| Farm size in Hectares                     | 0.038    | 0.010    | 0.213    | 0.831   |
| Years in fish Farming                     | 0.053    | 0.093    | 1.751    | 0.081   |
| Number of years spent in school           | 0.047    | 0.035    | 0.738    | 0.461   |
| Age of respondents                        | 0.094    | 0.141*   | 2.238    | 0.026   |
| Income from fish farming                  | 2.932E-7 | 0.044    | 0.819    | 0.413   |
| Frequency of contact with extension agent | 0.116    | 0.092*   | 2.075    | 0.039   |
| Income from other farming activities      | 2.706E-6 | 0.051    | 1.181    | 0.239   |
| Income from other occupation              | 7.368E-7 | 0.047    | 0.901    | 0.369   |
| Number of ponds                           | -0.097   | -0.050   | -1.081   | 0.281   |
| Years of awareness                        | 0.483    | 0.329**  | 5.945    | 0.000   |
| Frequency of travel                       | 0.068    | 0.024    | 0.539    | 0.591   |
| Awareness                                 | 0.604    | 0.582**  | 10.833   | 0.000   |

Source; Field survey, 2015

## CONCLUSIONS

In conclusion, the level of participation in Agricultural Insurance Scheme (AIS) in Ondo State was still very low despite the claim by a good percentage of the fish farmers that they were aware of AIS.

It is therefore recommended that policy makers should consider the significant variables such as age, sources of information, household size, awareness and contact with the extension agents when planning for participation in AIS. It is also necessary to investigate into the factors that hinder participation of fish farmers in AIS despite high level of awareness.

Agricultural Insurance Corporation should indemnify insured farmers whenever there is disaster.

Government, Agricultural Insurance Corporation and extension agency should improve on awareness creation.

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## MORAL HAZARD IN THE USE OF AGRICULTURAL CREDITS BY IRANIAN FARMERS: A CASE STUDY DEZFUL TOWNSHIP

Mohammad AGHAPOUR SABBAGHI

Islamic Azad University. Agricultural Management Department. Shoushtar Branch, Iran. Email: aghapoor@ut.ac.ir

*Corresponding author:* aghapoor@ut.ac.ir

### *Abstract*

*The presence of moral hazard in the use of the granted facilities in the agricultural sector is among the most important challenges of Iran's agricultural system. Given the high degree of such moral hazard in Dezful Township, in the present study the factors influencing it, has been examined in this city. In this study the binary Logit model was used and the data was obtained randomly through questionnaire from 249 farmers who were granted farm facilities in the year 2015. The study results showed that the variables like age, having occupation other than farming and the loan interest rate have a positive effect on the moral hazard and the other variables including the education level, the education major, income level, size of irrigated lands, having break period, experts visit and the degree of mechanization have negative effect on the moral hazard in farm facilities. Making the necessary predictions and implementing regular visits upon granting the facilities and considering the personal qualifications like holding agricultural related degrees are among the most important recommendations of the present study in order to reduce the moral hazard in Dezful township.*

*Key words:* moral hazard, agricultural sector facilities, Logit Model, Dezful township

### INTRODUCTION

Investment in agriculture sector in addition to paving the way for production growth and employment in the sector, would help in the production growth and employment in other sectors as well so that it creates more employment opportunities in rural areas and prevents from immigration of the villagers to the cities [14]. The agricultural facilities are regarded as the main policy making means for the growth and production as well as using new technologies in agriculture sector [13]. The agricultural development requires change of the production methods from the subsistence farming to the commercial method and this change requires optimum allocation of the financial resources [1]. Farming credits as one of the subsidiaries of the rural credits are allocated to the poor and vulnerable employees working in the agriculture sector to boost their welfare and the production [8]. Target setting in relation with this credits in developing countries must be towards villagers, because the best part of active workforce of such countries is working in the agricultural sector [5].

Iran's agriculture sector is one of the most important sections of the country's economy; however the investment in this sector is not considerable compared with other sectors since of its performance and capacity. On the other hand the high risk of activity in agriculture sector and low income of the small-sized farms units necessitates the provision of credits for financing of the agriculture sector [11].

In Iran in order to support the agriculture sector producers in the frame of development programs and annual budgets, considerable amounts of credits in the form of loan with managed funds are allocated to them. Keshavarzi Bank (Agribank), which is known as the main financial and credit institution of the agricultural sector of Iran, pays about 70 percent of the required credits by this sector to supply the needed current facilities for the maintaining and exploitation of the production capacities of this sector. One of the major challenges concerning the agricultural credits is the manner of using this credit facilities by the farmers. Evidences suggests that despite the allocation of huge capitals in the form of bank facilities to the agriculture sector, significant part of the farmers receiving

agricultural loan, use in other sectors. Fulfilling the consumption and subsistence needs, restoration and building construction, paying the past dues and debt, trip, non-agricultural economic activities, [12]. Indeed, the cash nature of the loans causes mobility to another sectors and convertibility of them. The mobility of agriculture credits by itself has been caused the “ethical risks” [16]. Researchers consider different factors effective this moral hazard in the use of the granted facilities. In the studies like Bashiru et al [4], Wongnaa & Awonyu-Vitor [18], Oboh & Ekpebu [10], Afolabi [2], Varmazyari et al [17], Mohamadi-Yeganeh [9], Sharifi- Renani et al [15], Fouladi [7] in addition to the personal specifications of loaners, consider some variables as type of farming facility, interest rate of facilities, no. of inspections after granting the loan and the existence of break period as effective moral hazard in the use of the granted facilities.

Statistics in Dezful Township indicate that many credits granted by Keshavarzi Bank, Dezful branch have been invested in the other sectors such as industry, according to acquired information from Keshavarzi Bank across the township moral hazard reaches to more than 80 percent. In other words, moral hazards regarding the credits received by the farmers are a serious risk in financing the agriculture sector which will result in outflow of capital in long term. Accordingly, in a case study the factors effective this moral hazard concerning the using of credits in agriculture sector across Dezful Township area in the year 2015 has been investigated.

## MATERIALS AND METHODS

The dependent variable in this study is a dummy variable in the form of zero and one values (‘zero’ for those that have been used the loan in agriculture sector and ‘one’ for the farmers that have used the facilities in a sector other than the agriculture sector). Hence in the present study the Logit Binary Model has been used. In this model, the variables relevant to the personal, economical and agricultural characteristics of borrowers and the granted

facilities' features have been considered in deviation of the received facilities.

$$y_i = a_0 + \sum_{i=1}^{10} a_i x_i + \varepsilon_i \quad (1)$$

In the above relationship  $y_i$  shows the moral hazard in the received facilities, indicating two ‘one’ value (using in other sectors) and ‘zero’ value (using in agricultural sector).  $x_i$  is The  $i$ th explanatory variable that affected manner of received facilities using by the farmers. The explanatory variables in this study are as follows:

Age ( $x_1$ ): is a continuous variable that shows the age of the receiver of facilities at the time of obtaining loan.

Education level ( $x_2$ ): Indicative of the education level of the borrower

Field of education ( $x_3$ ): as a dummy variable has the value of ‘one’ for the degree of education related to agriculture and ‘zero’ value for other disciplines.

Size of irrigated lands ( $x_4$ ): is a continuous variable that shows the total irrigated lands owned by the receiver of facilities at the time of receiving the loan.

Having a second occupation besides farming ( $x_5$ ): a dummy variable having the value of ‘one’ when the farmer has another profession beside farming, and the value of ‘zero’ when the farmer is active only in the field of farming.

Break period ( $x_6$ ): in this variable the values of ‘1’ and ‘2’ are considered for loans with and without break period respectively.

Annual Income ( $x_7$ ): a continuous variable that shows the annual income of the receiver of the facilities.

Degree of mechanization ( $x_8$ ): a variable that measures the degree of mechanization of farming.

Profit of the received credibility. ( $x_9$ ): The facility interest rate by type of contract that can be expressed as a percentage.

Number of inspections by the bank experts. ( $x_{10}$ ): shows the number of inspections by the bank experts regarding the loan consumption method in order to confirming the good performance and physical progress.

The statistical society in this study comprises all 900 villager farmers receiving farm facilities in Dezful Township from Keshavarzi bank. In the present study the personal interview has been used for gathering information and statistics. Also since we don't have any reason for using another sampling method such as Classification or Clustering, random sampling method was used to determine the sample size which on this basis and using Morgan table the sample size has been considered as equal to 269 farmer.

## RESULTS AND DISCUSSIONS

Table (1) represents the statistical features of some of the variables under study.

Table 1. Statistical features of some of the variables under study

|                              | Average | Min | Max |
|------------------------------|---------|-----|-----|
| Age                          | 43.19   | 19  | 80  |
| Annual Income(million Rials) | 245     | 18  | 41  |
| Farmland                     | 4.14    | 1   | 20  |
| granted facilities           | 65      | 10  | 250 |

Source: Own calculation.

As can be seen from the Table above, the average age of the under study society is about 43 years with broad distribution from 19 to 80 years old. Average annual income of the villagers is 245 million Rial which is a figure close to the national average of 230 million. The average 4 acres of farmland of under cultivated farmlands in Dezful city is indicative of the smallness of farm pieces. Finally the average granted facilities by Keshavarzi bank in the township is 6.5 million Rial, fluctuating between 10 to 250 million Rial. In part of the questionnaire the reasons for moral hazard in the received facilities is asked, the most important of which are referred to in Table (2).

The results presented in Table 2 shows that from the farmers' perspective the three factors including low profit of the agriculture sector compared with other economic sectors, lack of proper supervision on the loans' using and the income risk and lack of stable incomes during the year are among the most important reasons for the facilities deviation across Dezful Township.

Table 2. Reasons for moral hazard in using facilities in Dezful Township from farmers' perspective

| Reason  | Mean | Standard deviation | Coefficient of changes | Ranking |
|---|------|--------------------|------------------------|---------|
| short-term reimbursement period   | 55/2 | 12/1               | 439/0                  | 6       |
| income risk and shortage of stable income during the year                                     | 81/2 | 07/1               | 38/0                   | 3       |
| Low interest rate of the profit resulting from farming activities compared with other sectors | 21/3 | 78/0               | 242/0                  | 1       |
| high interest rate of facilities  | 76/2 | 09/1               | 394/0                  | 4       |
| seasonal nature of the activities in agriculture sector                                       | 44/2 | 09/1               | 446/0                  | 7       |
| Lack of proper supervision of the loan consumption  | 88/2 | 94/0               | 326/0                  | 2       |
| Lack of adequate support on the part of the state for agricultural activities                 | 5/2  | 05/1               | 42/0                   | 5       |

Source: Own calculation.

This suggests that the adoption of new strategies for increasing the agricultural sector profitability should be considered; something that has been emphasized in Bagheri et al., (2009) as well [3].

Table 3. The results of Logit model

| Variables                  | Coefficients | T-value    | Weight Elasticity             | Marginal Effect |
|----------------------------|--------------|------------|-------------------------------|-----------------|
| Intercept                  | 0.28         | 0.11       | -----                         | -----           |
| Age                        | 0.11         | 2.91***    | 0.09                          | 0.05            |
| Education                  | -0.09        | -2.98***   | -0.11                         | -0.07           |
| Education                  | -0.13        | -3.14***   | -0.14                         | -0.04           |
| Size of irrigated          | -0.11        | -2.99***   | -0.09                         | -0.11           |
| Having a                   | 0.14         | 3.12***    | 0.16                          | 0.11            |
| Having break               | 0.22         | 2.88***    | 0.18                          | 0.13            |
| Income                     | -0.26        | -2.01***   | -0.25                         | -0.16           |
| Degree of mechanization    | -0.17        | -1.99**    | -0.15                         | -0.09           |
| Facility interest          | 0.28         | 3.95***    | 0.21                          | 0.1             |
| No. of experts'            | -0.35        | -3.88***   | -0.29                         | -0.18           |
| R <sup>2</sup> Madala:0.52 |              | LR: 191.12 | R <sup>2</sup> McFadden: 0.53 |                 |

Source: Own calculation on the basis of data \* = level (10%) \*\* level (5%) \*\*\* = level (1%)

To investigate the presence or absence of heteroscedasticity in binary models, it would not be possible to use the typical methods like the Brooch-Pagan, Whith and Goldfield - Quant test methods. Davidson and McKinnon (1982) [6] introduced statistics titled LM2 for heteroscedasticity test in Logit and Probit models. This statistics is based on LM method in which a dummy regression using Logit and Probit estimation results is formed and this dummy regression is used for heteroscedasticity test. Results of this

statistics reject the heteroscedasticity assumption in this model. It is clear that the model's overall performance is very good. The variables in the model explain some 52% of the variation in the budget surplus and are jointly significant at beyond the 99% confidence level (as indicated by the F test at the bottom of Table 3). In Logit model, the initial estimated coefficients show only the explanatory variables effect on the dependent variables probability without value interpretation. In this case the marginal effect and weight elasticity having been reported in columns 4 and 5 of the above table. The elasticity has been calculated using the estimated parameters of Logit model and the mean of the relevant variables. Turning to the variables in the model, it can be seen that these generally behave as expected.

As can be seen from the above table, variables like the age, having a second job other than farming and the facility interest rate have positive effect and variables like the education level, education degree, income, size of irrigated lands, having break period, no. of experts' visit and degree of mechanization have negative effect on the moral hazard of facilities using.

In this table the positive sign has been obtained for the variable "Age", indicating that the age increase can cause the moral hazard of facilities using. Particularly, the elasticity estimates indicate that a surplus equal to 10% of age leads to a surplus of approximately 0.9% in the moral hazard of facilities using.

The negative factor obtained for the education variable shows that granting loans to the educated people decreases the probability of moral hazard, especially if education be related to agriculture. The same finding has been emphasized in Varmazyari et al. (2010) and Oboh & Ekpebu (2011) studies [10, 17]. The final effect resulted for the variable 'education degree' shows that averagely there will be 4% lower probability for those farmers having an agriculture related degree to moral hazard compared with other farmers.

The coefficient resulting for the 'irrigated lands' variable is 0.11 with negative sign, indicating that the increase in the area of cultivated lands produces negative effect on the moral hazard in facilities. A 0.09 elasticity

for this variable shows that an increase of about 10% in the area of cultivated lands shall decrease 0.9% probability of moral hazard. Possessing more areas of land in addition to influencing the financial power of the farmers for reimbursement of loans is considered an important motivation for investment of the received loan in agriculture sector. Having an occupation in a sector other than agriculture is one of the most important factors in probability of moral hazard. Considering the binary nature of this variable, the final effect was used for interpretation of this variable. This effect demonstrates that the farmers having a second job are disposed to moral hazard with 11% probability more than farmers who only active in the field of agriculture.

From among the important variables involving in the moral hazard, the lack of break period of loan reimbursement is notable. The positive coefficient of this variable shows that the moral hazard probability will increase by the lack of break period for the loan.

The 'income' is a variable in this study that its negative relationship with moral hazard has been proved at 1%. The study conducted by Mohamadi-Yeganeh and et al, (2012) [9] referred to the above as fact. These shows that financial empowerment of the farmers can result in their loan are used in agriculture sector and thereby preventing from moral hazard. The ability to make appropriate decisions on the investment of loan and having the proper authority to deal with the volatility and risk in the agriculture sector is one of the reasons for these findings. The obtained elasticity for this variable also is indicative of the fact that an increase of 10% in this variable reduces the moral hazard probability of agriculture facilities up to 2.5%.

The negative coefficient of the variable "degree of mechanization" reflects that the increase in the degree of mechanization in Dezful Township regions could in part reduce the moral hazard in facilities using in agriculture sector. On the one hand, self-mechanization of agriculture is something requiring capital and hence would be a point for using of the received loans. On the other hand, mechanization of agriculture can be considered as a factor effective in increasing

the income and dependency of the farmers to activities in this sector. The elasticity obtained for this variable shows that an increase of 10% in the degree of mechanization of the region can reduce the moral hazard probability up to 1.5% in facilities. The positive coefficient for the 'facility interest rate' indicates the potential increase in moral hazard in facilities using with the increase in the percentage of the interest of the granted loan. The elasticity obtained for this variable also shows that an increase of 10% in the interest rate of the can increase the facilities' moral hazard probability up to 2 percent. The findings show that one of the most important factors in reducing the moral hazard is the number of visits by the bank experts regarding the using of loans in agriculture sector. This finding has also been emphasized in Bagheri et al., (2009) [3] and Varmazyar, et al. (2010) [17]. The resulting elasticity for this variable shows that a 10 percent increase in the amount of visits can reduce the possibility of moral hazard for 9.2 percent.

## CONCLUSIONS

In this study, one of the major problems of the financial sector in rural communities of the country, called as moral hazard in facilities using in the agriculture sector across Dezful township region is taken into consideration. According to Dezful township farmers' views, the low profit in agriculture sector compared to other economic sectors such as industry and services, is the major cause of moral hazard. Hence the adoption of policies and plans for increasing the profitability of the agriculture sector and empowering its competitiveness vs. other economic sectors in absorption of investments is emphasized.

The results indicate that the implementation of regular and continuous monitoring by the bank can be considered a very important factor in reducing the moral hazard in the agriculture sector facilities. Thus the anticipation and implementation of regular visits by bank experts during granting facilities by banks is among the most important recommendations of this study. Also considering the negative effect of the size of irrigated lands on the moral hazard, development of plans and policies for

increasing the farmers' ownership and increasing their cultivated lands' area is recommended to reduce the moral hazard in line with the using of facilities in agriculture sector.

High income is among the factors effective in the reduction of moral hazard probability. Hence the decision making and planning to reduce the income risks and boosting the financial abilities of the farmers lies among other recommendations of this study to reduce the moral hazard in agriculture sector. Findings showed that the increase in degree of mechanization can reduce the moral hazard in agriculture sector facilities; hence, the planning and policy-making in order to increase the degree of mechanization in Dezful Township area (given the low degree of mechanization in the city), can be an effective factor in reducing the dependent variable.

Also taking into account the degree of agricultural mechanization at the time of granting such facilities can be considered one of the solutions to reduce moral hazard. Education is among the individual variables that can have positive effect on reducing moral hazard in the agriculture sector. Therefore, we would recommend that having education and knowledge, especially in the field of agriculture be considered as one of the qualifications in granting facilities by banks. Findings showed that activity in the non-agriculture sector is one of the reasons playing significant role in increasing the moral hazard in facilities using in agriculture sector.

This shows that policymaking for preventing the farmers from occupation in second jobs such as planning for increasing their income in the sector and decreasing the income fluctuations can be considered as significant factor for using facilities in agriculture sector.

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## VALUE CHAIN OF SHALLOT AGRIBUSINESS IN MEDIUM LAND OF MAJALENGKA, WEST JAVA, INDONESIA

Sri Ayu ANDAYANI<sup>1</sup>, SUHAENI<sup>2</sup>, Latief Z NUR<sup>3</sup>

<sup>1</sup>University of Majalengka, Faculty of Agriculture, Jl. KH Abdul Halim 103 Majalengka 45418, West Java, Indonesia

<sup>2</sup>University of Singaperbangsa, Agribusiness Studies Program, Jl. H.S. Ronggowaluyo, Teluk Jambe, Karawang 41361, West Java, Indonesia.

<sup>3</sup> University of Majalengka, Management Studies Program, Faculty of Agriculture, Jl. KH Abdul Halim 103 Majalengka 45418, West Java, Indonesia

**Corresponding author:** sri.ayuandayani@yahoo.com

### Abstract

*This study has a purpose to assess the value chain of shallot agribusiness in medium land of Majalengka. The data is collected through interview using a questionnaire that was prepared in advance. Respondents in this study include agroinput actors, growers or shallot farmers, market participants (wholesalers, retailers), financial institutions, partner institutions, and required resources. This study uses a value chain analysis through stages of entry points, value chain mapping, value chain management, the determination of the profit margin on each chain actors, analysis of governance structures, and upgrading the value chain. The results showed that agribusiness value chain management needs to be improved, both at primary actors and supporting actors. Their business is profitable and worth the effort. There are five marketing channel patterns of shallot in the medium land of Majalengka. The biggest profit margin is in channel pattern one, namely farmers-farmers' groups-partner institution-consumer.*

**Key words:** value chain, shallot, marketing patterns

### INTRODUCTION

Shallot (red onion) is one of the agricultural products with high economic value. This commodity has a potential to increase farmers' income. Shallots are commonly consumed as cooking spice in Indonesian household. Nevertheless, shallot production is slower compared to the very high demand of the product from household and food industry which pushes up its price.

Majalengka is one of the shallot-producing regency in West Java Province, Indonesia. The average productivity of shallot in Majalengka in 2016 amounted to 9.84 tonnes/ha [2]. Shallot commodities spread across three lands; the highlands, medium land, and lowland. Majalengka is also one of the regions that receives the agribusiness cluster development program of shallot initiated by *Bank Indonesia*. However, Majalengka has a low level of shallot productivity under production potential of above 20 ton/ha. Some of the causes include the following: (a) the availability of quality seed, (b) the limitations of infrastructure and

production facilities, (c) the implementation of SOP-specific location properly, (d) problem of unfair marketing in each chain.

The problems of various in onion commodity in Majalengka Regency could be rank according the problems related to pest attack, provision of facilities to finance the purchase of fertilizers and pesticides as well as imported onions that cause low selling price onion farmers in the market [3].

It is in line with research [1], the problems that often arise in system of horticulture agribusiness in general is the problem from the stage of production to marketing of horticultural products have not fully provide the optimal incentive to farmers, part of value received by farmers is still minimal when compared with the actors in other links.

Nevertheless, the position of shallot supply during the last five years is surplus. The problem of domestic shallot market is price fluctuations caused by the uneven distribution throughout the year (there is rainy season as off-season) as well as poor management of stock mechanism which causes the insufficient

production within high-season to meet the need of off-season. Therefore, a reformation in shallot production management during the dry season (high-season) and rainy season (off-season) is needed to sustain the shallot production throughout the year in the lowlands, medium land, or highland.

This phenomenon raises an interesting research question of how to create an efficient value chain and deliver justice at every point of shallot agribusiness, followed by the ability to accelerate the development of shallot agribusiness viewed from the added value and production sustainability to guarantee farmers' income.

## MATERIALS AND METHODS

### Research methods

The value chain of shallot agribusiness research in the medium land of Majalengka uses primary and secondary data. Primary data was collected by questionnaires from respondents. In general, respondents consist of agro-input actors, growers or shallot farmers, market participants (wholesalers, retailers), financial institutions, partner institutions, and other sources needed. Secondary data were obtained from the Central Bureau of Statistics, Agriculture Department of Majalengka, West Java Province; Agricultural Department and other related agencies.

This research was conducted in farmers' group of Cijurey, Kulur village, in the medium land of Majalengka regency. Samples determined by non probabilistic with entry point of main business actors (shallot farmers), continue with forward and backward searching using snowball sampling to obtain samples at the next point in the value chain mapping, analysis of governance structure, critical success factor, and upgrading the value chain [5].

### Analysis method

The onion value chain is the key skeleton key for setting the onion input factor and its service, than the two are incorporated in order to grow, transform or produce a product, how to product moves physically from producer to consumer, how to make product and value along marketing chain so as to improve the efficiency [10].

The analytical method used is value chain analysis with the following stages:

(1)Entry point (shallot farmers), is used to determine the starting point of the research. Once the entry point is determined, the next thing to do is searching using snowball system to obtain a sample for the next point up to the consumer.

(2)Value chain mapping, is determined after the identification of the main actors of the value chain and other actors obtained by tracing backward and forward. Value chain mapping is used to:

(a)Identifying the factors that play a role in the formation of the value chain

(b)Mapping the flow of money that rolls along the value chain.

(c)Mapping the flow of goods ranging from agro-input (upstream) to agro-output (downstream).

(d)Mapping the flow of information on prices, demand, and production planning as well as new innovation.

(e)Mapping the flow of logistic reserve in the form of return goods.

(f)Identifying and mapping the supporting industry and stakeholders involved.

(3)Analyzing the value chain management at every point of the chain

(4)Determining the profit margin of each actors which is obtained through the input-output relationship and then calculate the business feasibility. The approaching method used to calculate the business feasibility can be done by R/C ratio [4]

(5)Analysis of Government Structure is determined after actors and map of the value chain are known. After that, the relevant institutions which are likely to be involved in improving the value chain of shallot need to be identified.

(6)Value chain improvements are done by optimizing the efficiency level of the existing chain by promoting the principle of justice for all actors in the marketing chain.

## RESULTS AND DISCUSSIONS

### Product Characteristics of Shallot in Medium Land of Majalengka

The research product of shallot in the medium land is conducted in Cijurey farmer groups, Kulur village, District of Majalengka, West Java, Indonesia. The group is chaired by *Mr. Didi* with 25 members. Shallot variety cultivated is *Bima Curut*, that suitable to be planted in the medium and lowland area. Based on the research results, the *Bima Curut* variety grown in the medium land has 48.2 cm height with 9.1 fruit bulbs [6]. *Bima Curut* variety preferred by farmers because of its larger-size bulbs, that preferred by consumers and it is expected to penetrate the supermarket and get a high-value selling.

The average highest harvest of shallot in medium land acquired in June, July, and August, which known as the great harvest months, when the highest yields can reach 10-13 ton/ha; even the average yields only around 5-7 ton/ha/year. Meanwhile, in September, October, and November, the supply of shallot is decreased due to the difficulties in obtaining irrigation water, and also between January to May, the supply of shallot is quite rare because farmers rarely grow shallot. Between December to March (the rainy season) the

farmers will switch their crop into rice or vegetables.

Shallot commodity is planted gradually in the medium land of Majalengka. The first planting was between November - December, the second was between March to May, and the third was in June to August. Furthermore, farmers would plant rice until the shallot planting season comes. Thus, the shallots are planted three times a year by intercropping with red pepper, bird's eye chilli, vegetables, and bitter melon. The Shallot Supply in medium land of Majalengka in One Year, can be seen in Table 1.

The characteristics of shallot quality, based on market demand, and drying process is one of the quality characteristics which is determined by the intended market, which are:

- (i) Local quality red shallot (drying for 2-3 days)
- (ii) Skip quality red shallot (drying for 7-10 days)
- (iii) Shallot without leaves and roots (*Rogol* red shallots quality)
- (iv) Shallot that have been cleaned from residual soil (*Red shallot pretes* quality).

Table 1. The Shallot Supply in Medium Land of Majalengka in One Year

| Month                     | 1  | 2 | 3  | 4 | 5 | 6  | 7 | 8 | 9   | 10 | 11   | 12 |
|---------------------------|--|---|--|---|---|--|---|---|---|----|--|----|
| Total Production          | January to the middle of March, crop rotation by planting rice |   | Medium   |   |   | High   |   |   | September to the middle of November, crop rotation by planting rice |    | Low  |    |
| Source of Procurement     |  |   | <i>Bima Curut</i> variety (from local breeder) |   |   | <i>Bima Curut</i> variety (from local breeder) |   |   |   |    | <i>Bima Curut</i> variety (from local breeder) |    |
| Access to get the shallot |  |   | Hard to get                                    |   |   | Easy to get                                    |   |   |   |    | Quite hard to get                              |    |
| Average quantity (ton/ha) |  |   | 6 - 8  |   |   | 10 - 13  |   |   |   |    | 5 - 7  |    |
| Farmers' price (IDR/kg)   |  |   | 11,000 -12,000                                 |   |   | 15,000 - 20,000                                |   |   |   |    | 13,000 -15,000                                 |    |
| Quality:                  |  |   | Medium - Poor                                  |   |   | Good   |   |   |   |    | Poor   |    |

Notes. Primary data (own calculation)

### The Mapping Results of Value Chain

The mapping results of shallot agribusiness value chain in Majalengka, especially in medium land involves many actors in delivering products from upstream to downstream. The structure of the agribusiness value chain of shallot can be seen in Figure 1.

There are several factors which made farmers have no option to sell their shallot crops to more profitable markets, as follows:

- (i) The lack of significant role from cooperative, farmers' group, farmers' group association, and Agropolitan Sub Terminal (STA) that can help farmers in marketing their crop yields to the modern market (Hypermart

and Hero supermarket) and processing industries.  
 (ii) The high level of farmers' dependence to the wholesalers.  
 (iii) The high cost of harvesting and post-harvesting, reluctantly the farmer went to usurer.

(iv) The lack of storage facilities and manual drying process.  
 (v) The lack of information on market access and pricing.

The structure of the agribusiness value chain of shallot can be seen in Figure 1.

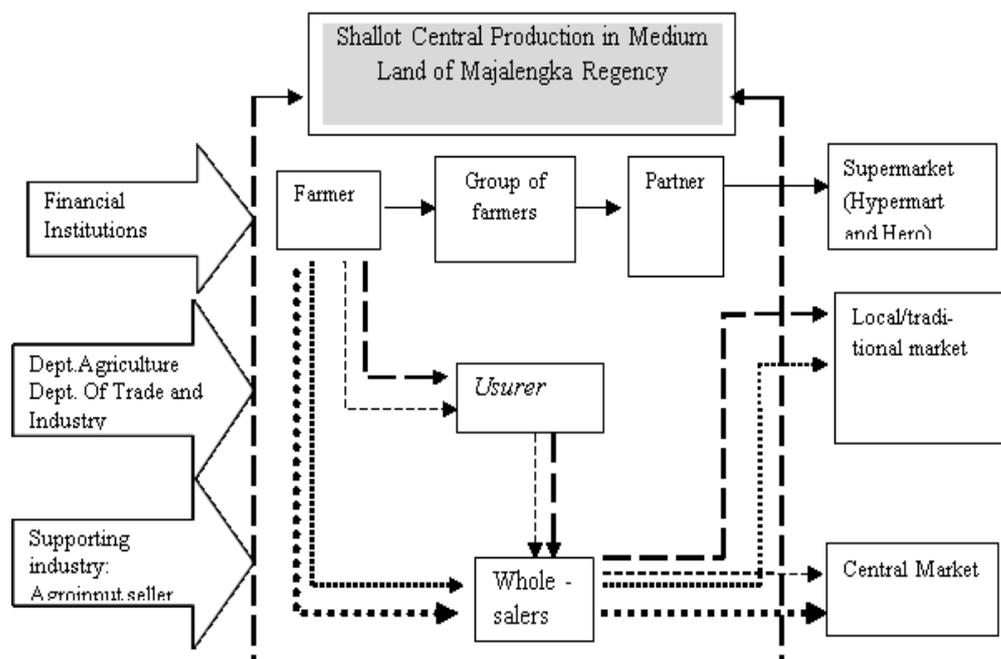


Fig. 1. Structure of Shallot Value Chain in Medium Land of Majalengka  
 Notes: Primary data.

The urgent farmers need, is one of the factors of dependence on collecting traders, other than that the onion product are easily damaged characteristics due to the lack of storage facilities so that this will encourage farmers to sell immediately despite the low price [9].  
 Figure 1 shows that the structure of shallot value chain in medium land of Majalengka

involves two actors, the primary actors and supporting actors.

**a) Primary Actors**, are the main actors in the shallot value chain system, which are: farmers seed breeders, shallot growers/producing farmers, farmer groups, partners, usurer, wholesalers. The primary actors can be seen in Table 2.

Table 2. Primary Actors of Shallot Agribusiness Value Chain in Medium Land of Majalengka

| No | Actors        | Role in Shallots Value Chain  |
|----|---------------|---|
| 1  | Farmers       | Farmers can be divided into two groups :<br>- Farmers seed breeder: act as provider of shallot seeds and distribute them to shallot growers. In medium land, especially in the Cijurey farmer groups, there is one shallot seed breeder of <i>Bima Curut</i> variety.<br>- Farmers/shallot growers: people who do the shallot cultivation, whether as sharecroppers or tenant farmer. |
| 2  | Farmers Group | A place to collect shallots from farmers and also the place for coordination and coaching.  |
| 3  | Usurer        | Usurer has a role in purchasing shallots from farmers, processing the harvest and post-harvest, but they are only 10% of the farmer.  |
| 4  | Wholesalers   | They purchase yields from farmers, do the drying, packing, and deliver the products to the destination market.  |

Notes: Primary data

**b) Supporting Actors**

The supporting actors are those who indirectly involved in the shallot value chain in Majalengka. Fertilizer and pesticides/agroinput minimarket, Department of Agriculture, Department of Trade and Industry, Banking, Counseling agency of

Agriculture, Fisheries, and Forestry), Brokers, Wholesalers, Wholesale market traders in Java, Wholesale market traders outside Java, and Retailers. But there is not any processing industry, in the medium land. The actors who support the shallot value chain can be seen in Table 3.

Table 3. Supporting Actor of Shallot Value Chain

| No  | Actors   | Role in Shallots Value Chain   |
|-----|--|--|
| 1.  | Partner Institution  | Partner Institutions is <i>Kapalindo</i> , an organization of <i>LPPM UNPAD</i> which markets and accommodates the agricultural products from farmer groups to Hypermart and Hero supermarket  |
| 2.  | Agro-input minimarket                                      | Serve to purchase the production facilities for shallot farmers.   |
| 3.  | Department of Agriculture                                  | Institution responsible for agricultural policy, channeling assistance and information from the government   |
| 4.  | Department of Industry and Trade                           | Institutions responsible for trade policy of agricultural products, supporting agent and delivering information from the government  |
| 5.  | Banking  | Financial institutions that lend money to the actors of shallot value chain for working capital or investment.   |
| 6.  | <i>Bank Indonesia</i>                                      | Provide training of organic fertilizers and pesticides, field schools, and workshops at <i>Bank Indonesia</i> , Cirebon  |
| 7.  | Counseling Agency of Agriculture, Fisheries, and Forestry) | Government agencies in the field of agriculture responsible to provide technical guidance on the value chain of shallot at district level  |
| 8.  | Seed Agency  | Agency that provides seed certification and training on seed-making  |
| 9.  | Central Market/Wholesale Traders (CMWT)                    | CMWT can be divided into two, namely the wholesale market in Java and outside Java:<br>- Java wholesale markets: receive shallot supply from the merchant/traders shipper (wholesaler) and distribute them to central market in Java<br>- Wholesale markets outside Java: receive shallot supply from the merchant shipper (wholesaler) and distribute them to central market outside Java |
| 10. | Local/Traditional Market Traders                           | Traditional traders around Majalengka (for example, in Maja market) and obtain shallots from merchant shipper (wholesaler) and usurer  |
| 11. | Cooperative  | The existed cooperative which only takes a role in technical assistance.   |

Notes: Primary data

**Management of Shallot Agribusiness Value Chain in Medium Land of Majalengka**

**1). Value Chain Activities at Shallots Farmer Level**

**a. Planning Process at Shallot Farmer Level**

Production planning is very important in agribusiness so the product can meet the expectation. Planning activities undertaken by shallot farmers include the planting site selection, determination of shallot varieties to be planted, planting schedules, financial planning, and marketing.

The location of shallot research in medium land took place and get samples from Cijurey farmer groups. The suitable shallot variety planted in that area is *Bima Curut*. Planting schedules have never encountered an error. In terms of financing, Cijurey farmer groups have easy access to financial institutions, but the number has not been sufficient enough.

The average yields obtained by farmers is around 5-7 tons/ha. Of the entire crop, 75% is made as shallot consumption and 25% is used

as seed for their own use or for sale to other farmers by selling them first to breeder farmers in farmer groups. Of overall shallots consumption sold, 40% went to small wholesalers and 60% sold to big wholesalers which will then be sold to the wholesale market. Payments to farmers are cash, but if there is a delay it won't be more than 5 days.

**b. Procurement Process at Shallot Farmer Level**

Procurement of production for farmers is quite limited, especially for subsidized fertilizer. However, the supply of organic fertilizer is quite easy since it has lot in numbers and being purchased from local farmers. For seed procurement, farmers usually buy from the existing seed breeders. *Cijurey* farmer groups have been able to produce their own shallot seed. However, there is only one farmer who has already certificate of *Bima Curut* variety. The requirement for shallot seed is good quality with its proper size (not too big or too small), good leaves, no foul, and the water

content only 30% so that it can be stored for 2-3 months. Shallots for seed, should be 40-50 days minimum of age after harvesting or drying. To be used as seeds, shallot bulbs are simply sun drying manually, by hanging them on racks in the kitchens or simple storage building owned by farmers. But when the rainy season comes, the drying process of shallot bulbs is done by the smoking system in order to stay dry and to avoid rot. The need of seed per hectare as much as 800 kg with the price of ready-to-plant seeds of IDR 50,000/kg.

In addition to the procurement of farming facilities, farmers are still experiencing difficulties in the procurement of capital or access to credit to financial institutions. The constraints that occur in the process of accessing credit is still uneven distribution of formal credit institutions to farmers, the level of inadequate human resources of farmers in the understanding of existing credit in financial institutions [11].

Onion farmers in Majalengka regency are also able to access credit to financial institutions. The factors that influence farmers in the selection of micro finance institutions as a source of onion farming system are the level of education of farmers, farmers experience in farming, the number of family dependents, the frequency of credit taking, the perception of farmers, the income of farmers and the amount of credit or loan [8].

#### *c. Production Process at Shallot Farmer Level*

Production process carried out by farmers started from land preparation, tillage (mounds manufacture, ditches, improving soil texture/ridges), planting, replanting and maintenance of plants (watering, fertilizing, pest and disease control, and weeding). After two months (60-65 days), the shallots are ready to be harvested. The characteristics of ready-to-harvest shallots are wilted yellow scallions with slightly visible bulb shallots on the soil surface. The productivity of shallot in the rainy season is 5-7 ton/ha, while in the dry season it can reach 13 ton/ha. Shallot production is lower in the rainy season due to the fact that the plants should not get too much water or it would be rot.

For shallots which will be used as seed, once they ready to be harvested, farmers will do the

revocation and binding process which is done by themselves or labor inside or outside the family. The shallots, then, dried under the sun outside the house. Farmers usually use a modification of motorcycle and rickshaw, for transporting from farm to farmer house. The drying process is carried out for 7-10 days with one person labor to flipping the shallots. Afterwards, the shallots will be removed the residual dirt to clean and avoid the rot. The next step is to storage on shelves in the kitchen or in storage warehouse equipped with manual furnace underneath and get fungicides spray only one time. After 2-3 months storing, shallots are ready to be used as seed. The seed normally fifty percent shrinkage, and the price of shallot seeds ready to plant is around IDR 50, 000/kg. While askip shallot is only IDR 24,000-36,000/kg and consumption shallots are IDR 20, 000.

#### *d. Distribution process at Shallot Farmer Level*

Farmers in the medium land of Majalengka usually sell their crop yields using downpayment system (around 10% of farmers) and the yields are distributed to the wholesalers, partner agencies, and other destination markets, and the rest 90% are direct selling to the buyer. In down payment system, the farmers do not have to spend money for harvesting, distribution, and post-harvesting process. While for direct selling, they have to pay up for harvesting, distribution, and post-harvesting cost.

#### *e. Return Process at Shallots Farmer Level*

At farmer level, there is usually no product return (shallots, post-harvest tools etc.) because the farmers do not apply the contract system with buyers. *Cijurey* farmer groups had held a contract with *Kapalindo* and marked up the selling price up to IDR 20,000/kg.

### **2). The Value Chain Activities at Traders Level**

*a. Planning Process at Traders Level*, conducted at the level of trader or wholesalers. Farmer groups can act as wholesalers, and receive shallots from members. The planning process at wholesalers level includes planning contract with partner institutions, namely *Kapalindo*, who buys crops from farmers' groups that act as wholesalers. Previously, *Kapalindo* has done the planning and

supervising, before planting, harvesting, and post-harvesting. This is done in order to obtain the expected yields.

Farmers do the shallot sorting and grading to determine a proper crop for *Kapalindo*, and the off grade will be sold directly to local market. The payment will be made after farmer groups have sent yields and fulfill some administrative files. That payment will be channeled back to farmers' partner as funds to purchase the yields. Thus, in general, capital financing of farmer group partners which paid each harvest with a profit margin was based on the agreement that has been set before. Currently, the cooperation between farmers' groups and *Kapalindo* is not run smoothly due to the constraints of payments from supermarkets (*Hypermart* and *Hero*), that will impact to the farmers as growers.

Shallot yields are sent by the wholesalers to *Kapalindo* and central market in Java and outside Java. The deal does not always in written, but based on direct communication through mobile phones. The wholesalers plan the shallot supply from the farmers with consideration of post-harvest cost reduction that must be spent. In addition to supply, traders must also plan the cost for the payment and distribution to central market.

#### *b. Procurement Process at Traders Level*

Procurement at traders level includes shallot supply, capital, and labor. Shallot supply should be adapted to the intended market. Generally, the shallots for *Kapalindo* must meet the grade they desired and require special 5 kg packing. While the shallots for the central market has no difficulty in grade determination because there are no prior agreements.

The volume of shallot purchase at traders level can reach 70 tons per cropping season. In one shipment to wholesale markets in Java, it can reach 5-7 tons per day, while outside Java is 7-8 tons per day. Shallot price at farmer level is between IDR15,000 – 20,000/kg with the lowest price are IDR 7,000-10,000/kg. Trader or wholesalers usually take profit of IDR 500-2,000/kg, while usurer get IDR 1,000-2,000/kg. Traders pay in cash because farmers fear of fraud and the urge to fulfill their daily needs, and this will be crucial for traders/wholesalers because of capital

procurement to pay cash to the farmers, so they get it from *Bank Rakyat Indonesia (BRI)* through the small business loan system (*KUR*) that offers 3% interest within 4 months period. In addition to providing supplies and capital, another important thing is the provision of labor, that mostly needed at post-harvest stage. Starting from the process of revocation of shallots in the field, transporting to the storage, drying, sorting, packaging, and shipping. The shipping has greatly affect the fluctuations price of shallots in traditional market. If the price is not comparable with shipping, because the shallot price is lower, they will delay to send so it would affect shallot supply. When the shallot is rare in the market, then the price will go up automatically in accordance with the laws of the market mechanism.

#### *c. Production Process at Trader Level*

The high or low production of shallot is very influential for traders. If the shallots supply in medium land of Majalengka is deficient, the traders or wholesalers would search in other areas inside (upper and lower land) and outside Majalengka. To maintain the supply, wholesalers will always have to ensure the availability of shallots through intermediaries who go around to find shallots ready for harvesting.

#### *d. Distribution Process at Traders Level*

Traders or wholesalers conduct distribution activities starting from farmers' lands to the warehouse or from the usurer's stall to be sold to the central market or partner institution. The freight cost is usually charged to the traders. Drying shallots are vary depending on the destination market. Central markets outside Java, need the completely dry shallots to avoid rot due the long distance shipping, and for Java central markets need the cleaned (without leaves and root) and blowered. The packaging and weighing using netted sacks and transported by trucks; and it will get 50% shrinkage since the harvest beginning until the end of the distribution process.

#### *e. Returns Process at The Traders Level*

Return process from traditional market to traders is almost none.

### **3). The Value Chain Activities at Usurer Level**

#### *a. Planning Process at Usurer Level*

Planning activity for usurer is to ensure the availability of shallot at the farmers' level. Generally, the risks that should be taken by usurer is the difficulty to get shallot from farmers, especially in September and October on rainy season. Farmers are reluctant to grow shallots on those months because of the high risks, such as pests and diseases. If the shallot in Majalengka is rare, usurer would search outside Majalengka. Other risks that should actually be planned is financing. Usurer have to pay cash to farmers, while they were paid after 3-7 days delay by traders or wholesalers. The farmers that sell by this system get more prices than the other system.

#### *b. Procurement Process at Usurer Level*

Procurement process at the usurer level includes shallot supply, capital, and labor. Shallot supply usually getting hard in the rainy season. For capital procurement, usurer usually got a loan from banks. Providing labor needs full attention because usurer requires much labor for harvest and post-harvest processes, ranging from revocation, transportation from the field to concentrating place, by three wheels vehicle, unloaded process at the stall, drying, and post-harvest handling.

#### *c. Production Process at Usurer Level*

At production process, usurer must be careful to avoid the risk of loss, because usurer buying shallots from farmers before the harvesting time. After an agreement with the farmers settled, usurer prepare for labor to harvesting and bring it to drying stall. The length time of shallot drying, depends on the market destination. After drying, the next processes are leaves taking, blowring, packing, weighing, transporting and distributing. The cost is borne by the traders or wholesalers.

#### *d. Distribution process at Usurer Level*

Distribution is done during transporting process from the field to the drying place which requires one day because the location is not so far from drying place. Freight costs depend on the region of origin.

#### *e. Returns Process at Usurer Level*

There is no product return process at this level, because transactions with the traders conducted in retail. All the damage and defects

after the transaction are borne by the trader or wholesalers.

#### *3. Cost Analysis of Shallots Farming*

In medium land of Majalengka, shallot farming can be done three times a year during the rainy and dry season with interspersed of the rice crop and other vegetables. Some of the shallot farmers in Majalengka regency, especially in medium land, do their own harvest while some submit it to usurer. Harvest and post-harvest submitted to usurer accounted less than 10%, and the analysis of the shallot farming cost per one hectare.

Table 4 shows the average yield per hectare. Yields at rainy season are lower compared to the dry season, because the level of rot quite high (around 20%) under normal conditions. In abnormal conditions, a lot of shallots would became waste. Moreover, there has not any shallot processing yet. in the medium land.

The results calculation of shallot farming in the lowlands of Majalengka regency shows that the value of R/C ratio is 1.91 means that every IDR 1 spent, will add revenue by IDR 1.91. The value of  $R/C > 1$  indicates that the work done by shallot farmers deserve to be pursued. B/C ratio value of 0.91 means that every IDR 1 spent, will provide revenue of IDR 0.91, and the B/C ratio value  $> 0$  indicates that the work done by shallot farmers is profitable.

#### **Profit Margin**

Based on Figure 1, there are five patterns of shallot marketing channels in medium land of Majalengka as follows:

- ▶ Pattern 1 (Farmer-Farmers' groups-Partner-Modern Market/Supermarket)
- ▶ Pattern 2 (Farmer- Usurer - Wholesalers-Traditional Market)
- - - - -▶ Pattern 3 (Farmer- Usurer - Wholesalers-Central Market)
- .....▶ Pattern 4 (Farmer-Wholesalers-Traditional Market)
- .....▶ Pattern 5 (Farmer-Wholesalers-Central Market)

In order to determine the most appropriate marketing channels which provide justice, it can be seen from the level of shallot profit margin per kg in every marketing chain [7].

Table 4. Analysis of Shallots Farming at Cijurey Farmers' Group

| No       | Description                      | Total   | Average Prices | Value (IDR) |
|----------|----------------------------------|---------|----------------|-------------|
| <b>A</b> | <b>Variable cost</b>             |         |                |             |
| 1        | Seed (kg)                        | 687.5   | 30,000         | 20,625,000  |
| 2        | Fertilizer                       |         |                |             |
|          | a. Organic fertilizer (kg)       | 2,637.5 | 1,000          | 2,637,500   |
|          | b. SP-36 (kg)                    | 125     | 2,000          | 250,000     |
|          | c. KCL (kg)                      | 100     | 3,000          | 300,000     |
|          | d. Urea (kg)                     | 143.75  | 2,000          | 287,500     |
|          | e. ZA (kg)                       | 93.75   | 1,400          | 131,600     |
|          | f. NPK (kg)                      | 125     | 10,000         | 1,250,000   |
|          | g. Leaves fertilizer (lt)        | 1       | 75,000         | 75,000      |
|          | Total of Fertilizer Cost         |         |                | 4,931,600   |
| 3        | Pesticides                       |         |                | 3,155,000   |
| 4        | Labor                            |         |                |             |
|          | a. Men Labor                     | 469.25  | 70,000         | 32,847,500  |
|          | b. Women Labor                   | 200.5   | 40,000         | 8,020,000   |
|          | Total of Labor Cost              |         |                | 40,867,500  |
|          | Total of Variable Cost           |         |                | 69,579,100  |
| <b>B</b> | <b>Fixed Cost</b>                |         |                |             |
|          | a. Land Lease                    |         |                | 10,000,000  |
|          | b. Tax                           |         |                | 40,000      |
|          | Total of Fixed Cost              |         |                | 10,040,000  |
|          | Total of Production Cost (A + B) |         |                | 79,619,100  |
|          | Total Revenue                    | 10,138  | 15,000         | 152,070,000 |
|          | Total Income                     |         |                | 72,450,900  |
|          | R/C                              |         |                | 1.91        |
|          | B/C                              |         |                | 0.91        |

Notes: Primary data (own calculation)

Table 5. Analysis results of Shallot Agribusiness Marketing Margin in Medium Land of Majalengka

| Pattern             | 1      | 2      | 3      | 4      | 5      |
|---------------------|--------|--------|--------|--------|--------|
| Farmer              |        |        |        |        |        |
| - Selling Price     | 20,000 | 11,000 | 11,000 | 12,000 | 13,000 |
| - Margin            | 12,000 | 3,000  | 3,000  | 4,000  | 5,000  |
| Usurer              |        |        |        |        |        |
| Selling Price       |        | 14,000 | 14,000 |        |        |
| - Margin            |        | 3,000  | 3,000  |        |        |
| Wholesalers         |        |        |        |        |        |
| - Selling Price     |        | 16,000 | 18,000 | 16,000 | 19,000 |
| - Margin            |        | 2,000  | 4,000  | 4,000  | 6,000  |
| Partner Institution |        |        |        |        |        |
| - Selling Price     | 30,000 |        |        |        |        |
| - Margin            | 10,000 |        |        |        |        |
| Traditional Market  |        |        |        |        |        |
| - Selling Price     |        | 19,000 |        | 19,000 |        |
| - Margin            |        | 3,000  |        | 3,000  |        |
| Total Margin        | 22,000 | 11,000 | 10,000 | 11,000 | 11,000 |

Notes: Primary data (own calculation)

Table 5 shows the results of analysis of profit margins in each shallot marketing channel. The highest profit margin is on channel pattern 1; because it has short marketing chain. However, cooperation with partner institutions was ceased due to the payment constraints. It is

unfortunately, because the cooperation has profit potential for farmers. On channel pattern 1, farmers did markup the price IDR 20,000/kg with the aim to minimize the shallot price fluctuations in the market. The lowest profit

margin is in channel pattern 3 of IDR 10,000 due to the long marketing channels.

The level of marketing margin is used to measure the efficiency of the marketing system. The higher the marketing margin, the more inefficient the marketing system [6].

## CONCLUSIONS

The perpetrators of onion agribusiness value chain in medium lands of Majalengka district can be divided into two, namely the primary actors and supporting actors. Primary actors include farmers, farmer groups, collectors and clearing traders. While the supporting actors who are not intentionally involved in the process of onion value chain such as store of agricultural production facilities, agricultural service, trade and industry, banking, BP3K; while the value chain activity is divided into three namely the value chain activities at the level of farmers, traders and usurers, each activities are planning, procurement, production, distribution and return.

The shallot agribusiness value chain in medium land of Majalengka shows need any improvements in terms of management for both primary and supporting actors. The effort made by the shallot agribusiness value chain actors is profitable and feasible to be developed. Majalengka medium land has 5 (five) shallot marketing channel patterns. The highest profit margin exists is channel pattern 1 (one), namely farmers-farmers' groups-partner institutions-consumer.

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## STANDARD CHARACTERIZATION OF RED ONION LANDRACES ‘DE BUZĂU’ AND ‘DE TURDA’

Maria Mihaela ANTOFIE, Camelia SAVA SAND

“Lucian Blaga” University from Sibiu, Faculty of Agricultural Sciences, Food Engineering and Environment Protection, 7-9 Dr. Ioan Rațiu, 550012, Sibiu, Sibiu county Romania, E-mails: mihaela.antofie@ulbsibiu.ro; camelia.sand@yahoo.com

**Corresponding author:** mihaela.antofie@ulbsibiu.ro

### Abstract

*To maintain food security, the conservation and sustainable use of all plant genetic resources for food and agriculture (PGRFA) is essential under the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty) adopted in 2005 based on the Convention on biological diversity signed in 1992. Both Conventions have been ratified by Romania and the conservation and sustainable use of domesticated crops and edible wild plant species needs to be addressed in near future. The scope of this article is to analyse two onion landraces for evaluating their status of conservation and furthermore, to propose some measures for their further conservation and sustainable use based on the needs of local communities. We underline that onion is mentioned on the Annex of the Plant Treaty as a PEGFRA. Red onion landraces ‘de Turda’ was officially recognized in 1952 and ‘de Buzău’ in 1977, based on the analysis of Official Catalogues. If, the landrace ‘de Turda’ was erased from the Official Catalogue after 1990, ‘de Buzău’ continues to be recognized at the official level. Both landraces have been assessed against the UPOV Standard TG/46/7, to find solutions for further recognition of ‘de Turda’ onion as an important plant genetic resources for food based on the provisions of Directives 2008/62 / EC, 2009/145 / EC and 2010/60 / EU. The analysis of our results reveals that ‘de Buzău’ is producing large size bulbs and ‘de Turda’ is producing medium size bulbs and both are distinct, uniform and stable based on Standard TG/46/7 requirements. The consistent results of our analysis further support the need for on farm conservation of these two genetic resources in their agro-ecosystems of origin that is important for food security maintenance in local communities.*

**Key words:** autochthone landrace, onion, ‘de Buzău’, ‘de Turda’, UPOV standard TG/46/7.

### INTRODUCTION

To maintain food security, the conservation and sustainable use of all plant genetic resources for food and agriculture is essential under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) that it was adopted based on the Convention on biological diversity [7]. Both Conventions have been ratified by Romania and the conservation of biological diversity is on edge due to climate change effects for domesticated crops and edible wild plant species and the lack of any strategy for supporting their conservation and sustainable use [2].

Onion (*Allium cepa* L.) is a crop of major importance in Romania and its cultivation is closely related to the history of the country [18]. This crop species is listed into the Annex of the International Treaty on Plant Genetic Resources for Food and Agriculture, or Plant

Treaty, further supporting the relevance of this species all over the world for biodiversity conservation and food security. Today, many scientific articles claim that we assist to tremendous genetic erosions in crops generally [6, 12, 15]. The constraints imposed by globalization of the trade and lack of consistent policies at the regional level in supporting the landrace for *on farm* conservation are among the major threats [8, 11]. Complex strategies for reinforcing the conservation of all plant genetic resources for food and agriculture (PGRFA) have also been published [4, 5, 16, 17]. The working group of experts on *Allium* at the European level is interested in long time in ensuring the conservation of all potential genetic resources that may support food security for long term [14]. The scope of this article is to reveal that in Romania still exist valuable onion genetic resources that need to be officially recognized for their value in supporting food security. In this regards red

onion bulbs belonging to two autochthonous landraces 'de Buzău', from South Romania and 'de Turda' from Transylvania, provided by local producers, will be described based on the UPOV Standard TG/46/7 (UPOV, 2008). Both landraces will be assessed against the evaluation of their status of conservation in the place of origin [1].

## MATERIALS AND METHODS

**Study area** was represented by Mărăcineni Commune, Buzău county (Lat. 45°12' and Long. 26°48'E) and Viișoara Commune, Cluj county (Lat. 46°33'28" Long. 24°56'00"), where two producers and landowners from each of the localities have provided onion bulbs of red onion landraces 'de Buzău' and 'de Turda'. They are producers of red onion for more than 50 years and onion seeds are originating from their own production.

**Plant material.** Mature onion bulbs for trade as commodity have been examined after their harvesting from three original locations during October, 2015 (i.e. 100 onion bulbs of each location have been purchased directly from producers).

**Morphometric measurements.** A lab ruler and a professional calliper have been used for the evaluation of morphometric characteristics according to the UPOV Standard TG/46/7 [20]. A Canon camera was used at a fixed point of 30 cm under a light intensity between 2,500 and 8,000 Lx. Measurements and observations were realized for longitudinal, top-down and bottom-up views of the onion bulbs. An analytical balance Bio-Rad and an oven Froilabo AP60 were used for fresh weight and dry matter analysis.

**Surveys.** National official catalogues for plant varieties and hybrids and hybrids, starting with 1952, were surveyed for the evaluation of the official status of conservation of these landraces and particularly regarding the situation of official recognition of onion landraces in Romania. *Ex situ* conservation programmes survey is run by the Gene Bank from Suceava as the National Focal Point under the Plant Treaty, and secondary may be supported by Research Stations from Buzău, Mărăcineni and Turda. They were surveyed for

the presence of these landraces in their databases. The portal of National Institute for Statistics was surveyed for onion cultivation and production.

**Evaluation of status of conservation** was realized based on the existing methodology and published in 2011 [1].

## RESULTS AND DISCUSSIONS

Landrace's definition is not yet generally accepted by the scientific community. However, at the international level stands the definition first provided by Anderson and Cutler in 1942 that was supported by recent researchers [19]. One relevant definition, with a broad acceptance is that provided by Zeven in 1998 [21]. He proposed two terms: autochthonous landraces (cultivated for long time in the ecosystem of origin) and allochthonous landrace (landraces recognized to be introduced in a certain ecosystem). The major threat for our autochthonous landraces, that are recognized to achieve a relevant recognition for their qualities, is that they are endangered to disappear or to become allochthonous in the country of origin but in different agro-ecosystems, due to inconsistent political strategies for *in situ* or *on farm* crops conservation. The results of this article are based on original autochthonous landraces provided by local producers belonging to original agro-ecosystems with a long history of cultivating these plant genetic resources (i.e. over 100 years).

### Onion bulbs characterization of autochthonous landraces: 'de Buzău' and 'de Turda'.

*Degree of splitting into bulblets* (Standard characteristic no. 11). Both landraces 'de Buzău' and 'de Turda' generally present into their bulbs at least two bulblets and occasionally three. The degree of splitting into bulblets was 18.53% for 'de Buzău' and 22.56% for 'de Turda'. Such a characteristic may be enhanced by climatic conditions based on producers, but never reached 30% in the case of both producers even there is the situation of two completely different landraces. *Bulb size* was evaluated after the dry skin, roots and stems have been removed. The average

fresh weight for 'de Buzău' was 172.35 g (i.e. the fresh weight ranged between 150 and 200 g) and for 'de Turda' it was 68.23 g (i.e. the fresh weight ranged between 38.23 and 100.35 g) (Fig. 1 a). Based on these results and according with the Standard characteristic no. 12.1., 'de Buzău' is a large size onion and 'de Turda' is a medium size onion.

*Bulb height* for 'de Buzău' is 12.02 cm ranging between 9.23 and 15.22 cm and for 'de Turda' is 6.58 cm ranging between 4.23 and 8.98 cm. In case of 'de Buzău' 85% of the bulbs ranged between 12 and 14 cm being a large class onion. However, over 72% of 'de Turda' bulbs are ranging between 6 and 7 cm, and according with the Standard characteristic no 13.1. it is a medium class onion (Fig. 1 b).

*Bulb diameter* ranged for 'de Buzău' between 4.21 and 6.30 cm (i.e. average bulb diameter: 5.03 cm) and for 'de Turda' it ranged between 3.80 and 5.87 cm (i.e. average bulb diameter: 4.85 cm). Around 78,3% of the bulbs 'de Buzău' ranged  $\pm 0,5$  cm around 6 cm and for 'de Turda' 82% the bulbs ranged  $\pm 0,5$  cm around 6.5 cm. According with the Standard characteristic no. 14.1., both landraces are medium size onion bulb (Fig. 1 c).

*Bulb ratio height/maximum diameter* ranges between 4 and 6 (cm/cm) for 'de Buzău' (i.e. an average ratio of 5.03) and between 1.08 and 2.53 with for 'de Turda' (i.e. an average ratio of 4.85) (Fig. 1 d). Both local varieties may be classified as medium size onion according the Standard characteristic no. 15.1.

*Bulb position of maximum diameter* was at the half height of the bulb for 'de Buzău'. However, for 'de Turda', at least two population have been described such as: 76% of the bulbs with the maximum diameter position at *the middle*, but 24% of the bulbs were at *towards the stem end* (1.53 cm) (Figs. 2 a, 2b). As most of the bulbs the maximum diameter position is at the half of the height both landraces may be considered as positioned in *the middle* according with the Standard characteristic no. 16.

*Bulb shape of stem end* in case of 'de Buzău' proved to be *strongly sloping* in all samples. However, for 'de Turda' about 24% of the bulbs were rounded and 76% *slightly sloping*. Based on the Standard characteristic no. 19, it

can be considered that the onion population is dominated by the *slightly sloping* bulb shape of stem end (Fig. 1).

*Bulb shape of root end* proved to be only *round* shape for both landraces based on the Standard characteristic no. 20. The root diameter for 'de Buzău' has an average of 1.31 cm and for 'de Turda' of 1.02 cm (Fig. 1).

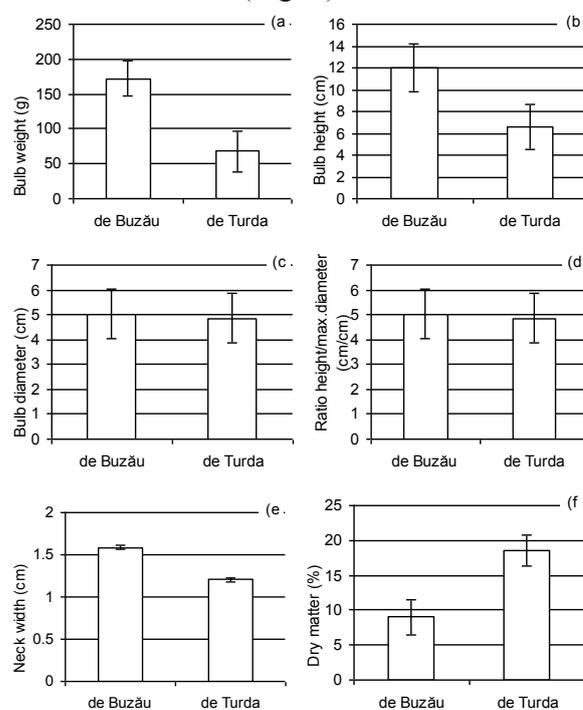


Fig. 1. Standard bulb measurements for red onion landrace 'de Buzău' and 'de Turda': a) weight (g); b) height (cm); c) maximum diameter (cm); d) ratio bulb height/ maximum diameter (cm/cm); e) width of neck (cm); f) dry matter (%).

*Bulb adherence of dry skin after harvest* (Standard characteristic no. 21) and *Bulb thickness of dry skin* (Standard characteristic no. 22) are *medium* for both landraces.

*The base colour of dry skin* is *dark red* without exception for all investigated bulb and therefore both landraces belongs to class 7 according to the Standard characteristic no. 23.

*Bulb intensity of base colour of dry skin* is *dark* for both landraces (Standard characteristic no. 24).

*Hue of colour of dry skin* (in addition to base colour) is *reddish* for 'de Buzău' and *purplish* for 'de Turda' according to the Standard characteristic no. 25.

*Dry matter*. The dry matter ranged between 6.5% to 11.57% with an average of 9.02% for 'de Buzău'. In case of 'de Turda', the average

in dry matter was 18.57%, with a minimum of 16.22% and a maximum of 20.82%. Based on the Standard characteristic no. 29. 'de Buzău' belongs to *low* class and 'de Turda' belongs to *medium* class (fig. 1 f).



Fig. 2. Standard bulb measurements for red onion landrace 'de Buzău' and 'de Turda': a) weight (g); b) height (cm); c) maximum diameter (cm); d) ratio bulb height/ maximum diameter (cm/cm); e) width of neck (cm); f) dry matter (%).

However, the description of these two onion landraces does not fit to that published 40 years ago [10] that supports them high productivity. This discrepancy may be due to the traditional knowledge related to the continuing selection process of seeds or traditional practices that are implemented in the ecosystem of origin based on the local populations demands according to the producers.

#### Socio – economic vulnerabilities

Both interviews realized with the two producers revealed a common barrier that is trade of onion as a commodity. Thus, even 'de Buzău' is officially recognized, still the lack of a local market do not support the connection between local producers and market place at the region or county level as it is supposed to be [9]. This is essential for the maintenance of these landraces both in Buzău and Cluj counties for coupling the producers to the trade on short trade chain that are highly supported by the European Directive 2010/60/EU. A comparable situation was already published for red onion 'de Făgăraș' where it was registered dramatic socio-economic vulnerabilities supporting the erosion of this landrace [3].

The tax for entering the local market is estimated to be around 12 Euros in both counties for 2014 and 2015. Additionally, taxes for storage or renting a market place are also high (i.e. 150 Euros/month in Buzău and 145 Euros/month in Cluj county). On the other hand, the entering on the market of large retailers is highly supported. However, producers are stimulated to label the commodity as "produced in Romania" compared to "imported commodity" which may have a positive impact for selling these commodities. The value in the market place is higher compared to large retailers due to high taxes for local producers. It can be concluded that there is a lack of commitment for local marketing policy. Still, no mention is regarding the way of defining the commodity. Thus, the recognition of the commodity as autochthonous landraces would be beneficial for producers as it is recognized that the crop is cultivated in the original ecosystem for more than 80 years. This will be consistent with the maintained qualities of the products and will further support the producers for stimulating the trade of these genetic resources as valuable commodities.

#### The official situation of onion landraces in Romania

The surface cultivated with onion varieties in Romania has changed during the last 25 years. Thus, if in 1990, Romania cultivated 27,231 ha with a total production of 218,525 t only after one year it was cultivated less 24,454 ha with a total production of 225,440 t. After a short decrease of the cultivated area at the national level the onion cultivation was more appreciated and today almost 32,000 ha are cultivated with onion with a better production of 387,000 t for 2014 [13]. The cultivated onion varieties are mostly of import origin and classical agricultural practices that are using pesticides are in place. The areal of origin of onion autochthonous landraces are under threat due to the lack of trade policy at the local level. The lack of promotion on the local market place may support the disappearance of the traditional knowledge related to these valuable genetic resources for food and agriculture. To this we add the uncontrolled seeds exchange as 'traditional seeds' and not considering the

value of autochthonous landraces for the future onion breeding programme.

The landrace 'de Turda' was officially recognized starting with 1952 together with 'Roşie de Făgăraş' and 'de Arieş'. All three autochthonous landraces have been considered as valuable landraces being cultivated for more than 100 years in the same ecosystem. Therefore, due to similar characteristics, have been placed under the same position with different names, into the Annex of the Official catalogue for plant varieties in 1952. The landrace 'de Buzău' was recognized for its value in 1977 and continue also today. However, no onion landraces are today recognized for their value in the ecosystem of origin, that are politically supported according to the European regulatory framework in this domain such as the following: Directive 2008/62/EC; Directive 2009/145/EC and Directive 2010/60/EC.

In the national programme for *ex situ* conservation belonging to the Gene Bank Suceava, no accessions have been registered for 'de Buzău' or 'de Turda'. One landrace was homologated by the Research Station for Research and Development in Vegetables Buzău: 'Rubiniu' in 2009, that was bred based on the autochthonous landrace 'de Buzău'.

The evaluation of status of conservation is based on the proposed methodology in 2011 [1].

Thus, for 'de Turda', the cultivar may be considered as *endangered within on farm* the fourth category of vulnerabilities and it is threatened with *on farm* extinction if no administrative and financial measures will be adopted. Such measures should promote short chains of micro-economy in the place of origin of this landrace according to the European framework. On the other hand, 'de Buzău' it is in a better status as it is officially recognized but still due to concrete negative socio-economic vulnerabilities it is *vulnerable on farm*. As it was reflected in the proposed methodology such genotypes are not endangered but need their including into breeding and conservation programmes to ensure that *on farm* conservation is effective. Even 'de Buzău' it is included in the breeding programme (e.g. 'Rubiniu' red onion cultivar

is released in 2009 based on 'de Buzău') still no measures are in place for *on farm* conservation of this landrace.

## CONCLUSIONS

Both landraces, provided from the ecosystem of origin, 'de Buzău' and 'de Turda' proved to reveal distinct, uniform and stabile characteristics based on the UPOV Standard TG/46/7 and should be recognized as autochthonous landraces under conservation for the region of origin. Based on the analysis of these results it can be considered that today there are no recognition in our country for autochthonous landraces for supporting food security at the local level. Such landraces must be further supported to be included into the Official Catalogue as varieties "under conservation" according to the European Union framework.

Moreover, they may be further supported to be maintained *on farm* in their ecosystem of origin based on consistent socio-economic policies at regional level. There is a lack in the national strategy for plant genetic resources conservation for food and agriculture regarding the use of term 'autochthonous landrace' and 'traditional seeds' that may fuel the erosion of all autochthonous landraces still existing in marginal ecosystems posing a major threat on food security to the country.

Both landraces may be listed under the Red List of plant varieties for Romania according to the proposed methodology that was published in 2011.

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## A MELIFER BASE FROM MĂRGINIMEA SIBIULUI. CASE STUDY-SĂLIȘTE

Iuliana ANTONIE

“Lucian Blaga” University, The Faculty of Agricultural Sciences, Food Industry and the Protection of the Environment, Sibiu, 7-9 Dr. Ion Rațiu, 550012, Sibiu, Romania, Phone: +40 269 211338, Fax: + 40 269 213381, E-mail: iuliana\_antonie@yahoo.com

*Corresponding author:* iuliana\_antonie@yahoo.com

### Abstract

*The study aimed to identify and evaluate the honey species in Sibiu surrounding area, especially in the surroundings of Săliște. Thus, it is desirable to complete and exploit as efficiently the honey resources in Sibiu County. Among the research methods applied in this study are: the use of bibliographic resources, direct field observations, the collection of plant material in the studied ecosystem, the determination of the botanical material in the laboratory. 23 plant families of 44 species have been identified in the area. Of these, only 28 have a melliferous potential. According to the nature of the feed they provide to the bees, the honey plants have been divided into: nectaropolinifers, nectarifers, polinifers. The honeycomb base includes species belonging to mountain forests, hills and plateaus, grasslands and meadows. From the apiculture point of view of we have identified five groups. The floral potential of the area has encouraged other than sheeping another concern of the inhabitants of this area, namely beekeeping.*

*Key words:* melifer base, faunistics, Săliște (Sibiu county)

### INTRODUCTION

Bee's mythology started from man's fascination for this creature. Admiration reaches such a high degree that the dilemma is justified: it is creation or evolution.

Bees always existed, from the Palaeolithic cave paintings to Bonaparte's Imperial, which had a bee as a heraldic sign. As far as we are concerned, the metropolis on the column of Trajan in Rome testifies to the bee's worship in the Geto-Dacian space. In the age of genetics, bee has been involved as a revealing research material on gene involvement in animal behaviour.

Bee Dance, a ritual and mysterious air balloon, has been deciphered by the removal of any supernatural element by Karl von Frisch, who has clarified that bees, through this dance, communicate to their community, information about nectareous locations in the area. Karl von Frisch received the Nobel Prize [1].

Bees, through their internal organization, have formed a model in human aspirations to prefigure social relations. The Bishop of Canterbury in a conversation with King Henry about the organization of the kingdom gives the following answer:

"So also - the bees, by the law of nature, meant to give the example of the ordinance and the most flourishing kingdom "[18].

Lewisohn, "an adept of anthropomorphic animal psychology," a theory of great vogue in the 18th-19th centuries, describes in his book "A History of Animals" among other things a story about how to accept man-bee relations. Fable, through its structure and the message it carries, best illustrates the theory of anthropomorphism. Allegory and fable reproduce what a man wants from the animal as a model. In Lewisohn's story, a Dutch doctor, Bernard Mandeville, believes in the straightening of society through the fable. He also believes in the original that moral and ethical excesses prevent society from performing. In his poem "Bees Story" he imagines a state of these who is leading according to the most drastic norms of morality and ethics. The result is total state fall, until bankruptcy, and the remaining bees return to tree trunks, as it was in *illo tempore*. The indignation of the English community in this fable was so great that a complete judge condemned the author, and his literary production was outlawed [9].

Entire encyclopaedias, treatises, textbooks, popularization books, a whole literature illustrating the importance of bee breeding and the interaction of the human- bee binomial have been written. We cannot talk about the bees and the products [12,13] they offer without underlining that they depend exclusively on the vegetable world [10].

## MATERIALS AND METHODS

The research took place in the surroundings of Săliște, Sibiu County;

The survey period took place during the years 2014-2015;

For the proper conduct of the study, the following specific methods were considered:

- Use of information from the literature [7,10,11];
- Observation for the identification and inventory of honey species in the studied area, area belonging to the fourth grading category, the Transylvanian bio-aquatic zone [23];
- Direct, qualitative gatherings in the studied ecosystem;
- Laboratory identification of botanical material collected from the field by using more bibliographic resources [4, 5, 9, 14, 15, 16, 17];
- Drawing up the floral list.

## RESULTS AND DISCUSSIONS

Our study complements research on the honey base in the Center Region [1, 2, 3]. The researches focused on Marginimea Sibiului area, which is located in the southwestern part of Sibiu County, and comprises 18 localities located at the foot of the Cindrel Mountains. The basic occupation of the population of this area was the transhumant sheepfold. The area is of a rare beauty, and the mother nature was extremely lucky with its inhabitants: mountains, hills, waters, forests, meadows and orchards where they grow over 1,400 plant species from which the locals use 450: medicinal, food, fodder and honey. The latter representing 23% of the plants in the whole area [6, 25]. The floral potential of the area has stimulated another concern for the inhabitants, namely beekeeping. Botanical research has

been differentiated in the localities belonging to Mărginimea Sibiului. For the towns of Galeș, Rod, Vale floral information is reduced. The flora of Poiana Sibiului is known only for 10%, the one in Fântânele (Cacova), Săliște, Sibiul, Tilișca does not exceed the proportion of 25% and the flora of Poplaca is known for 50%. Localities such as Gura-Râului, Rășinari, Râu-Sadului, Sadu, Tălmăcel are very well botanically researched [5]. From this vast area, we focused our attention on Săliște locality to identify the honeycomb base and to emphasize its economic importance.

The town of Săliște, also known as the "capital of Mărginimea Sibiului " by some [24] or "the place of full beauty" by others [25], is located 20 km from Sibiu, towards Sebes Alba, at the foot of the Cindrel Mountains, Aciliu, Amnas, Crint, Gales, Fantanele, Mag, Săcel, Sibiul and Vale.

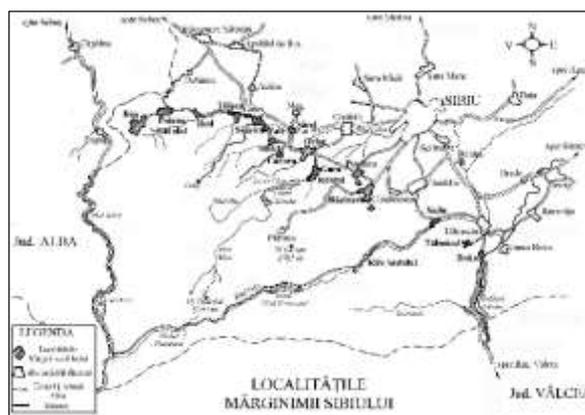


Fig. 1. The settlements of Mărginimea Sibiului  
Source: <https://limbaromana.org/wp-content/uploads/harta.jpg>

The climate is moderate with lower annual averages ( $6^{\circ}\text{C}$ ), and average annual precipitation ranges from 600-700mm. Grains are grown in the area, but there are also orchards, pastures and grazes, being a beehive in terms of apiculture.

In his book "Cormoflora of Sibiu County" Professor Constantin Drăgulescu, following the analysis of the flora of the localities in the county, states that the town of Săliște is part of the localities with summary information on the floral potential, specifying in his book 34 species [5]. Our study highlighted a total of 23 families of 44 species

Table 1. The main plants useful for bees in Săliștei flora, Sibiu County (2014-2015)

| Nr Crt<br>1 | Species name<br>2  | Average data of blossoming<br>3 | Honey production (Kg/ha)<br>4 | Share of apiculture<br>5 | Observations<br>6   |
|-------------|--|---------------------------------|-------------------------------|--------------------------|---|
| 1           | <i>Quercus petraea</i> (Matt.) Liebl. (Fagaceae)             | 20-30 April                     | 20                            | Medium                   | Forest honeybee plant that offers abundant pollen and sometimes mana. It shelters <i>Lachnus roboris</i> , a very important mana producer.            |
| 2           | <i>Fagus sylvatica</i> L. (Fagaceae)                         | 15-25 May                       | 20                            | Medium                   | Forest honeybee plant. Visited by bees especially for pollen-rich plants. He also offers mana.  |
| 3           | <i>Pinus sylvestris</i> L. (Pinaceae)                        | May-June                        | 10                            | Medium                   | Provides large amounts of inferior quality pollen, sometimes even honey.  |
| 4           | <i>Picea abies</i> (L.) H. Karst. (Pinaceae)                 | 20-30 June                      | 50                            | Big                      | Tree that provides pollen and honey.  |
| 5           | <i>Betula pendula</i> Roth (Betulaceae)                      | April-May                       | 10                            | Small                    | Visited by bees especially for the abundant and early pollen, extremely necessary for the colonies.   |
| 6           | <i>Acer pseudoplatanus</i> L. (Sapindaceae)                  | April-May                       | 200                           | Medium                   | It is a source of nectar and especially pollen. Nectar is secret and in bad weather.  |
| 7           | <i>Fraxinus excelsior</i> L. (Oleaceae)                      | April                           | 20                            | Small                    | Provides pollen bees, propolis and sweet bark juices.   |
| 8           | <i>Corylus avellana</i> L. (Betulaceae)                      | 1-10 March                      | 20                            | Medium                   | Male inflorescences, avenues, open up early. It is a great pollenifer and offers honey  |
| 9           | <i>Robinia pseudacacia</i> L. (Fabaceae)                     | 10-20 May                       | 800-1200                      | Very big                 | The plant hung from the forest. It provides the main production pick.   |
| 10          | <i>Trifolium pratense</i> L. (Fabaceae)                      | 15-25 June                      | 25-50                         | Medium                   | Honey production is lower than all other species of this genus due to the depth of the corolla [11]. Bees do not always collect nectar.               |
| 11          | <i>Trifolium repens</i> L. (Fabaceae)                        | 20-30 May                       | 100-250                       | Big                      | One of the most important honey plants. The plant has the following qualities: produces nectar and pollen in abundance, and offers monoflorous honey. |
| 12          | <i>Lotus corniculatus</i> L. (Fabaceae)                      | May- September                  | 15-30                         | Small                    | Plants are rarely visited by himenopters.   |
| 13          | <i>Onobrychis viciifolia</i> Scop. (Fabaceae)                | 5-15 June                       | 120-300                       | Big                      | It is an early source in nectar and pollen for <i>Apis mellifera</i> carpathian Foti.   |
| 14          | <i>Medicago sativa</i> L. (Fabaceae)                         | 15-25 May                       | 25-200                        | Medium                   | The bee does not visit the lantern too often because the pistil hits the hymenopter at the base of the trumpet [11].                                  |
| 15          | <i>Campanula abietina</i> Griseb. & Schenk (Campanulaceae)   | July-August                     | -                             | Without sharing          | Bell bells produce nectar, but are of no economic importance to beekeeping.   |
| 16          | <i>Crocus heuffelianus</i> Herb. (Iridaceae)                 | March-April                     | 20                            | Small                    | Provides, early spring, pollen and nectar to bees.  |
| 17          | <i>Vaccinium myrtillus</i> L. (Ericaceae)                    | 05-15 May                       | 15-30                         | Medium                   | Produces nectar and pollen.   |
| 18          | <i>Vaccinium vitis-idaea</i> L. (Ericaceae)                  | May-July                        | -                             | Without sharing          | Good source of bee nectar   |
| 19          | <i>Bruckenthalia spiculifolia</i> (Salisb.) Rchb (Ericaceae) | July-August                     | -                             | Without sharing          | Offers nectar to insects, without economic importance.  |
| 20          | <i>Rubus idaeus</i> L. (Rosaceae)                            | 05-15 June                      | 50-200                        | Very big                 | It is a major bush with concentrated nectar (abundant).   |
| 21          | <i>Rubus caesius</i> L. (Rosaceae)                           | 22-31 May                       | 30-50                         | Medium                   | Offers nectar and pollen  |
| 22          | <i>Sorbus aucuparia</i> L. (Rosaceae)                        | April-May                       | 30-40                         | Medium                   | Visited by bees for nectar, often pollen.   |
| 23          | <i>Crataegus monogyna</i> Jacq. (Rosaceae)                   | 20 -30 May                      | 35-100                        | Medium                   | Offers nectar and pollen  |
| 24          | <i>Fragaria vesca</i> L. (Rosaceae)                          | May-June                        | -                             | Without sharing          | Appreciated due to nectar but not of economic importance.   |
| 25          | <i>Malus domestica</i> Borkh. (Rosaceae)                     | 20-30 April                     | 30-42                         | Medium                   | It is appreciated for both its nectar and pollen. The species is particularly important in the development of colonies.                               |
| 26          | <i>Prunus domestica</i> L. (Rosaceae)                        | 15-25 April                     | 20-30                         | Medium                   | Provides quality pollen and nectar and plays an essential role in colonial development.   |
| 27          | <i>Sambucus nigra</i> L. (Adoxaceae)                         | June-July                       | 80                            | Small                    | Provides a small amount of nectar and pollen to the bees.   |
| 28          | <i>Thymus serpyllum</i> L. (Lamiaceae)                       | June-July                       | 150                           | Medium                   | Plant rich in nectar.   |

**Families with only one representative:** Sapindaceae (*Acer pseudoplatanus* L.); Oleaceae (*Fraxinus excelsior* L.); Rubiaceae (*Galium odoratum* (L.) Scop); Geraniaceae (*Geranium*

*robertianum* L.); Gentianaceae (*Gentiana asclepiadea* L.); Juncaceae (*Luzula luzuloides* (Lam.) Dandy & Wilmott); Ranunculaceae (*Trollius europaeus* L.); Primulaceae (*Soldanella*

*pusilla* L.); *Oxalidaceae* (*Oxalis acetosella* L.); *Lamiaceae* (*Thymus serpyllum* L.); *Adoxaceae* (*Sambucus nigra* L.); *Hypericaceae* (*Hypericum perforatum* L.); *Campanulaceae* (*Campanula abietina* Griseb. & Schenk); *Brassicaceae* (*Cardamine bulbifera* Crantz.); *Iridaceae* (*Crocus heuffelianus* Herb);

**Families with two representatives:** *Fagaceae* (*Quercus petraea* (Matt.) Liebl., *Fagus sylvatica* L.); *Betulaceae* (*Betula pendula* Roth, *Corylus avellana* L.); *Pinaceae* (*Pinus sylvestris* L., *Picea abies* (L.) H. Karst.);

**Families with three representatives:** *Ericaceae* (*Vaccinium myrtillus* L., *V. vitis-idaea* L., *Bruckenthalia spiculifolia* (Salisb.) Rchb.); *Poaceae* (*Festuca rubra* L., *Agrostis capillaries* L., *Poa pratensis* L.);

**Families with four representatives:** *Asteraceae* (*Pilosella aurantiaca* (L.) F.W. Schultz & Sch.Bip, *Carlina acaulis* L., *Homogyne alpina* (L.) Cass., *Matricaria chamomilla* L.);

**Families with six representatives:** *Fabaceae* (*Trifolium pretense* L., *T. repens* L., *Lotus corniculatus* L., *Onobrychis viciifolia* Scop., *Medicago sativa* L., *Robinia pseudacacia* L.);

**Families with seven representatives:** *Rosaceae* (*Sorbus aucuparia* L., *Crataegus monogyna* Jacq., *Rubus idaeus* L., *R. hirtus* Waldst. & Kit., *Fragaria vesca* L., *Malus domestica* Borkh., *Prunus domestica* L.);

Of the total of 44 species, only 28 have a melliferous potential (Table 1)

Table 2. Numerical and relative abundance of honey species in the surroundings of Săliște, Sibiu county

| Nr. crt. | Family        | Numeric Abundance | Relative Abundance (%) |
|----------|---------------|-------------------|------------------------|
| 1        | Rosaceae      | 7                 | 25                     |
| 2        | Fabaceae      | 6                 | 21.44                  |
| 3        | Ericaceae     | 3                 | 10.72                  |
| 4        | Pinaceae      | 2                 | 7.14                   |
| 5        | Fagaceae      | 2                 | 7.14                   |
| 6        | Betulaceae    | 2                 | 7.14                   |
| 7        | Sapindaceae   | 1                 | 3.57                   |
| 8        | Oleaceae      | 1                 | 3.57                   |
| 9        | Campanulaceae | 1                 | 3.57                   |
| 10       | Iridaceae     | 1                 | 3.57                   |
| 11       | Adoxaceae     | 1                 | 3.57                   |
| 12       | Lamiaceae     | 1                 | 3.57                   |
|          | <b>Total</b>  | <b>28</b>         | <b>100</b>             |

The 28 species in the researched region belong to 12 families. We make the list of botanical families in order of numerical importance (Table 2)

Analyzing the data in Table 2, the family with the largest number of honey species, 7 in number, is the Rosaceae family (25%) followed closely by Fabaceae with 6 species (21.44%). The Ericaceae family with 3 species (10.72%) is ranked third. The families *Pinaceae*, *Fagaceae* and *Betulaceae* are represented by 2 species each (7.14%), and the families *Sapindaceae*, *Oleaceae*, *Campanulaceae*, *Iridaceae*, *Adoxaceae* and *Lamiaceae* have a melliferous plant species (3.57% each).

The landscape of Mărginimea Sibiului include several areas: alpine with numerous meadows dominated by grasses and creeping shrubs; Subalpine area with bushes, meadows; the mountain forest area with spruce, mountain maple, poplar, blueberries and secondary meadows installed on the site of forests; the area of hills and plateaus with deciduous forests (beech, oak, hornbeam, sycamore, acacia), fruit trees [19, 26].

The hazy resources of Săliște and surrounding areas belong to the following categories:

Trees and shrubs: *Robinia pseudacacia* L., *Acer pseudoplatanus* L., *Quercus petraea* (Matt.) Liebl., *Fagus sylvatica* L., *Picea abies* (L.) H. Karst., *Betula pendula* Roth, *Fraxinus excelsior* L., *Corylus avellana* L., *Rubus idaeus* L., *R. caesius* L., *Sorbus aucuparia* L., *Crataegus monogyna* Jacq., *Fragaria vesca* L., *Vaccinium myrtillus* L., *V. vitis-idaea* L., *Sambucus nigra* L.;

Fruit trees and berries: *Malus domestica* Borkh (Fig 2), *Prunus domestica* L.;



Fig. 2 Stall in Săliște in the apple orchard (original)

Hayfields and pastures, forest races: *Trifolium pratense* L., *T. repens* L., *Onobrychis viciifolia* Scop., *Campanula abietina* Griseb. & Schenk, *Crocus heuffelianus* Herb, *Thymus serpyllum* L., *Bruckenthalia spiculifolia* (Salisb.);

**Some species include fodder crops:** *Onobrychis viciifolia* Scop, *Trifolium pratense* L., *T. repens* L., *Medicago sativa* L., *Lotus corniculatus* L.

Depending on the products offered to the bees (Table 1), the 28 species from the Săliște flora, Sibiu County belong to the following categories:

- **Nectaropoliniferous plants.** They offer both the pollen and the nectar to the himenopteres. From the economic point of view, they are the most valuable apiculture and are the most widespread. Among these are: *Acer pseudoplatanus* L., *Robinia pseudacacia* L., *Trifolium pratense* L., *T. repens* L., *Lotus corniculatus* L., *Onobrychis viciifolia* Scop., *Medicago sativa* L., *Crocus heuffelianus* Herb, *Vaccinium myrtillus* L., *Rubus idaeus* L., *R. caesius* L., *Sorbus aucuparia* L., *Crataegus monogyna* Jacq., *Malus domestica* Borkh., *Prunus domestica* L. [21].

- **Nectar plants.** They offer bees only nectar. In the studied area only, the *Thymus serpyllum* L. is of economic value. Other species produce nectar but are not apicultural *Campanula abietina* Griseb. & Schenk, *Vaccinium vitis-idaea* L., *Bruckenthalia spiculifolia* (Salisb.) Rchb, *Fragaria vesca* L.

- **Poleniferous plants.** The latter offer pollen bees such as *Quercus petraea* (Matt.) Liebl., *Fagus sylvatica* L., *Pinus sylvestris* L., *Picea abies* (L.) H. Karst., *Betula pendula* Roth, *Fraxinus excelsior* L., *Corylus avellana* L., *Pinus sylvestris* L. [20].

The honey resources of our country have been grouped into 5 categories according to their apical importance [7,8]. The five categories include plants with a very large, large, medium, small, and no weight bee. The plants in Săliștei area are found in all these groups (Table 1).

**1. Species with very high weight (7.16%).** Only two species are included in this category: *Robinia pseudacacia* L., *Rubus idaeus* L. They provide yearly significant crop production;

**2. Large apicot species (10.71%):** *Picea abies* (L.) H. Karst., *Trifolium repens* L., *Onobrychis viciifolia* Scop. with high melliferous potential, supplying periodically the production harvest;

**3. Species with medium beekeeping (50%).** In this category, most of the identified taxa are fourteen: *Quercus petraea* (Matt.) Liebl, *Fagus sylvatica* L., *Pinus sylvestris* L., *Acer pseudoplatanus* L., *Corylus avellana* L., *Trifolium pratense* L., *Medicago sativa* L., *Vaccinium Myrtillus* L., *Rubus caesius* L., *Sorbus aucuparia* L., *Crataegus monogyna* Jacq., *Malus domestica* Borkh., *Prunus domestica* L., *Thymus serpyllum* L. [20, 21]. All these species provide annual maintenance and developmental selections, of production;

**4. Species with low apiculture (17.85%).** In this category we find five species: *Betula pendula* Roth, *Fraxinus excelsior* L., *Lotus corniculatus* L., *Crocus heuffelianus* Herb., *Sambucus nigra* L. These provide bee families with nectar and pollen needed for maintenance and development.

**5. Species without beekeeping (14.28%).** There are plants that occasionally offer nectar and pollen short time. They are not economically important. Among these species we find four taxa: *Campanula abietina* Griseb. & Schenk, *Vaccinium vitis-idaea* L., *Bruckenthalia spiculifolia* (Salisb.) Rchb, *Fragaria vesca* L.

Out of the total of the 28 species studied, five (17.85%) are producing extrafloral honey, sometimes called honey, and normal honey. This type of honey is of animal origin and comes from sweet bees collected from leaves, petioles and branches. Mana is the excretion product of Homoptera (*Aphididae*, *Lachnidae*, *Lecanidae*), with a system adapted for sucking and iching, which feed on sap of elaborate plants [22]. Mana can have a sugar concentration of 20-40% [11]. Among the host plants in the surroundings of Săliște, which are of economic importance to the manufactures, are: *Quercus petraea* (Matt.) Liebl., *Fagus sylvatica* L., *Pinus sylvestris* L., *Picea abies* (L.) H. Karst, *Corylus avellana* L.

Analyzing the data of Table 2 stands out that the period of flowering of the honey plants is in the period of March to September, with the

maximum favorability of harvesting in May-June.

## CONCLUSIONS

In the area of Mărginimea Sibiului, especially in the surroundings of Săliște, 44 plant taxa were identified, of which 28 were with melliferous potentials. They belong to a number of 12 botanical families: *Rosaceae* (7 taxons), *Fabaceae* (6 taxa), *Ericaceae* (3 taxa), *Pinaceae*, *Fagaceae* and *Betulaceae* with 2 taxa each. Families of *Sapindaceae*, *Oleaceae*, *Campanulaceae*, *Iridaceae*, *Adoxaceae*, *Lamiaceae* have one representative for each.

The natural landscape of Mărginimea Sibiului is differentiated on several areas: alpine, subalpine, hill and plateau. Honey plants are found in areas with trees and shrubs, orchards with trees and fruit trees, meadows, pastures, rarities of the forest.

Due to the nature of the food that it offers *Apis mellifera carpatica* Foti, the 28 species of plants of the melliferous base studied are divided into three categories: 15 nectaropoliniferous species, i.e. 53.57%; 4 nectariferous species, i.e. 14.28% and 8 polyniferous species, i.e. 28.57%. The fact that half of the honey plants offer bees both nectar and pollen makes this category the most important of the area in beekeeping and economic terms.

We find all five categories of honey resources: species with high apiculture (7,16%), species with high apiculture (10,71%), medium bee species (50%), small species (17, 85%), bee-free species (14.28%). Because the floristic potential of the area is 67.87% in the first three important economic categories, it encouraged another concern for the inhabitants of this area, namely beekeeping.

The maximum harvesting allowance in the area is estimated between May and June.

There have been identified five host plants of economic importance for manmade producers: *Quercus petraea* (Matt.) Liebl., *Fagus sylvatica* L., *Pinus sylvestris* L., *Picea abies* (L.) H. Karst, *Corylus avellana* L.

It is necessary to capitalize much more effectively on the flora and, implicitly, on all the honey resources in the area, because the

productive performances, measurable in quantities of honey and other hive products, are primarily influenced by the honeycomb base.

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## TECHNICAL EFFICIENCY OF RICE FARMERS IN NIGERIA: A WAY OUT OF ECONOMIC RECESSION

Waheed M. ASHAGIDIGBI

Federal University of Technology, Agricultural and Resource Economics Department, Akure, Nigeria, Email: ashagidigbi2000@yahoo.co.uk

*Corresponding author:* ashagidigbi2000@yahoo.co.uk

### *Abstract*

*The need to reduce food import bills and enhance farmers' technical efficiency, most especially in a recessed economy like that of Nigeria is germane. Improving farmers' technical efficiency which in turn will boost productivity is one of the exit routes. The study analysed the determinants of rice farmers' technical efficiency in Nigeria. Harmonized Nigeria Living Standard Survey (HNLSS) conducted by National Bureau of Statistics was used for this study. Input and output data of 130 rice farmers across the country were used. Descriptive statistics and Stochastic Frontier Production Function were the analytical techniques adopted. Fertilizer input and farm size were observed to enhance the output of rice and rice farmers' technical efficiency respectively at 5% level. Efficient Fertilizer distribution and land policy options that would favour rice farmers should be intensified to ensure increased efficiency and productivity. This would reduce food import bills, reduce government expenditure and create a pathway towards economic recovery.*

*Key words:* rice farmers, technical efficiency, recessed economy, Stochastic frontier model

### INTRODUCTION

Nigeria recorded food import bills of about ₦1.923 trillion (USD 9.28) per annum at current prices between the period of 1990 – 2011, amounting to about ₦1.0 billion worth of food per day. This however was in multiple of five times of the export value (Vaughan *et al*, 2014) [11]. Four commodities including rice, fish, wheat and sugar jointly account for an annual food import bill of ₦1.3 trillion even though there is potential production capacity in Nigeria as mentioned by Ajasa, (2016) [4]. As one of the measures in moving the country out of recession, there must be a concerted effort in drastically reducing food import bills and enhancing local production of these crops that are mainly imported. A sure means of ensuring this is through increasing the productivity and efficiency of Nigerian farmers, especially rice farmers.

Inefficiency in rice (regarded as a strategic food security commodity) production has been identified as one of the factors contributing to low rice productivity in Nigeria. The presence of shortfalls in efficiency means that output can be increased without the need for new technology (Akinbode, 2011) [6].

The country's estimated annual demand for milled rice is 5.2 million tons, while the average national production is 3.3 million tons, while the supply and demand gap of 1.9 million tons can only be bridged by importing rice. The importation of rice to bridge the demand and supply gap is worth ₦365 billion (Ayanwale and Amusan, 2012) [8]. The major reason for the importation of rice is the inability of the local farmers to meet domestic demand due to low productivity. The inability of the Nigerian recessed economy to satisfy the domestic demand and the consequent growth of rice import quantity and value remains a cause of concern. This necessitates the need for local farmers to increase their efficiency in input use, in order to bridge the demand-supply gap in rice production in Nigeria. Many technical efficiency studies (Ajibefun *et al*, 2002; Adepoju, 2008) [5] carried out are usually state or region based. This study covered the entire country with the inclusion of all the zones or regions.

The pertinent questions the study intended to address include:

-How technically efficient are rice farmers in Nigeria;

-What are the factors that could enhance the technical efficiency of rice farmers in Nigeria  
 The main objective of the study was to determine the factors influencing the technical efficiency of farmers in Nigeria. The specific objectives are to:

-Determine the level of technical efficiency of rice farmers in Nigeria,

-Examine the determinants of technical efficiency of rice farmers in Nigeria

The need for empirical measure of farmers' efficiency in rice production is germane. This will serve as a guide to food policy makers with reference to rice production in an economy that could no longer support the huge import bill. This will provide performance indicator and create improving policy environment that will improve efficiency of rice production in the country, which could serve as a pathway to economic recovery.

## MATERIALS AND METHODS

The study area is Nigeria. The data employed for the analysis was from secondary source obtained from the Harmonized Nigeria Living Standard Survey (HNLSS) collected by National Bureau of Statistics in 2010 [10]. Descriptive statistics such as frequency distribution, percentages and mean were used to determine socio-economic characteristics of 130 rice farmers and their level of technical efficiency.

In addressing objective 2, stochastic frontier function was adopted, implicitly stated as:

$$Y_i = f(X_i, \beta) + \varepsilon_i \quad (1)$$

The explicit equation is stated as:

$$\ln Y_i = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \varepsilon_i \quad (2)$$

where:

$Y_i$  = Output of rice of the  $i$ th farmer (Kg)

$X_i$  = Vector of inputs used by the  $i$ th farmer

$X_1$  = Farm size (hectare)

$X_2$  = Total labor used in crop production (man-day)

$X_3$  = Quantity of seeds used in cultivation (kg)

$X_4$  = Total quantity of pesticides (litre)

$X_5$  = Volume of herbicide (litre)

$X_6$  = Fertilizer (Kg)

$\beta$  = Vectors (coefficient) to be estimated

$\varepsilon_i(u_i + v_i)$  = Error term: the symmetrical disturbance which captures the random error effects on output. It is also assumed to be independently and identically distributed as  $N(0, S_v^2)$ . It accounts for error and other factors beyond the control of the farmer ( $V_i$ ) and ( $U_i$ ) efficiency component that captures the technical inefficiency of the  $i$ th farmer.

According to Aigner et al., 1977 [3], technical efficiency of the farmer is expressed below:

$$TE_i = Y_i / Y_i^* \quad (3)$$

where:

$TE_i$  = Technical efficiency of the  $i$ th farmer

$Y_i$  = Observed output of the  $i$ th farmer (kg)

$Y_i^*$  = Potential output (kg).

According to Battese and Coelli, 1996 [9] as cited by Ahmadu and Erhabor (2012) [2], the inefficiency model has been adopted as given below.

$$R = \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + E_i \quad (4)$$

where:

$R$  = Technical inefficiency of the  $i$ th farmer

$Z_1$  = Age of farmers (Years)

$Z_2$  = Household size

$Z_3$  = Farm size (Hectare)

## RESULTS AND DISCUSSIONS

Table 1 shows the socio-economic characteristics of the rice farmers in the study area. As shown in the Table, about 62% of the farmers are married, which indicates that rice farming is dominated by famers that have members to cater for. A greater percentage of the farmers (85%) have no access to credit, which may greatly affect their level of efficiency and productivity.

Also, a greater percentage of the population, over 69% are within the productive age of 42 years, having 6 household members on the average. The majority of the rice farmers however cultivates less than one hectare of land.

Table 1. Socio-economic Characteristics of the Rice Farmers in Nigeria

| Variables                  | Frequency | Percentage |
|----------------------------|-----------|------------|
| <b>Marital status</b>      |           |            |
| Monogamous                 | 80        | 61.54      |
| Polygamous                 | 38        | 29.23      |
| Widowed                    | 1         | 0.77       |
| Never married              | 11        | 8.46       |
| <b>Access to credit</b>    |           |            |
| Yes                        | 19        | 14.62      |
| No                         | 111       | 85.38      |
| <b>Household size</b>      |           |            |
| 1-5                        | 59        | 45.38      |
| 6-10                       | 54        | 41.54      |
| 11-15                      | 17        | 13.08      |
| Mean                       | 6         |            |
| <b>Age group (years)</b>   |           |            |
| <30                        | 28        | 21.54      |
| 30-60                      | 87        | 66.92      |
| >60                        | 15        | 11.54      |
| Mean                       | 42.07     |            |
| <b>Farm size(hectares)</b> |           |            |
| <1.00                      | 77        | 59.23      |
| 1.00-5.00                  | 48        | 36.92      |
| 5.01-10.00                 | 1         | 0.77       |
| >10.00                     | 4         | 3.08       |
| Mean                       | 1.364     |            |

Source: HNLSS, 2010 Survey Data [9].

Table 2. Basic statistics of rice production in Nigeria

| Variable           | Mean     | Standard Deviation | Max    | Min     |
|--------------------|----------|--------------------|--------|---------|
| Fertilizer (Kg)    | 11451.64 | 18170.74           | 0      | 150000  |
| Seed cost (Naira)  | 947.3077 | 1822.154           | 0      | 18000   |
| Total hectares     | 1.363106 | 1.420491           | 0.0072 | 6.5     |
| Herbicide (Litres) | 702.2989 | 680.3985           | 100    | 4800    |
| Pesticide (Litres) | 291.5327 | 866.1345           | 0      | 6000    |
| Labor (Mandays)    | 20830.55 | 175066.8           | 300    | 2000009 |

Source: Data from NBS, 2010.

However, labour and pesticides application tend to reduce the output of the farmers, conforming with the finding of Ashagidigbi *et al.* (2011) [7], who found out that labour has an inverse relationship with the output of egg producers. The negative relationship between labour and output of maize farmers could be as a result of the need to replace labour with mechanization. Also, the level of maize infestation could be insignificant causing the application of pesticides not to increase output. The mean efficiency level of rice farmers in Nigeria is 88.6%. The significant value of sigma squared  $\Sigma^2$  shows the presence of inefficiency effects in rice production in the

The descriptive statistics of inputs used by rice farmers in Nigeria was profiled in Table 2.

A rice farmer in Nigeria cropped an average of 1.36 hectares of land, planted ₦947 worth of rice seeds and applied 11.45 tons of fertilizer; and 702 litres and 291 litres of herbicides and pesticides respectively. The low cost of maize seeds planted could be due to the fact that farmers usually obtain the seeds to be planted from the previous harvest.

Table 3 shows the estimated coefficient of the production frontier and their corresponding levels of statistical significance. The significant variables include fertilizer and herbicide at 5% level of significance, while labour is significant at 10%. The  $\Sigma^2$  of 0.4969627 and gamma  $\gamma$  of 0.938771 were significant at 5% level.

Application of 1 kg of fertilizer increased rice farmers' output by 0.455.

study area while the significant gamma ( $\gamma$ ) of 0.938771 indicates that about 93% variation in output of the rice production would be attributed to technical inefficiency effects alone while only 7% would be due to random effects. The results revealed that factors significantly influencing farmers' technical inefficiency are age, household size and farm size at 5%, 5% and 10% level respectively. Age of farmers tends to enhance farmers inefficiency, while household size and farm size reduce it. In order words, for farmers to be technically efficient, increase in farm land is germane. This is important as majority of the farmers are small holders cultivating less than one hectare of land.

Table 3. Stochastic Production Function Estimate

| Variables                                    | $\beta$ Coefficient | T-Ratio    |
|--|---------------------|------------|
| Constant                                     | 0.11582143***       | 24.232582  |
| Pesticide                                    | -0.40575115         | -0.64804   |
| Labor  | -0.28868125*        | -1.8805725 |
| Herbicide                                    | -0.57034320**       | -2.0546729 |
| fertilizer                                   | 0.45588941**        | 2.0767785  |
| seed   | 0.43246923          | 0.68311932 |
| <b>Inefficiency model (<math>Z_i</math>)</b> |                     |            |
| intercept                                    | 0.51861261          | 0.53891600 |
| Household size                               | 0.10587445**        | 2.3493483  |
| Age  | -0.17706923**       | -2.7457912 |
| Farm size                                    | -0.85117912***      | -3.4655440 |
| sigma-squared ( $\Sigma^2$ )                 | 0.49696267***       | 3.7103507  |
| Gamma ( $\gamma$ )                           | 0.93877110***       | 44.172773  |
| Mean Efficiency: 88.6%                       |                     |            |

Log likelihood function = 0.87325006

## CONCLUSIONS

Arising from the findings of this study, there could be an improvement in the combination of inputs, especially in a recessed economy like Nigeria in order to enhance rice farmers' technical efficiency and productivity. This could be achieved through ensuring availability of fertilizer and farmland.

Therefore, efficient fertilizer distribution policy measure that will ensure timely availability of fertilizers to farmers should be intensified.

Secondly, government should formulate land use policy that would ensure easy accessibility of farmers to productive land in order to boost productivity and reduce our food import bill during this economic recession period.

Young and capable farmers should also be encouraged to engage in rice farming to boost production of rice in the country.

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## INSIGHTS ON ROMANIAN WINE PRODUCTION AND TRADE

Silviu BECIU<sup>1,2</sup>, Georgiana Armenița ARGHIROIU<sup>2</sup>, Georgiana Melania COSTAICHE<sup>2</sup>, Anișoara CHIHAIA<sup>2</sup>

<sup>1</sup>The Bucharest University of Economic Studies, 6 Piata Romana, 1st District, Bucharest, 010374, Romania, Mobile: 004 0723165907, Email: beciu.silviu@gmail.com

<sup>2</sup>University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti, District 1, 11464, Bucharest, Romania, Phone: +40213182564, Fax: +40213182888, Mobile: +40723 16590, Emails: beciu.silviu@gmail.com, arghiroiu.armenita@gmail.com, melania.sanda@yahoo.com, ani\_chihaia@yahoo.com,

**Corresponding author:** arghiroiu.armenita@gmail.com

### Abstract

*The paper aimed to make an analysis on the evolution of the wine sector in Romania, insisting on the aspects related with production and trade and the issues that contributed to this trend. The research method is quantitative, based on dynamic analyze of time data series, using specific production and trade indicators. The discussions are focused on evolution of total vineyards in Romania, trends of wine production, consumption and trade. The results indicates that the wine sector developed in last years, helped by absorption of all the funds provided by the national program support for the period 2009-2013 and the launch of the new program for the 2014-2018 period, but the production which is not profitable without subsidies and the low price of the wine exported by Romania maintain a reduced competitiveness of this sector.*

**Key words:** Romania, vineyards, wine sector, production, trade

### INTRODUCTION

Romania is one of main producers of wine from Central and Eastern Europe, well positioned both on the European and the world market. [8] Even if Romania has a large surface occupied with wines, almost as Portugal, [1] the competitiveness of wine sector remain low. While the recent studies made by FADN and wine specialists indicates that the wine production in Romania is dependent on subsidies per ha, without which the economic results would be negative, that is not the case of most part of the European wine producers [7]. Wine competitiveness of a country is related with benefits resulted from wine trade, and recent results indicate that these can be achieved either by increase in exports volume or increase in average unit price [4]. Romania continue to be rather unspecialized in the wine exports but the chance of the Romanian wine sector is to increase competitiveness through measures that conduct to real development of the wine specialized enterprises that are acting on the national and can access the international wine market [3]. Based on EU policy for developing the wine sector, the

accessing of the European funds are a real choice for this sector even if assuring co financing can be an obstacle [2].

### MATERIALS AND METHODS

For this paper, we processed time series from national and international statistic related with Romanian wine production and Romanian wine trade, in order to calculate specific indicators that offer an image of the evolution of Romanian wine sector. We calculated the evolution of vineyards in Romania using fixed base method, trade balance in quantitative and value terms, the imports coverage degree by exports, the average price for the wine exported by Romania or imported in Romania, the evolution of the wine consumption per capita, the imports coverage degree by exports, the evolution of the share of wine exported by Romania in EU in the total wine exported worldwide.

We choose to calculate the imports coverage degree by exports, because the trade balance was not achieved, and this indicator is related with economic competitiveness.

## RESULTS AND DISCUSSIONS

Romanian's areas with vineyard didn't significant change during 2012-2016 period. The vineyard covered 178,151 ha in 2016. In 2016 the areas with vineyards were situated in the South East Region – 37.97 %, South West Oltenia Region – 18.57 %, West North East Region – 16.77 %, South Muntenia Region –

15.37 %, North West Region – 4.22, Center Region – 3.37 %, West Region 2.97 %, Bucharest- Ilfov Region – 0.76 %

The increase of the grafted bearing vineyards is related with the national programme of conversion of vineyards, which included 7,406 ha in 2013, 5,959 ha in 2014, 2,900 ha in 2015 and 1,730 ha in 2016.

Table 1. Evolution of the vineyards surface in Romania during 2012-2016

| Vineyards categories      | Total hectares in 2012 | Evolution 2013/2012 % | Evolution 2014/2012 % | Evolution 2015/2012 % | Evolution 2016/2012 % |
|---------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Total bearing vineyards   | 178,654                | -0.15                 | -1.11                 | -0.30                 | -0.28                 |
| Grafted bearing vineyards | 89,735                 | 0.00                  | 0.32                  | 3.08                  | 3.30                  |
| Hybrid bearing vineyards  | 88,919                 | -0.31                 | -2.55                 | -3.71                 | -3.90                 |
| Total grapes              | 8,700                  | -7.47                 | -17.44                | -22.00                | -20.48                |
| Wine grapes               | 169,954                | 0.22                  | -0.27                 | 0.81                  | 0.75                  |

Source: Own calculation, Data Tempo Online – National Institute of Statistic -Romania [6]

Due to climate changes the wine production suffered decreases lately, France and Southern hemisphere countries are mostly affected [1].

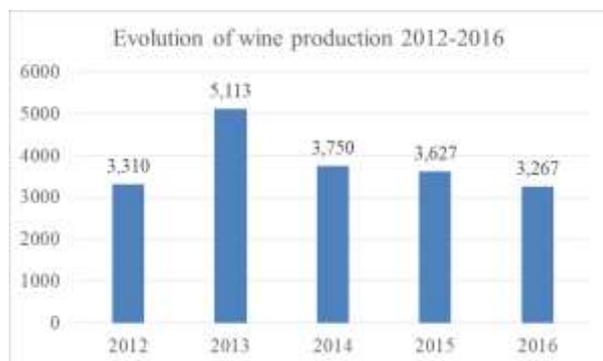


Fig.1. Evolution of wine production in Romania (thousand hl)

Source: Own calculation, Data Tempo Online – National Institute of Statistic -Romania [6]

Table 2. Evolution of wine consumption per capita in Romania

| Indicators                             | 2013    | 2014    | 2015    |
|--|---------|---------|---------|
| Total wine consumption in Romania (l)  | 460,000 | 470,000 | 390,000 |
| Wine consumption per capita (l/capita) | 22.97   | 23.55   | 19.62   |

Source: Own calculation, data provided by INSSE and Wine Institute [6]

The wine production in Romania is related with the yearly climate, and usual is above 3,000 thousand hl.

The beer is the main alcoholic beverage competitor for wine in Romania (around 80 l/capita), while the wine consumption per capita in 2015 was well below other countries from Europa, as Vatican City (54.2 l/capita), Croatia (44.2 l/capita), France (42.5 l/capita), Portugal (41.7 l/capita), Italy (33.3 l/capita) or Germany (24.8 l/capita) (Source: Wine Institute)

Table 3. Romanian trade balance for wine (quantitative terms)

| Indicators                                     | 2013   | 2014  | 2015  | 2016  |
|--|--------|-------|-------|-------|
| Total import of wine in Romania (thousands to) | 36.7   | 34.1  | 50.7  | 50.2  |
| Total of Romanian wine export (thousands to)   | 10.4   | 10.5  | 13.8  | 12.9  |
| Trade balance (thousands to)                   | - 26.3 | -23.6 | -36.9 | -37.3 |

Source: Own calculation, based on MADR data [5]

The analyse of the evolution of the balance of Romanian wine trade in quantitative terms indicated that in the last years the gap between

the imports and exports of wine products in quantitative and value terms increased, and the trade balance remained negative.

Table 4. Romanian trade balance for wine (value terms)

| Indicators                                 | 2013  | 2014  | 2015  | 2016 |
|--|-------|-------|-------|------|
| Total import of wine in Romania (mil Euro) | 38    | 33.2  | 42.4  | 47.5 |
| Total of Romanian wine export (mil Euro)   | 16.5  | 18.0  | 22.3  | 20.5 |
| Trade balance (mil Euro)                   | -21.5 | -15.2 | -20.1 | -27  |

Source: Own calculation, based on MADR data [5]

The imports coverage degree by exports in Romania reduced from 54.22 % in 2014 to 43.16 % in 2016.



Fig.2. The imports coverage degree by exports

Source: Own calculations calculation based on Tempo Online series- National Institute of Statistic – Romania [6]

Total value of the wine exported by Romania extra EU-2018 was 6.25 million euro in 2016. The main export partners were China (11,914 hl and a unit price of 2.53 Euro/litre), USA (6,794 hl and a price of 1.92 Euro/litre), Canada (2,606 hl) and Russia (1,457 hl).

Table 5. The average price of wine exported by Romania worldwide

| Indicators   | 2013 | 2014 | 2015 | 2016 |
|--|------|------|------|------|
| Total Romanian wine export worldwide (thousands to)              | 10.4 | 10.5 | 13.8 | 12.9 |
| Total value of the wine exported by Romania worldwide (mil euro) | 16.5 | 18.0 | 22.3 | 20.5 |
| Average price of Romanian wine exported worldwide (euro/l)       | 1,58 | 1.71 | 1.61 | 1.58 |

Source: Own calculation based on Tempo Online series- National Institute of Statistic - Romania [6]

The price of the wine exported by Romania is low, which can be related with high quantities of bulk wine exports. In 2016 the average price of the wine exported by Romania extra EU-28 was 2.35 Euro/litre, which means that is high above of the price of export in EU (Table 5). The price of wine imported in Romania is very low, which means that Romania import significant quantities of wine of poor quality that can be easily sell on the market ( Table 6).

Table 6. The average price of the wine imported by Romania

| Indicators   | 2013 | 2014 | 2015 | 2016 |
|--|------|------|------|------|
| Total import of wine in Romania (thousands to)         | 36.7 | 34.1 | 50.7 | 50.2 |
| Total value of the wine imported by Romania (mil euro) | 38   | 33.2 | 42.4 | 47.5 |
| Average price of the wine imported by Romania (euro/l) | 1.03 | 0.97 | 0.83 | 0.94 |

Source: Own calculation based on Tempo Online series- National Institute of Statistic – Romania and MADR Romania [5, 6]

The evolution of the wine exports in EU increased with 26 % from 2013 to 2016, and the share of the wine exports of Romania in EU in the total worldwide wine exported by Romania increased from 77.8 % in 2013 to 79% in 2016.

Table 7. The evolution of the wine exports in the EU

| Indicators  | 2013 | 2014 | 2015 | 2016 |
|---|------|------|------|------|
| Total Romanian wine export in EU (thousands to)                       | 8.1  | 7.7  | 10.8 | 10.2 |
| Total Romanian wine export worldwide (thousands to)                   | 10.4 | 10.5 | 13.8 | 12.9 |
| Share of wine exported in EU in the total wine exported worldwide (%) | 77.8 | 73.3 | 78.2 | 79   |

Source: Own calculation based on Tempo Online series- National Institute of Statistic – Romania and MADR Romania [5, 6]

The evolution of the wine imports from EU increased with 71 % from 2013 to 2016, and the share of the wine imported from EU in the total worldwide wine import in Romania

increased from 63.7 % in 2013 to 79.6 % in 2016. In 2016 the total wine imported from EU in Romania accounted 40 thousands to, comparative with only 10.2 thousands to of wine exported by Romania in EU, in the same year.

Table 8. The evolution of the wine imports in Romania from the EU

|   | 2013 | 2014 | 2015 | 2016 |
|---|------|------|------|------|
| Total wine import from EU in Romania (thousands to)   | 23.4 | 25.8 | 41.6 | 40   |
| Total wine worldwide imported by Romania (thousands to)                                     | 36.7 | 34.1 | 50.7 | 50.2 |
| Share of wine imported in Romania from EU in the total worldwide wine import in Romania (%) | 63.7 | 75.6 | 82   | 79.6 |

Source: Own calculation based on Tempo Online series- National Institute of Statistic – Romania and MADR Romania [5, 6]

## CONCLUSIONS

The wine sector in Romania is based on traditional and recent vineyards area which developed in the last years based on reconversion national program and indirect effect of other market orientated financial supported measures.

While the development of the internal market is related with the consumption trends which is not so favorable, the competitiveness of this sector is based on trade which need to improve based on adequate strategies in order to gain export access to extra EU wine markets, where the wine prices are attractive and the profit margin is higher.

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## STUDY ABOUT ROMANIA'S POSITION IN THE INTERNATIONAL TRADE WITH MEAT

Silviu BECIU<sup>1,2</sup>, Georgiana Armenița ARGHIROIU<sup>2</sup>, Georgiana Melania COSTAICHE<sup>2</sup>, Anișoara CHIHAIA<sup>2</sup>

<sup>1</sup>The Bucharest University of Economic Studies, 6 Piata Romana, 1st District, Bucharest, 010374, Romania, Mobile: 004 0723165907, Email: beciu.silviu@gmail.com

<sup>2</sup>University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti, District 1, 11464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40723 16590, Emails: beciu.silviu@gmail.com, arghiroiu.armenita@gmail.com, melania.sanda@yahoo.com, ani\_chihaia@yahoo.com,

**Corresponding author:** arghiroiu.armenita@gmail.com

**Key words:** trade, meat, market, Romania

### Abstract

*This paper aimed to analyse the evolution of world trade with meat and to evaluate the Romania's position and recent evolution in the EU and world trade with meat. The research method is based on a quantitative approach, based on national and international time data series with trade. The results indicated significant changes in the world trade with meat for the main meat trade importing and exporting countries. Romania was a net importer country for meat products, being in the last years an important export market for the EU countries.*

## INTRODUCTION

In a world which exported over 11 trillion US\$ manufactured goods in 2016, the exports of agricultural products increased by an average of 5 % per year which led to an increase of 70 % for the world exports with these products from 2006 to 2016 [6]. The world trade value with agricultural products continued to indicate a higher level of imports than exports [3]. One of the main importing countries for agriculture product, China, developed in the last years the internal pork production, which led to a significant decline of China's pork imports, but was unable to increase in the same manner its beef production, and changed into a major beef importer [4]. The exports of broiler meat on the China markets was an opportunity for UE, since the USA was not eligible for export on this market due sanitary restrictions. Romania was a net importing country for agro-foods products until 2013 [1], when the trade balance gained a surplus for agro-food products, mainly due to trade in cereals and oilseeds. This was not the case for the meat products, Romania remaining a net importing country for meat and edible meat products. [2], although the trade in live animals in Romania showed a positive balance [5].

## MATERIALS AND METHODS

For this paper we analysed: the evolution of the world trade with agricultural product in the world total trade, in terms of exports and imports; the evolution of the world trade balance with agricultural products in correlation with the evolution of the total world trade balance; the evolution of the exports and imports of the agro-food products, the evolution of the world meat exports and imports and the recent evolution related with Romanian meat trade. International Trade Centre - ITC, the joint agency of the WTO and United Nations, USDA and National Institute of Statistic from Romania.

## RESULTS AND DISCUSSIONS

The share of the imports of the agricultural products in the total world imports has increased from 7.18 % in 2010 to 8.6 % in 2015, based on increased trend of consumption of agricultural products in the countries that concentrate most part of the world population. The world agricultural product imported accounted 1.4 USD Trillion, from a total import of 16.4 Trillion. (Table 1).

The share of the exports of the agricultural products in the total world exports has also increased from 7.68 % in 2010 to 8.55 % in

2015. The world agricultural product exports accounted 1.3 USD Trillion from a total export of 16.2 Trillion.

Table 1. Share of imports of agriculture products in the total world imports (thousand \$)

| Year                                  | 2010           | 2011           | 2012           | 2013           | 2014           | 2015           |
|---------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Agricultural products                 | 1,000,205,661  | 1,338,722,994  | 1,347,268,087  | 1,408,452,875  | 1,460,174,980  | 1,416,786,941  |
| All products                          | 15,313,697,477 | 18,320,582,704 | 18,522,806,171 | 18,885,688,817 | 18,898,729,572 | 16,473,390,841 |
| % agricultural product in total trade | 7.18%          | 7.31%          | 7.27%          | 7.46%          | 7.73%          | 8.60%          |

Source: ITC and own calculation, [7]

Table 2. Share of exports of agriculture products in the total world exports (thousand \$)

| Year                                  | 2010           | 2011           | 2012           | 2013           | 2014           | 2015           |
|---------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Agricultural products                 | 1,157,358,104  | 1,413,011,777  | 1,439,626,842  | 1,515,206,143  | 1,559,326,447  | 1,346,979,021  |
| All products                          | 15,063,577,937 | 18,084,608,304 | 18,355,979,023 | 18,853,961,888 | 18,854,544,370 | 16,235,512,034 |
| % agricultural product in total trade | 7.68%          | 7.81%          | 7.84%          | 8.04%          | 8.27%          | 8.55%          |

Source: ITC and own calculations, [7]

In 2015 the sold of the trade balance for agricultural product was negative. These can be related with the increase of the net trade deficit with agriculture products in the

developing countries, where the consumption is increasing each year and can't be covered by the internal production.

Table 3 Evolution of international trade balance for agriculture products (thousand \$)

| Year                  | 2010         | 2011         | 2012         | 2013        | 2014        | 2015         |
|-----------------------|--------------|--------------|--------------|-------------|-------------|--------------|
| Agricultural products | 57,152,443   | 74,288,783   | 92,358,755   | 106,753,268 | 99,151,467  | -28,049,726  |
| All products          | -250,119,540 | -235,974,400 | -166,827,148 | -31,726,929 | -44,185,202 | -237,878,807 |

Source: ITC, [7]

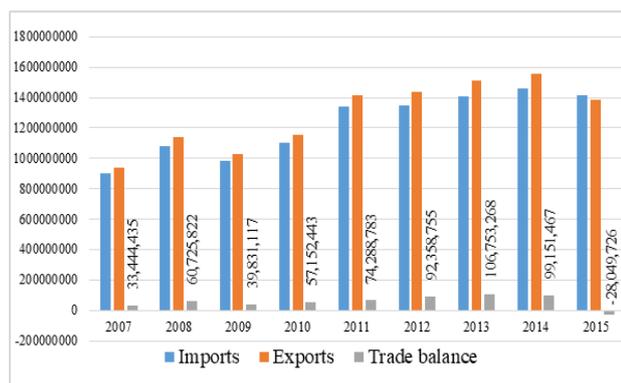


Fig.1. International trade with agro-food products (USD thousands).

Source: ITC, [7]

The international trade balance increased yearly from 2010 and recorded the highest positive value in 2013.

In 2014 the world meat imports reached the highest value, of US dollar thousand 124,155,625.

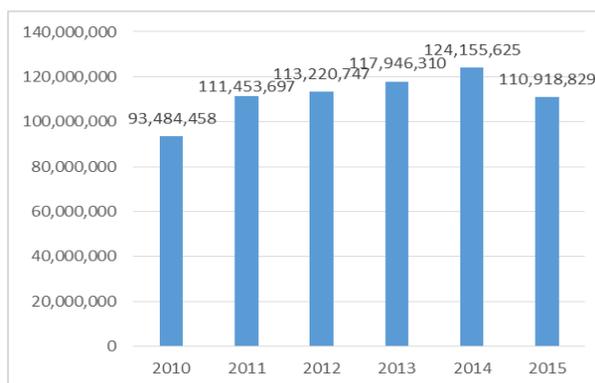


Fig.2. International meat imports (USD thousands).

Source: ITC, [7]

In 2014 the world meat exports has recorded also the highest value, of US dollar thousand 131,683,740.

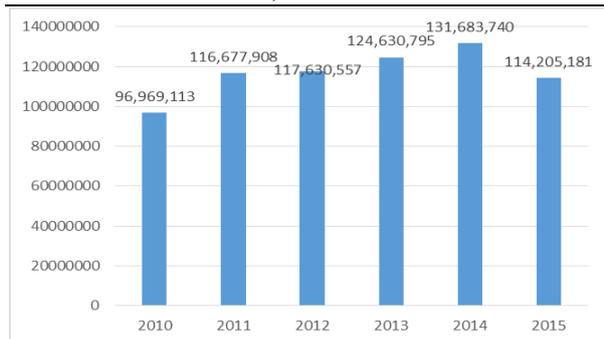


Fig.3. International meat exports (USD thousand).  
 Source: ITC, [7]

Japan was the main importing country for meat products for the period 2007-2015, accounting 8 % of all world meat imports.

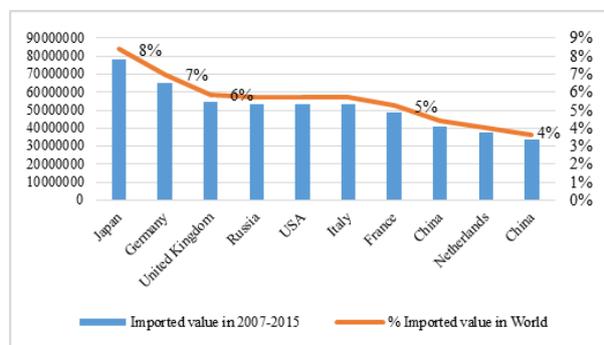


Fig.4. The main importing countries for meat during 2007-2015.  
 Source: Own calculation based on ITC data, [7]

The data provided by FDA indicated that the main beef and veal imports were made in 2016 by USA (1,367 thousand metric tons – carcass weight equivalent) China (818 thousand metric tons), and Japan (719 thousand metric tons) while the main beef and veal exports in 2016 were from India (1,764 thousand metric tons), Brazil (1,698 thousand metric tons) and Australia (1,480 thousand metric tons). From 2013 to 2016 the China beef and veal imports increased with 98 % while Russia reduced its imports of beef and veal by 50 % from 1,023 thousand metric tons in 2013 to 522 thousand metric tons in 2016. We could notice the increase of the quantities exported by EU, from 244 thousands metric to in 2013 to 344 thousands metric to in 2016. USA was the main exporting country for meat products for the period 2007-2015, accounting 13 % of all world meat exports.

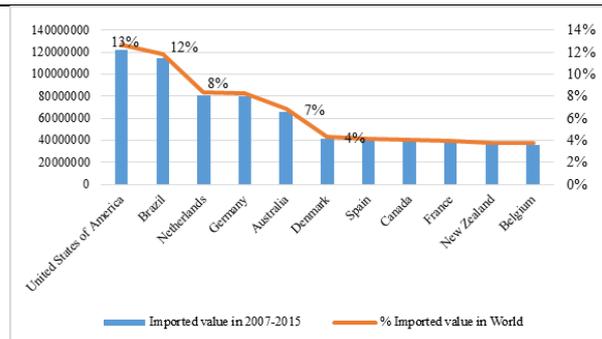


Fig.5 The main exporting countries for meat during 2007-2015.  
 Source: Own calculation based on ITC data, [7]

The world trade with pork had increased in the last decade, both in terms of imports and exports. The main pork imports in 2016 were made by China (2,181 thousand metric tons – carcass weight equivalent), Japan (1,361 thousand metric tons) and Mexico (1,021 thousand metric tons), while the main pork exports in 2016 were from European Union (3,125 thousand metric tons – carcass weight equivalent), USA (2,377 thousand metric tons) and Canada (1,320 thousand metric tons). From 2013 to 2016 the China imports of pork increased almost 3 times from 770 to 2,181 thousand metric tons in 2016. In Russia the imports of pork decreased from 883 to 347 thousands metric tons, based on increase of internal production from 2,400 thousands metric tons in 2013 to 2,870 thousands metric tons in 2016.

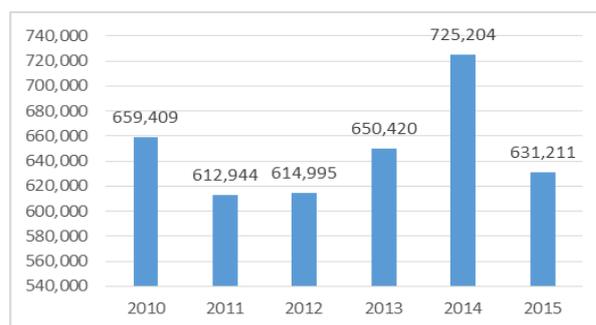


Fig 6. The evolution of meat imports in Romania, during 2010-2015, (USD thousand).  
 Source: ITC, [7]

The main broiler imports at world level were made in 2016 by Japan (973 thousand metric tons – ready to cook equivalent), Saudi Arabia (886 thousand metric tons) and Mexico (791 thousand metric tons), while the main broiler exports in 2016 were from Brazil (3889

thousand metric tons – ready to cook equivalent), USA (3014 thousand metric tons) and European Union (1276 thousand metric tons).

The highest value of the meat imported by Romania was recorded in 2014, of US dollar thousand 725,204.

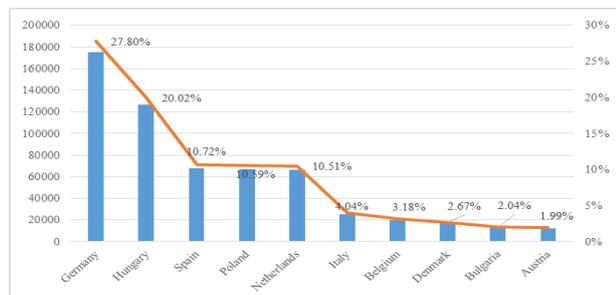


Fig 7. The main trade partners for Romania, for the meat imports in 2015.

Source: Own calculation based on ITC data. [7]

As regarding the groups of meat products imported by Romania, the most significant is the pork meat.

Table 4. The main products imported by Romania in terms of value (US Dollar Thousand)

| Product  | Imported value in 2013 | Imported value in 2014 | Imported value in 2015 | Imported value in 2016 |
|--|------------------------|------------------------|------------------------|------------------------|
| Meat of swine, fresh, chilled or frozen  | 357,726                | 378,390                | 327,996                | 380,264                |
| Meat and edible offal of fowls of the species Gallus domesticus, ducks, geese, turkeys | 162,574                | 194,710                | 162,250                | 179,285                |
| Meat of bovine animals, frozen   | 32,190                 | 41,964                 | 58,461                 | 64,067                 |

Source: ITC, selected products. [7]

Germany is the main exporter of meat for Romania market accounting for 27.8 % of all Romania's imports.

More than 94 % of the imports of meat in Romania are from UE.

In 2015 Romania meat exports reached 275,127 US dollar thousand, the trend for meat exports decreasing yearly since 2012.

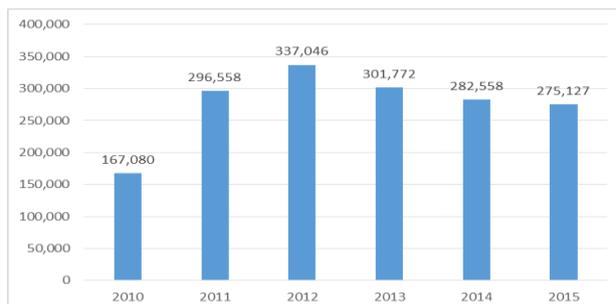


Fig 8. The evolution of meat exports from Romania, in US dollar thousand, during 2010-2015.

Source: ITC, [7]

United Kingdom was the main destination for the Romanian export with meat products, followed by Bulgaria and France. Most of export country destination are from EU.

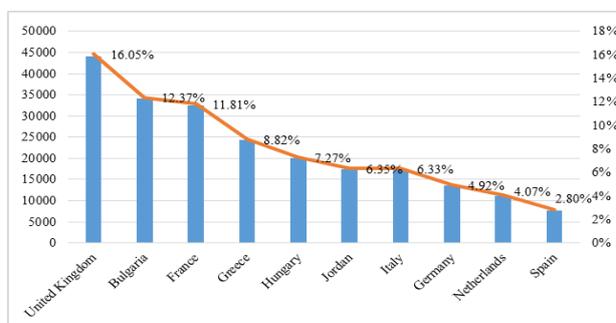


Fig 9. The main trade partners for Romania, for the meat imports in 2015.

Source: Own calculation based on ITC data. [7]

Table 5. The main products exported by Romania in terms of value (US Dollar Thousand)

| Product label  | Exported value in 2013 | Exported value in 2014 | Exported value in 2015 | Exported value in 2016 |
|--|------------------------|------------------------|------------------------|------------------------|
| Meat and edible offal of fowls of the species Gallus domesticus, ducks, geese, turkeys | 183,433                | 163,744                | 148,140                | 124,543                |
| Meat of swine, fresh, chilled or frozen  | 42,261                 | 51,814                 | 38,694                 | 54,273                 |
| Meat of sheep or goats, fresh, chilled or frozen                                       | 12,648                 | 22,630                 | 37,551                 | 25,826                 |

Source: ITC, selected products. [7]

The highest value for Romanian meat products were recorded in 2016 for the category meat and edible offal of fowls of the species Gallus domesticus, ducks, geese and turkeys.

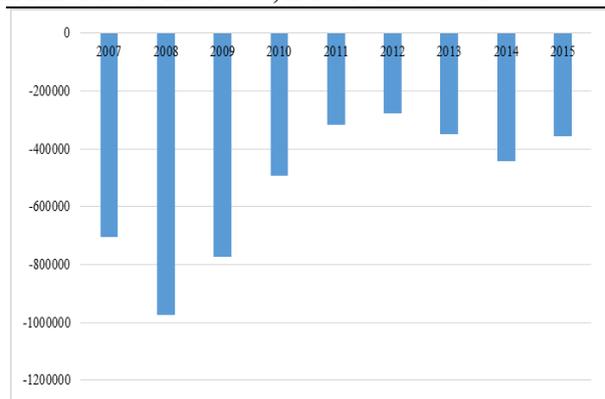


Fig.10. Evolution of meat trade balance in Romania for 2007-2015.

Source: ITC, [7]

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## CONCLUSIONS

Romania remained a net importing country for meat products and an important market for the main meat exporting countries from EU. This is related with a low competitiveness of the meat sector, which have to increase its profitability and quality of the products on the market. Due to increase of world consumption and the limited production of meat in countries that concentrate most part of the world population, the world trade with meat product will continue to increase, and Romania should integrate with the meat exports on the international markets.

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## MORTALITY VERSUS PROFITABILITY IN A ROMANIAN SWINE FARM

Silviu Ionut BEIA<sup>1</sup>, Liana ELEFTERIE<sup>2</sup>, Raluca Alexandra NECULA<sup>1,3</sup>,  
Violeta Elena BEIA<sup>4</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40744 6474 10, Emails: beiaionut@yahoo.com

<sup>2</sup>Spiru Haret University, Bucharest, Faculty of Law and Economics Science, Constanța, Phone/Fax: +40-241-545015; Mobile: +40771130000; Email: elefterieliana@yahoo.com

<sup>3</sup>The Bucharest University of Economic Studies, Faculty of Agrifood and Environmental Economics, 5- 7 Mihail Moxa Street, 1st district, Postal code: 010961, Bucharest, Romania, Email: raluca\_nec@yahoo.com

<sup>4</sup>The National Sanitary Veterinary and Food Safety Authority, Bucharest, Phone/ Fax: 021.312.49.67, Mobile: 0749700160; Email: beia.violeta@ansvsa.ro

**Corresponding author:** raluca\_nec@yahoo.com

### Abstract

*In a world with a continuously major demographic increasing, the global economy will be oriented to a correct path „the economy of rationality and hope”, which has to ensure the world’s rapidly demand and needs for food. As an important economic branch, a sustainable agriculture must simultaneously deliver food security, environmental sustainability and economic opportunity. In such a global environment, Romanian swine farms are vertically integrated into farrowing operations, the piglets grow and are fed until they reach market weight and at the end, they are slaughtered. There are many criteria for assessing good results in an integrated pigs farm, such as the volume, structure and quality of pigs produced, present and future possibilities to improve the activity, at what cost and with what investment effort and risks. An inherent risk of a swine farm with a huge impact to profitability and financial equilibrium is represented by pig mortality. For this reason we have analysed it at a farm level, taking into account that the mortality’s rate is the main issue that characterize the management in a swine farm. The analyses were made with the aim to reduce the economic effect of mortality, to review and improve the welfare conditions for pigs, to adapt them to the requirements of modern genotypes, increasing the prolificacy with a direct impact to reduce the financial loss due to pigs death.*

**Key words:** swine farm, mortality, profitability, economic rationality

### INTRODUCTION

In a global world characterized by a financial and moral crisis, all EU economies and even the current Romanian economy require an open, transparent and dynamic trend. The management needs to combine classic economic elements, but also updated elements in an unique synthesis following the path to a new framework of ideas, leading to a more complex study of the economical issued through the glass of the balance and unbalance at different levels and economic structures.

The global food system today is marked by serious challenges and risks, due to major demographic increasing which changes the rapidly demand for food. The international statistics forecast a world population of around 9 billion in the following 20 years, which will

determine a significant increase of global food demand [7]. All these are driving to a new challenge of the agricultural food sector, which will have to feed a bigger population in future and will require substantial movements to ensure the production, distribution and consumption of sufficient nutritious and sustainably produced food. So, in the foreseeable future the economic trend of the global economy will be „the economy of rationality and hope”, which tends to change the individual and the communities in which they work in, taking them to a healthy way of life, coexisting with all the generations and also to strive to succeed. The global economic development has to settle and stimulate the health of the entire eco system, the unity between people, environment,

organizations, institutions and communities.[1]

The modern agriculture will generate a lot of economic opportunities for global investors, in order to sustain the world food demand and in the meantime to assure food security and environmental security. [12]

In such a global environment, commercial swine farms are a popular form of livestock, with more than one billion pigs killed each year worldwide and the pigs are used for human food and some parts as skin, fat, organs, are used for clothing factories, ingredients for processed foods, medicine and other use.

Modern Romanian swine farms are vertically integrated into farrowing operations, where sows are impregnated and continually give birth, the piglets grow and are fed until they reach market weight and at the end of the cycle they are slaughtered.

Especially in pigs farms the responsibilities are assigned to two groups: a) individual responsibilities reflect how they do their job properly, talking care of animals and b) how the middle and top management assure the financial and material resources and design the strategy of the farm, in such a way to assure animal welfare and the health of the entire eco system and in the meantime to earn profit in a free market economy [9].

Obviously, there are many criteria for assessing good results in an integrate pigs farm. In this context it arrases the resolution of fundamental problems related to volume, structure and quality of pigs to be produced, present and future possibilities to improve the activity, at what cost and the way to deal with distribution and the market evolution of pigs produced [10].

A current risk which affect the profitability of a swine farm is represented by pig mortality.

There are a number of potential reasons which influence the growth in pig mortality, like:

-Genetics has changed dramatically over the last period and selection for production traits has been correlated over time with a decrease in liveability;

-The usage of all-in, all-out pig flow, has also led to the common use of multi-site production systems and pig flow dynamics may have negatively impacted overall herd immunity;

-There are numerous bacterial and viral diseases that may cause pig mortality, out of which without any doubt PRRS is the most costly of these.

-A great risk for a swine farm is the opportunity for entry of exotic viruses such as foot-and-mouth virus, African Swine Fever, or Classical Swine Fever (Hog Cholera), so the managers have to remain vigilant and responsive to this risk.

On a roughly analysis it seems that the number of pigs dying in European area appears to be on a slow, but steady climb in the last three years. Talking into consideration all risks in pigs current industry, it results that a main issue of the management strategy in a swine farm to reduce the economic effect of mortality is to review and improve the welfare conditions for pigs, to adapt them to the requirements of modern genotypes, increasing the prolificacy with a direct impact to reduce the financial loss due to mortality[8].

## MATERIALS AND METHODS

In order to prove the economic impact of pig mortality on financial loss, it was made a study in a Romanian private swine farm, located in Dobrogea, S-E area of Romania, in Constanta county and which, for confidentiality reasons, we will call it Black Sea Farm.

It has a capacity of around 2,000 productive sows, which will be extended during 2016 up to 2,600 sows. Black Sea Farm is a full-integrated project as well, producing piglets for fattening. The expected number of fattened pigs, once all sows will be in full production is estimated to rise to 60,000 heads. The farm has an own feed mill, grain storage facilities as well as a BIOGAS – installation under construction, made with EU funds and with owners investments financing and will be operational at 2016 end, for the production of electricity.

During our study we have taken in consideration the fact that the business environment imposes the need for clarification and a realist understanding of the economic impact of mortality in a pig farm, which needs to be assimilated on the premised of an accurate analyse of all risks overview.

The economic coordinates in swine farm can be synthesized based on object, method and function. National and international experience all share the necessity of implementing in the process of growing pigs some characteristics:

The pig grow theory must be seen differently now and its main objectives of study were changed. In present time this analyse went on tracking all the changings of conditions in which the pigs are growing in modern farms and all practical aspects.

This means that the tendencies of one period are intertwined with the general worldwide tendencies in the macroevolution process started in the early 90's, as no clear predictions were ever made even if we can hint some important ones. The important fact is that the production analyse for a swine farm in the future will be a creative leap on the premises of scientific and technological revolution as a worldwide trend. The science-technic revolution is defined through deep transformation – agricultural, environment, veterinarian, biological, physical, chemical, informational, automatic feeding and survey, etc. We also need to take into consideration the production management strategy and economic-financial status which bring new ending to pigs grow business.

The production and financial approach methodology and techniques adds a new perspective between the potential risks and the enforcement of the economic impact in the production activity of a pig farm. This means catching the authenticity of the economic factor, taking out some oversized assumption and errors for some fundamental parts of practices such as: the productive function of a pig farm, the pigs free market evolution and requirements, the role of the consumer, the link between continuity and economic change and updating the technology and privatization.[11]

a) This process is going towards interdisciplinary and more-disciplinary actions. The cause of this trend are the complexity in all production farm departments, the updated technical process of the study, creating relations between trainings in pigs industry and practical one, between fundamentals and the applied ones in a modern learning curricula, accentuating the

dimensions of practice experience, shifting towards structural theories made for the natural and human environment. In these circumstances the growing pigs' methods need to be in contact with all social and biological sciences. It will need to approach humans as consumers and work resources and also the decision factor in order to open new leads of risks investigation, more refines instruments of mortality avoidance and animals' measurement of welfare, improvement of the economic analysis.

b) Another approach is the integration of the processed into the era of computers, for viewing sows insemination, farrowing, feed consumption, gain evolution, etc.

c) Another important aspect is the flow towards logic. In practice, for developing and growing pigs there are some empiric investigation and also logical patterns involved. So more functions are in place in modern farms – methodological function, heuristic, explanatory and researching method. In the current economic environment, can be find more of the ideas of worldwide casuistry, profitability, and multiple interaction. At the same time logical patterns are used as models, mathematical logic is also used in identifying the cycles for pigs, laws, theories and principles.

In this period of continuously world demographic growing, the Romanian agricultural, as part of global economy, on the European pattern, has to improve its role and functions, to rise in importance and there is a need to improve it and elaborate it on a long term program. Without a real development of all agricultural branches, Romania would need to find in the dark the way through economic problems, argumentative opinions and opposite political proposes.

The economic development of swine grow is a new trend in our country and also for others in the European region, where the decision and political view to reform and make the pigs farms more efficient in order to surpass this current crisis are crucial for success. For this reason the decreasing of mortality risks, helps the farmers in choosing the correct path to diminish the tension between limited, scarce, expensive, un reachable resources and the

current growing and divers human needs for food. In this manner we can overcome the shortage and limitations imposed by nature and acting rationally in the social economic environment, levelling goals and responsibility and also results in an coherent historic and economic system.[10]

Lifting the pig grow on a coherent way, allows a more accurate understanding of the dynamics of the agricultural economy on a long run and in a word wide view.

As such the decisions which are taken in order to smother the free market competition are complex and important as we need to keep in mind also a lot of other aspects such as adhesion, integration, harmonization, convergence, and globalization. And also the need of a reconstruction of spiritual aspects to form a durable evolution of the knowledge society. In this context the ideology suffers mutations and they are still present as in the past. There is also the reverse where we make the role of the free market absolute and the balance is fragile and very scare.

When political decision of economic and financial aspects are taken it is taken out the dimension and the social impact of the economic processes which will generate sooner or later high costs, economical unbalance, social and ecological changes very hard to contain revealing certain processes are harmful, but considered as normal in the Romanian economic life, as deindustrialization, fraudulent privatization, corruption, etc.. However, scientific and coherent economic theory to assess fair and realistic-scientific orientation further transformational economic and financial movements in a particular environment led sustainable development and European integration, national identity as authentic samples [3]. The important methods of financial analysis were:

Horizontal Analysis, for comparing pigs stock evolution, mortality, feed consumption, over different months or defined periods within a fiscal year. .

One of the two methods used for a horizontal analysis:

- the first way method of horizontal analysis in which the amounts in absolute values of

various production and financial items were compared over different periods of time, helping us to analyse the spending trends of the Black Sea pig farm business. Besides, it also helped us to analyse the effects of external factors which affected the rise in mortality, over business profitability.

- Percentage analysis based on the change in different items over different periods of time, showing the performance of production flows, in different periods of time.

Ratio Analysis. This is the method in which the ratio between two or more variables related to pig production is compared, such as: mortality ratio, feed consumption ratio, farrowing ratio, financial loss ratio, etc.

All the ratios presented above, used in our study case are collectively used to carry out the production analysis of pig business to assess growth, profitability, and solvency of Black Sea Farm.

All information and figures provided for our research by Black Sea Farm, were interpreted by us from quantitative and qualitative point of view. In our study, we took into consideration the socio-economic factors, concerning attitudes, opinions background, behaviours, inherent risks, which were used in quantitative research as well as in qualitative one. The most important method used in this research was financial analysis, because in a pig farm it carry out an important analysis based on the production results. We have compiled the information provided by business statements, reviews them with the help of business representatives to ensure their accuracy [5].

## RESULTS AND DISCUSSIONS

### *Pigs Livestock analysis*

Our case study started with the presentation of pigs' stock evolution for a period of three years, from January 2013 up to December end 2015. During this period, the total number of pigs on categories raised year by year, from a total number of 26,836 pigs at December end 2013 to 27,121 pigs at December end 2014 and attended a maximum of 31,111 pigs on December end 2015, as follows:

Table 1. Pigs livestock by categories-Comparative figures 2013-2015

| Explanation          | Boars              | Sows    | Repl. young boars | Replacement Gilts | Piglets | Growers | Testing Young boars | Testing Gilts | Fatteners | TOTAL     |           |
|----------------------|--------------------|---------|-------------------|-------------------|---------|---------|---------------------|---------------|-----------|-----------|-----------|
| Stock December 2013  | Pigs no            | 13      | 1,789             | -                 | 652     | 3,244   | 8,681               | -             | 860       | 11,597    | 26,836    |
|                      | Total weight       | 1,997   | 310,992           | -                 | 98,263  | 11,353  | 146,606             | -             | 50,226    | 834,406   | 1,453,843 |
|                      | Average weight/pig | 153.62  | 173.84            |                   | 150.71  | 3.5     | 16.89               |               | 58.4      | 71.95     | 54.18     |
| Stock December 2014  | Pigs no            | 9       | 1,861             | 12                | 1,016   | 3,693   | 8,970               | -             | 869       | 10,691    | 27,121    |
|                      | Total weight       | 1,253   | 320,104           | 1,590             | 165,340 | 18,610  | 172,467             | -             | 89,618    | 846,986   | 1,615,968 |
|                      | Average weight/pig | 139.22  | 172.01            |                   | 162.74  | 5.04    | 19.23               |               | 103.13    | 79.22     | 59.58     |
| Stock December 2015  | Pigs no            | 14      | 2,000             | 2                 | 630     | 3,545   | 9,406               | -             | 340       | 15,174    | 31,111    |
|                      | Total weight       | 3,291   | 387,186           | 310               | 116,481 | 14,272  | 189,472             | -             | 25,337    | 1,006,932 | 1,743,281 |
|                      | Average weight/pig | 235.07  | 193.59            |                   | 184.89  | 4.03    | 20.14               |               | 74.52     | 66.36     | 56.03     |
| % December 2015/2014 | Pigs no            | 155.56% | 107.47%           |                   | 62.01%  | 95.99%  | 104.86%             |               | 39.13%    | 141.93%   | 114.71%   |
|                      | Total weight       | 262.65% | 120.96%           |                   | 70.45%  | 76.69%  | 109.86%             |               | 28.27%    | 118.88%   | 107.88%   |
|                      | Average weight/pig | 168.85% | 112.55%           |                   | 113.61% | 79.89%  | 104.77%             |               | 72.26%    | 83.76%    | 94.04%    |

Source: Calculations based on the Black Sea Farm internal data

### Mortality analysis

While the number of pigs presented above was rising each year, from 2013 to 2015, during our research, we have ascertained that the number of pigs from different categories (starting with piglets, growers, and ending with fatteners) dying ratio was also rising. All the computation was done from the information designed by Black Sea Farm in its standard monthly production report and animals movement. The rising of dying ratio in the meantime with the rising of crowd is due in our opinion to the following reasons:

They has not a stable plan for genetics:

-Crowd increasing was not monitored properly on categories;

-Pig flow increasing has a negative impact to herd immunity;

-Pig flow used was all-in, all-out, leading to the use of multi-site production systems;

-Disease issues were not managed properly;

-Mycoplasma pneumonia and porcine reproductive and respiratory syndrome (PRRS) were major problems;

-The disease control system was weak and not well correlated with vaccination program.

Mortality evolution per pig category in Black Sea Farm during the analyzed years is presented in Table 2.

Table 2. Yearly Mortality - comparative figures - 2013-2015

| Explanation             | Cumulated mortality January-December |                |               |                |               |                | %                   |                |
|-------------------------|--------------------------------------|----------------|---------------|----------------|---------------|----------------|---------------------|----------------|
|                         | 2013                                 |                | 2014          |                | 2015          |                | Year 2015/Year 2014 |                |
|                         | Heads                                | KG             | Heads         | KG             | Heads         | KG             | Heads               | KG             |
| Boars                   | 2                                    | 540            | 1             | 320            | 5             | 1,320          | 500.00%             | 412.50%        |
| Sows                    | 1,670                                | 18,015         | 153           | 29,875         | 205           | 36,035         | 133.99%             | 120.62%        |
| Replacement young boars | -                                    | -              | 1             | 100            | -             | -              |                     |                |
| Replacement Gilts       | 1,546                                | 2,137          | 64            | 8,205          | 69            | 10,250         | 107.81%             | 124.92%        |
| Piglets                 | 5,700                                | 15,426         | 6,056         | 14,972         | 6,138         | 16,809         | 101.35%             | 112.27%        |
| Growers                 | 6,363                                | 31,985         | 2,224         | 28,041         | 3,519         | 49,066         | 158.23%             | 174.98%        |
| Testing Young boars     | -                                    | -              | -             | -              | -             | -              |                     |                |
| Testing Gilts           | 549                                  | 3,115          | 91            | 9,410          | 90            | 7,715          | 98.90%              | 81.99%         |
| Fatteners               | 14,235                               | 115,296        | 2,314         | 126,424        | 3,215         | 152,821        | 138.94%             | 120.88%        |
| <b>TOTAL</b>            | <b>30,065</b>                        | <b>186,514</b> | <b>10,904</b> | <b>217,347</b> | <b>13,241</b> | <b>274,016</b> | <b>121.43%</b>      | <b>126.07%</b> |

Source: Calculations based on the Black Sea Farm internal data

Annual total mortality (heads and Kg) had a significant rise in 2015, compared to 2014, increasing by 21.43% for pig heads and by 26.07% for pig Kg.

Table 3. Mortality rate (%) by categories

| Explanation  | Mortality rate (%) on categories |             |             |             |             |             |
|--------------|----------------------------------|-------------|-------------|-------------|-------------|-------------|
|              | 2013                             |             | 2014        |             | 2015        |             |
|              | Heads                            | Kg          | Heads       | Kg          | Heads       | Kg          |
| Boars        | 10.00                            | 14.84       | 6.67        | 7.84        | 14.29       | 16.74       |
| Sows & gilts | 2.06                             | 1.99        | 3.27        | 3.23        | 4.37        | 3.79        |
| Maternity    | 9.20                             | 4.92        | 11.00       | 5.04        | 9.17        | 4.72        |
| Nursery      | 5.19                             | 2.05        | 4.12        | 1.77        | 5.31        | 2.74        |
| Finishing    | 4.90                             | 2.43        | 4.55        | 2.67        | 5.21        | 2.83        |
| <b>Total</b> | <b>6.28</b>                      | <b>2.39</b> | <b>6.44</b> | <b>2.69</b> | <b>6.51</b> | <b>3.05</b> |

Source: Calculations based on the Black Sea Farm internal data

Table 4. Mortality in maternity – Yearly comparative figures 2014-2015

| Month        | Starting stock |               | Comparative figures Year 2015: Year 2014 (%) |                        |                |               |               |
|--------------|----------------|---------------|--|------------------------|----------------|---------------|---------------|
|              | Starting stock |               | Farrowing in month                           | Total piglets in month |                | Mortality     |               |
|              | Heads          | Kg            | Heads/Kg                                     | Heads                  | Kg             | Heads         | Kg            |
|              | <b>1</b>       | <b>2</b>      | <b>3</b>                                     | <b>4=(1+3)</b>         | <b>5=(2+3)</b> | <b>6</b>      | <b>7</b>      |
| January      | 113.84         | 163.92        | 97.05  | 103.36                 | 142.39         | 52.54         | 63.73         |
| February     | 142.54         | 198.88        | 97.68  | 115.22                 | 166.25         | 90.56         | 101.84        |
| March        | 132.28         | 190.72        | 133.97                                       | 133.21                 | 174.79         | 110.16        | 139.95        |
| April        | 181.32         | 231.31        | 122.88                                       | 145.67                 | 198.14         | 76.10         | 94.20         |
| May          | 175.03         | 229.74        | 134.33                                       | 148.32                 | 192.64         | 71.16         | 85.98         |
| June         | 177.83         | 217.71        | 127.90                                       | 147.00                 | 188.16         | 51.76         | 64.78         |
| July         | 148.32         | 173.06        | 140.99                                       | 144.12                 | 164.45         | 123.94        | 94.41         |
| August       | 171.81         | 183.27        | 124.09                                       | 141.82                 | 164.34         | 186.98        | 140.22        |
| September    | 152.84         | 164.78        | 149.52                                       | 151.07                 | 161.38         | 181.16        | 165.44        |
| October      | 116.10         | 93.92         | 110.38                                       | 112.64                 | 97.79          | 204.31        | 203.31        |
| November     | 98.61          | 77.18         | 144.33                                       | 118.46                 | 86.54          | 178.95        | 202.42        |
| December     | 113.33         | 86.90         | 108.51                                       | 110.53                 | 91.31          | 115.47        | 153.16        |
| <b>Total</b> | <b>113.84</b>  | <b>163.92</b> | <b>122.14</b>                                | <b>121.65</b>          | <b>123.32</b>  | <b>101.35</b> | <b>112.27</b> |

Source: Calculations based on the Black Sea Farm internal data

In maternity, mortality rate (computed per heads and per Kg) increased in 2015, compared to 2014, by 1,35% for heads and by 12,27% for Kg. This means that the piglets died closer to the weaned period, not in the first days after birth.

Mortality rates were huge in 2015 and in our opinion, it is a big question mark that the ongoing principle could be assured in a foreseeable future with the same bad management. The major decision in order to save the farm is to change the key managers, such are: general manager, production manager and the veterinarian.

In order to reduce the mortality to acceptable levels, the new management has to[4]:

-implement early gilt development;

-change vaccination programs, by improving sow vaccination programs to increase pig immunity downstream;

-improve timing of nursery vaccination

-increase weaning age;

-improve the conditions for animal welfare.

#### **Farrowing index analyze**

We have started our analyze for farrowing, having in view that the most critical period in the life cycle of a pig is from birth to weaning and every farrowing is different. Practice proves that during the farrowing period, on average, about two pigs per litter are lost.[6]

In Black Sea Farm, the average gestation period for sows was between 114 days to 116 days. We have obtained information about the method used to identify all pregnant sows and the schedule when sows were due, which was

designed to help the producer determine farrowing date based on the date sows are bred. Taking into consideration that the farrowing index and non-productive days are interconnected and important key performance

indicators for the breeding herd, we have analyzed also these indicators for 2014 and 2015 (Table 5).

Table 5. Farrowing index 2015

| December 2015 |  |                |              |                 |                   |                        |               |                        |              |                        |                   |                |                              |                        |                                 |
|---------------|--|----------------|--------------|-----------------|-------------------|------------------------|---------------|------------------------|--------------|------------------------|-------------------|----------------|------------------------------|------------------------|---------------------------------|
| No            | Month  | Sows and gilts | Insemin. No. | Insemin. rate % | Month             | Farrowing sows & gilts | Piglet Birth  | Piglets per farrow sow | Weaned Sows  | Died sows after farrow | Total sows weaned | Weaned piglets | Aver. piglets weaned per sow | Total KG Wean. piglets | KG Weight per Piglet at Weaning |
|               | 0  | 1              |              |                 | 2                 | 3                      | 4             | 5=(4:3)                | 6            | 7                      | 8=6+7             | 9              | 10=9:8                       | 11                     | 12=11:9                         |
| 1             | Oct-2014   | 2,633          | 707          | 72.28%          | Jan-2015          | 511                    | 5,232         | 10.24                  | 436          | 3                      | 439               | 3,888          | 8.86                         | 23,794                 | 6.12                            |
| 2             | Nov-2014   | 2,657          | 744          | 63.44%          | Feb-2015          | 472                    | 4,968         | 10.53                  | 481          | 3                      | 484               | 4,405          | 9.10                         | 26,430                 | 6.00                            |
| 3             | Dec-2014   | 2,659          | 653          | 79.63%          | Mar-2015          | 520                    | 5,778         | 11.11                  | 480          | 4                      | 484               | 4,647          | 9.60                         | 27,882                 | 6.00                            |
| 4             | Jan-2015   | 2,695          | 628          | 78.34%          | April-2015        | 492                    | 5,642         | 11.47                  | 610          | 2                      | 612               | 6,214          | 10.15                        | 37,284                 | 6.00                            |
| 5             | Feb-2015   | 2,638          | 570          | 87.89%          | May-2015          | 501                    | 5,815         | 11.61                  | 448          | 1                      | 449               | 4,668          | 10.40                        | 28,008                 | 6.00                            |
| 6             | March-2015   | 2,616          | 728          | 60.71%          | June-2015         | 442                    | 5,377         | 12.17                  | 437          | 1                      | 438               | 4,812          | 10.99                        | 28,872                 | 6.00                            |
| 7             | April-2015   | 2,613          | 615          | 84.23%          | July-2015         | 518                    | 6,016         | 11.61                  | 546          | 2                      | 548               | 6,128          | 11.18                        | 33,152                 | 5.41                            |
| 8             | May-2015   | 2,625          | 734          | 62.40%          | Aug-2015          | 458                    | 4,991         | 10.90                  | 405          | 4                      | 409               | 3,902          | 9.54                         | 20,574                 | 5.27                            |
| 9             | June-2015  | 2,628          | 659          | 68.29%          | Sept-2015         | 450                    | 5,000         | 11.11                  | 536          | 2                      | 538               | 5,349          | 9.94                         | 29,374                 | 5.49                            |
| 10            | July-2015  | 2,552          | 612          | 76.80%          | Oct-2015          | 470                    | 5,305         | 11.29                  | 450          | 7                      | 457               | 4,537          | 9.93                         | 23,814                 | 5.25                            |
| 11            | Aug-2015   | 2,573          | 734          | 52.86%          | Nov-2015          | 388                    | 4,376         | 11.28                  | 398          | 2                      | 400               | 4,013          | 10.03                        | 20,683                 | 5.15                            |
| 12            | Sept-2015  | 2,528          | 637          | 69.23%          | Dec-2015          | 441                    | 4,958         | 11.24                  | 461          | 1                      | 462               | 4,725          | 10.23                        | 25,226                 | 5.34                            |
| 13            | <b>Total year</b>                                      | <b>31,417</b>  | <b>8,021</b> | <b>70.60%</b>   | <b>Total 2015</b> | <b>5,663</b>           | <b>63,458</b> | <b>11.21</b>           | <b>5,688</b> | <b>32</b>              | <b>5,720</b>      | <b>57,288</b>  | <b>10.02</b>                 | <b>325,093</b>         | <b>5.67</b>                     |
| 14            | Average no of sows and gilts (row 13:12)               |                |              |                 |                   |                        |               |                        |              |                        | <b>2,618</b>      |                |                              |                        |                                 |
| 15            | Total farrowing sows in one year                       |                |              |                 |                   |                        |               |                        |              |                        | <b>5,663</b>      |                |                              |                        |                                 |
| 16            | Farrowing index (15:14=farrowing per sow one year)     |                |              |                 |                   |                        |               |                        |              |                        | <b>2.16</b>       |                |                              |                        |                                 |
| 17            | Weaned rate per year (weaned piglets : farrowing sows) |                |              |                 |                   |                        |               |                        |              |                        | <b>10.12</b>      |                |                              |                        |                                 |
| 18            | Weaned Piglets per sow per year (16x17)                |                |              |                 |                   |                        |               |                        |              |                        | <b>21.88</b>      |                |                              |                        |                                 |
| 19            | Weaned piglets (14x18)                                 |                |              |                 |                   |                        |               |                        |              |                        | <b>57,288</b>     |                |                              |                        |                                 |

Source: Calculations based on the Black Sea Farm internal data

Table 6. Farrowing index 2014

| December 2014 |  |                |                     |                     |                   |                        |               |                           |                |                         |                         |  |  |  |  |
|---------------|--|----------------|---------------------|---------------------|-------------------|------------------------|---------------|---------------------------|----------------|-------------------------|-------------------------|--|--|--|--|
| No            | Month  | Sows and gilts | Insemination number | Insemination rate % | Month             | Farrowing sows & gilts | Piglets Birth | Piglets per farrowing sow | Weaned piglets | Total KG Weaned piglets | KG Weight/Piglet Weaned |  |  |  |  |
|               | 0  | 1              |                     |                     | 2                 | 3                      | 4             | 5=(4:3)                   | 6              |                         |                         |  |  |  |  |
| 1             | Oct-13   | 2,203          | 639                 | 77.15%              | Jan-14            | 493                    | 5,391         | 10.94                     | 4,634          | 26,414                  | 5.70                    |  |  |  |  |
| 2             | Nov-13   | 2,256          | 516                 | 89.73%              | Feb-14            | 463                    | 5,086         | 10.98                     | 4,216          | 24,240                  | 5.75                    |  |  |  |  |
| 3             | Dec-13   | 2,356          | 601                 | 71.38%              | March 2014        | 429                    | 4,313         | 10.05                     | 4,416          | 26,760                  | 6.06                    |  |  |  |  |
| 4             | Jan-14   | 2,254          | 505                 | 82.18%              | April 2014        | 415                    | 4,445         | 10.71                     | 4,456          | 25,251                  | 5.67                    |  |  |  |  |
| 5             | Feb-14   | 2,172          | 496                 | 86.69%              | May 2014          | 430                    | 4,329         | 10.07                     | 3,310          | 17,662                  | 5.34                    |  |  |  |  |
| 6             | Mar-14   | 2,173          | 612                 | 65.36%              | June 2014         | 400                    | 4,204         | 10.51                     | 2,714          | 14,648                  | 5.40                    |  |  |  |  |
| 7             | Apr 2014   | 2,256          | 654                 | 64.68%              | July 2014         | 423                    | 4,267         | 10.09                     | 4,649          | 30,310                  | 6.52                    |  |  |  |  |
| 8             | May 2014   | 2,401          | 595                 | 64.37%              | Aug-14            | 383                    | 4,022         | 10.50                     | 3,095          | 17,405                  | 5.62                    |  |  |  |  |
| 9             | Jun-14   | 2,495          | 657                 | 50.23%              | Sep-14            | 330                    | 3,344         | 10.13                     | 2,868          | 15,877                  | 5.54                    |  |  |  |  |
| 10            | Jul-14   | 2,256          | 627                 | 75.28%              | Oct-14            | 472                    | 4,806         | 10.18                     | 3,743          | 21,258                  | 5.68                    |  |  |  |  |
| 11            | Aug-14   | 2,404          | 811                 | 41.55%              | Nov-14            | 337                    | 3,032         | 9.00                      | 3,401          | 20,406                  | 6.00                    |  |  |  |  |
| 12            | Sep-14   | 2,495          | 764                 | 60.99%              | Dec-14            | 466                    | 4,569         | 9.80                      | 3,816          | 23,061                  | 6.04                    |  |  |  |  |
| 13            | <b>Total one year</b>                              | <b>27,721</b>  | <b>7,477</b>        | <b>67.42%</b>       | <b>Total 2014</b> | <b>5,041</b>           | <b>51,808</b> | <b>10.28</b>              | <b>45,318</b>  | <b>263,292</b>          | <b>5.81</b>             |  |  |  |  |
| 14            | Average no of sows and gilts (row 13:12)           |                |                     |                     |                   |                        |               |                           |                |                         | <b>2,310</b>            |  |  |  |  |
| 15            | Total farrowing sows in one year                   |                |                     |                     |                   |                        |               |                           |                |                         | <b>5,041</b>            |  |  |  |  |
| 16            | Farrowing index (15:14=farrowing per sow one year) |                |                     |                     |                   |                        |               |                           |                |                         | <b>2.18</b>             |  |  |  |  |
| 17            | Rate per year (weaned piglets : farrowing sows)    |                |                     |                     |                   |                        |               |                           |                |                         | <b>8.99</b>             |  |  |  |  |
| 18            | Weaned Piglets per sow per year (16x17)            |                |                     |                     |                   |                        |               |                           |                |                         | <b>19.62</b>            |  |  |  |  |
| 19            | Weaned piglets (14x18)                             |                |                     |                     |                   |                        |               |                           |                |                         | <b>45,318</b>           |  |  |  |  |

Source: Calculations based on the Black Sea Farm internal data

Table 7. Piglets birth evolution – January-December 2013-2015

| Month        | Farrowing - Piglets birth |               |               | % 2015/2014 |
|--------------|---------------------------|---------------|---------------|-------------|
|              | Year 2013                 | Year 2014     | Year 2015     |             |
| January      | 4,136                     | 5,391         | 5,232         | 97.05       |
| February     | 3,979                     | 5,086         | 4,968         | 97.68       |
| March        | 4,941                     | 4,313         | 5,778         | 133.97      |
| April        | 4,094                     | 4,445         | 5,642         | 126.93      |
| May          | 4,623                     | 4,329         | 5,815         | 134.33      |
| June         | 4,741                     | 4,204         | 5,377         | 127.9       |
| July         | 3,859                     | 4,267         | 6,016         | 140.99      |
| August       | 4,939                     | 4,022         | 4,991         | 124.09      |
| September    | 4,235                     | 3,344         | 5,000         | 149.52      |
| October      | 3,798                     | 4,806         | 5,305         | 126.54      |
| November     | 4,762                     | 3,032         | 4,376         | 63.67       |
| December     | 4,384                     | 4,569         | 4,958         | 104.22      |
| <b>Total</b> | <b>52,491</b>             | <b>51,808</b> | <b>63,458</b> | <b>98.7</b> |

Source: Calculations based on the Black Sea Farm internal data

Table 8. Weaned piglets evolution - January- December 2013-2015

| Month        | Weaned Piglets |               |               | % 2015/2014   |
|--------------|----------------|---------------|---------------|---------------|
|              | Year 2013      | Year 2014     | Year 2015     |               |
| January      | 3,414          | 4,634         | 3,888         | 83.9          |
| February     | 3,215          | 4,216         | 4,405         | 104.48        |
| March        | 4,670          | 4,416         | 4,647         | 105.23        |
| April        | 3,931          | 4,456         | 6,214         | 139.45        |
| May          | 4,490          | 3,310         | 4,668         | 141.03        |
| June         | 3,549          | 2,714         | 4,812         | 177.3         |
| July         | 4,077          | 4,649         | 6,128         | 131.81        |
| August       | 4,253          | 3,095         | 3,902         | 126.07        |
| September    | 3,990          | 2,868         | 5,349         | 186.51        |
| October      | 4,838          | 3,743         | 4,537         | 121.21        |
| November     | 3,590          | 3,401         | 4,013         | 117.99        |
| December     | 3,657          | 3,816         | 4,725         | 123.82        |
| <b>Total</b> | <b>47,674</b>  | <b>45,318</b> | <b>57,288</b> | <b>126.41</b> |

Source: Calculations based on the Black Sea Farm internal data

In order to assure profitability at sale, it is very important to keep under control the production costs on the entire flow, starting with minimum production costs for production piglets. [2]

Taking into consideration the experience in breeding herd of production manager, the management has to make the best investment decisions during the flow, for cutting some non productive expenses in order to reduce the production costs, to rise the profitability and to improve the farm performance [3].

Based on our analyse, the main targets for Black Sea Farm to reduce the production costs have to be:

-Farrowing index (piglets per sow per year): at least 2.4

-Non-productive days: maximum 15 days

#### **Financial loss analysis due to mortality in Black Sea Farm**

The financial loss in Black Sea Farm due to pig mortality was analysed in our case study in all growing swine phases as follows:

- mortality in maternity;
- mortality in nursery and finishing;
- mortality of sows and gilts.

In order to have an accurate figure of the computation of economic effect of 1% mortality in maternity, we have started our computation from the following figures of 2014 and 2015, presented in detail on a monthly basis above, as follows:

-the average number of piglets farrowed (birth) per year in 2015= 11.21 heads;

-the farrowing index 2015 =2.16 (number of farrowing/sow/year);

-1% x 11.21 piglets x 2.16 = 0.24 piglets in minus weaned per year per sow;

-the average market sales price for a piglet in 2015 was 150 Lei, so it results a loss per sow of 36 Lei (which instead of being loss could be used for feeding a pregnant sow for 12 or 13 days).

*Mortality in Maternity*

Table 9. Computation of loss in Maternity 2014-2015 due to piglets mortality

| No | Explanation  | MU                  | Year 2014     | Year 2015     |
|----|--|---------------------|---------------|---------------|
| 1  | Average no of piglets per farrowing saw                          | No.                 | 10.28         | 11.21         |
| 2  | Mortality in maternity   | %                   | 11            | 9.17          |
| 3  | Farrowing index  | No.                 | 2.18          | 2.16          |
| 4  | Piglets lost/year/sow due to mortality (1x 2x3)                  | No.                 | 2.47          | 2.22          |
| 5  | Average market sales price for a piglet                          | lei                 | 120           | 150           |
| 6  | Financial Loss per saw per year in Lei (4x5)                     | lei                 | 296           | 333           |
| 7  | Saws for reproduction (Farrowing sows & gilts : farrowing index) | lei                 | 2,310         | 2,618         |
| 8  | <b>Total loss in Maternity due to Mortality in Lei (6x7)</b>     | <b>thousand lei</b> | <b>683.76</b> | <b>871.79</b> |
| 9  | Average yearly exchange rate for 1 €                             | lei                 | 4,444         | 4.45          |
| 10 | <b>Total loss in MATERNITY in Euro (8:9)</b>                     | <b>€</b>            | <b>154</b>    | <b>195.91</b> |

Source: Calculations based on the Black Sea Farm internal data

The financial loss due to piglets died in maternity, compared with 2014, has a significant increase in 2015 of € 41,909, meaning 27.21%, even the mortality rate in maternity decreased with 1.83%.

The reasons for farm financial loss increasing were:

-Farrowing index was smaller in 2015, with 0.02%;

-Average market sales price for a piglet raised in 2015 with € 6.71;

Table 10. Loss from dead piglets should not get all phases to become fatteners for sale

| No | Explanation  | MU         | Year 2014      | Year 2015       |
|----|--|------------|----------------|-----------------|
| 1  | Weaned piglets lost/year/sow due to mortality                          | No         | 2.47           | 2.22            |
| 2  | Saws for reproduction  | No         | 2,310          | 2,618           |
| 3  | Piglets which should not become fatteners for sale (1x 2)              | No         | 5,705          | 5,812           |
| 4  | Mortality rate (Nursery & Finishing) 10% (Max)                         | No         | 570            | 581             |
| 5  | Fatteners for sale less mortality, if the piglets shouldn't die (3-4)  | No         | 5,135          | 5,231           |
| 6  | Average sales price for a fattener of 100 Kg                           | lei        | 500            | 450             |
| 7  | <b>Revenues not realized from sales due to piglets mortality (5x6)</b> | <b>lei</b> | <b>2,567.5</b> | <b>2,353.95</b> |
| 8  | Average yearly exchange rate for 1 €                                   | lei        | 4.44           | 4.45            |
| 9  | <b>Loss in Euro from sales revenues not realized (7:8)</b>             | <b>€</b>   | <b>578.27</b>  | <b>528.98</b>   |

Source: Calculations based on the Black Sea Farm internal data

Piglets lost in maternity, would not pass all the phases to become fatteners good for sales, so we have computed the economic impact to the value of the sales revenues not realized, or the turnover lost, which was € 578,266 in 2014 and

€ 528,977 in 2015. The main reason for the financial loss increasing in 2015 was due to the decreasing of market sales price for a live pig € 11.23.

Table 11. Financial Loss from APIA financial help lost and not cashed

| No | Explanation  | MU       | Year 2014     | Year 2015     |
|----|--|----------|---------------|---------------|
| 1  | Fatteners less mortality, if the piglets shouldn't die | capita   | 5,135         | 5,231         |
| 2  | Subsidy per capita                                     | €        | 28.95         | 28.95         |
| 3  | <b>Loss in Euro from subsidy not cashed (1x2)</b>      | <b>€</b> | <b>148.66</b> | <b>151.44</b> |

Source: Calculations based on the Black Sea Farm internal data

Pigs growing farms receive from Government, an amount of money to cover a part of production cost for each fattener sold, valued € 28.95. It is given by Romanian Agency for Payments and Intervention in Agriculture

(APIA), through a European financing program, measure no.2.1.5.

The financial loss due to piglets died in maternity, which didn't arrive fatteners to be sold was computed talking into consideration

also a mortality rate of 10 % (the maximum percentage).

The value of APIA financial aid which was not cashed, increased in 2015, compared to € 2,779 in 2014, attending a total value of € 151,437.

The total financial loss from maternity (summarized in table 12) was valued at € 876,323 in 2015.

Table 12. Total financial loss from unrealized revenues from maternity

| No | Explanation                                      | MU    | Year 2014 | Year 2015 |
|----|--|-------|-----------|-----------|
| 1  | Total loss in Maternity due to Mortality in Euro | Th. € | 154       | 195.91    |
| 2  | Loss in Euro from sales revenues not realized    | Th. € | 578.25    | 528.98    |
| 3  | Loss in Euro from subsidy not cashed             | Th. € | 148.66    | 151.44    |
| 4  | Total Financial Loss in Maternity (7:8)          | Th. € | 880.92    | 876.32    |

Source: Calculations based on the Black Sea Farm internal data

### *Mortality in Nursery & Finishing*

Table 13. Computation of fodder loss in Nursery & Finishing 2014-2015

| No | Explanation   | MU         | Year 2014 | Year 2015 |
|----|---|------------|-----------|-----------|
| 1  | Growers & Fatteners - Mortality Heads               | kg         | 4,538     | 6,734     |
| 2  | Average weight per dead pig                         | kg         | 34.04     | 29.98     |
| 3  | Average weight per pig transferred from maternity   | kg         | 5.81      | 5.67      |
| 4  | Average gain per dead pig (2-3)                     | kg         | 28.23     | 24.31     |
| 5  | Fodder consumption per kg gain                      | kg         | 3.06      | 2.98      |
| 6  | Total fodder consumption per dead pig (4x5)         | kg         | 86.38     | 72.44     |
| 7  | No of days for staying in the stable                | No.        | 81        | 81        |
| 8  | Price per Kg fodder                                 | lei        | 0.98      | 1.01      |
| 9  | Fodder expenses per dead pig                        | lei        | 85        | 73        |
| 10 | <b>Total fodder expenses with dead pigs in Lei</b>  | <b>lei</b> | 381.1     | 492.7     |
| 11 | Average yearly exchange rate                        | lei/€      | 4.4       | 4.5       |
| 12 | <b>Total fodder expenses with dead pigs in Euro</b> | <b>€</b>   | 85.8      | 110.7     |

Source: Calculations based on the Black Sea Farm internal data

Table 14. Financial loss due to Sales Revenues not realized 2014-2015

| No | Explanation  | MU             | Year 2014 | Year 2015 |
|----|--|----------------|-----------|-----------|
| 1  | Growers & Fatteners -Mortality Heads                                 | kg             | 4,538     | 6,734     |
| 2  | Average sales price for a fattener of 100 kg                         | lei            | 500       | 450       |
| 3  | <b>Total Revenues not realized from sales due to mortality (1x2)</b> | <b>Th. lei</b> | 2,269     | 3,030.3   |
| 4  | Average yearly exchange rate   | lei/€          | 4.4       | 4.5       |
| 5  | <b>Total Revenues not realized due to mortality in Euro (3:4)</b>    | <b>€</b>       | 511.0     | 681.0     |

Source: Calculations based on the Black Sea Farm internal data

Table 15. Financial Loss from APIA financial aid lost and not cash

| No | Explanation                                       | MU           | Year 2014 | Year 2015 |
|----|---|--------------|-----------|-----------|
| 1  | Growers & Fatteners -Mortality Heads              | kg           | 4,538     | 6,734     |
| 2  | Subsidy per capita                                | €            | 28.95     | 28.95     |
| 3  | <b>Loss in Euro from subsidy not cashed (1x2)</b> | <b>Th. €</b> | 131.38    | 194.95    |

Source: Calculations based on the Black Sea Farm internal data

Table 16. Total financial loss from unrealized revenues and cash inflows nursery & finishing

| No | Explanation  | MU           | Year 2014 | Year 2015 |
|----|--|--------------|-----------|-----------|
| 1  | Fodder loss in Nursery & Finishing                     | Th. €        | 86.5      | 110.7     |
| 2  | Financial loss due to Sales Revenues not realized      | Th. €        | 511.0     | 681.0     |
| 4  | Financial Loss from subsidy lost and not cashed        | Th. €        | 131.4     | 194.9     |
| 5  | <b>Total Financial Loss in Nursery &amp; Finishing</b> | <b>Th. €</b> | 728.9     | 986.6     |

Source: Calculations based on the Black Sea Farm internal data

Table 17. Centralized total financial loss due to mortality in black sea farm

| No | Explanation  |       | Year<br>2014 | Year<br>2015 |
|----|--|-------|--------------|--------------|
| 1  | Total Financial Loss due to Mortality in MATERNITY           | Th. € | 880.924      | 876.323      |
| 2  | Total Financial Loss due to Mortality in NURSERY & FINISHING | Th. € | 728.93       | 986.639      |
| 3  | Total Financial Loss due to Mortality of SOWS & GILTS        | Th. € | 1,520.14     | 1,831.84     |
| 4  | GRAND TOTAL FINANCIAL LOSS DUE TO PIGS MORTALITY<br>(1+2+3)  | Th. € | 2,401.79     | 2,708.15     |

Source: Calculations based on the Black Sea Farm internal data

In 2015 the total financial loss due to mortality is huge, representing € 2,708,154 and was increasing by 13% compared to the previous year.

If we compare the total mortality rate in 2015, which was 6.51% with the mortality rate in 2014 which was 6.44%, the increasing was only of 0.07%, but the financial loss of 13% increasing is influenced by the mortality rates in different phases of growing, such as maternity, nursery and finishing.

## CONCLUSIONS

The case study was a great experiment with many observations concerning pig flows, weaning ages, herd sizes, hot nurseries, cold nurseries, wean-to-finish, and a host of the other opportunities or variables associated with pig production.

During our research we have observed that the increasing of mortality rate was due to pigs' disease control, which has been particularly ineffective.

They didn't manage to avoid health crisis, reduce the chronic effects of disease, and maximize productivity. Unfortunately there are no "magic bullets" – no universal vaccine or antibiotic – no single strategy or program. The following is a philosophy more than a recipe to success. Sometimes the problem must be viewed from both high above and close up to find the best choices. Hopefully some of the following ideas will help in the management of both day to day problems and long term health solutions. The need for quality and routine veterinary services is essential for strategic and timely intervention and disease therapy.

Our recommendations for improving the Black Sea Farm's activity and to assure the welfare of pigs compliant with European Council Directive 2008/120/EC are:

- Improving the quality of the flooring surfaces;
- Increasing the living space available for sows and gilts;
- Setting requirements for light and maximum noise levels;
- Providing permanent access to fresh water and to materials for rooting and playing;
- Increased weaning age by setting a minimum weaning age of four weeks;
- Assuring lengthy and proper acclimatization of healthy breeding stock;
- Implementing early gilt development,
- Improving sow farm vaccination programs to increase pig immunity downstream,
- Restricting and controlling movements of people, vehicles and equipment into areas where the pigs are kept;
- Cleaning and disinfecting equipment, vehicles, protective clothing and footwear before and after contact with farm animals;
- Introducing higher level of training and competence on welfare issues for personnel.

A portfolio of professional managers is the gold asset of a pig farm.

Bringing together genetics, facilities and nutrition in a professional way, they achieve maximal performance in a pig farm by minimizing losses due to mortality and morbidity.

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## THE DYNAMICS OF PIG CARCASSES CLASSIFICATION IN ROMANIA BETWEEN 2009–2015, BY MANUAL METHOD THE ZWEI PUNKTE

Mirela CĂRĂTUȘ STANCIU<sup>1</sup>, Monica Esperance GĂUREANU<sup>2</sup>,  
Mariana Carmen BURTEA<sup>2</sup>, Livia VIDU<sup>3</sup>, Iulian VLAD<sup>3</sup>, Nicolae CĂRĂTUȘ<sup>3</sup>

<sup>1</sup>”Lucian Blaga” University of Sibiu, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, 5-7 Ion Ratiu Street, 550003, Sibiu, Romania, Phone: +40269211338, Mobile:+40744472790, Email: mirela\_stanciu2008@yahoo.com,

<sup>2</sup>”Dunărea de Jos” University of Galați, Faculty of Engineering and Agriculture, Research Center and Agriculture – Environment Consultance, 29, Calea Călărășilor Street, Brăila, Romania, Phone: 0239-612572, E-mail: moro6769@yahoo.com,

<sup>3</sup> University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Animal Sciences, 59 Mărăști Boulevard, District 1, Bucharest, 011464, liviavidu@gmail.com, vladiul@yahoo.com

**Corresponding author:** mirela\_stanciu2008@yahoo.com

### Abstract

*This paper presents the analysis of the evolution of pig carcasses classification in Romania by the method: Zwei Punkte (ZP), during 2009-2015. This method of classification is generally used in low-capacity slaughterhouses, which in the previous year sacrificed less than 200 pig heads /week. The data were gathered from the national classification commission and from the specialty inspectors. The data were processed, analyzed and interpreted as to the number of pigs carcasses classified by this method. Also, the evolution of the quality of the carcasses classified by manual method ZP was also analyzed. The quality of the carcasses was assessed on the basis of the following indicators: the thickness of the subcutaneous fat layer, the thickness of the Gluteus medius muscle and the percentage of lean meat in the carcass, as well of their correlation. The best quality of carcasses classified by the ZP method was recorded in 2014 with an average of 60.0% lean meat. During the analyzed period the carcass quality has a high constancy without any special fluctuations.*

**Key words:** carcasses, pig, classification method, quality

### INTRODUCTION

European legislation on the classification of pig carcasses has long been applied. [1,7, 8, 10] In Romania there are used three methods of pig carcasses classification, from which one is a manual method and two use optical probe.

The Zwei Punkte (ZP) classification method is a manual grading method of pig carcasses. The accuracy of this manual method depend by the human factor. The method is used only in slaughterhouses which slaughtered in the previous year below the average of 200 pig heads/week. [2,3]

### MATERIALS AND METHODS

Determination of the estimated average percentage of lean meat in the carcasses, according to which the carcass quality class is established, shall be calculated by using the calculation formula: [2,5,6, 12]

$$Y = 50,89767 - 0,70985 \times X1 + 0,26457 \times X2,$$

where:

Y = the estimated percentage of lean meat in the carcass;

X1 = the thickness of the bacon (including rind) above the Gluteus medius muscle, determined to a minimum (mm);

X2 = the thickness of the muscle between the medullary canal and the anterior tip of the Gluteus medius in a straight line (mm).

This formula was established following the national dissection test. [3,4]

### RESULTS AND DISCUSSIONS

The principal functions of the carcasses classification are to monitor the pig market situation; establish an average price for pig carcasses which can be used for reference price calculations; make price quotations comparable throughout all EU member states. [11]

### Analysis of the number of carcasses classified by the Zwei Punkte method

The analysis of the number of carcasses classified by this method reflects the development of the pork sector in Romania in the last years.

The recorded data regarding on the classification of pork carcasses by the Zwei Punkte method during 2009-2015, their number as well as their percentage of the total carcasses classified each year are presented in Table 1.

Table 1. Number and weight of carcasses classified in Romania between 2009 and 2015 by Zwei Punkte method

| Year | Number of carcasses | % from total |
|------|---------------------|--------------|
| 2009 | 426,156             | 14,9         |
| 2010 | 331,227             | 12,2         |
| 2011 | 338,646             | 11,0         |
| 2012 | 238,857             | 7,1          |
| 2013 | 162,166             | 4,4          |
| 2014 | 233,228             | 5,9          |
| 2015 | 175,843             | 4,3          |

Source: Own calculation, based on the statistical data from CCC EUROP.RO, 2017 [10] and from Classification Agencies

It was noted that from year to year the percentage of classified carcasses by ZP method decrease from 14.9% (426,156 carcasses) in 2009 to 4.3% (175,843 carcasses) in 2015. It can be said that this is a significant reduction.

The graphical representation of the classified carcasses by ZP method from the total carcasses classified in 2009-2015 is shown in Fig. 1.

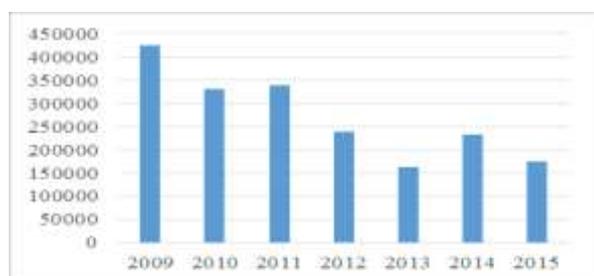


Fig. 1. Evolution of the number of pig carcasses classified in Romania between 2009 and 2015 (heads) by Zwei Punkte Method

Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

The constant reduction in the share of carcasses classified by this method shows, that in Romania in recent years the number of slaughtered pigs has increased. At the same time, the number of authorized slaughterhouses remained relatively constant, thus increasing the average slaughtered pigs /week.

As a result we can make a conclusion that, the number of abattoirs in which the carcasses classification was replaced the manual method of classification with semiautomatic methods, which used optical probe. At the same time, the precision of the classification operation has increased.

### Analysis of the average weight of carcasses classified by the ZP manual method during 2009 - 2015

Between 2009-2015 the average weight of the carcasses recorded each year of the analyzed period is presented in Table 2 and Figure 2.

Table 2. The average weight of the carcasses classified by the Zwei Punkte method, between 2009 and 2015

| Year                         | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------------------------------|------|------|------|------|------|------|------|
| The weight of warm carcasses | 75.5 | 78.5 | 75.0 | 76.8 | 76.0 | 76.5 | 76.5 |

Source: Own calculation, based on the statistic data from CCC EUROP.RO, 2017 [10] and from Classification Agencies

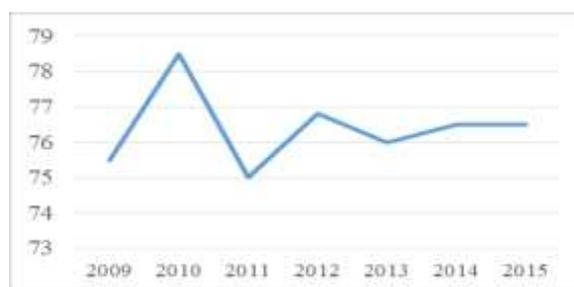


Fig. 2. Evolution of weight of warm carcasses classified in Romania between 2009 and 2015 by Zwei Punkte Method (kg)

Source: Own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

It is noted that the average weight of the carcasses classified by this method is constantly maintained. The highest weight was recorded in 2010, the only year in which no

financial support was given to the pig breeding sector.

The uniformity of the carcasses weight is maintained even though this method is also classified the carcasses obtained from the pigs raised in individual household or from local and traditional breeds like Mangalița and Bazna etc. These local breeds have a great variability of characters (weight, quality, yield, etc.).

**Analysis of the quality of carcasses classified by the Zwei Punkte method, during 2009 - 2015**

The quality of the carcasses is assessed by reference to the average percentage of lean meat estimated from the total carcasses weight. The calculation formula is specific to each grading method and it is used based on the measured thickness values of subcutaneous fat and Gluteus medius muscle.

The average thickness of the muscle (Gluteus medius) determined in each year of the analyzed period is as follows:

There is an improvement in carcasses quality over the analyzed period, the average thickness of the bacon decreasing from 14.2 mm in 2010 to 12.9 - 13.2 mm in the years 2014 and 2015.

Table 3. The average thickness of the muscle (Gluteus medius) for the carcasses graded using ZP method, between 2009 and 2015 (mm)

|                                  | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|----------------------------------|------|------|------|------|------|------|------|
| The thickness of the bacon layer | 13.4 | 14.2 | 13.5 | 13.3 | 13.1 | 12.9 | 13.2 |

Source: Own calculation, based on the statistic data from CCC EUROP.RO, 2017 [10] and from Classification Agencies

The thickness of the bacon in the calculation formula of lean meat in the carcass has a greater influence than the thickness of the muscle. The thickness of the bacon is inversely proportional to the percentage of lean meat.

The second element underlying the determination of the carcass quality is the thickness of the muscle.

In the analyzed period, the mean thicknesses of the Gluteus medius muscle thickness measured

with the manual ZP method are shown in the table 4 and figure 4.

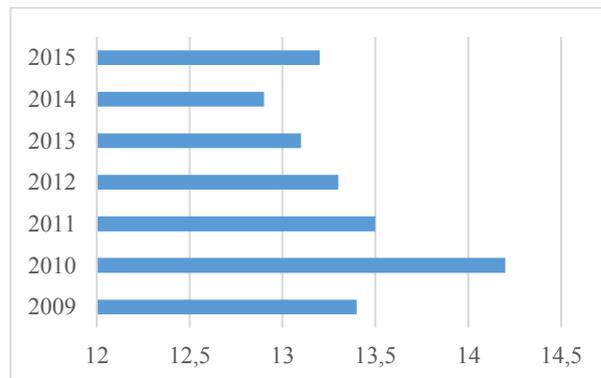


Fig. 3. Evolution of the tickness of bacon layer at the carcasses classified in Romania between 2009 and 2015 by Zwei Punkte Method (mm)

Source: Own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

Table 4. The thickness of the muscle Gluteus medius measured by Zwei Punkte method of classification, between 2009 and 2015 (mm)

| Year                        | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|-----------------------------|------|------|------|------|------|------|------|
| The thickness of the muscle | 68.8 | 69.1 | 69.1 | 67.5 | 69.2 | 69.2 | 67.8 |

Source: Own calculation, based on the statistic data from CCC EUROP.RO, 2017 [10] and from Classification Agencies

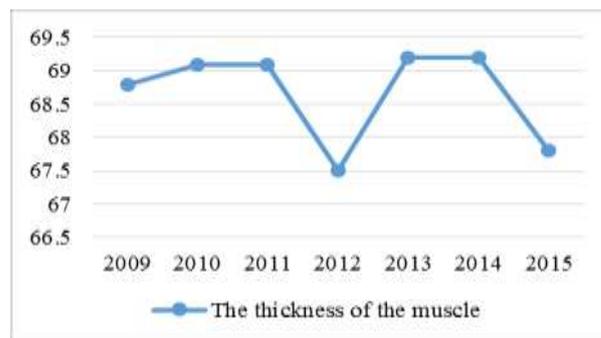


Fig. 4. Evolution of the muscle Gluteus medius thickness at the carcasses classified in Romania between 2009 and 2015 by Zwei Punkte Method (mm)

Source: Own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

The value of the thickness of the muscle influences proportionally the percentage of lean meat in the carcass. If this indicator has a larger size, it is obtained a higher quality of the carcasses.

Regarding the uniformity of this parameter, it was observed that in 2012 the lowest value was recorded (67.5 mm), and in the years 2013 and 2014 the average thickness of the muscle had the highest value, namely 69.2 mm.

The values thus determined indicate a fairly high constancy of the thickness of the muscle. The estimated percentage of lean meat in the carcass is a criterion according to which it is determined to fit into the corresponding quality class of the carcasses. It is based on the values and correlations between this two mentioned and analyzed parameters. It is important the relationship between them.

Also it can be seen in table 5 and figure 5, there are differences in carcasses quality even if the same annual mean thickness of the Gluteus medius muscle is recorded.

However, even if in two consecutive years the average thickness of the muscle was the same, namely 69.1 mm both in 2010 and in 2011, the carcasses quality was higher in 2011.

This is because the average thickness of bacon was lower in 2011 by 0.7 mm than in 2010.

Table 5. Comparative status of uniformity of thickness of subcutaneous fat and Gluteus Medius muscle (mm)

|                                 | Year |      |      |      |      |      |      |
|---------------------------------|------|------|------|------|------|------|------|
|                                 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| % of lean meat in the carcasses | 59.6 | 59.1 | 59.6 | 59.3 | 59.9 | 60   | 59.5 |

Source: Own calculation, based on the statistic data from CCC EUROP.RO, 2017 [10] and from Classification Agencies

Table 6. The average annual percentage of lean meat recorded between 2009 and 2015 in carcasses classified by the Zwei Punkte method

| Year                              | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|-----------------------------------|------|------|------|------|------|------|------|
| Fat thickness                     | 13.4 | 14.2 | 13.5 | 13.3 | 13.1 | 12.9 | 13.2 |
| Muscle (Gluteus medius) thickness | 68.8 | 69.1 | 69.1 | 67.5 | 69.2 | 69.2 | 67.8 |

Source: Own calculation, based on the statistic data from CCC EUROP.RO, 2017 [10] and from Classification Agencies

A similar situation was found also in the years 2013 and 2014, when at identical values of the thickness of the muscle, different values of the thickness of the subcutaneous fat layer were recorded. It is also noted, that the best quality report was recorded in 2014. In this year, the bacon layer had the lowest average of 12.9 mm and it was correlated with the highest value of the thickness of the muscle, 69.2 mm.

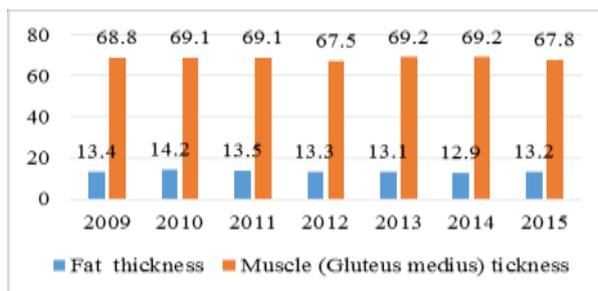


Fig. 5. Uniformity of thickness of the bacon correlated with the thickness of the muscle (Gluteus medius) at the carcasses classified in Romania between 2009 and 2015 by Zwei Punkte Method (mm)

Source: own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies

As a result of the estimated average percentage of lean meat in the carcass based on the calculation formula and the values determined by the ZP method of the two parameters (thickness of subcutaneous fat and Gluteus medius muscle), it was recorded the evolution presented in Fig.6.

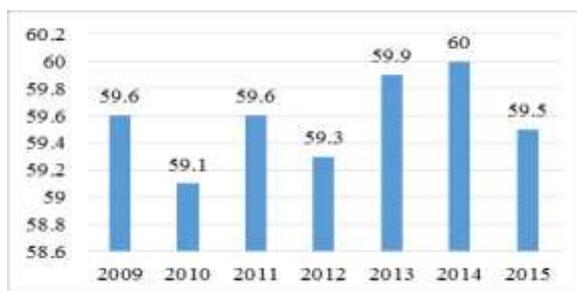


Fig. 6. The average annual percentage of lean meat recorded between 2009 and 2015 at carcasses classified by the Zwei Punkte method

Source: Own design based on the statistic data from CCC EUROP.RO, 2017 and from Classification Agencies.

## CONCLUSIONS

The best quality of carcasses classified by the ZP method was recorded in 2014 with an

average of 60.0% lean meat, which is also confirmed by the separate analysis of the determined parameters. In this year, the lowest value of the thickness of the fat layer and the highest value of the thickness of the muscle was recorded.

Due to the fact that the maximum difference of the lean meat percentage determined by the Zwei Punkte manual method is only 0.9, between the minimum of 59.1% recorded in 2010 and 60.0% in the year 2014, while in the other years the differences were insignificant, it is appreciated that during the analyzed period the carcass quality has a high constancy. No special fluctuations were recorded.

Being a manual grading method by which measurements were made with the ruler between certain anatomical parts of the carcasses, there may also be an influence of the human factor. The human factor can influence the accuracy of the workmanship.

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## DYNAMICS OF DAIRY COWS HOLDINGS DIMENSIONAL STRUCTURE AND THEIR ECONOMIC PERFORMANCES

Rodica CHETROIU

Research Institute for Agriculture Economy and Rural Development, 61 Marasti Boulevard, District 1, 011464, Bucharest, Romania, Phone: +40213136087, Tel/Fax:+40213136096, Mobile:+40730094630, Email: rodica.chetroui@iceadr.ro

**Corresponding author:** rodica.chetroui@iceadr.ro

### Abstract

*The present paper presents the evolution of dairy cows holdings dimensional structure during 2010-2016, based on the operational statistical information, also comparing the economic indicators of the farms of different sizes. Romania's agriculture is one of great diversity in terms of farm structure, production methods and technologies used. This diversity reflects climatic conditions, topography and the evolution of socio-economic environment. The results of the study indicate that total number of dairy cows increased by about 1% during the study period, while the number of cows' holdings decreased by 20.6%, demonstrating a higher concentration of the flocks. At structural level, most holdings are represented by 1-2 head households, and the farms with 100 heads are the fewest. Structural dynamics is positive, because the holdings with 1-2 heads decreased from 87.27% in 2010 to 83.72% in 2016, while farms with more than 100 heads increased from 0.04% to 0.07%. At the level of economic indicators, the farms with larger flocks get higher economic outcomes than the small ones, due to the possibility of using high-tech technologies, access to various support programs, stronger position on the market, and capitalization of economic results.*

**Key words:** holdings, cows, structure, economic

### INTRODUCTION

The evolution of agriculture in developed countries highlights the concerns of increasing the size of holdings, statistics surprising their evolution over time, while reducing the number of farms.

By dimension is meant that area (livestock) that ensures the optimal conditions for the use of all material and human resources in accordance with the production structure and technologies used in agricultural holdings in order to achieve the proposed objectives. [4]

It is a common assumption that a larger size of the holding favours the increase in the use of the labour force, the fixed and circulating capital etc., having direct and beneficial consequences on the economic and social viability of the commercial agricultural holdings.

Production outputs, of course, also depend on the volume of resources and the way they are valued, although their low degree of concentration in family farms makes difficult the exploitation process. [3]

### MATERIALS AND METHODS

The purpose of this study is to identify the evolution of dairy cows holdings dimensional structure, based on the operational statistical information from specialty department in the Ministry of Agriculture and Rural Development, since 2010 to 2016. Also, using established economic formulas, different economic indicators were calculated for holdings of different sizes, comparing different types of costs and profitability.

### RESULTS AND DISCUSSIONS

The results of research shows that on April 30, 2010, there were 761,528 cows' holdings, with 1,396,886 heads. Six years later, on April 30, 2016, the number of holdings decreased significantly by 20.6%, reaching 604,473 units, but the number of cows increased by 1% during the period under study, showing a higher concentration of the flocks (Figure 1). This reduction is based on the disappearance of a large number of small, economically unviable dairy cows holdings each year. [10]

Much of the pressures to adjust the farm structure take place on small farms, less competitive, who have to make efforts in the process of increasing productivity and diversify incomes, or find alternative activity. This adjustment is a stage that developed countries have already gone through. [5]

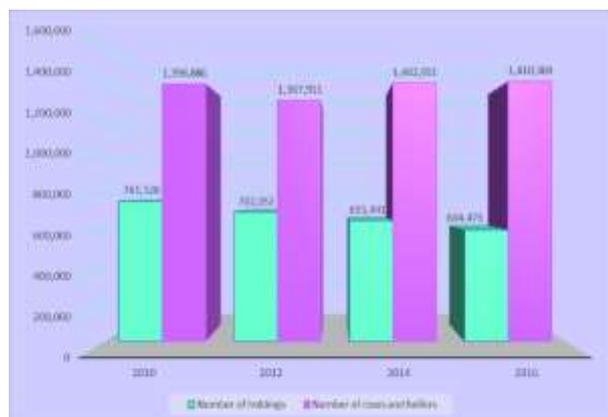


Fig. 1. Evolution of number of holdings, cows and heifers

Source: Ministry of Agriculture and Rural Development [6]

Regarding dimensional structure of holdings, it can be observed the most part of it (over 80%) are with 1-2 cows that are subsistence farms, non-commercial, producing only for family consumption. The subsistence and semi-subsistence holdings, seen in the general agricultural landscape of Romania, give the image of crumbled agriculture. [9]

The equilibrium dimension of the farm (in the case of the family commercial farm) tends to grow with economic development. [5]

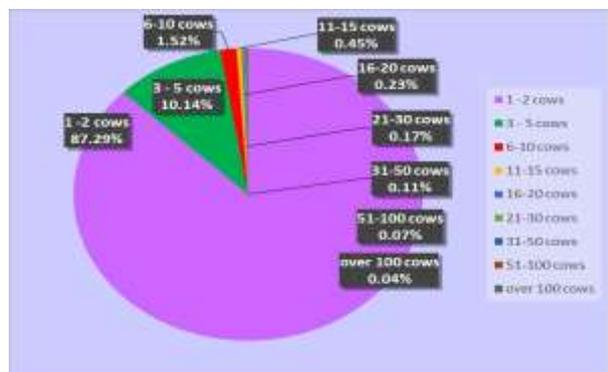


Fig. 2. Dimensional structure of holdings in 2010

Source: Ministry of Agriculture and Rural Development [6]

In the Figure 2, there is illustrated dimensional structure of holdings in 2010.

It is obvious that the share of different categories of holdings decreases while the number of cows and heifers increases.

In the Figure 3, is illustrated dimensional structure in 2016, with a positive trend of decreasing small farms share and increasing larger ones: the category 1-2 heads decreased from 87.27% in 2010 to 83.72% in 2016, while farms with more than 100 heads increased from 0.04% to 0.07%.

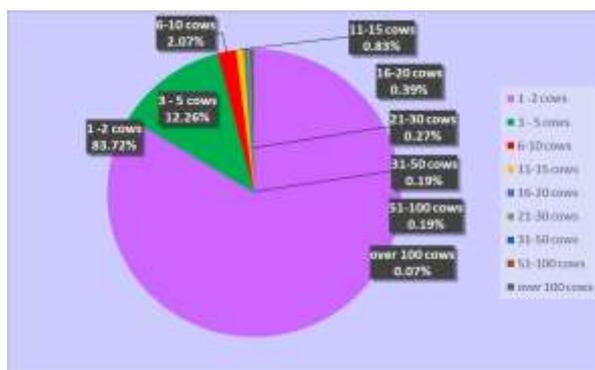


Fig. 3. Dimensional structure of holdings in 2016

Source: Ministry of Agriculture and Rural Development [6]

Along with improving technologies and with more efficient use of resources, small farmers who do not participate in the cost reduction competition will inevitably face revenue pressures. In front of these pressures there are only two options, either to reach the level (including size) of efficient commercial farms, or to seek extra revenue from other sources (through diversification sources of income or leaving the sector). [5]

Regarding the number of cows, the most part of them are in the smallest farms, with 1-2 cows.

In the year 2010, there were 60% of cows in farms with 1-2 heads, 19% in 3-5 heads, 6% in 6-10 heads etc. and only 4% in over 100 heads category (Figure 4).

Romania has certain structural characteristics similar to those of the agricultural sectors of the other EU Member States, but it is unique in terms of the size of the gap between the category of farms and small farms and the prevalence of subsistence / semi-subsistence farming. [7]

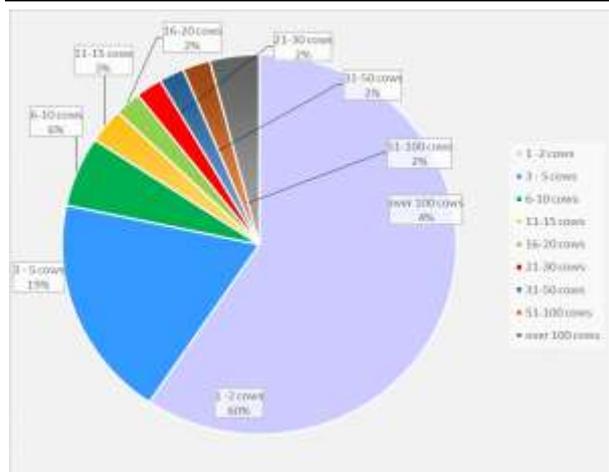


Fig. 4. Distribution of number of cows in different types of holdings in 2010  
 Source: Ministry of Agriculture and Rural Development [6]

The share of cows in 1-2 heads category decreased in 2016 at 50% and in category over 100 heads increased at 7% (see Figure 5). This was a general positive trend in all categories, toward increasing the number of cows in larger size holdings.

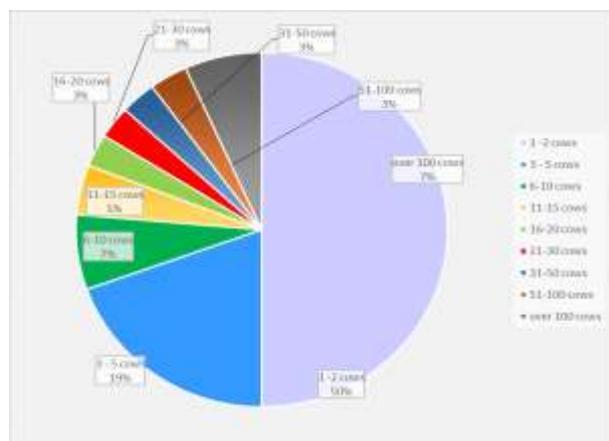


Fig. 5. Distribution of number of cows in different types of holdings in 2016  
 Source: Ministry of Agriculture and Rural Development [6]

Facing these realities, it is necessary to develop appropriate policies for Romanian farmers, starting from the dual structure of the agricultural sector, so as to meet the specific needs of each segment (large and medium-sized farms stimulated to become even more competitive, but also solutions for the development of agriculture on a small scale. Small farmers have difficulties in complying with the requirements of milk hygiene, have

low efficiency, are not organized, do not benefit from consultancy and market information.

Better integration of farmers on market and on value chain is needed. For small producers, the emphasis should be on stimulating the association and improving access to investment credits, while for large farms there is a need for modernization investments to comply with EU requirements and for increasing competitiveness on international market. [7]

The data indicate that, during 2010-2016, large farms with over 100 cows have almost doubled their flocks, showing that their evolution has been positive, both technologically and economically (Figure 6).

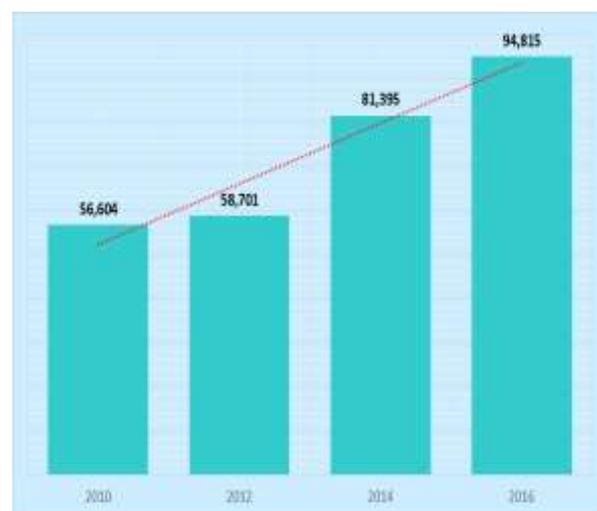


Fig. 6. Evolution of number of cows in the category over 100 heads (heads)  
 Source: Ministry of Agriculture and Rural Development [6]

This dynamics highlights the trend of a slow motion from the agriculture of subsistence to commercial agriculture, on a competitive arena of international market.

Economic calculations highlight the fact that the increase in the physical size of farms is correlated with the increase in their economic size and the economic efficiency is superior to those with larger dimensions. Thus, production costs per litre of milk are lower in a holding with over 100 heads where the degree of technology and yields are higher than in a farm with 20 cows (Figure 7).



Fig. 7. Economic indicators for milk in farms with 20 cows and 100 cows (RON/litre of milk)

Source: Own calculations

The issue of the dimension of holdings largely refers to the viability of small farms [2].

There are factors that act in the direction of increasing the size of farms: automation, mechanization, modern technologies, transport routes, production specialization, increasing managerial capacity, etc. Factors that undermine the growth of farm size are: transport costs, veterinary requirements, the need for environmental protection, etc.

There are factors that act in both directions, such as population density, water sources, production systems, types of economic and social organization, etc [1].

## CONCLUSIONS

Low development of agricultural products marketing or acquiring production factors is notorious for individual farms. Small farmers, with a few cows, low equipment and livestock endowment, with no advanced knowledge in the field and lacking financial resources, choose for "low risk - low yields" production strategies. [4]

The lack of specialization and diversification of production within the small farms leads to the obtaining of small quantities of different products and different qualities which make difficult to capitalize on them. This makes impossible to apply intensive high productivity technologies.

In order to move from the predominance of subsistence cows farms to commercial ones, integrated into market, it is necessary:

-stimulating the organizing of associative forms;

-strengthening the financial resources of cows' holdings through budgetary resources for investment projects for well-defined objectives, in order to increase the performance capacity of dairy farms;

-formation of a financial market (credit) functional in rural areas to provide the possibility of collecting money, increasing the access of agricultural producers to capital sources, etc. [8]

-using the opportunities created by European funds for the modernization and re-technology of cows farms, etc.

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## IMPACT OF PROJECT IMPLEMENTATION FINANCED UNDER SOP HRD 2007-2013 ON DEVELOPMENT OF EDUCATIONAL SECTOR IN SOUTH MUNTENIA REGION

Daniela CREȚU, Andrei Radu IOVA, Elena LASCĂR

University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40740207985, E-mail:danielacretu5@yahoo.com

*Corresponding author:* danielacretu5@yahoo.com

### *Abstract*

*Under the current conditions, in which the Romanian economy still faces serious structural problems, corroborated with the global economic crisis, it is absolutely natural to consider as extremely important the financial support granted by the European Union to Romania as a safe source of financing and necessary for the development of the Romanian state as a whole in order to recover significant differences from other European states. The research starts from the premise that there is a correlation between the degree of maturity of the project management in the Romanian society, in general, within South Muntenia Development Region in particular, and the results obtained in attracting and implementing the European funds. We presented the objectives and the results obtained following the implementation of the projects in the education sector through SOP HRD 2007-2013 in South Muntenia Region, the impact on the beneficiaries of the financed projects in order to identify good practices and to formulate proposals that contribute to the improvement of the project management, respectively to the improvement of the impact of projects on the performance of organizations implementing them and on the effectiveness of the development and implementation of the regional strategies and policies. For the programming period 2007-2013, 195 open calls for proposals were launched, out of which 43 open calls for proposals effectively covered the education sector. The total financial amount allocated was 7,020,363,692.85 lei approximately 1,651,850,280.67 euros. It also presents an analysis of the questionnaire applied in the research and conclusions on the impact of the funding obtained by the educational sector.*

**Key words:** quality, education, European funds, impact, SOPHRD

### INTRODUCTION

Sectoral Operational Programme Human Resources Development (SOPHRD) established the major intervention axes for Romania in the human resources sector, axes co-financed under the European Social Fund under the objective Convergence, for the programming period 2007 - 2013. SOPHRD had 7 Priority axes and 21 major fields of intervention (MFI). In the education sector, projects under the major fields of interventions 1.1, 1.2, 1.3, 1.5, 2.1 and 2.2 were accessed [11].

**MFI 1.1. Access to education and initial high quality vocational training** [3] addressed to the need to develop and structure a pre-university education system to provide and ensure high quality education, professional skills and key competences for everybody.

### **MFI 1.2. High quality in higher education**

[3] supported the activities destined to restructured the higher education in order to develop and implement national systems of qualifications and to ensure the quality in the higher education, destined to improve the learning opportunities, at the level of the bachelor and master cycles of study.

### **MFI 1.3. Human resources development in education and vocational training**

[3] supported the training and development of the teaching staff skills in the education system and initial and continual vocational training sector, especially as regards the ability to use interactive teaching methods and TIC.

### **MFI 1.5. Doctoral and post-doctoral programmes to support the research**

[3] – under which scholarships were granted, thus ensuring the conditions to participate in the doctoral and post-doctoral programmes in

Romania, as well as study practices/research/academic mobility of maximum 8 months in an university/research center of the European Union.

**MFI 2.1 Transition from school to active life** [3] supported the development of labor skills of the persons under the situation of transition from school to active life and consequently, the improvement of their insertion on the labor market. **MFI 2.2. Prevention and correction of early school leaving** [3] supported the elaboration and implementation of strategies, action plans and measures, at local and multi-regional level, to: prevent the phenomenon of early school leaving and maintain in the education sector and initial vocational training the persons under risk; a re-integration in education of the persons who abandoned/left school early.

SOPHRD 2007-2013 was managed by the Managing Authority SOPHRD 2007-2013 organized within the Ministry of Labor. For the specific fields of education two intermediate bodies were designated within the Ministry of Education, respectively IB SOPHRD – MNE (DMI 1.1, 1.2, 1.3, 1.4, 1.5, 2.2) and IB SOPHRD – national center for development of education and vocational training CNDIPT (MFI 2.1 and 2.3) [4].

For the programming period 2007-2013 **195** application forms were launched, of which 43 application forms aimed effectively the education sector. The total financial amount allocated was 7,020,363,692.85 lei, about 1,651,850,280.67 euro.[9]

Under these application forms, two types of projects were launched [5]: Strategic projects – implemented at national, multi-regional and sectoral level, with a value contained between 500,000 – 5,000,000 euro; **Grant projects** – implemented at regional, multi-regional or local level, with a value contained between 50,000 – 499,999 euro. For the projects managed by IB SOPHRD within the Ministry of Education the financial allocation was defined only at national level, not at regional level. Under this paper, we will present the projects implemented in the education sector, in South Muntenia region, for the programming period 2007-2013. Following

submitting the application forms in South Muntenia, projects were submitted in the education sector in total amount of 421,641,401.18 lei (about 99,209,741.45 euro) [10] namely about 6% of the total financial allocation related to all application forms launched under SOPHRD 2007-2013.

## MATERIALS AND METHODS

As research methods, we used documenting, the analysis and data processing from a secondary analysis. These methods are based on the synthesis processes, induction and deduction, analogy and comparative analysis. Once the information was defined, known and interpreted, the next step was the detailed documenting of the interest sector. In the analysis activity, the study of the documentation available for the sector or for the analysed system is a starting point.

The documenting, the analysis and the data processing and the information obtained from the following sources: scientific papers in the sector, annual progress report on SOPHRD implementation, official websites of the Ministry of Labor and intermediate bodies, information taken from the specialized websites on European programmes implementation, Sectoral Operational Programme Human Resources Development 2007-2013, Framework Document for the implementation of SOPHRD 2007-2013.

In order to analyze the efficiency and effectiveness of using the European funds allocated through SOPHRD 2007-2013 in the sector of pre-university and university education, we developed a questionnaire with 5 open questions and grid type.

The questionnaire was sent electronically to the 60 beneficiaries of projects financed in the education sector in South Muntenia region.

By applying the questionnaire we aimed to identify the impact of the projects on the direct beneficiaries (for which we asked for a brief description of the impact of the projects as can be perceived daily, as well as for expressing the satisfaction ticking marks), good practices/successful stories which we requested to provide an example of a "successful story") as

well as the main difficulties encountered in the project implementation (for which we asked for a brief description of them and identify the main difficulties by ticking pre-defined items). 42 questionnaires received from the beneficiaries were analyzed.

## RESULTS AND DISCUSSIONS

*South-Muntenia Region* has as a managing structure and implementation of the regional development policies, South-Muntenia Regional Development Agency (South-Muntenia RDA), which started operating in 1999 and it has the headquarter in Călărași municipality. In the other 6 counties, the Agency is represented by a County Office. The education system, both at national level and at the level of South-Muntenia Region, includes the education infrastructure, represented by the buildings in which the education activity takes place, namely kindergartens, schools, high schools, faculties and places for vocational education and special education. It can be said that the school infrastructure is well represented at the level of the region and thus it is possible to support the good development of the educational act, with the mention that in the rural area, this type of social infrastructure can be considered inadequate to the rural development process, requiring a restructuring of the school structures and investment projects related to the local requirements and needs [2].

The share of schools in the region is as follows: 0.15% for primary education and 99.85% for secondary school compared to the national level, where the share was 1.29% and respectively 98.71%. Prahova County has the largest number of kindergartens - 41 units, most secondary schools - 137 schools, as well as the most high schools throughout the region, 54 high schools and 6 post-high schools in 2015. Arges County has, however, the highest number of faculties, respectively 2 higher education units. [2].

Under SOPHRD 2007-2013 in the sector of pre-university education 51 projects were implemented, with a total value of

348,104,865.19 lei (about 81,907,027.10 euro) [12].

For the pre-university sector projects were financed in the education sector under MFI 1.1 Access to education and initial quality vocational training, 1.3 – Human resources development in education and vocational training, 2.1 – Transition from school to active life, 2.2 – Prevention and correction of early school leaving (Figure 1.)

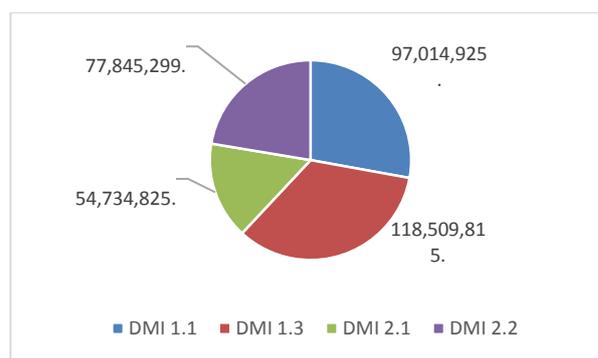


Fig. 1. Projects implemented on fields of intervention specific to pre-university education - LEI  
Source: Ministry of European Funds

Within **the main field of intervention** 1.1 - **Access to education and initial quality vocational training**, 9 projects were implemented, with total value of 97,014,925.60 lei (about 22,827,041.32 euros), of which a grant project and 8 strategic projects in Călărași, Prahova, Dâmbovița, Teleorman counties (Figure 2.) [12].

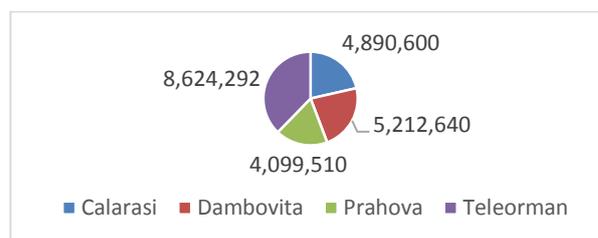


Fig. 2. Sums attracted under MFI 1.1 in South Muntenia region - LEI  
Source: Ministry of European Funds

Projects were not implemented in Argeș, Giurgiu and Ialomița counties. Following the projects implementation financed under SOPHRD 2007-2013, under MFI 1.1, 36.827 persons benefited, and the distribution on target group categories is shown below (Fig. 3).

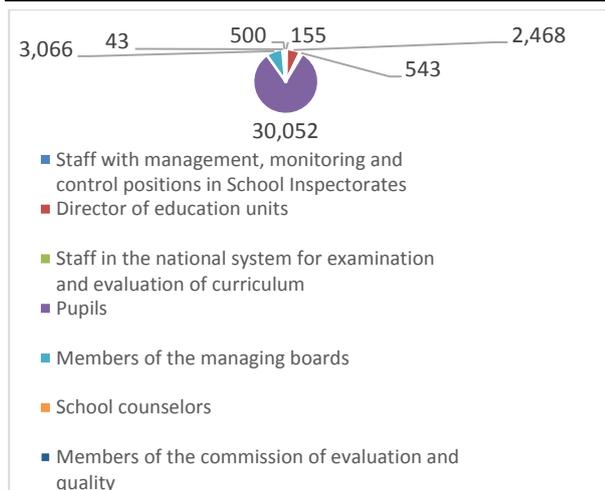


Fig. 3. Target group categories involved in the projects implementation – MFI 1.1- no. persons  
 Source: Own calculation.

Within **the major field of intervention 1.3 - Human Resources Development in Education and Training**, 15 projects were implemented, with total value of 118,509,815.00 lei (about 27,884,662.35 euro), out of which 6 grant projects and 9 strategic projects.

Within **MFI 1.3** no projects were implemented in Călărași, Ialomița, Giurgiu, counties and for the counties where the projects were implemented, the distribution according to the attracted amounts is shown in the following figure (Fig. 4).

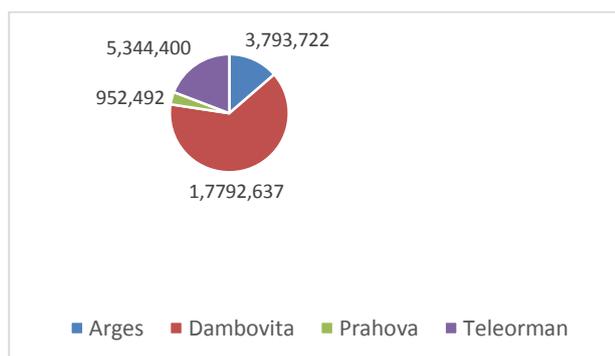


Fig. 4. Sums attracted following the project implementation under MFI 1.3- LEI  
 Source: Ministry of European Funds

Following the implementation of the projects financed under SOPHRD 2007-2013, within MFI 1.3, 23,157 persons benefited, and the distribution on target group categories is shown below (Fig. 5.)



Fig. 5. Target group categories involved in the project implementation – MFI 1.3 – no. persons  
 Source: Own calculation.

Within **the main field of intervention 2.1 - Transition from school to active life**, 15 projects were implemented, total value of 54,734,825.25 lei (about 12,878,783.00 euro), out of which 12 grant projects and 3 projects strategic projects.

Within MFI 2.1 no projects were implemented in Giurgiu county, and the allocation of attracted amounts, by counties, is shown below (Fig. 6.)

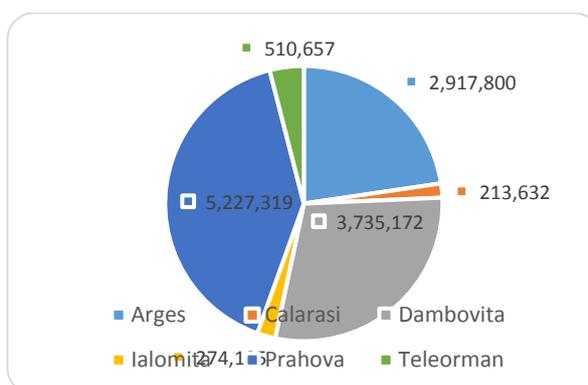


Fig. 6. Sums attracted under MFI 2.1 in South Muntenia region - LEI  
 Source: Ministry of European Funds

Following the implementation of the projects financed through SOPHRD 2007-2013, 10,274 people benefited under MFI 2.1 and the distribution by target group categories is shown below (Fig. 7.) [12].

Within **the major field of intervention 2.2 – Prevention and correction of early school leaving**, 12 projects were implemented, total

value of 77,845,299.34 lei (about 18,316,540.00 euro), of which 4 grant projects and 8 strategic projects.

Briefly, within MFI 2.2 projects were not implemented in Călărași county, and the distribution of the sums on counties is shown below (Fig. 8.).

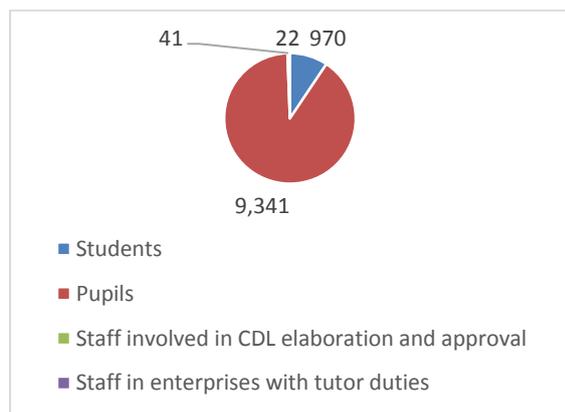


Fig. 7. Categories by target group involved in the project implementation – MFI 2.1 – no. persons  
Source: Own calculation.

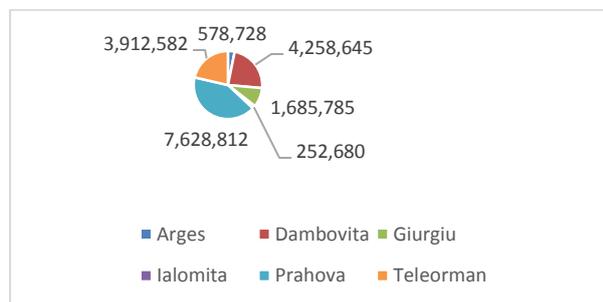


Fig. 8. Sums attracted under MFI 2.2 in South Muntenia region– LEI  
Source: Ministry of European Funds

Following the projects implementation financed under SOPHRD 2007-2013, under MFI 2.2, 13,275 persons benefited, and the distribution on target group categories is the following (Fig. 9.) [11].

In conclusion, in the pre-university education sector, projects were implemented in all counties in South Muntenia region, and 83,633 persons benefited from the activities implemented under these projects [12].

Under SOPHRD 2007-2013 in the university education sector, 9 projects were implemented, with a total value of 73,536,535.99 lei (about 17,302,715.00 euro) [12].

For the university education, projects were financed under the major field of intervention

1.2 - *Quality in higher education and within MFI 1.5 Doctoral and post-doctoral programmes in support of research* (Figure 10).

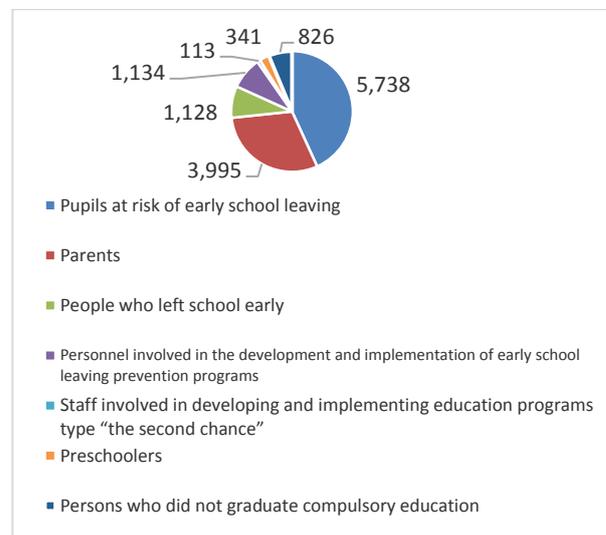


Fig. 9. Categories of target group involved in the project implementation – MFI 2.2- no. persons  
Source: Own calculation.

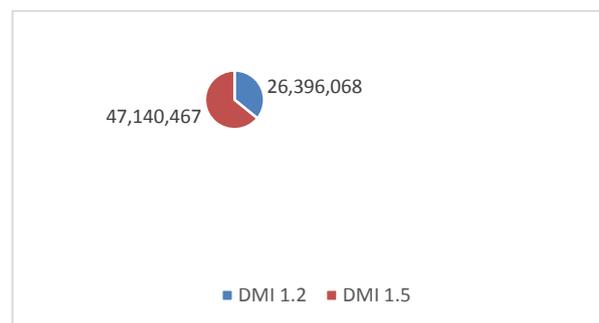


Fig. 10. Projects implemented on major fields of intervention specific to university education - LEI  
Source: Ministry of European Funds

Within the major field of intervention **1.2 – Quality in higher education**, 4 strategic projects were implemented, with a total value of 26,396,068.04 lei (about 6,210,840.00 euro), and the distribution of the sums attracted, on universities, are shown below (Fig. 11.) [9, 8].

Following the implementation of the projects financed under SOPHRD 2007-2013, under MFI 1.2, 1,949 persons benefited, and the distribution on target group categories is shown below: students, staff involved in elaborating university programs, representatives of social partners in education.[1].

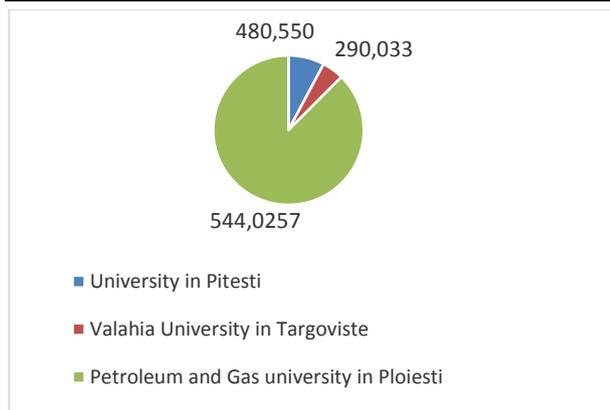


Fig. 11. Sums attracted under MFI 1.2 in South Muntenia region - LEI

Source: Ministry of European Funds

Within the major field of intervention 1.5 - **Doctoral and post-doctoral programs in support of research**, 5 strategic projects were implemented, with total value of 47,140,467.95 (about 11,091,875.00 Euro) and the distribution of attracted funds to the beneficiary universities, is shown below: Valahia University in Targoviste and Petroleum and Gas University in Ploiesti. Following the implementation of the projects financed by SOPHRD 2007-2013, 306 PhD students benefited from MFI 1.5. In conclusion, in the university education sector, projects were implemented in all three university centers in South Muntenia region, and from the activities implemented within these projects benefited 2,255 persons. In order to analyze the efficiency and effectiveness of using the European funds allocated through SOPHRD 2007-2013, in the pre-university and university sector, 42 questionnaires were analyzed from the beneficiaries who wanted to collaborate in our research. Regarding **the impact of project results on beneficiaries**, the respondents generally described that the project activities had a direct impact on the target group members.

The project beneficiaries in the pre-university education sector appreciated that an important role was given to provide financial and material support to target group members, mainly formed of pupils or persons who abandoned school, in the sense that they could continue/resume studies to increase the employment opportunities in the labor market

[2]. Following their participation in the project activities, the members of the target group had the opportunity to participate in various experience sharing in the country and even abroad, an activity that would not have been possible without the support of the project, given that the members of the target group in the pre-university sector belong to the disadvantaged communities.

On the other hand, the teachers involved as a target group in the analyzed projects have positively appreciated their involvement in the project through the fact that they have benefited from specific training courses that helped them in acquiring new skills in specific working techniques with the target group members from disadvantaged communities at risk of leaving school or with persons who have already left the education system [6].

The overall objective of SOPHRD 2007-2013 was: *“to develop human capital and increase competitiveness by linking education and lifelong learning to the labor market and providing increased opportunities for future participation in a modern, flexible and inclusive labor market of 1.650. 000 persons”*[7].

The project beneficiaries of the university education, respectively the students appreciated positively the role of the projects in the scientific training, especially by granting scholarships to increase their participation in scientific research activities, at national and international symposia, through participation in research internships in the country and abroad, activities that could not have been achieved without the logistic and material support provided within the project. The academic staff involved in the project implementation as a target group have improved their skills, developed new curricula adapted to the labor market, participated in various symposia and scientific events, benefited from experience sharing at national and transnational level.

Regarding how respondents appreciated **the impact of project results related to the needs initially identified for the target group**, the situation is presented in Fig.12.

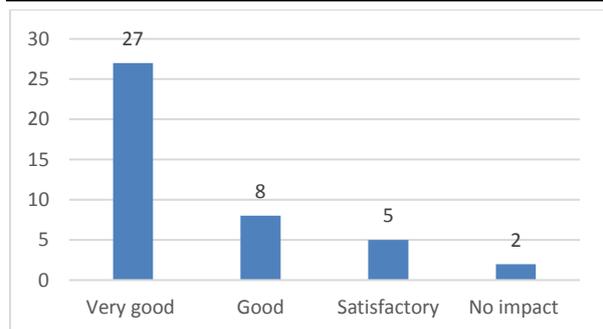


Fig. 12. Impact of project results related to the initial needs of the target group – no respondents  
Source: Own calculation.

Referring to the examples of **good practices / “successful stories”** identified in the projects implemented by the respondents, we present in brief a few examples described in the questionnaire: elaborating and distributing a *Good Practice Guide based on case studies in kindergartens on children from Italy, Sweden, Spain and Romania*, which presents a comparative analysis of pre-school education models from the four countries; Annual fundraising campaigns (such as *Christmas Tree Festival*), organizing charity shows to provide material and logistic support to encourage children to participate / return to the education system; Implementation of the *training program - from need to efficiency* that was elaborated starting from an individual analysis of the training needs, the elaboration by each individual student of a personalized professional development plan, the development of training activities focusing on the actual practice and on concrete case studies; Application of **“blended-learning”** system by using electronic platforms, through which there is the possibility of a permanent, contact trainer-formable, but formable-formable, so that each formable/trained can regulate its own continuous learning activity in a constructive sense and benefit from the best practices of the colleagues; **Attending AGROTEHNICA 2015 Farming Equipment Fair in Hanover, Germany** - through which the participating students extended their horizons and improved their skills, benefited from a complex experience exchange where they had the opportunity to watch / test different technologies.

Regarding **the difficulties encountered in the implementation of the projects**, the respondents mentioned aspects such as frequent legislative changes, problems in ensuring the financial flow, large delays in reimbursement of the amounts already spent from the beneficiary institutions own funds, lack of communication/counseling from the contracting authority, difficulties to attract and maintain the target group in the pre-university education system (especially in the case of the Roma population).

The classification of **the major difficulties identified by the beneficiaries in the project implementation**, according to the respondents' options, is presented in Fig.13.

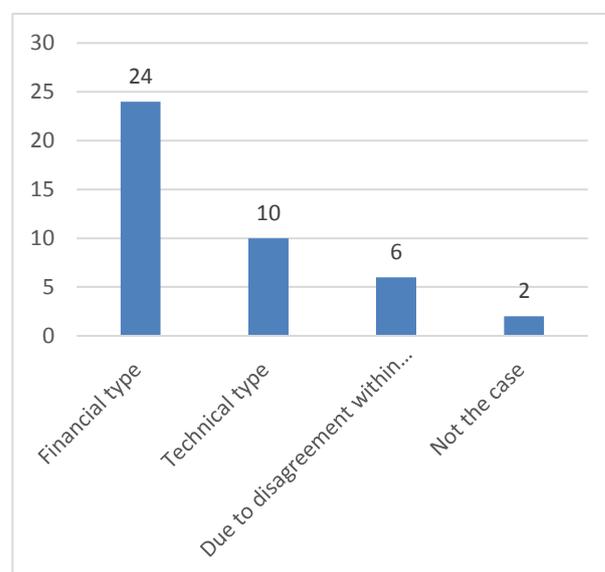


Fig. 13. Major difficulties identified in the project implementation –no of respondents  
Source: Own calculation.

## CONCLUSIONS

Under the projects implemented in South Muntenia region, in the education sector, financed under SOPHRD 2007-2013, a total number of 85,888 persons were supported (about 5% from the target group under the programme).

In order to bring long-term benefits, projects must take into account the context in which they are implemented, respond to the development needs of organizations implementing them and, last but not least, to solve problems. Every project that has benefited from an European grant has to

contribute to the achievement of the objectives of the programme, but also to the achievement of the objectives set by the European policies. Concerning the amounts contracted within the projects financed by SOPHRD 2007-2013 in the education sector, we notice that most funds were attracted in Dâmbovița, Prahova and Teleorman counties, in contrast the least funds were attracted in Ialomița, Giurgiu and Călărași counties, although the number of the disadvantaged communities is high and the school abandon is above the national average. The low rate of attraction of non-reimbursable foreign funds in the three counties can be caused by local stakeholders' lack of interest in implementing the projects, lack of literacy and implementation skills in the education sector, lack of human and financial resources needed to start and successfully implement a project etc.

The results of the research presented in this paper can be considered as support for improving the management of the European funded projects. Another *potential impact* of the research results is the awareness of the project managers about the importance of evaluating and monitoring the impact of the projects and the benefits it offers.

In conclusion, European funds must be seen as an important financing source that can lead to the modernization of Romania, and project management as the instrument that can make this progress possible.

An important role in this process is the ability of the state to efficiently channel funds to users and to appropriate investments for the desired economic growth. These European funds at present can bring an important contribution to Romania economic growth strategy. In this uncertain economic context, the projects financed by the European funds represent an important engine for economic growth.

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## ENSURING COMPETITIVENESS OF AGRO-INDUSTRIAL ENTERPRISES BASED ON DEVELOPING THE HR STRATEGY

Mihail Nikolaevich DUDIN<sup>1</sup>, Evgenia Evgenevna FROLOVA<sup>2</sup>,  
Boris Igorevich BASHILOV<sup>2</sup>, Yulia Igorevna SHKOLNIK (PANOVA)<sup>2</sup>,  
Olga Olegovna SMIRNOVA<sup>3</sup>

<sup>1</sup>Russian Presidential Academy of National Economy and Public Administration (RANEPA), 119571, Russian Federation, Moscow, 82 Vernadsky Av., Phone: +7 499 956-99-99, Email: dudin.n.mihail@mail.ru

<sup>2</sup>Peoples Friendship University of Russia (RUDN University), 117198, Russian Federation, Moscow, 6 Mikluho-Maklaya Str., Phone: +7 (495) 434-53-00. Emails: evgevgfrol@mail.ru, borisigbashilov@mail.ru, shkolnik\_panova@mail.ru

<sup>3</sup>The Council for the Study of Productive Forces under the Ministry of Economic Development of the Russian Federation (SOPS), 117997, Russian Federation, Moscow, 7 Vavilova St., Phone: +7 (499) 135-61-08, Email: smirnova81olga@mail.ru

**Corresponding author:** dudin.n.mihail@mail.ru

### **Abstract**

*The goal of the research is to stipulate the role of personnel in ensuring the competitiveness of agro-industrial enterprises and to define basic areas of its development. It is required to formulate essential provisions of the HR strategy in the agrarian sector to bring the latter to the leading positions in the national economy. The article shows that the formation of the competences of agro-industrial enterprise employees becomes a source of its competitive advantages. It shows the interrelation of the competitive personnel with the other elements of the competitiveness of the agro-industrial enterprise. It is determined that the development of the personnel of agro-industrial enterprises requires the relevant diversified support. The leading areas of the HR strategy of the development of the agro-industrial enterprises' personnel have been defined. In the context of these areas, the mechanisms whose joint functioning will allow improving the components of the competitiveness of the agro-industrial enterprises' personnel have been characterized.*

**Key words:** *agro-industrial enterprises, personnel development, competitive personnel, enterprise competitiveness, strategy, strategic management*

### **INTRODUCTION**

In the context of modern economic conditions, it is necessary to note the objective nature of import substitution in the Russian agriculture that is caused by the emergence and increase in the food import dependence during the previous years. That is why the need to develop the agrarian production, to maintain positions of the majority of agro-industrial enterprises (especially, small and medium-sized) on internal food markets and to strengthen their export potential acutely sets the problem of searching for new competitive advantages.

According to the authors of the article, the key competitive advantage of any enterprise in the

context of modern economic activity is the availability of the competitive personnel. The authors interpret it as the personnel that has the required set of competences, high self-organization, internal motivation and aims at fulfilling certain production tasks. These are employees with such qualities that can provide the balance between economic interrelations of agro-industrial enterprises and economic subjects of other sectors of the national economy. That is why constant development of the personnel is the key task of management of agro-industrial enterprises and consequently requires due scientific assistance. It is generally known that the enterprise competitiveness depends on its competitive advantages. Besides, some researchers tend to

identify a competitive advantage with the factors that define the final results of the enterprise operation, characteristics of its goods, etc. In particular, R.A. Fathutdinov states that in terms of results of the competitive struggle the competitive advantage is the best state of the competitiveness factor of the subject performing the economic activity as compared to the state of this factor with its competitors. In addition, the researcher interprets the competitiveness factor as a characteristic of the subject of competitive relations of the environment where it functions and that has an impact on the result of the economic competition [5].

According to the researchers, in the context of implementing the stipulated system of the state strategic policy focused on optimal use of the current resourceful potential to strengthen competitive positions of the agrarian sector of economy, it is necessary to move from obtaining certain competitive advantages related to the effect of price factors on the implementation of factorial advantages, namely intellectual capital, mineral wealth, and research and technical potential [8].

In spite of the fact that the enterprise competitiveness is formed under the impact of a number of internal and external factors, the authors of the article think that the personnel is the initial and at the same time determining element of forming its competitive advantages. Taking it into account, they agree with M.A. Suklyshkina that the organization competitiveness is directly related to the personnel's competitiveness, and this indicator directly characterizes the competitive potential of the enterprise [13].

As F. Yansen fairly states, today the world economic system is forming the paradigm of developing and improving the efficiency of social production based on using knowledge and innovations [17]. In this context, the factor of developing personnel for the agrarian sector of economy becomes especially important because without having employees of the relevant quality it is impossible to efficiently use the potential of the latest technical means, technologies, methods of management, and to fully implement the innovational model of the

agriculture development. Besides, only thanks to professional personnel, it is possible to provide high quality management, high level of labor and production organization, efficiency of the labor motivation system, timely and high quality fulfillment of production tasks, innovation in implementing the production and marketing strategy i.e. everything used by small and medium-sized enterprises of the agro-industrial complex to counteract agricultural holdings in the context of unequal technical and technological equipment of the production.

The uniqueness of the personnel in providing competitive advantages of the enterprise is defined by the fact that it is the basis of forming the human and intellectual capital that makes up the educational basis of developing and moving the knowledge. This is the employee who is the owner and bearer of knowledge, qualification, experience, and information he can accumulate, use, develop and transfer during the whole period of his life and labor activity. At the epoch of the post-industrial society the knowledge and information are considered to be among the basic resources that ensure the innovational development of economy and competitive product.

The position of S. Becker is rather grounded in this context. He states that "the human capital formed on the basis of the enterprise personnel is peculiar of self-growing value, and unlike other resources that require support and management to create competitive advantages of the enterprise, it is developed individually, attracts and combines other resources of the enterprise" [1].

Of course, the authors of the article share the opinion that the role of personnel in providing the competitiveness cannot be absolutized because the resourceful, technical and technological provision of enterprises, their functional opportunities, market positions, allocation and other factors are also important. However, the majority of them derive from the impact of the enterprise personnel, in particular management and organizational decisions of its management and results of the whole team work. However, the researchers' and experts'

acknowledgement of the priority of advantages of the certain enterprise personnel, as compared to others in the competitive struggle, is stipulated by the fact that modern technical means, technologies, and material resources are equally available to all competing subjects. That is why they cannot be a source of providing competitive advantages [6].

Therefore, the formation of a peculiar set of competences of the personnel (selection of employees according to the competences form), their constant development, as well as the specificity of the labor organization and motivation can become inaccessible for competitors. Along with this, collective knowledge and organizational culture that are specific for the enterprise and form so called non-codified capital can be rarely copied and transferred to the environment of another enterprise.

Consequently, the ability of the enterprise to train and develop its employees faster than competitors is a source of its economic, social, and strategic advantages not only on the sectorial or territorial but also on the all-national and international level.

Research references interpret the category "personnel development" mainly as a process of professional training, qualification improvement, and re-training of employees. Particularly, according to V.I. Maslov, the personnel development is a system of organized process of continuous professional training of employees to prepare them for fulfilling new production functions, professional and qualification promotion, forming the reserve of managers and improving the social structure of the personnel [10].

The personnel development is definitely strategically important for providing a high level of the enterprise competitiveness because it is an efficient means of strengthening and accumulating the personnel potential of employees both at the current stage of the enterprise functioning and over time.

The need in constant development of the personnel is also caused by the need to support its competitiveness. It is stipulated by its relativity, dynamism, and target nature because

even under the unchangeable quality and quantity of the personnel or organizational capital of the enterprise, the personnel's competitiveness in relation to positions of other enterprises can change, as a rule, for the worse. These changes can be a consequence of various tendencies in the external environment, changes of the market environment, institutional rules. It causes the correction of goals of the enterprise and requirements to the personnel's quality to achieve them.

## MATERIALS AND METHODS

The further research will be methodologically stipulated by the provision related to the fact that the development of the agrarian enterprise personnel is strategically important for providing a high level of its competitiveness. Besides, according to the authors of the article, competitiveness of agrarian enterprises is expressed in the scheme of causal relationships shown in Fig. 1.

The top of this scheme is formed by the competitive personnel mastering competences that are essential for the enterprise and focused on the achievement of the enterprise goals.

On the one hand, this personnel generates competitive managers that manage it. On the other hand, it easily and correctly perceives all tasks and goals formed by the management. It means that as a result of the organic combination of the competitive personnel and management, the relevant organization of labor, motivation, formation of the unity and purposefulness of all team members' activity are provided.

The enterprise management is responsible for organizing the sale and promotion of goods on the market, i.e. for the formation of the efficient marketing strategy of the enterprise fulfilled by a certain group of employees.

The competitive personnel is also closely related to the technical aspect of the agrarian production. More than that, such personnel is an integral element of the innovational strategy of the enterprise development.

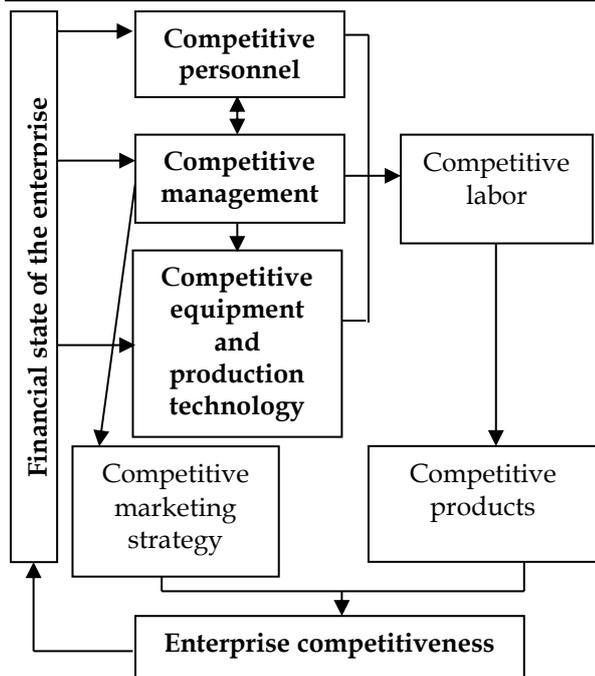


Fig. 1. Scheme of Causal Relationships of Providing Competitiveness of the Agrarian Enterprise  
Source: Compiled by the authors.

In order to master modern technical means and production technologies, and to produce certain technological novation, it is necessary to have the relevant knowledge, experience, due attitude to labor and creative potential.

Along with this, the development of employees' professional competences, and as well as the achievement of a certain level of the material and technical provision of the production depend on financial opportunities of the enterprise and volume of investments. In its turn, the cost of involving labor and material resources forms a certain level of production and sale expenses, which is one of the key factors of the products competitiveness.

Thus, the competitive personnel headed by competitive management and equipped with modern technical means can provide high quality and efficiency of labor, and form the competitiveness required by the market. In its turn, the products competitiveness defines the market position of the producer (the products share on the market), forms its financial position, and secures the achievement of high competitiveness of the enterprise, as a whole. That is why the creation of conditions for the development of competitive personnel is a primary task and the most important

condition for ensuring the successful operation of enterprises of the agrarian sector of economy.

## RESULTS AND DISCUSSIONS

The scales and key parameters of the personnel's development are defined, above all, by the strategy of developing the agro-industrial enterprise, level of implementing innovational technologies in the production, competition on the intracompany and sectorial labor market, competitive positions on goods markets, and its financial opportunities.

Unfortunately, at enterprises of the agrarian sector of economy, basic characteristics of the personnel that define its potential opportunities are underdeveloped.

On the one hand, it is caused by the extremely unsatisfactory conditions of forming the rural human capital, and on the other hand, by insufficient attention of enterprises management to providing the process of the personnel development.

According to the research results, through the example of a separate region, agrarian enterprises tend to minimize expenditures for using labor resources and optimize their number [15, p.61].

This thesis is proved, in particular, by the data about the level of expenditures of agricultural enterprises for maintaining and professional development of the personnel as a whole in Russia as compared to enterprises performing other types of economic activity (Table 1).

It is possible to see that in 2013 the amount of such expenditures as calculated per one employee was RUB 22,765.5, which is 1.7 times lower than in the industry and 2.15 times lower than the average in the economy.

At the same time in the structure of expenditures, investments in the personnel's professional training made up only 0.1%, which is the lowest indicator among all types of the economic activity with such expenditures.

In absolute terms the expenditures for professional education made up only RUB 22.76 per one employee, 6 times lower than the average in economy.

Table 1. Expenditures of Enterprises for the Labor Power and their Structure by Main Types of Economic Activity in 2013

|  | Average monthly expenditures for the labor power, RUB | including, percent |                             |                               |                                |                                    |   |  |                        |  |   |                    |                   |
|--|---|--------------------|-----------------------------|-------------------------------|--------------------------------|------------------------------------|---|--|------------------------|--|---|--------------------|-------------------|
|  |   | Salary             | including                   |                               |                                |                                    | Expenditures for providing employees with residence | Expenditures for the social protection |                        | Expenditures for professional training | Expenditures for cultural and every day servicing | Other expenditures | Taxes and charges |
|  |   |                    | Payment for the time worked | Payment for the time unworked | One-time motivational payments | Payment for food and accommodation |   | Obligatory deductions and payments     | Voluntary expenditures |  |   |                    |                   |
| Agriculture, forestry and fishery                            | 22,765.5  | 76.4               | 67.2                        | 5.9                           | 2.8                            | 0.8                                | 0.0   | 21.4                                   | 1.0                    | <b>0.1</b>                             | 0.1   | 0.6                | 0.2               |
| Processing industries  | 76,525.5  | 72.3               | 56.4                        | 8.8                           | 6.5                            | 0.6                                | 0.4   | 19.1                                   | 3.2                    | <b>0.4</b>                             | 1.1   | 3.0                | 0.5               |
| Industrial production  | 38,664.5  | 74.0               | 63.2                        | 6.9                           | 3.5                            | 0.5                                | 0.2   | 21.0                                   | 1.5                    | <b>0.3</b>                             | 0.5   | 2.3                | 0.3               |
| Production and distribution of electric power, gas and water | 42,554.7  | 74.8               | 62.1                        | 7.0                           | 5.5                            | 0.2                                | 0.1   | 19.9                                   | 2.2                    | <b>0.4</b>                             | 0.3   | 2.2                | 0.2               |
| Construction   | 44,902.5  | 74.5               | 64.5                        | 6.2                           | 3.2                            | 0.6                                | 0.1   | 19.8                                   | 1.0                    | <b>0.3</b>                             | 0.1   | 3.6                | 0.6               |
| Wholesaling and retailing                                    | 35,686.1  | 76.5               | 67.3                        | 5.3                           | 3.5                            | 0.3                                | 0.0   | 19.6                                   | 1.0                    | <b>0.2</b>                             | 0.2   | 1.6                | 0.9               |
| Transport and communication                                  | 49,287.4  | 74.2               | 60.8                        | 7.7                           | 5.4                            | 0.3                                | 0.3   | 19.7                                   | 2.7                    | <b>0.5</b>                             | 0.2   | 2.2                | 0.3               |
| Financial activity   | 78,301.0  | 78.6               | 64.0                        | 5.5                           | 9.0                            | 0.1                                | 0.3   | 17.8                                   | 1.2                    | <b>0.3</b>                             | 0.2   | 1.5                | 0.2               |
| Operations with real estate, renting and providing services  | 53,217.2  | 76.4               | 65.5                        | 6.2                           | 4.6                            | 0.2                                | 0.1   | 18.5                                   | 1.3                    | <b>0.3</b>                             | 0.2   | 2.8                | 0.4               |
| <b>In total for types of economic activity</b>               | <b>45,870.2</b>                                       | <b>75.1</b>        | <b>63.3</b>                 | <b>6.7</b>                    | <b>4.7</b>                     | <b>0.4</b>                         | <b>0.2</b>  | <b>19.7</b>                            | <b>1.7</b>             | <b>0.3</b>                             | <b>0.3</b>  | <b>2.4</b>         | <b>0.4</b>        |

Source: [14]

Consequently, there is a considerable gap between the total volume of investments in the personnel's professional development made by agro-industrial enterprises and economic subjects operating in other sectors. That is why at agro-industrial enterprises issues related to managing the personnel's development must be of top priority. It is related to the fact that social and economic contradictions accumulated in the rural environment cause the discontent of the employed population with the work, turnover of employees, lack of motives for professional

development, incompliance of the salary with the work results, etc.

The authors of this article do share the researchers' opinion that first of all it is necessary to focus on the development of creative, innovational qualities of the personnel, continuous use of results of the employees' creative activity in the economic activity. It is necessary to consider employees as an integral part of the enterprise intellectual capital [2; 4].

Table 2. Areas and Measures to Ensure the Personnel Development at Agro-Industrial Enterprises

| PROVIDING DEVELOPMENT OF THE PERSONNEL AT AGRO-INDUSTRIAL ENTERPRISES   |   |
|---|---|
| <p><b>Regulatory:</b></p> <ol style="list-style-type: none"> <li>1. Working out the provision about professional training and development of the personnel,</li> <li>2. Contractual documentation of relations between members of the professional development.</li> </ol>  | <p><b>Organizational:</b></p> <ol style="list-style-type: none"> <li>1. Partnership of the administration and employees in the area of organizing professional education,</li> <li>2. Forming the system of education management, and</li> <li>3. Organizational support of employees during their self-education, and obtaining higher education.</li> </ol>                                   |
| <p><b>Professional:</b></p> <ol style="list-style-type: none"> <li>1. Forming the group of tutors for training and production education,</li> <li>2. Attracting specialists from educational establishments and leading enterprises of the sector for learning about the latest achievements of the science and engineering.</li> </ol>                     | <p><b>Educational and methodical:</b></p> <ol style="list-style-type: none"> <li>1. Implementation of active forms and methods of on-site training of employees,</li> <li>2. Development of individual and team programs of training and production education in accordance with the learners' needs, and</li> <li>3. Wide use of visual materials (brochures, booklets, and films).</li> </ol> |
| <p><b>Financial and investment:</b></p> <ol style="list-style-type: none"> <li>1. Establishing the fund of financing professional development,</li> <li>2. Attracting external resources of financing the personnel development, and</li> <li>3. Using methods of material motivation to stimulate employees for education and self-development.</li> </ol> | <p><b>Informational and consulting:</b></p> <ol style="list-style-type: none"> <li>1. Constant informing employees about the possibility and terms and conditions of professional education, training, or improving qualification at or beyond the enterprise,</li> <li>2. Explanatory work about the need to improve qualification.</li> </ol>   |

Source: Compiled by the authors.

Consequently, the improvement of the competitiveness of the personnel working at agro-industrial enterprises requires developing a consolidated mechanism of maintaining and developing the personnel's potential that will be based on the efficient use of the human resources, increasing the salaries, taking measures on motivating labor, improving

social safety and protection of employees, attracting investments in continuous professional training, and improving the personnel's qualification.

The implementation of the concept of the personnel's development requires from the administration of agro-industrial enterprises to take measures on providing this process in various areas (Table 2).

Summarizing the research approaches to understanding areas of the personnel's development under modern conditions [7; 3; 9; 11; 12; 16], and taking into account the level of providing the agrarian production with personnel and need to implement the innovational model of its development, the authors of this article think that the strategy of improving the competitiveness of employees of agro-industrial enterprises must be based on such target benchmarks as

- 1) Improvement of the qualitative characteristics of the enterprise personnel,
- 2) Development of the labor motivation system and improvement of the working life quality,
- 3) Development of an efficient personnel management system, and
- 4) Social protection and social provision of employees.

Every area assumes the use of specific mechanisms based on the complex of organizational and economic measures that have both direct and indirect impact on the personnel's development. Every group of measures contributes to the achievement of certain internal and external effects that to a definite degree are interrelated and inter-stipulated. Their consolidated effect allows not only improving the competitiveness of personnel, but also forming conditions for providing long-term stability of its reproduction. It means that making certain investments in the personnel's development in the above areas, the enterprise focuses not only on the current profits but also on the opportunity to obtain them in the future. The final result of implementing strategic measures on improving the personnel's competitiveness is the enterprise's achievement of specific economic results, such as labor efficiency increase, products quality

improvement, decrease in non-production expenditures and working hours losses, decrease in the employees turnover, and general increase in the economic efficiency of production. In its turn, it enables the enterprise to obtain additional competitive advantages and successfully function in the changing market environment.

According to the authors of this article, the improvement of the quality of the personnel of agro-industrial enterprises is a key area of its development strategy. Such personnel's qualities as educational level, qualification competence, working experience and practical skills, business and personal characteristics of employees are the most essential components of competitiveness. Its other elements - working capacity, efficiency and career perspective of employees - derive from the personnel's quality. Thus, the quality of the labor force is a sort of a basement of the employee's competitiveness and professional aptitude.

At the same time, specific qualitative characteristics of the personnel are estimated by employees differently: taking into account their perception, need in them, and opportunity to attract and efficiently use these qualities. It means that certain qualities of employees are considered as competitive only under conditions of a certain enterprise and a certain position. That is why in order to ensure the personnel's competitiveness, it is necessary to bring its qualitative characteristics in compliance with the requirements of the labor market and employers.

Thus, under the modern market conditions the main strategic goal of improving the personnel's quality for national agro-industrial enterprises is to form a wide range of competences required for implementing the innovational model of development. Above all, it goes about mastering modern technologies of production, new equipment, methods of labor and production organization, and management and marketing activity.

The enterprises that have limited opportunities to implement innovational projects and follow a traditional mode of activity must also focus on improving employees' professionalism and

personal characteristics, particularly, responsibility, adaptability (including professional and territorial mobility, motivation, innovativeness, creative approach to solving the set tasks, etc.).

The main mechanism of implementing goals related to improving the personnel's quality is the organization of continuous professional and production training of employees at agro-industrial enterprises, as well as investing in it. It will allow not only improving the personnel's educational and qualification level and innovational potential, but also stabilizing the number of the enterprise employees because, taking into account continuous training and improving the qualification of personnel, top managers of enterprises do not need to dismiss employees whose knowledge or professional skills are out-of-date in the context of the scientific and technical progress, and waste funds and time for selecting, educating and training new personnel.

The most important area of the personnel's competitiveness development strategy is the improvement of the labor motivation system and the quality of the employees' working life. Within this area, it is supposed to achieve two main goals:

To provide efficient stimuli for self-improvement, professional education, career growth, and creativity,

To improve the employees' material welfare and health protection.

The main mechanisms to improve them include the development of the system related to monetary (labor payment, bonuses) and non-monetary (social package) stimulating of employees, non-material motivation, social programs, and improving conditions and safety of labor.

As a result of these mechanisms effect, a certain level of the working life quality is achieved. The improvement of the working life quality creates conditions for the interest in the long-term employment of the employee at the enterprise and motivates him for further professional development, career growth, and increase in the labor efficiency. As for the enterprise, it obtains the relevant economic and social effects in the form of a decrease in the

employees' turnover, increase in the production efficiency, growth of economic and social activity of employees, their scrupulous fulfillment of duties, and care about final results of the activity.

The growth of the working life quality also results in the improvement of investments in human capital and formation of conditions for increasing them. This is because the reason of extremely low level of investments in preparing agrarian personnel is their high turnover that is usually stipulated by unsatisfactory conditions of labor and low salary. That is why entrepreneurs hardly spend funds for training their employees because of the possibility of the employees' change of work, and actually the fear to lose the spent funds. In the context of stabilizing the composition of the labor resources, this problem is dismantled.

In addition, respectable salaries, a considerable social package and other factors increase the attractiveness of agricultural employment. Thereby conditions for attracting young specialists and highly professional personnel from other areas are formed. The competitiveness of agrarian personnel also improves.

The labor motivation and working life quality are a limited supplement to the system of improving the personnel quality, and actually, the main linking element between all strategic areas of its development. Thus, the main motive of the employee to improve qualification and professional education is the opportunity to get a higher salary as a result of increasing the efficiency of his own labor, career growth, involvement in technologically difficult and thus highly paid types of work. However, it is possible only under the conditions of organizing an efficient HR management system that is considered herein as a separate strategic area of its development. The main goals of this area include optimization of the size and structure of the enterprise personnel by improving the level of technical assistance of production and service, provision of rational and efficient employment, minimization of the factors related to the seasonal nature of labor and so

on; providing compliance of the remuneration for labor with its results, and improvement of the efficiency of using the personnel.

The mechanism of achieving the above goals is based on general improvement of the system of social and labor relationships, particularly, their allocation component. Above all, it is extremely important to provide the dependence of the labor payment level on its efficiency. It is also necessary to rationally differentiate the employees' salary according to the professional and qualification characteristic, occupied position, type and complexity of performed works, etc. At the same time it requires the relevant organizational provision of the production process itself and the process of personnel management through the system of collective agreement based regulation, labor rating and payment.

In the context of managing the employee's career, it is necessary to develop a scheme of personnel's transfer, to define the procedure and conditions of vacancies filling and document them in relevant internal provisions. The career may grow both vertically (transfer to a higher position) and horizontally (qualification improvement, extending functions and tasks), and diagonally (the growth of the authority and recognition by colleagues). Managing the employee's career forms conditions for meeting his needs in self-implementing, colleagues' recognition, achievement of a certain status, etc.

The last important area of the strategy related to developing the personnel of agro-industrial enterprises is the organization of the efficient social protection and social provision of employees to increase their welfare and insure from various social risks. The top target benchmark is the formation of favorable conditions of the human development and reproduction of labor potential of the village.

The mechanism of implementing a social component is performed through the development of the internal economic social insurance, participation of the enterprise in programs related to contributing to the employment and social support of the population, financing the development of the social area.

Thus, there is an impact on the internal and external environment of the personnel's competitiveness development. On the one hand, the improvement of the employees' protection from consequences of social risks contributes to the improvement of the quality of their working life, and consequently, it is an additional motivator for improving the work results, professional and career growth, etc. On the other hand, participation in programs of economic and social development of rural territories improves the welfare of local population as potential employees, contributes to keeping the youth in the village and growth of the human capital quality. At the same time, top managers of enterprises must not consider the social development as secondary because basically the personnel composition of agrarian enterprises is formed by the rural population. That is why the creation of a relevant economic and social environment in the village is an important condition for accumulating those elements of the human capital that through the relevant development mechanisms will be transformed into the required competences and will improve the personnel's competitiveness. At the same time, economic and social effects achieved as a result of implementing the personnel development strategy not only form a certain level of its competitiveness, but also are themselves the result of the improvement of professional and personal characteristics of employees.

## CONCLUSIONS

The modern stage of the development of enterprises functioning in the agrarian sector of economy prioritizes the problem related to providing them with the competitive personnel that has the knowledge and competences required for implementing the innovational model of the economic activity. It is the enterprise personnel that plays the key role in achieving a certain level of the labor competitiveness, i.e. it has a direct impact on forming final parameters of products (volume, price, quality) that define its competitive positions on the market.

A high level of the personnel competitiveness allows increasing the production profitability and the value of the enterprise assets, improving the efficiency of using resources, and what is the main, providing long-term, unique, self-growing and competitive advantage of the enterprise due to the use of the unique resources of competitiveness that cannot be followed by competitors. That is why the personnel's comprehensive development must be a strategic task of the HR policy of the agro-industrial enterprise.

The improvement of the competitiveness of the personnel of agro-industrial enterprises requires the development of a consolidated mechanism of maintaining and developing the personnel potential that will be based on the efficient use of human resources, increase in the salary level, measures on labor motivation, improvement in the level of social safety and social protection of employees, attraction of investments in the personnel's continuous professional training, and improvement of the qualifications.

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## ANALYSIS REGARDING THE DIRECT PAYMENTS IN THE EUROPEAN UNION

**Eduard Alexandru DUMITRU, Valentina Constanța TUDOR, Ana Ruxandra MICU, Marius Mihai MICU**

University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40744 6474 10, Emails: dumitru.eduard@iceadr.ro, valentina\_tudor@yahoo.com, micuanaruxandra@yahoo.com, micumariusmihai@yahoo.com;

**Corresponding author:** micumariusmihai@yahoo.ro

### *Abstract*

*Direct payments to European farmers through the common agricultural policy are extremely important to them. The CAP has undergone countless changes over time and has been modified in the circumstances. Lately, the focus has been mainly on decoupled support, to the detriment of coupled support and rumours across the European Union as to whether it would be the last time they would assist by direct payments to farmers, fueling farmers' anxiety in especially those from countries have recently joined the European Union. Financing the agricultural sector is a necessity and a future, as the reduction of the CAP budget after 2020 is not a viable solution in this respect, which will lead to a decline in all aspects of the sector. The statistical processing of data provided by the European Commission demonstrates, among other things, the defamation of the most recent countries that have joined the European Union, such as Bulgaria or Romania, but especially Croatia.*

**Key words:** direct payments, CAP, the Common Agricultural Policy

### INTRODUCTION

CAP was established in 1962, his main role was to ensure good prices for farmers, who managed to produce from year to year increasingly more. The European Union came to life, with the signing of the Treaty of Rome in 1957 [7].

The period 1970-1980 is known as the period during which farmers in Europe produced more than was needed, so they took a series of measures to align production to demand.

Due to reduction in agricultural prices it was necessary to introduce direct payments to farmers to resist, and they were encouraged to produce more and use environment friendly practices, a period that coincided with the Rio summit was referring to the principles of sustainable development [1].

Mid-90s concentrated on producing adequate food in terms of quality, so that the introduction of new measures based on encouraging investment in farms, training farmers in improved processes and marketing. Also during this period it appeared the first

European regulation on organic farming, which has been implemented [9].

With the 2000 CAP puts greater emphasis on the economy, social and cultural development of rural Europe. Also once this period farmers are more market oriented and specific to areas with agriculture. Consequently, farmers began to put a greater emphasis on food safety, environment, and good condition of the animals. Also standards were introduced on avoiding pain and suffering for the livestock, ensuring minimal spaces in which they are grown, etc [2].

In the mid-2000s, the European Union is the largest importer of agricultural products, managing to import more than the United States, Japan, Australia and Canada combined. Between 2004-2007, the population of farmers has doubled, because the European Union and joined November 12 countries representing so, in 2007, 27 countries with a population of over 500 million [8].

In 2011, it wanted a reform of the CAP (period in which the European Commissioner for Agriculture, was the representative of

Romania) which wanted enhancing the competitiveness of the agricultural sector by promoting innovation, climate change and supporting job creation employment in rural areas [10].

PAC focuses on agricultural product quality by applying the highest quality standards and rigorous plant and animal health control, so that the EU population are able to consume safe food whose traceability is known [3].

From 1980 to 2010, the budget structure of the CAP has undergone a genuine transformation so that if the early 80's budget was divided evenly by supporting measures to market and support exports in 2010 only for marketing measures there budget allocation. Instead bulk of the budget is intended decoupled aid and investment aimed at rural development. CAP budget also underwent a transformation impressive, from about 12 billion in 1980 to over 55 billion euro in 2010 [4][5].

## MATERIALS AND METHODS

Research is based on the use of statistics taken from the Department of Agriculture and Rural Development of the European Commission and available data on the web site of the Ministry of Agriculture and Rural Development of Romania.

As a research method was used statistical method for recording in a systematic and unified statistical data in order to achieve a parallel indicators identified in the European Union.

## RESULTS AND DISCUSSIONS

The European Union currently comprises 28 countries, with Croatia in 2013. In the year 2014, the countries that had made the greatest contribution to the budget of the European Union was Germany (20.9%), France (15.3%) and Italy (11.6%). Also the top 3 positions is kept in the share of population with 15.9% (80 million), 13% (65 million) and 12% (60 million) (Table 1).

Despite the fact that the five countries listed above are the countries with the highest GDP in member countries of the European Union

when it comes to GDP reported per capita, ranking changes so that this top make their way countries like Luxembourg, which has by far the highest GDP / capita, amounting to 87,600 euros, followed by Denmark and Sweden 46,200 euros to 44,400 euros per capita (Table 1).

Table 1. Top countries contributing to the EU budget (2014)

| Country | Total population | Rural population | GDP (million) | GDP / per capita |
|---------|------------------|------------------|---------------|------------------|
| Germany | 80,767,463       | 13,203,427       | 2,915,650     | 36,000           |
| France  | 65,835,579       | 19,535,623       | 2,132,449     | 32,200           |
| Italy   | 60,782,668       | 12,199,659       | 1,613,859     | 26,500           |
| UK      | 64,308,261       | 1,850,094        | 2,254,297     | 34,900           |
| Spain   | 46,512,199       | 3,408,796        | 1,041,160     | 22,400           |

Source: European Commission, Eurostat, Update: January 2016.

At EU level, the average GDP per capita of 27,400 euros, while EU population is over 506 million inhabitants.

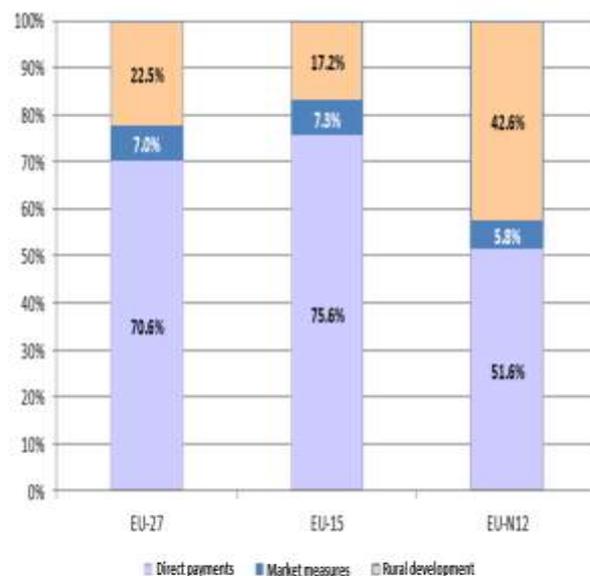


Fig. 1. The distribution of CAP expenditure 2009-2014  
 Source: Own calculation.

Distribution PAC spending in 2009-2014, make EU27 be directed to direct payments, with a share of 70%. Once we get closer to the EU-12 shows that the percentage of direct payments tends to decrease, reaching 51.6% and to increase their support rural development. Market measures tend to have a relatively equal distribution per Compare all

indicators, ranging between 7.3% and 5.8% of the total expenditure budget of CAP (Fig. 1).

Table 2. PAC spending in 2014 in European Union countries (in 1000 euros)

| Member countries | Direct payments | Market measures | Rural development | Total      |
|------------------|-----------------|-----------------|-------------------|------------|
| Belgium          | 552,451         | 53,303          | 40,856            | 646,609    |
| Bulgaria         | 578,641         | 23,451          | 0                 | 602,092    |
| Czech Republic   | 878,679         | 14,131          | 0                 | 892,809    |
| Denmark          | 916,928         | 9,114           | 90,288            | 1,016,331  |
| Germany          | 5,101,256       | 95,870          | 664,602           | 5,861,728  |
| Estonia          | 99,062          | 1,245           | 103,626           | 203,933    |
| Ireland          | 1,227,717       | 6,744           | 0                 | 1,234,461  |
| Greece           | 2,246,414       | 45,232          | 0                 | 2,291,646  |
| Spain            | 5,106,397       | 474,169         | 0                 | 5,580,566  |
| France           | 7,779,692       | 551,831         | 4,353             | 8,335,876  |
| Croatia          | 93,202          | 3,247           | 0                 | 96,449     |
| Italy            | 3,902,241       | 603,595         | 0                 | 4,505,837  |
| Cyprus           | 51,668          | 5,330           | 0                 | 56,998     |
| Latvia           | 143,760         | 4,014           | 138,327           | 286,101    |
| Lithuania        | 374,109         | 4,080           | 230,393           | 608,582    |
| Luxembourg       | 33,088          | 298             | 0                 | 33,386     |
| Hungary          | 1,284,695       | 52,241          | 0                 | 1,336,936  |
| Malta            | 5,273           | 296             | 0                 | 5,569      |
| Netherlands      | 805,800         | 33,845          | 87,118            | 926,763    |
| Austria          | 695,527         | 22,061          | 557,807           | 1,275,395  |
| Poland           | 2,982,334       | 225,398         | 1,569,518         | 4,777,250  |
| Portugal         | 634,797         | 100,405         | 577,031           | 1,312,233  |
| Romania          | 1,259,561       | 74,988          | 0                 | 1,334,549  |
| Slovenia         | 140,204         | 6,271           | 118,679           | 265,154    |
| Slovakia         | 371,547         | 7,951           | 271,155           | 650,653    |
| Finland          | 519,427         | 5,257           | 335,441           | 860,125    |
| Sweden           | 679,485         | 13,343          | 0                 | 692,828    |
| UK               | 3,195,725       | 39,471          | 475,532           | 3,710,728  |
| UE-28            | 41,659,680      | 2,478,675       | 5,264,723         | 49,403,077 |

Source: European Commission, Directorate General for Agriculture and Rural Development.

France is the country that allocates the largest amount of money of direct payments in agriculture, 7.7 billion euros, followed by Spain with 5.1 billion euros and Germany 5.1 billion. For 2014, the allocation for direct payments in agriculture has exceeded 41 billion euro at the 28 European Union countries (Table 2).

The highest amounts allocated to market measures were granted by Italy (600 million), followed by France and Spain with 551 million euros or 474 million euros. Regarding rural development, Poland has allocated in 2014, of the most significant amount of money over euro 1.5 billion (Table 2).

At EU level, the largest budget allocation of direct payments bound for beneficiaries earning between 20,000-50,000 euros,

accounting for over 26% of direct payments budget.

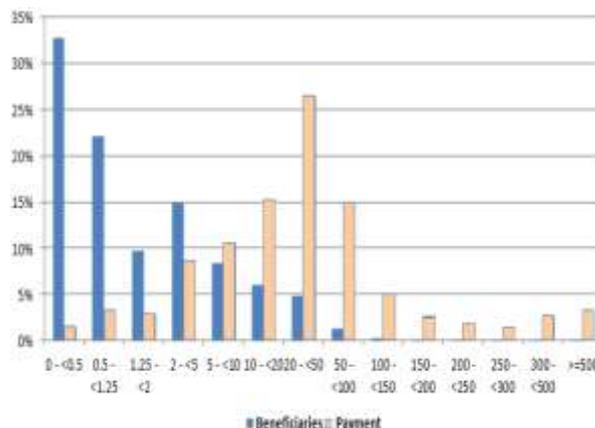


Fig. 2. The distribution of direct payments to producers (financial year 2014)

Source: European Commission, Directorate General for Agriculture and Rural Development;

Also most of the beneficiaries are those who receive up to 500 euros, accounting for about 33% of all beneficiaries of direct payments (Fig. 2.)

Table 3. Direct payments situation for the financial year 2014

| Size payments             | Financial Year 2014 |             |                   |             |
|---------------------------|---------------------|-------------|-------------------|-------------|
|                           | Beneficiary         |             | Payments euro     |             |
|                           | X 1000              | % in total  | X 1000            | % in total  |
| < 0 €                     | 120                 | 1.6%        | -5,582            | 0.0%        |
| ≥ 0 and < 500 €           | 2,343               | 31.2%       | 652,611           | 1.6%        |
| ≥ 500 and < 1,250 €       | 1,659               | 22.1%       | 1,340,814         | 3.2%        |
| ≥ 1,250 and < 2,000 €     | 724                 | 9.6%        | 1,148,425         | 2.8%        |
| ≥ 2,000 and < 5,000 €     | 1,117               | 14.9%       | 3,550,879         | 8.5%        |
| ≥ 5,000 and < 10,000 €    | 624                 | 8.3%        | 4,404,273         | 10.6%       |
| ≥ 10,000 and < 20,000 €   | 447                 | 5.9%        | 6,343,930         | 15.2%       |
| ≥ 20,000 and < 50,000 €   | 360                 | 4.8%        | 11,049,115        | 26.5%       |
| ≥ 50,000 and < 100,000 €  | 93                  | 1.2%        | 6,257,770         | 15.0%       |
| ≥ 100,000 and 150,000 €   | 17                  | 0.2%        | 2,082,094         | 5.0%        |
| ≥ 150,000 and < 200,000 € | 6                   | 0.1%        | 1,075,011         | 2.6%        |
| ≥ 200,000 and < 250,000 € | 3                   | 0.0%        | 728,522           | 1.7%        |
| ≥ 250,000 and < 300,000 € | 2                   | 0.0%        | 557,777           | 1.3%        |
| ≥ 300,000 and < 500,000 € | 2                   | 0.0%        | 1,123,684         | 2.7%        |
| ≥ 500,000 €               | 2                   | 0.0%        | 1,369,101         | 3.3%        |
| <b>Total</b>              | <b>7,521</b>        | <b>100%</b> | <b>41,678,424</b> | <b>100%</b> |

Source: European Commission, Directorate General for Agriculture and Rural Development.

The categories of beneficiaries that have received between 0 and 500 euros in financial year 2014 was 2.3 million (representing 31.2% of all beneficiaries), followed by those with payments with a value between 500 and 1,250 euro (22.1% of all beneficiaries) and those with sums between 2,000 and 5,000 euros, the

number of beneficiaries 1.1 million (representing 14.9% of all beneficiaries) (Table 3).

In terms of value exclusive of payments, more than 11 billion euros, representing 26.5% of the total budget for direct payments for the year 2014 was recorded by the beneficiaries who have received between 20,000 and 50,000 euros, followed by those receiving between 10,000 and 20,000 euros, accounting for 15.2% (Table 3.).

In total, in the financial year 2014 benefited a total of over 7.5 million beneficiaries from direct payments to the European Union, totalling a value of over 41 billion euros (Table 3.).

## CONCLUSIONS

In early 1980, the Common Agricultural Policy budget, it would be worth around 11 billion euros and was divided into two steps, almost in equal proportions, i.e. market measures and export finance. With 1981 it was introduced in the CAP budget and separate allocation for rural development.

In 1992 it was introduced coupled support, whose time peak was reached in 2005, when the next year's budget for the coupled support has been halved, and replaced by decoupled support, which until now has had an upward trend in the proportion of its CAP budget.

Measures taken by the CAP have been updated according to the needs of farmers and the market situation at those moments also in the future, this will have to take into account the context in which the European Union is found. In a eventual elimination of direct payments to farmers most likely to lead to major imbalances between European farmers and other farmers in the world, so that this transition should be a gradual and targeted on the future of the CAP (after 2020) follow them [6].

Also this will be a big disadvantage for the newest countries that entered the European Union and which have not benefited from such aid to farmers, and the most disadvantaged such as Croatia, which joined the European Union only in 2013.

It is clear that the system for granting direct payments to EU farmers, play a key role in ensuring their normal living. CAP budget suffered large changes from 1980 to the present, it actualized according to the situations arising in European agriculture.

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## ANALYSIS ON THE GRANTING OF DIRECT PAYMENTS IN ROMANIA AND BULGARIA

**Eduard Alexandru DUMITRU, Valentina Constanța TUDOR, Marius Mihai MICU, Ana Ruxandra MICU**

University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40744 6474 10, Emails: dumitru.eduard@iceadr.ro, valentina\_tudor@yahoo.com, micumariusmihai@yahoo.com, micuanaruxandra@yahoo.com;

**Corresponding author:** micumariusmihai@yahoo.com

### *Abstract*

*Both Romania and Bulgaria, the 2014-2020 period is probably a defining period in the country's development, particularly agriculture, taking into account the Commission's intention to abandon the granting of payments in agriculture, after 2020. So, time is critical and highly sensitive, being the last chance to reduce major differences compared to other countries, them benefited from such support on a much higher period than countries new entrants disfavored them up to a large extent thereon. It also represents a tremendous help of direct payments to farmers, contributing to their living standards and continuing their activities in agriculture. This paper seeks to highlight the need for support in agriculture so that by processing the statistical data it can be concluded that in both countries, even after the passing of seven years, regarding the first programming period, the situations are not solved completely, so these measures should be further enforced to help farmers.*

**Key words:** direct payments, Romania, Bulgaria, the Common Agricultural Policy

### INTRODUCTION

CAP's history began with the signing of the Treaty of Rome, when they created the European Economic Community, among the six founding countries, following the actual birth act in 1962 to take the Common Agricultural Policy. In 1984 CAP falls victim to its own success that food production was too large to use. In subsequent years (1992) are encouraged practices friends with the environment, animal welfare and food safety standards, such as the 2013 PAC to be reformed, focusing on the sector's competitiveness, promoting sustainability of farms and innovation and the creation of employment in rural areas [1].

CAP is based on three components namely: market support, income support and rural development. As regards financing the CAP is determined by budgetary allocations fixed for a period of 7 years. For example, market and income support are financed from the EU budget, while rural development is based on

multiannual programs and co-financing from Member States [2][10].

We can say that 40% of the EU budget is necessary that policy, but suffered a decline in the last 30 years from 75% at somewhere around 40% of the EU budget, given that this time joined European Union's 18 new members, thus doubling the number of farmers [4][6].

With 2015 as schemes direct payment were changed so that European farmers can access schemes mandatory payment (those that were adopted by all member countries) but also any voluntary schemes of payment (only in countries where these schemes were adopted). Among the mandatory schemes include: SAP (single area payment), and greening payment scheme for young farmers. Regarding voluntary schemes, they are: redistributive payment, offered support areas with natural constraints and coupled support [8][11].

The area payment is the provision of a payment per hectares for each farmer who fit the conditions for granting this type of support. Complementing this payment can be made and

the reverse payment is granted to each firm per hectar, if they comply with practices in agriculture on climate and environment. This payment aimed at three basic conditions: the maintenance of permanent grassland, crop diversification and maintaining ecological zones representing 5% of the arable land of the farm with more than 15 hectares [7][5].

## MATERIALS AND METHODS

Research is based on the use of statistical data provided by the Department of Agriculture and Rural Development of the European Commission, the data available on the web site of the Ministry of Agriculture and Rural Development of Romania and Bulgaria, taking into account several indicators.

As a research method was used statistical method for recording in a systematic and unified statistical data in order to achieve a parallel indicators of the two countries.

## RESULTS AND DISCUSSIONS

In between 2014 and 2020 will be allocated significant sums of agriculture and rural areas in European Union countries. Also new direct payments is intended to be distributed in a more equitable manner and only active farmers will benefit from these payments. These payments vary from country to country, different factors were taken into account [10]. Romania joined together with Bulgaria to the European Union in 2007, so a comparison in terms of the amounts allocated to various schemes, schemes chosen by them, and the results achieved by the end of 2014 are relevant for determining future objectives and the possibility of applying the results satisfactory, taking into account the characteristics of each country.

From Table one can see that Romania's budget for the direct payments for 2014-2020 is 12 billion euros, while Bulgaria's is 7.4 billion, representing only 62% of budget Romania. Regarding the budget for rural investment, for the same periods, Romania allocated a budget of almost 4 times higher (8 billion) than

allocated by Bulgaria or (2.3 billion) (Table 1.).

Table 1. A comparative table in terms of direct payments between Romania and Bulgaria

| Specification  | Romania          | Bulgaria          |
|--|------------------|-------------------|
| <b>2014-2020 budget related direct payments</b>          | 12 billion euros | 7.4 billion euros |
| <b>Rural investment allocated budget 2014-2020 (RDP)</b> | 8 billion euros  | 2.3 billion euros |
| <b>CAP investment period 2007-2013</b>                   | 10 billion euros | 4 billion euros   |
| <b>The share of primary sector jobs</b>                  | 30.6%            | 19%               |

Source: CAP summary sheet - Romania and Bulgaria.

By the end of the first programming period, Romania spent through the CAP's about 10 billion euros, while Bulgaria spent 2.5 times less, and the share of jobs in the primary sector, it is 30.6% in Romania and 19% in Bulgaria (Table 1.).

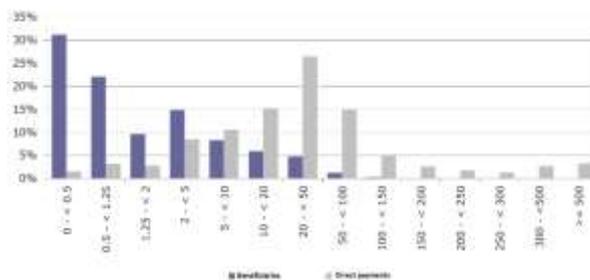


Fig. 1. Distribution and beneficiaries of direct payments in the EU by the amount of payments received (EUR thousand) in financial year 2014

Source: Report distribution of direct payments for agriculture (financial year 2014).

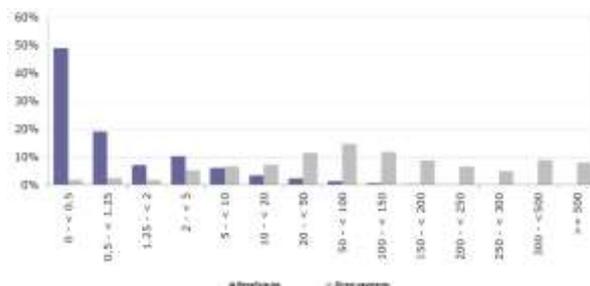


Fig. 2. Distribution and beneficiaries of direct payments in Bulgaria by the amount of payments received (EUR thousand) in financial year 2014

Source: Report distribution of direct payments for agriculture (financial year 2014).

Regarding the related financial year 2014, over 30% of beneficiaries received support whose

value was between 0 and 500 euros, which meant approximately 2% of direct payments. Also accounted for over 27% of all direct payments were received by 5% of all beneficiaries who received payments worth between 20,000-50,000 euros (Fig. 2).

At the level of Bulgaria, during the 2014 financial exercise, it appears that about 50% of beneficiaries receive payments of up to 500 euros, representing approximately 2% of direct payments budget. Most of the budget for direct payments of about 15%, goes to beneficiaries who receive such aid between 50,000 and 100,000 euros (Fig. 3).

While in 2008 the number of beneficiaries who received support which had a value below 5,000 euros was more than 90% of all beneficiaries at the end of 2014, their share reached 85%, the difference being replaced by beneficiaries that received support included between 5000-50000 euros (about 13%) and the difference of almost 2% of those receiving support with a value between 50,000-100,000 euros or 100,000 euros.

Regarding the share of direct payments, the highest amount was intended, in 2008, beneficiaries who received aid of between 5,000 and 50,000 euros, representing a rate of over 40% of the total budget allocated to direct payments. At the end of 2014, approximately 50% of the budget was given to the beneficiaries of direct payments that were cashing aid of 100,000 euros.

At the end of 2013, the economic value (SO) under € 4,000 farms in Bulgaria, have a share of about 75% of the total, while those with a value between 4,000 and 100,000 euros a share of 18% and the remaining approximately 2% consisted of farms that have economic value of 100,000 euros.

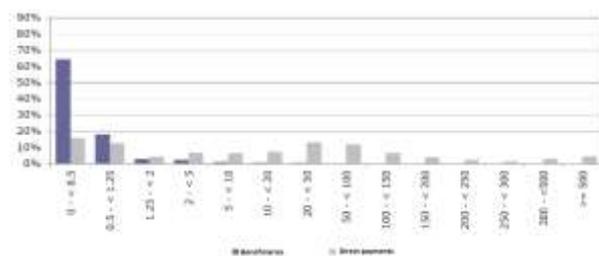


Fig. 3. Distribution and beneficiaries of direct payments in Romania by the amount of payments received (EUR thousand) in financial year 2014

Source: Own design.

In Romania, the largest share of beneficiaries of direct payments is represented by those who receive up to 500 euros, accounting for about 62% of all beneficiaries and for allocating the largest amount of the total budget for direct payments, accounting for about 16% of them (Fig. 4).

In 2008, the number of beneficiaries receiving aid with a value of up to € 5,000 had a share of 98% of the total, so that at the end of 2014, this ratio would decline only 1-2 percentage points. Also in 2008 the largest share of direct payments to concentrate the beneficiaries who received below 5,000 euros, having a share of over 50%, managing that in 2014, between amounts paid to beneficiaries who were receiving under 5,000 euros and those received between 5,000 and 50,000, to balance, reaching somewhere around 35% of direct payments budget.

At the end of 2013, about 83% of farms in Romania had an economic dimension under 4,000 euros, while the rest consisted of farms with an OS of between 4,000 and 100,000 euros (about 15%), and nearly 1% are farms an economic size of over 100,000 euros.

It is interesting that the total economic size of farms in Romania, the share is an almost similar between farms with an SO under 4,000 euros (size they have over 80% of total farms) and those with a SO more than 100,000 euros (size they have less than 1% of total farms) so that the two category each represent about 30% of the total economic value of farms in Romania.

For the period 2014-2020, Bulgaria has taken the following decisions as regards its main payment schemes, so that was taken into account Single Area Payment Scheme (SAPS), Payment redistributive scheme for coupled support, and helping young farmers and for which what the largest allocation was distributed SAPS's (47.8% in 2016). Romania has also opted for the same types of payments, but the SAPS has allocated over 50% of the budget for direct payments.

For example in terms of support provided to beneficiaries to pay redistributive both Bulgaria and Romania have opted for this payment, but the latter, unlike Bulgaria offers

this support for two types of intervals, for areas up to 5 hectares offering 5 euros / hectare, and from 5 to 30 hectares offering 45 euros / hectare, unlike Bulgaria which only offers up to 30 hectares (there are no scales intermediate) and offering 77 euros / hectare, being surpassed in this respect by Belgium (Wallonia region) offering 133 euros / ha.

Regarding the terms for which farmers can receive aid through direct payments, both countries have agreed not to introduce a minimum threshold for which no grant aid (which ranged between 100-500 euros and attainment of this amount makes the recipient not receive any help), but beneficial Bulgarian and the Romanian must have an eligible area of 1 hectare for crops and livestock sector. Aid should be a minimum of 100 euros to enter the possession aid.

Also in finalizing coupled support, Bulgaria has chosen to support the beef and veal meat, fruit and vegetables, milk and milk products, protein crops and sheep and goats meat. On the other hand Romania chose to support the beef meat, fruit and vegetables, grain legumes, hemp, hops, milk and dairy products, plant protein, rape, seeds, meat goat and sheep, silkworms and sugar beet.

## CONCLUSIONS

On the farming situation in its whole, both in Romania and in Bulgaria, we can say that agriculture accounts for 6.5% of GVA and 5.3% for Bulgaria. Also if the workforce employed in agriculture, in Romania it is 30.6%, 19.2% strictly observe. These two indicators are far above the average in the European Union, namely 1.7% for the economy and 5.2% of the workforce.

Also this is not very good, because the GVA is significant in both countries, which means that the economy is based on agriculture, which produces mainly raw material, to the detriment of products that have added value. At the same time jobs in agriculture are poorly paid, as they consist mostly of unskilled workers who have no knowledge in agriculture, represented by labour crude.

Both in Romania and in Bulgaria small farms predominate, so that 74% of them have less than 2 hectares (in the case of Romania a total of over 3.8 million farms) and 83.2% for Bulgaria of a total of more than 370,000 holdings.

In Romania, the share of young farmers who are aged 35 years is approaching the EU average, accounting for 7.3% (EU average is 7.5%), while in Bulgaria it is 6.9%.

Allocation of direct payments granted by Bulgaria account for up to 50% by farmers who receive up to 500 euros, much less than in Romania allocating more than 60% of this type of beneficiary, taking into account the number of farmers Romania reported at Bulgaria.

At first glance we would say that Bulgaria allocates greater attention to performance against Romania, allocating greater financial resources (as a percentage of the total budget of direct payments allocated to the country), but this is partially true because the funds Romania are much more substantial than those of Bulgaria, so its budget allocated to direct payments in 2014 was over 578 million, plus and more than 23 million for market measures, while Romania was allocated direct payments over 1.2 billion, plus about 75 million for market measures.

Obviously, both for Romania and Bulgaria for the period 2014-2020 is critical for agriculture (and others) so that the measures taken should help eliminate gaps with the other countries in terms of agriculture, especially in the context that after 2020 the intention to eliminate these forms of support.

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## STRENGTHS AND WEAKNESSES OF E-WALLET SYSTEM IN AGRICULTURAL INPUT DISTRIBUTION AMONG FARMERS IN OSUN STATE, NIGERIA: IMPLICATIONS FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT

Michael FAMA KINWA, Dorcas Lola ALABI, Lateef Ayodeji OLA,  
Rukayat Abiodun ADEYEMO

Obafemi Awolowo University, Department of Agricultural Extension and Rural Development,  
Osun State, Nigeria, Phone:+2347039530266, E-mails: famakinwamichael2013@gmail.com;  
alabidorcas@yahoo.com lateeffayodejii@gmail.com; abeyspet@yahoo.com;

**Corresponding author:** famakinwamichael2013@gmail.com

### **Abstract**

*The study was designed to assess the strengths and weaknesses of e-wallet innovation system of agricultural input distribution among farmers in Osun State, Nigeria. A multistage stage sampling procedure was used to select the respondents. Data were gathered through structured interview schedule from 324 farmers randomly selected from four Local Government Areas of the state. Data collected were analyzed using appropriate descriptive and inferential statistical tools. The results showed that the respondents had a mean age of 44.1 years with majority (74.1% and 94.4%) were male and married respectively. The mean household size of the respondents was 9 persons. Removal of corruption on fertilizer (mean=2.53), access to fertilizers at subsidized price (mean=2.35), quickened access to improved seeds (mean=2.27) and elimination of exploitative activities of middlemen in fertilizer supply (mean=2.21) were the major strengths of the scheme. While low quantity of fertilizers allocated to farmers (mean=3.17), late supply of inputs (mean=3.05), poor mobile network for e-wallet (mean=3.02) and low level of awareness of e-wallet by farmers (mean=3.01) were the prominent weaknesses of e-wallet. It is therefore recommended that successive government should continue and improve on the approach by addressing the identified weaknesses since the system has great potentials for sustainable agricultural development in the nation.*

**Key words:** E-wallet, farm inputs, perceived strength, perceived weakness, farmers

### **INTRODUCTION**

Agriculture has been the mainstay of the Nigerian economy for several years and is still contributing significantly to the Gross Domestic Product (GDP) of the country [8]. It provides food for the growing population, income to the farming families, foreign exchange earnings to the nation; generate raw materials for agro-allied industries and employs substantial labour force. It is a sector propelled basically by the rural population with many intervention foci on economic and poverty alleviation strides in the country by various development agencies and governmental policies. According to [26], about 76% of Nigeria population lives in the rural areas and about 90% of the rural dwellers engaged in agricultural production as means of livelihood.

According to [5] the perennial inefficient distribution system of farm inputs, namely fertilizers, seeds and crop protection products represents a major constraint to achieving food security in Nigeria. In addition, Agricultural production is mainly carried out by farmers in rural areas. According to [1], most of the farms are fragmented, have low input and low output usages of farm machines, fertilizer and improved seeds have been very low. According to [27] in [1], ten tractors were available per 100 hectares of farmland in Nigeria as compared to 241 tractors per hectare in Indonesia. Also, [16] affirmed that the average usage of fertilizer in Nigeria is 13kg/hectare while the rest of the world average annual usage is 100 kg/hectare. Furthermore, the average usage in Asia reached up to 150 kg/hectare. Besides, less than ten percent of Nigerian farmers could access improved seeds. Analysis of the relative increase in crop yields

in developing countries shows that Nigerians crop yields have the lowest growth rate of 0.2% from 1968 to 2008 as against 1.2 % for China, 2.3% for Indonesia and 3% for Malaysia [26]. The farm outputs could hardly feed the farmers and his families. Hence a large percentage of the farmers depend on imported foods for their family sustenance.

Several attempts have been made over the years to boost farmers' productivity. Among these efforts are the suppliers of farm inputs such as improved seeds, agrochemicals and fertilizers at subsidized prices to the farmers. However, due to high level of corruption, insincerity and political interruption in the distribution channels, large proportion of these inputs could not reach the farmers [1]. [2] pointed out that the old system used in supplying inputs to the farmers was weak, inefficient and fraudulent, hence a large proportion of the farmers could not benefit from it. He stressed that the inputs meant for the farmers were diverted by political elites to other countries for personal gains. It was also noted that most of the fertilizers supplied were adulterated, thus damaging the environment.

It is on this note that Agricultural Transformation Agenda (ATA) was inaugurated in 2011 to meet the yearnings of farmers who were incapacitated in getting access to fertilizers and other farm inputs. It was borne out of concern by the federal government to eradicate the corrupt government dominated fertilizer procurement and distribution to farmers through its agro-input corporation agencies in the states of the country [20]. The programme was introduced based on the inspiration of making farming a competitive business for optimal financial gains. It has policies designed to encourage stakeholders, government, private sector, farming operators and intending farmers in agricultural business to improve agricultural production sustainably, raise household food security and increase farmers income by providing direct subsidy through discounted seeds, fertilizers, agro-chemicals and farm machinery equipment on hire through growth enhancement design of electronic wallet (e-wallet) [22].

The e-wallet (electronic wallet) system, the first in sub-Saharan Africa is an innovative and motivational mobile technology to assist farmers with access to fertilizer inputs, seeds inputs, financial services, agricultural information tips, and other inputs, thereby increasing the yields and outputs of farmers. An e-wallet is defined as an efficient and transparent electronic device system that makes use of vouchers for the purchase and distribution of agricultural inputs [9]; [2]. Growth Enhancement Scheme (e-wallet innovation) opened unique connecting link as it targets the farmers directly with critically needed modern farm inputs on real-time basis. Understandably, the implementation of GES seems to be ahead of other components because of the primacy and urgency of boosting farm-level outputs and productivity. [4] observed that the scheme seeks to provide targeted support for seeds and fertilizers to 5 million farmers per year or 20 million farmers within four years. According to the project appraisal, the GES would generate 5-10 times returns in increased production with the overall benefit-cost ratio estimated at about 16:1.

The e-wallet approach is designed for smallholder farmers, who appear to be the most vulnerable by the impropriety in the fertilizer and other input sector of the Ministry of Agriculture. The criteria for farmers' participation include: farmers being above 18 years old; having participated in a survey authorized by the government to capture farmer personal detailed information; own a cell phone with a registered SIM card and have at least sixty naira credit in the cell phone. The fulfillment of these conditions guarantees the issuance of an e-wallet voucher to the farmer. The voucher is used to redeem fertilizers, seeds and other agricultural inputs from agro-dealers at half the cost [24]. In 2012, Federal Ministry of Agriculture and Rural Development reported that about 1.5 million smallholder farmers got their subsidized seeds and fertilizers using their mobile phones. It was established that 10 million farmers that registered were given identity cards which allowed the use of biometric information to target them more effectively. Also, over 3.4

million farmers were reported to have received their subsidized inputs in 2013, with the expectation that close to 5 million farmers would be reached by the end of the dry season [4]. The project was expected to provide direct linkage between the farmers and the government so as to enable the government to disseminate valuable information to the farmers, thus ensuring farmers' progress [9].

With GES, the government sought to withdraw from direct fertilizer purchase and distribution, and introduced an alternative system of distribution built on the voucher system. [1] further highlighted that for an agro input dealer to participate in the programme, he/she must own a cell phone with a registered SIM card, understand the process of using e-wallets, and attend training programmes designed for the project.

Despite the aforementioned potentials of e-wallet agricultural input delivery system, there is need to assess the strengths and weaknesses among farmers, thereby revealing the implications of the findings on sustainable agricultural development in the study area and Nigeria at large; hence, this study.

### **Objectives of the Study**

The main objective of the study was to assess the perceived strengths and weaknesses of e-wallet systems of agricultural inputs delivery among farmers in Osun State, Nigeria.

The specific objectives were to:

- (i) describe socio-economic characteristics of the respondents in the study area;
- (ii) determine the perceived strength of e-wallet innovation system; and
- (iii) identify the weakness of e-wallet innovation system as perceived by the farmers.

## **MATERIALS AND METHODS**

### **Sampling procedure**

The study was conducted between May and December 2015 in Osun State, Nigeria which has thirty Local Government Areas (LGAs). A multistage sampling procedure was used to select the respondents (farmers). At the first stage, four LGAs were randomly selected from the State. These were Boripe, Egbedore, Ife Central and Ife East LGAs. At second stage,

three, five, two and eight rural communities were proportionately selected from Boripe, Egbedore, Ife Central and Ife East LGA respectively, based on the number of rural communities in each of these LGAs to make a total of 18 communities. At the last stage, 18 respondents were randomly selected in each of the chosen communities, making a total of 324 respondents in all.

Validated and pre-tested interview schedule was used to elicit information on socio-economic characteristics of the respondents, perceived strengths and weakness of e-wallet systems. The data were analysed and summarized using appropriate descriptive statistics such as frequency counts, percentages, mean among others.

### **Measurement of variables**

The strength of e-wallet was measured by asking the farmers to rate ten statements on strengths of e-wallet in agricultural input delivery system as perceived by them. The reactions were against a 3-point Likert type scale of strength ranging from weak (1 point), strong (2 points) and very strong (3 points). The total score per respondent was calculated as strength score. Furthermore, weakness of e-wallet was measured by asking the respondents to rate ten statements on the weakness of e-wallet system in agricultural input delivery as perceived by them. The reactions were against a 3 point Likert type scale ranging from fairly weak (1 point), weak (2 points) and very weak (3 points) as used by [18].

## **RESULTS AND DISCUSSIONS**

### **Socio-economic characteristics of farmers**

Results in Table 1 reveal that majority (74.1%) of the respondents were male; suggesting that males are more into farming than females in the study area probably because of their more energetic prowess for agronomic exercises than their female counterparts. In addition, majority (69.2%) of respondents were within the age group of 30-60 years with the mean age of 44.1 years. This implies that majority of the farmers were in their active and productive age. Therefore, they are energetic to undertake onerous and tedious tasks in farming

operations. This could enhance their effective participation in e-wallet scheme and enhance greater productivity. Vast majority (94.47%) of the respondents were married, this suggests that they are people with responsibilities. Majority (80.1%) of the respondents had one form of education or other while few (19.9%) did not attend any school. This implies that majority of the farmers were literates which could assist them to benefit better in the scheme than the illiterates. This result is in tandem with the findings of [15; [6]; [21] who submitted that education and training improves the skill, attitude and knowledge of an individual thus sharpening their ability to comprehend and apply innovations with ease. Below half (47.4%) had been visited extension agents within the last one year while more than half (52.6%) had no contact with extension agents. It shows that extension service which is expected to enable farmers to take up innovations and improve production was inadequate in the study area. It has been observed that extension services have positive effects on knowledge, adoption and productivity [15]. This therefore implies that weak extension contact observed would deny farmers some benefits and opportunities in agriculture that could enhance better living among them. The mean average farm size of the respondents was 2.3 hectares. This corroborated the findings of [11] that the mean farm size of farmers in Osun State was 2.38 hectares. This implies that majority of respondents were smallholder farmers. This confirms the fact that the e wallet approach actually reached the target group, i.e. the small scale farmers. Nearly two-third (62.5%) had household size of 6-10 persons with mean household size of 9 persons. This implies that respondents had fairly large household size which could possibly serve as farm labours. This result corroborates the findings of [23] who reported that the mean household size of rural farmers was 9 persons. Vast majority (80.2 %) of the respondents had access to credits from informal sources like friends and farmers' cooperatives which enabled to them to have access to inputs provided by it is time for them to redeem them. Majority (92.4%) of

the respondents possessed mobile phones to access e-wallet while 7.6 percent did not have.

Table 1. Distribution of respondents according to socio-economic characteristics (n=324)

| Personal Characteristics          | Freq | Percentage | Mean |
|-----------------------------------|------|------------|------|
| <b>Age</b>                        |      |            |      |
| ≤ 30 years                        | 44   | 26.2       |      |
| 31- 60 years                      | 225  | 69.2       | 44.1 |
| Above 61 years                    | 45   | 4.6        |      |
| <b>Sex</b>                        |      |            |      |
| Male                              | 240  | 74.1       |      |
| Female                            | 84   | 25.9       |      |
| <b>Educational level</b>          |      |            |      |
| No formal education               | 62   | 19.1       |      |
| Primary school                    | 77   | 23.8       |      |
| Secondary school                  | 108  | 33.3       |      |
| Post-secondary education          | 77   | 23.8       |      |
| <b>Marital status</b>             |      |            |      |
| Married                           | 306  | 94.4       |      |
| Single                            | 8    | 2.5        |      |
| Widow/widower                     | 10   | 3.1        |      |
| <b>Extension contact</b>          |      |            |      |
| Had contact                       | 154  | 47.4       |      |
| Had no contact                    | 171  | 52.6       |      |
| <b>Cosmopolitaness</b>            |      |            |      |
| Had traveled                      | 301  | 93.0       |      |
| Never travelled                   | 23   | 7.0        |      |
| <b>Farm size</b>                  |      |            |      |
| < 1 Ha                            | 156  | 48.1       |      |
| 1- 5                              | 120  | 37.5       | 2.3  |
| >5                                | 48   | 14.9       |      |
| <b>Possession of mobile phone</b> |      |            |      |
| Yes                               | 307  | 92.6       |      |
| No                                | 24   | 7.4        |      |
| <b>Household Size</b>             |      |            |      |
| Below 5                           | 55   | 17         |      |
| 5-9                               | 203  | 62.5       | 9    |
| Above 9                           | 66   | 20.4       |      |
| <b>Access to credit</b>           |      |            |      |
| Yes                               | 260  | 80.2       |      |
| No                                | 64   | 19.4       |      |

Source: Field Survey, 2015

Majority (93%) of the respondents had travelled from their communities to other communities within the last one year, implying that respondents have wide external orientation which might be exposed them to more information which might in turn have positive

effect on their level of awareness on e-wallet innovation system.

**Perceived Strength of E-wallet by Farmers**

Results in Table 2 show that removal of corruption on fertilizer (mean=2.53) ranked 1<sup>st</sup> among the respondents’ perceived strength of e-wallet; this indicates that e-wallet platform has been able to address the problems of corruption in the supply of agricultural inputs, thereby achieving one of the main objectives of the scheme. Ensuring increased access to fertilizers at subsidized price (mean=2.35) ranked next, follow by better of access to improved seeds (mean=2.27); elimination of exploitative activities of middlemen in fertilizer supply (mean=2.21); and renewal of farmers confidence in government programmes (mean=2.19) This result implies that e-wallet scheme has been able to address farmers’ needs properly by providing fertilizers and seeds at affordable prices without exploitation from middlemen resulting to increasing level of trust and confidence in government agricultural programmes. Other strengths like increased rice/maize production (mean=2.17) and improved quality of produce (mean= 2.05) ranked 6<sup>th</sup> and 7<sup>th</sup> respectively, showing that e-wallet scheme has a lot of far-reaching implications on sustainable food availability at household level. While the least ranking strengths include increase in farmers’ income (mean=1.83); increase in farm size (mean=1.42) and access to other farm inputs (mean=1.12). This implies that e-wallet system has less impact on farmers’ income, their farm size and access to other inputs. This might be due to the fact that very small quantities of inputs were allocated to the farmers in the scheme.

This finding is in agreement with the reports of [1]; [14] who established that e-wallet quickened accessibility to improved seed, access to fertilizer, subsidized farm input and renewed confidence in government programmes. It implies that majority of the respondents’ perceived e-wallet programme positively. It could also be inferred that various inputs given to the farmers meet their immediate needs by boosting their agricultural production; improved their well being and also

renew their trust in government programme. This result also corroborates the findings of [3] that submitted that the GESS is a special scheme which seeks to increase farmers (irrespective of gender) access to subsidized farm inputs such as fertilizers and improve seeds through a well-designed and monitored public and private sector partnership. It is also in support of report of [25] that highlighted the prospects of e-wallet, positing that the scheme will serve as a stimulus for modern economy and enhance rural income. If this policy frame work is well pursued, it will also reduce Nigeria food import bill and stimulate agricultural export.

Table 2. Distribution of respondents according to their perceived strength (n=342)

| Strengths  | Mean | Rank             |
|--|------|------------------|
| Removal of problem of corruption on fertilizers                          | 2.53 | 1 <sup>st</sup>  |
| Increased access to fertilizers at subsidize price                       | 2.35 | 2 <sup>nd</sup>  |
| Better of access to improved seeds                                       | 2.27 | 3 <sup>rd</sup>  |
| Elimination of exploitative activities of middlemen in fertilizer supply | 2.21 | 4 <sup>th</sup>  |
| Renews farmers confidence in government programmes                       | 2.19 | 5 <sup>th</sup>  |
| Ensure food security through increased rice/maize production             | 2.17 | 6 <sup>th</sup>  |
| Improved quality of produce  | 2.05 | 7 <sup>th</sup>  |
| Increase in farmers’ income  | 1.83 | 8 <sup>th</sup>  |
| Increase in farm size  | 1.42 | 9 <sup>th</sup>  |
| Accessibility to other farm input  | 1.12 | 10 <sup>th</sup> |

Source: Field Survey, 2015

**Perceived Weakness of E-wallet by Farmers**

Results in Table 3 show that low quantity of fertilizers allocated to farmers (mean=3.17) ranked 1<sup>st</sup> among the weaknesses of e-wallet innovation system as perceived by farmers. This suggests that the two bags of fertilizers allocated to a farmer were too small to meet their farm need, it is line with findings [19]; [22] who ascertained that the quantity of fertilizer (2 bags of 50kg- 1NPK & 1 Urea) allocated to farmer was not enough for the majority of farmers that cultivate one hectare of land and above. Late supply of inputs (mean=3.05) ranked 2<sup>nd</sup>. Indicating that farmers were receiving fertilizers and other inputs very late, sometimes use inputs meant

for rainy season for dry season cropping and this could have negative effect productivity. Poor mobile network for e-wallet (mean=3.02) ranked next, and this could result to late arrival of messages on farmers' mobile phones as poor coverage/connectivity of mobile networks in many rural areas are very poor frustrated some farmers out of the scheme.

This result corroborates the findings of [13] which reported that farmers in most parts of the country were unable to receive text messages with e-wallet system due to poor network from telecommunications service providers, making it difficult to get their packages. Low level of awareness of e-wallet by farmers (mean=3.01) was also identified as weakness but rated 4<sup>th</sup>, this might be because many farmers were not capture during farmers' registration, implying that GES lacked wider publicity during its implementation stage. This observation gives credence to the submission of [19] who reported that farmers were not given adequate awareness for massive participation in the scheme; and there was untimely access to information on the scheme in many part of Nigeria. Limited number of redemption centers (mean=2.99) and cumbersome procedure farmers go through to get approval for inputs (mean=2.96) ranked 5<sup>th</sup> and 6<sup>th</sup> respectively. This is an indication that farmers experienced a lot of stress during registration and redemption processes in form of long distance travelling and long queue at the redemption centres. This might discourage many farmers from participating in the scheme. Other weaknesses include incompatibility of agro-inputs supplied for production (mean=2.85), sharp practices/diversion by project executors/influential people (mean=2.83), Most registered people were not farmers (mean=1.42) and ranked 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> respectively. While the least ranked weakness was inability to operate mobile phones (mean=1.08). This implies that farmers did not find it difficult to use their mobile phone to access the inputs allocated to them.

Table 3. Distribution of respondents according to their perceived weaknesses of e-wallet (n=342)

| Weaknesses  | Mean | Rank             |
|---|------|------------------|
| Low quantity of fertilizers allocated to farmers                  | 3.17 | 1 <sup>st</sup>  |
| Late supply of inputs   | 3.05 | 2 <sup>nd</sup>  |
| Poor mobile network for e-wallet project                          | 3.02 | 3 <sup>rd</sup>  |
| Limited number of redemption centres                              | 3.01 | 4 <sup>th</sup>  |
| Low level of awareness of e-wallet by farmers                     | 2.99 | 5 <sup>th</sup>  |
| Cumbersome procedure of getting approval for inputs               | 2.96 | 6 <sup>th</sup>  |
| Incompatibility of seeds supplied for production                  | 2.85 | 7 <sup>th</sup>  |
| Most registered people were not farmers                           | 2.83 | 8 <sup>th</sup>  |
| Sharp practices/diversion by project executors/influential people | 1.42 | 9 <sup>th</sup>  |
| Loss and lack of functional mobile phones                         | 1.08 | 10 <sup>th</sup> |

Source: Field Survey, 2015

## CONCLUSIONS

Based on the findings of the study, it was concluded that e-wallet (electronic wallet) system, an innovative and motivational mobile technology designed to assist farmers to access agricultural inputs, without the intervention of middlemen, thereby increasing the yields and outputs of farmers. It also removes corruption on fertilizers and renewed farmers' confidence in government programmes. However, the scheme was not without some weaknesses including inadequate quantities of inputs allocated to each farmer, late supply of inputs; poor mobile network coverage; few number of redemption centres; low level of awareness of the scheme and cumbersome procedures in getting approval from cellulants. This shows that the scheme had great potentials for stimulating sustainable agricultural development by generating employment and making food security a reality in Nigeria.

It is therefore, recommended that successive government should continue and improve on the on this agricultural input distribution scheme by addressing the identified weaknesses. For instance, appropriate awareness channels should be employed such as billboards and radio in local language;

quantity of inputs should be allocated based on the farm size of farmers; verification process should be made simple for farmers; number of redemption centres should be increased and closer to farmers for easy access to inputs and procurement and there is the need for mobile network operators in Nigeria to widen their network service coverage to improve phone use in rural areas.

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## RESEARCH ON THE TRENDS IN ANIMAL PRODUCTION IN THE LAST DECADE IN ROMANIA

Mircea Adrian GRIGORAS

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Manastur Street, 400372, Cluj-Napoca, Romania, Phone: +40 264596384/400, Fax: +40 264592793, Email: mircea.grigoras@usamvcluj.ro

**Corresponding author:** mircea.grigoras@usamvcluj.ro

### Abstract

*The paper has the purpose to analyze the trends in the animal production in Romania. The empirical data were collected from the National Institute of Statistics for the period 2007-2016. Using the trend method, and indices method, it was presented the evolution of animal production value, and its share in the value of agricultural production, livestock by species, animal production: meat, milk, eggs, honey, the position of Romania in the EU-28 livestock and animal production, average consumption of animal products per inhabitant, price at farm gate and basic prices for products of animal origin, average acquisition prices for animal products and average price of animal products in the agro-food market. Animal production value declined by 30 % accounting for Lei 23.8 billion in 2016, with a share of 33.8 % in the value of agricultural production. The livestock declined in case of bovines, pigs and poultry, but increased in case of sheep, goats and bee families. The quantitative animal production decreased regarding total live weight at slaughter in case of bovines and pigs, it increased in case of poultry and remained stable in case of sheep and goats. Milk production declined, egg production remained stable and honey production increased. While meat production had a slight increase per inhabitant, meat consumption declined. Both milk production per inhabitant and milk consumption decreased. Both producer price at farm gate and the basic price for the products of animal origin registered a growth in the analyzed period, they are not enough high to cover production costs mainly in dairy and pig farms, despite of the allotted subsidies. This situation reflected a descending trend in animal production with a negative impact on the farmers' income, market offer, demand/offer ratio. Romania is not competitive in the sector of animal production with other EU countries and remains a net importing country of animal products.*

**Key words:** livestock, production, consumption, price, milk, meat, eggs, honey, Romania

### INTRODUCTION

Agriculture is one of the most important branches of Romania's economy, assuring food for population and raw materials for processing industry, jobs for incomes for rural population and agro-food products for export [10].

Agriculture contribution to GDP is about 5.6 % compared to the contribution given by industry, trade and other economic branches [45].

During the last decade, and mainly after Romania's entry into the EU in 2007, agriculture has changed regarding farms structures and applied technologies looking for keeping pace with the new challenges in the competition with other EU countries, with risk and uncertainty, with growths and declines [11].

Innovation and modernization of technical endowment and the application of the new

technologies, production diversification and an efficient management could assure the development of agriculture and a high economic efficiency in this sector of the economy [9, 56].

Animal production is called to meet consumers' needs for milk, meat, eggs and other products of animal origin and also to meet industry requirements for raw materials.

Animal production is facing important changes regarding the number of farms, average farm size, production orientation, diversification, and technologies, livestock and its structure by species and animal categories yields and production, product quality, production costs, farm inputs and their costs, productivity and economic efficiency in order. More than this, animal production is a source of agro-food products for export giving its contribution to the international trade.

In this context, the present paper aimed to analyze the trends in the development of animal production in Romania in the period 2007-2016, regarding livestock by species, animal production (meat, milk, eggs, honey), consumption of products of animal origin and prices at the farm gate, basic prices and prices in agro-food market.

In this way, we could have a comprehensive pictures on the direction and intensity of animal production evolution in Romania and to evaluate its position among the EU countries.

## MATERIALS AND METHODS

The paper is based on a large bibliography in the field and on the empirical data collected from the National Institute of Statistics, Tempo online Data base for the period 2007-2016.

The main studied indicators were: the evolution of animal production value, the evolution of the share of animal production in the value of agricultural production, the evolution of livestock by species: bovines, pigs, sheep, goats, poultry and bee families; the evolution of quantitative animal production: meat, milk, eggs, honey, the position of Romania among the EU-28 member states for livestock and animal production, the evolution of the average consumption of animal products per inhabitant, the evolution of price at farm gate and basic prices for products of animal origin, the evolution of average acquisition prices for animal products and average price of animal products in the agro-food market.

The analysis was based on the indices method, comparison method, synthesis and deduction. The evolution pointed the level of the studied indicators in the year 2007, 2011 and 2016.

## RESULTS AND DISCUSSIONS

**The evolution of the animal production value.** During the analyzed period, the value of agricultural production increased by 47.5 % in 2016 when it was Lei 70.4 billion. This ascending trend was sustained by the both sectors: crop production and animal production, whose values recorded an increasing tendency.

In 2016, the value of animal production reached Lei 23.8 billion, being by 30 % higher than in 2007 (Lei 18.3 billion)( Fig.1.).

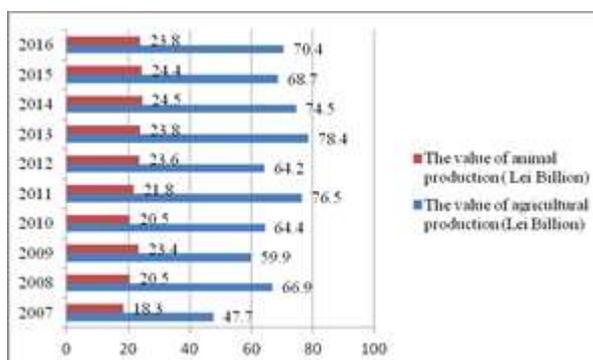


Fig.1. The evolution of the agricultural production value and of the value of animal production in Romania in the period 2007-2016 ( Lei billion)

Source: Own determination, Data from NIS Tempo online, 2017 [13].

As a consequence, the share of the value of animal production registered a relatively decline in the animal production value, from 38.3 % in the year 2007 to 33.8 % in the year 2016 ( Fig.2.).

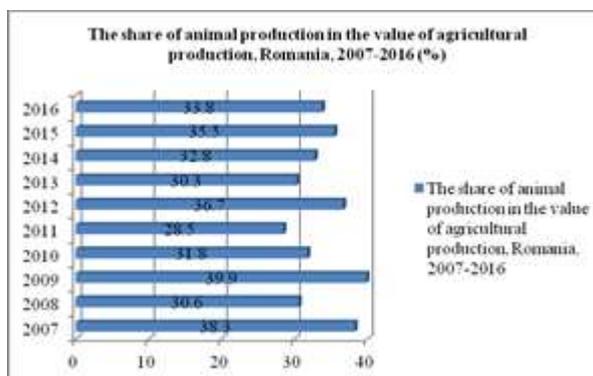


Fig.2. The evolution of the weight of the value of animal production in the value of agricultural production in Romania in the period 2007-2016 ( %)

Source: Own determination, Data from NIS Tempo online, 2017 [13].

This "image" of the value of animal production in Romania reflects that animal production is not a competitive branch of agriculture as it should be [3].

The main causes which justify the reduction of the value of animal production during the last decades are: the small animal farm size, the plotted land surface, the reduced surface for producing forages and low forage production due to the climate change, the reduction of the

livestock in cattle, pigs and poultry, the non corresponding technical endowment, animal feeding and maintenance, the extensive animal raising in small subsistence and semi subsistence farms. Most of the animal farms are lacked of fixed and working capital, are typical subsistence households owning a small number of animals, the labor force has a low training level, and as a result the productivity is low, the production performance in terms of yield and product quality is much lower compared to the level in the EU countries with a high developed animal production.

Under this situation, the market requirements are much more covered by imports and in a relatively less measure by the domestic production with a few exceptions. Therefore, Romania is at present a net importing country of agro-food products of animal origin [44, 53].

**The evolution of the livestock.** In the analyzed period, the evolution of the livestock registered a decreasing trend in case of bovines (-27.29%), pigs (-20.29%) and poultry (-7.74%). In 2016, in Romania there were 2,049.7

thousands bovines compared to 2,818.9 thousands in 2007. Also, there were 4,707.7 thousand pigs compared to 6,564.9 thousands in 2007; also there were 75,689.8 thousand poultry compared to 82,035.5 thousands in the year 2007.

A positive increasing trend has been noticed in case of three animal species: sheep, goats and bee families.

In 2016, the number of sheep was 9,875 thousand heads, by 16.59% more than in 2007, when it registered 8,469.5 million heads.

The number of goats registered the fastest dynamics, the growth rate for the whole analyzed period being 71.44%. In 2016, Romania had 1,483 million goats compared to only 865 thousands in 2007. The number of bee families increased by 46.31% from 982.3 thousands in 2007 to 1,477.3 thousands in 2016 (Table 1). Similar results regarding the evolution of livestock in Romania were found by [12].

Table 1. The livestock evolution in Romania in the period 2007-2016 (Thousand heads)

|              | 2007     | 2011     | 2016     | 2016/2011 % |
|--------------|----------|----------|----------|-------------|
| Bovines      | 2,818.9  | 1,988.9  | 2,049.7  | 72.71       |
| Pigs         | 6,564.9  | 5,363.7  | 4,707.7  | 71.71       |
| Sheep        | 8,469.5  | 8,533    | 9,875.4  | 116.59      |
| Goats        | 865      | 1,236    | 1,483    | 171.44      |
| Poultry      | 82,035.5 | 79,841.6 | 75,689.8 | 92.26       |
| Bee families | 982.3    | 1,249.6  | 1,473.3  | 146.31      |

Source: Own determination, Data from NIS Tempo online, 2017 [13].

The reduction of the bovine livestock was determined by many factors, among which the most important are: the non sufficient surface for producing forages and the low forage production due to the droughts, rainfalls and other extreme meteorological phenomena, the improperly maintenance and use of the pastures and meadows, the improperly feeding at the requirements level, the low reproduction indicators, the low use of the artificial insemination, the low price at the farm gate per milk kilogram and per kilogram live weight at deliver, the insufficient subsidies to support cattle breeders, pig breeders and poultry breeders [56].

Regarding Romania's position in the EU-28 based on its livestock, it deserves to mention that it comes on the 10th position with 2.05 million heads bovine livestock after France, Germany, United Kingdom, Ireland, Italy, Spain, Poland, Netherlands and Belgium. It also comes on the 9th position with 4.71 million pigs after Spain, Germany, France, Denmark, Netherlands, Austria, Italy and Belgium. It also comes on the 3rd position for its 9.88 million sheep after United Kingdom, and Spain, and on the 3rd position for 1.48 million goats after Greece and Spain [7]. (Table 2).

Table 2. Romania's position among the EU-28 countries for its livestock in 2016 ( million heads)

| Country        | Bovines   |               | Pigs     |               | Sheep    |               | Goats    |               |
|----------------|-----------|---------------|----------|---------------|----------|---------------|----------|---------------|
|                | Position  | Million heads | Position | Million heads | Position | Million heads | Position | Million heads |
| <b>EU-28</b>   | -         | <b>89.08</b>  | -        | <b>147.20</b> | -        | <b>87.10</b>  | -        | <b>12.78</b>  |
| France         | 1         | 19            | 3        | 12.79         | 6        | 7.16          | 4        | 1.20          |
| Germany        | 2         | 12.47         | 2        | 27.38         | 9        | 1.57          | 9        | 0.14          |
| United Kingdom | 3         | 9.81          | 10       | 4.53          | 1        | 23.82         | 10       | 0.10          |
| Ireland        | 4         | 6.61          | -        | -             | 7        | 3.44          | -        | -             |
| Italy          | 5         | 6.31          | 7        | 8.48          | 5        | 7.28          | 5        | 1.03          |
| Spain          | 6         | 6.26          | 1        | 29.23         | 2        | 15.96         | 2        | 3.09          |
| Poland         | 7         | 5.97          | -        | -             | -        | -             | -        | -             |
| Netherlands    | 8         | 4.28          | 5        | 11.88         | -        | -             | 6.       | 0.50          |
| Belgium        | 9         | 2.50          | 8        | 6.18          | -        | -             | -        | -             |
| <b>ROMANIA</b> | <b>10</b> | <b>2.05</b>   | <b>9</b> | <b>4.71</b>   | <b>3</b> | <b>0.88</b>   | <b>3</b> | <b>1.48</b>   |
| Denmark        |           |               | 4        | 12.28         |          |               |          |               |
| Austria        |           |               | 6        | 11.11         |          |               |          |               |
| Greece         |           |               |          |               | 4        | 9.74          | 1        | 3.89          |
| Portugal       |           |               |          |               | 8        | 2.07          | 7        | 0.35          |
| Bulgaria       |           |               |          |               | 10       | 1.36          | 8        | 0.24          |

Source: Eurostat Statistics Explained, Agricultural Production-animals, 2017 [7].

**The evolution of animal production.** As a consequence of the statement of the livestock, animal production has registered a different situation from a species to another.

**The meat production in terms of weight of the animals for slaughtering for consumption** declined in case of bovines and pigs, it increased in case of poultry and remained stable in case of sheep and goats.

In 2015, the total live weight of animals at slaughter accounted for 14,31 thousand tons, by 4.80 % less than in 2007, when it was 1,503 thousand tons (Table 3).

*The total live weight of cattle at slaughter* declined by about 40 % from 333 thousand tons in 2007 to 200 thousand tons in 2015. This was due to the reduction in the number of bovine livestock and the low average live weight at slaughter, the non corresponding feeding, the use of the extensive fattening system which did not assure a high daily gain (Table 3).

*The total live weight of pigs at slaughter* decreased by 12.50 % from 642 thousand tons in 2007 to 562 thousand tons in 2015. This was caused by the reduction of the number of pigs, the crisis of piglets for fattening in the market, the non corresponding feeding and low daily gain, the problems with sow reproduction and the artificial insemination used at a small scale,

which did not increase enough the number of piglets per sow [34, 46, 49]. (Table 3).

*The total live weight of sheep and goats* remained stable in 2015 at the level of 2007, that is 110 thousand tons (Table 3).

*The total live weight at slaughter for poultry* increased by 34.13 % from 416 thousand tons in 2007 to 559 thousand tons in 2015, as a consequence of the development of broilers fattening with a high productivity and profit rate producing fattened chickens over 2 kg/head at slaughter in the industrial units, most of them being integrated along the whole product chain (Table 3). In the industrial poultry companies, profitability rate is high, proving the broilers fattening has the highest profit rate [19, 30, 54, 59].

The new orientation in the EU policy regarding the development of meat production could advantage Romania for producing more meat [61].

*The total milk production* declined by 19.48 % from 61,048 thousand hl in 2007 to 49,156 thousand hl in 2015. This was caused by the reduction by 32.26 % of the total milk production coming from dairy cows and female buffaloes. In 2016, cows and female buffaloes produced 42,664 thousand hl milk (including calves consumption) compared to 54,875 thousand hl in 2007 (Table 3).

This was caused by the diminishing milking livestock, the reduced production performance of milk/cow/lactation, the non corresponding feeding, the reproduction problems, the insufficient use of the artificial insemination with frozen from the high breeding value bulls and the use of natural mating at a larger scale,

the lack of a corresponding selection of young female cattle and heifers and of a corresponding breeding programme. Also, the small size of dairy farms, most of them lacked of a modern technical endowment led to a low milk yield [1, 2, 16].

Table 3. The quantitative animal production, Romania, in 2007 and 2015

|   | MU             | 2007   | 2015   | 2015/2007% |
|---|----------------|--------|--------|------------|
| Weight of animal for slaughtering for consumption (live weight) | Thousand tons  | 1,503  | 1,431  | 95.20      |
| -Bovines  | Thousand tons  | 333    | 200    | 60.06      |
| -Pigs   | Thousand tons  | 642    | 562    | 87.50      |
| -Sheep and goats  | Thousand tons  | 110    | 110    | 100        |
| -Poultry  | Thousand tons  | 416    | 558    | 134.13     |
| Total milk, of which:   | Thousand hl    | 61,048 | 49,156 | 80.52      |
| -Cow and buffalo milk ( calves consumption included)            | Thousand hl    | 54,875 | 42,664 | 77.74      |
| Eggs  | Million pieces | 6,522  | 6,555  | 100.50     |
| Honey   | Thousand tons  | 20,199 | 35,000 | 173.27     |

Source: NIS, Animal livestock and animal production, 2016 and NIS Press Release No.120/June16,2008 [14, 15].

In the subsistence farms, a part of milk is used for calves consumption, for family needs and for feeding other animals from the household. This could also influence in a negative way the marketed milk production and farmer's income [25, 42].

All these aspects had a deep impact on gross margin and farmers' income, where gross product value was influenced not only by production but also by milk price offered by processors, meat price per kg live weight for the culled cow at slaughter, and for the calf for fattening Similar results were found by [18, 24, 25, 27, 29, 31].

In this way, along the years, the dairy farmers were facing many times the situation that the price at the farm gate did not allowed to cover production cost.

Also, milk quality did not always fit to the standards and as a consequence the producers received a lower price. The subsidies also had not been enough to balance the financial situation in the dairy farms, a reason as farmers to complain [52].

However, at present it is a lack of fresh milk offer in the market, and this is a reason for milk processors to buy milk from abroad to balance the demand on the internal market, affecting the Romanian milk producers [33, 60].

Despite that cow and buffalo milk have the highest share in total milk production, during the last decade, it was noticed a continuous growth of milk coming from sheep and goats which is considered a healthier milk with small fat globules which could be easily assimilated. This aspect encouraged the sheep and goat breeders to increase the livestock for these two species whose maintenance and milk production cost is lower compared to cows [6, 21, 37, 41 ].

*The egg production* remained relatively stable, in fact it registered just 0.5 % growth rate in the period 2007-2015. In 2015. the egg production accounted for 6,555 million pieces compared to 6,522 million in 2007.

This situation was favored by the lack of one day chickens on the domestic market, the increased price for the one day chickens and concentrated fodder which had a high share in the production costs, the imports of eggs traded at a lower price on the domestic market, and the increased price for farm utilities mainly electricity [20 ]. (Table 3).

In the commercial poultry companies egg production is efficient from an economic point of view, egg cost being able to be covered by market price [23].

*The honey production* increased by 73.27 % from 20,199 thousand tons in 2007 to 35,000

thousand tons in 2015. This was the result of the increased number of apiculturists and also of apiaries, of the number of bee families per apiary, the increased honey yield per bee family, the use of nutritional supplements and biostimulators in the years unsuitable for pickings [51]. Also, the low honey consumption on the internal market and the low acquisition price per honey kg have encouraged beekeepers to raise more bee families and to grow the apiary size over 50 bee families and mainly over 100 bee families, a size which is the most efficient from an economic point of view [26, 28, 35, 36, 39, 47]. Also, the beekeepers set up associations in many counties of Romania in order to build centers for honey collection, bottling and labeling to market their honey under an own brand as in the South Muntenia and Center of Romania [17].

Due to the fact that the Romanian honey is of high quality and due to the increased demand of honey on the Western European market, the beekeepers have oriented to honey export where consumption is much higher than 0.5-0.6 kg/inhabitant in Romania [40].

In 2015, Romania was on the top position in the EU-28 for its production of 35,000 thousand tons of honey (Table 3).

Regarding Romania's position in the EU-28 for the number of dairy cows and collected milk, the situation is the following: Romania comes on the 8th position with 1,191 thousand dairy cows after Germany, France, Poland, United Kingdom, Netherlands, and on the 18th position for 919 thousand tons of milk collected from dairy cows after Germany, France, United Kingdom, Netherlands, Poland, Italy, Spain, Ireland, Denmark, Belgium, Austria, Sweden, Czech Rep., Finland, Portugal and Lithuania [8]. (Table 4).

Table 4. Romania's position for the number of dairy cows and milk collected from cows in the EU-28 in 2016

| Country        | No. of dairy cows ( 1,000 heads) |             | Milk collected from cows (1,000 tons) |            |
|----------------|----------------------------------|-------------|---------------------------------------|------------|
|                | Position                         | 1,000 heads | Position                              | 1,000 tons |
| EU-28          | -                                | 23,595      | -                                     | 151,588    |
| Germany        | 1                                | 4,285       | 1                                     | 31,879     |
| France         | 2                                | 3,661       | 2                                     | 25,323     |
| Poland         | 3                                | 2,134       | 5                                     | 10,874     |
| Italy          | 4                                | 2,057       | 6                                     | 10,500     |
| United Kingdom | 5                                | 1,918       | 3                                     | 15,191     |
| Netherlands    | 6                                | 1,717       | 4                                     | 13,331     |
| Ireland        | 7                                | 1,240       | 8                                     | 6,585      |
| Romania        | 8                                | 1,191       | 18                                    | 919        |
| Spain          | 9                                | 844         | 7                                     | 6,800      |
| Denamark       | 10                               | 570         | 9                                     | 5,278      |
| Belgium        |                                  |             | 10                                    | 3,988      |
| Austria        |                                  |             | 11                                    | 3,103      |
| Sweden         |                                  |             | 12                                    | 2,933      |
| Czech Rep.     |                                  |             | 13                                    | 2,482      |
| Finland        |                                  |             | 14                                    | 2,394      |
| Portugal       |                                  |             | 15                                    | 1,935      |
| Hungary        |                                  |             | 16                                    | 1,536      |
| Lithuania      |                                  |             | 17                                    | 1,438      |

Source: Eurostat, Milk and Milk products Statistics, 2016 [8].

Regarding Romania's position in the EU-28 for meat production in terms of thousand tons of carcass weight, it comes on the 14th position with 58 thousand tons of carcass weight from bovines, on the 12th position for the carcass weight from pigs with 337 thousand tons, on the 10th position for the carcass weight of sheep with 8 thousand tons, and on the 9th

position for poultry carcass weight with 391 thousand tons [7].

These positions reflects that Romania is not still able to assure a high live weight of animals at slaughter and a corresponding fattening gain, feeding and carcass quality compared to other EU countries (Table 5).

Table 5. Romania's position in the EU-28 for meat production ( thousand tons of carcass weight) in 2016

|                | Bovines   |              | Pigs      |               | Sheep     |            | Goats    |            | Poultry  |               |
|----------------|-----------|--------------|-----------|---------------|-----------|------------|----------|------------|----------|---------------|
|                | Position  | Thou. tons   | Position  | Thou. tons    | Position  | Thou. tons | Position | Thou. tons | Position | Thou. tons    |
| <b>EU-28</b>   | -         | <b>7,799</b> | -         | <b>23,440</b> | -         | <b>713</b> | -        | <b>45</b>  | -        | <b>14,400</b> |
| France         | 1         | 1,462        | 3         | 2,206         | 3         | 83         | 3        | 6          | 3        | 1,669         |
| Germany        | 2         | 1,148        | 1         | 5,579         | 7         | 22         | -        | -          | 4        | 1,525         |
| Italy          | 4         | 810          | 6         | 1,544         | 6         | 31         | 4        | 2          | 6        | 1,366         |
| United Kingdom | 3         | 912          | 9         | 919           | 1         | 290        | -        | -          | 2        | 1,791         |
| Ireland        | 6         | 588          |           |               | 4         | 61         |          |            |          |               |
| Spain          | 5         | 638          | 2         | 4,059         | 2         | 117        | 2        | 10         | 5        | 1,524         |
| Poland         | 6         | 501          | 4         | 1,963         |           |            |          |            | 1        | 2,268         |
| Netherlands    | 7         | 416          | 7         | 1,453         | 8         | 13         |          |            |          |               |
| Austria        | 9         | 227          |           |               |           |            |          |            |          |               |
| Belgium        | 8         | 278          | 8         | 1,061         |           |            |          |            | 8        | 461           |
| Sweden         | 10        | 131          |           |               |           |            |          |            |          |               |
| Denmark        | 11        | 129          | 5         | 1,567         |           |            |          |            |          |               |
| Portugal       | 12        | 91           |           |               | 9         | 10         |          |            |          |               |
| Finland        | 13        | 86           |           |               |           |            |          |            |          |               |
| <b>ROMANIA</b> | <b>14</b> | <b>58</b>    | <b>12</b> | <b>337</b>    | <b>10</b> | <b>8</b>   | -        | -          | <b>9</b> | <b>391</b>    |
| Hungary        |           |              | 10        | 432           |           |            |          |            | 7        | 508           |
| Portugal       |           |              | 11        | 375           |           |            |          |            | 10       | 326           |
| Greece         |           |              |           |               | 5         | 54         | 1        | 21         |          |               |

Source: Eurostat Statistics Explained, Agricultural Production-animals, 2017 [7].

**The animal production per inhabitant.** As a result of the evolution of animal production and the demographic dynamics in Romania in the analyzed period, the animal production per inhabitant increased by 3.19 % in case of meat, it declined by 16.53 % in case of milk, and slightly increased by 0.6 5 in case of eggs.

In 2016, meat production per inhabitant was 74.3 kg compared to 72 kg in 2007, 244 liters milk compared to 292.3 liters in 2007, and 314 eggs compared to 312 pieces in 2007 (Table 6)

Table 6. Animal production per inhabitant in Romania in the period 2007-2016

|      | MU            | 2007  | 2011  | 2016 | 2016/2007% |
|------|---------------|-------|-------|------|------------|
| Meat | Kg/capita     | 72    | 67.4  | 74.3 | 103.19     |
| Milk | Liters/capita | 292.3 | 248.5 | 244  | 83.47      |
| Eggs | pieces        | 312   | 314   | 314  | 100.6      |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

**The average consumption of products of animal origin per inhabitant.** The consumption of meat per inhabitant declined by 14.5 % from 66.6 kg in 2007 to 57 kg in 2016. This happened because of the high price of meat in the market and low incomes/household even thou the incomes raised during the last years. Meat consumption in Romania is still a low one compared to the level in the developed countries, reflecting a lower living standard, as meat consumption/inhabitant is one of the key indicators reflecting the living standard level [4, 5, 50, 57, 58 ].

The position of meat sorts in consumption structure, in the decreasing order, is: pork, the traditional meat in Romania, and poultry, followed by beef and mutton and lamb. Of course, pork is the most preferred meat by the Romanian consumers, but also poultry meat due its high quality, rich content in protein, good taste when is cooked and convenient price [19, 22, 38].

Milk consumption also declined by 12.24 5 from 262.3 kg/capita to 230.2 kg, because of the high price of packed milk traded in supermarkets and low income/household [43].

The consumption of eggs declined by 7.47 % from 13.4 kg/capita in 2007 to 12.4 kg/capita in 2016. The situation was caused by the high price of eggs, low income level/household and more awareness of consumers regarding the

increase of cholesterol if egg consumption is high.

Even thou, honey consumption increased by 50 % from 0.4 kg/capita in 2007 to 0.6 kg in 2016, it is still a low consumption compared to the level in the developed EU countries (Table 7).

Table 7. Average consumption of products of animal origin per inhabitant, Romania, 2007-2016

|       | MU        | 2007  | 2011  | 2016  | 2016/2007 % |
|-------|-----------|-------|-------|-------|-------------|
| Meat  | Kg/capita | 66.6  | 56    | 57    | 85.5        |
| Milk  | Kg/capita | 262.3 | 234.5 | 230.2 | 87.76       |
| Eggs  | Kg/capita | 13.4  | 12.5  | 12.4  | 92.53       |
| Honey | Kg/capita | 0.4   | 0.5   | 0.6   | 150.0       |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

The surplus of production makes the object of export, under the condition to meet the EU quality standards, like in case of meat. Romanian honey is a preferred Romanian product on the EU market as long as it has a high quality and also export is advantaged by the low consumption on the domestic market [32].

**The value of animal production at producer price** was influenced both by the quantitative

animal production, but also by the price at the farm gate. In Table 8 it is presented the evolution of the value of animal production at producer price. It may be easily notice that the value of bovine production increased by 4.01 %, of pig production by 15.56 %, by 65.86 % in case of sheep and goats, by 61.93 % in case of poultry, by 3.08 % in case of milk and by 34.95 % in case of eggs (Table 8).

Table 8. The value of animal production at producer price, Romania, 2007-2016 ( Lei Million)

|                 | 2007     | 2011     | 2016     | 2016/2007 % |
|-----------------|----------|----------|----------|-------------|
| Bovine          | 1,414.75 | 1,079.76 | 1,471.6  | 104.01      |
| Pigs            | 3,079.2  | 3,531.5  | 3,558.5  | 115.56      |
| Sheep and Goats | 517.9    | 892.2    | 859      | 165.86      |
| Poultry         | 1,328.4  | 1,631.3  | 2,151.1  | 161.93      |
| Milk            | 4,340.8  | 5,299.3  | 4,474.51 | 103.08      |
| Eggs            | 2,230.7  | 2,759.5  | 3,010.5  | 134.95      |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

**The price of animal products.** In the analyzed period, the price of animal products increased, positively influencing the value of animal production.

**The evolution of producer's price** for products of animal origin is presented Table 9.

Table 9. Producer's price for animal products, Romania, 2007-2016 ( Lei/ton)

|                 | 2007  | 2011  | 2016   | 2016/2007 % |
|-----------------|-------|-------|--------|-------------|
| Bovine          | 3,805 | 6,500 | 6,910  | 181.60      |
| Pigs            | 4,720 | 6,860 | 6,650  | 140.88      |
| Sheep and Goats | 3,520 | 7,070 | 7,380  | 209.65      |
| Poultry         | 3,330 | 3,550 | 3,990  | 119.81      |
| Milk            | 1,257 | 2,047 | 1,992  | 158.47      |
| Eggs            | 7,200 | 9,200 | 10,200 | 141.66      |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

One may see that producer's price increased by +81.6 % in case of bovines, from Lei 3,805/ton in 2007 to Lei 6,910/ton in 2016; by +40.88 % in case of pigs from Lei 4,720/ton in 2007 to

Lei 6,650/ton in 2016; by + 9.65 % in case of sheep and goats from Lei 3,520/ton in 2007 to Lei 7,380/ton in 2016; by + 19.81 % in case of poultry from Lei 3,330/ton in 2007 to Lei

3,990/ton in 2016; by +58.47 % in case of milk from Lei 1,257/ton in 2007 to Lei 1,992/ton in 2016 and by +41.66 % in case of eggs from Lei 7,200/ton in 2007 to Lei 10,200/ton in 2016 (Table 9).

**The basic price for animal products**, including producer's price plus subsidies minus taxes per product, is presented in Table 10.

The basic price increased by + 53.19 % in case of bovines, by +33.26 % in case of pigs, by +

65.43 % in case of sheep and goats, and by 51.94 % in case of milk.

The differences between the basic price and producer's price are determined by the allotted subsidies and taxes per product.

In case of poultry and eggs, there are no deviations between the basic price and producer price in the years 2011 and 2016, except the year 2007 for poultry (Table 10).

Table 10. Basic price for animal products in Romania in the period 2007-2016 (Lei/ton)

|                 | 2007   | 2011   | 2016    | 2016/2007 % |
|-----------------|--------|--------|---------|-------------|
| Bovine          | 4,490  | 6,500  | 6,910   | 153.89      |
| Pigs            | 4,990  | 6,860  | 6,650   | 133.26      |
| Sheep and Goats | 4,461  | 7,070  | 7,380   | 165.43      |
| Poultry         | 3,862* | 3,550* | 3,990*  | 119.81*     |
| Milk            | 1,311  | 2,047  | 1,992   | 151.94      |
| Eggs            | 7,200* | 9,200* | 10,200* | 141.66*     |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

\*No differences between basic price compared to consumer's price presented in Table 9.

**The average acquisition prices for animal products** are presented in Table 11. One may notice that pork price increased by 50.4 % per kg live weight, poultry meat price increased by 11.5 % per kg live weight, fresh cow and sheep

milk price increased by 53.3 %, egg price increased by 29.1 % per piece, and honey price increased 3.32 times in the last year of analysis compared to the year 2007, considered as term of reference (Table 11).

Table 11. Average acquisition prices for animal products, Romania, 2007-2016

|                  | MU                 | 2007 | 2011 | 2016  | 2016/2007 % |
|------------------|--------------------|------|------|-------|-------------|
| Pork             | Lei/kg live weight | 3.55 | 5.21 | 5.34  | 150.4       |
| Chicken meat     | Lei/kg live weight | 3.72 | 4.21 | 4.15  | 111.5       |
| Fresh cow milk   | Lei/liter          | 0.75 | 1.03 | 1.15  | 153.3       |
| Fresh sheep milk | Lei/liter          | 0.75 | 1.03 | 1.15  | 153.3       |
| Eggs             | Lei/piece          | 0.24 | 0.30 | 0.31  | 129.10      |
| Honey            | Lei/kg             | 4.55 | 9.99 | 15.11 | 332.10      |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

**The average price for animal products** marketed in the agro-food markets is presented in Table 12. One may notice that fresh cow milk price increased by + 53.52 %, hen egg price by +54.76 % and honey price by +4.38 %. The price level in the agro-food market is more than double compared to the average acquisition price (Table 12).

The price for animal products depend very much on the demand/offer ratio, but also by other factors, for instance the opportunities for export as in case of honey, the only animal product which has a positive trade balance as exports are much higher than imports [48].

Table 12. Average price for animal products sold in the agro-food market, Romania, 2007-2016

|                | MU        | 2007  | 2011  | 2016  | 2016/2007 % |
|----------------|-----------|-------|-------|-------|-------------|
| Fresh cow milk | Lei/Liter | 1.7   | 2.56  | 2.61  | 153.52      |
| Hen egg        | Lei/piece | 0.42  | 0.56  | 0.65  | 154.76      |
| Honey          | Lei/kg    | 12.76 | 20.17 | 26.08 | 204.38      |

Source: Own determination, based on NIS Tempo on line, 2017 [13].

## CONCLUSIONS

The analysis allowed to draw the conclusion that animal production has been continuously developing in the last decade in Romania. But the rhythm of growth was lower compared to the one of vegetal production, which resulted in a smaller share of only 33 % of animal production value in the value of agricultural production.

A more detailed analysis has put into evidence the decline of the number of animals in case of bovines, pigs and poultry, and an increase of sheep and goats and bee families.

The reduction of the livestock had negative consequences on meat and milk production which have registered declines in beef, pork and milk production. But, at the same time, in the last decade, it was registered a stagnation of egg production and an important growth in mutton and goat meat as well as in honey production.

Even though domestic production could cover consumer needs in some cases, consumption of products of animal origin declined, mainly regarding meat, milk and eggs, and just a slight increase

was noticed in honey consumption.

The small price at farm gate and even the basic prices created problems to animal breeders who could not cover some time production cost.

More than this, to balance demand/offer ration on the internal market and taking into account that Romania operates in the open European market, imports of products of animal origin have come from other EU countries, where animal production is better subsidized, affecting the Romanian producers.

The achievements in animal production are below its potential. The contribution of animal production must increase for assuring the stability and availability in food supply and security of the population.

Animal production must become "an engine" in agricultural production, only paying attention to farm size, animal feeding, reproduction and breeding, applying modern technologies, improving technical endowment, assuring a high training level to labor force.

The Programme Horizon 2014-2020 is destined to help the farmers to modernize their farms and to buy high breeding value animals. Farmers must join their fixed and working capital to work better the land and raise animals, to purchase farm inputs at lower prices and sell animal products at higher prices. Animal production must contribute much more to agro-food trade balance and to cover better the needs of the internal and European market.

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## EVALUATING THE MECHANIZATION OF LIVESTOCK PRODUCTION IN TURKEY

Songül GÜRSOY

Dicle University, Faculty of Agriculture, Agricultural Machinery and Technologies Engineering Department, Diyarbakır, Turkey; E-mail: songul.gursoy@dicle.edu.tr

**Corresponding author:** songul.gursoy@dicle.edu.tr

### *Abstract*

*Livestock have always been an important part of agricultural production in Turkey. Chores are tedious and time consuming in livestock production. The main chores in livestock production are the preparation of the animal feed, watering, herding, milking, and cleaning of livestock yards. Therefore, mechanization and automation technologies are very important factors in reducing labor and modernizing of livestock production. The aim of this study is to evaluate the current situation of the livestock mechanization in Turkey, main mechanization problems in livestock production and suggestions for development of mechanization. In this purpose, the current data of Turkish Statistical Institute and Republic of Turkey Ministry of Food-Agriculture-Livestock was used to determine the enterprise size according to the number of animals, and the number of machinery per livestock husbandry according to the machinery type commonly used in livestock enterprises. Also, the previous studies carried out on the determination of the mechanization structure of livestock enterprises in different regions of Turkey were evaluated. The results of this study and the previous studies showed that the average size of livestock enterprise is very small in Turkey and the number of machineries per enterprise was very low. The fact that the livestock enterprises was very small prevented the development of mechanization and automation in livestock production and caused costly production. Also, livestock husbandries were not suitable for the development of mechanization. Consequently, it can be said that the Enterprise size according to the number of bovine, sheep and goats and barn construction are very important factors for development of livestock mechanization in Turkey.*

**Key words:** Livestock, mechanization, Turkey

### INTRODUCTION

Livestock are vital to subsistence and economic development in Turkey as well as in many countries around the world. They provide a flow of essential food products throughout the year, are a major source of government revenue and export earnings, and sustain the employment and income of millions of people in rural areas. The productivity and efficiency of Agricultural and livestock farming sectors in Turkey is lower than those in Europe due to small, fragmented farms, low education attainments and poor economic conditions [5]. Enterprises have to use the mechanization in livestock production in order to make their production easier, better quality and economical. Mechanization of livestock enterprises covers all levels of farming and processing technologies from simple and basic hand tools to more sophisticated and motorized equipment during the practices of livestock production, such as maintenance, feeding,

milking and cleaning. It eases hard labor, and improves the efficient use of resources and timeliness of agricultural operations. Also, it improves animal health and welfare, and product quality and productivity [10].

The mechanization in livestock production can be examined under three main aspects:

- (i) Feeding and watering of animals (fodder harvest, feed transport, feed preparation, feeding, watering etc. applications)
- (ii) Care of animals and yards (manure cleaning, storage, processing, and related applications)
- (iii) Producing the product (milk, meat, eggs, etc.).

Special attention is given to the feeding of animals. Livestock need a large proportion of their diet in the form of fresh cut or stored (usually ensiled) herbage from grass, maize, Lucerne (alfalfa), straw and other forage crops. Also, feeds of cereal and other grains are mixed to supplement fresh or conserved feeds that do not provide sufficient nutrients for the animals.

Appropriate mechanization is requirement of fodder production and utilization in any given situation. Livestock feeding and watering mechanization equipment includes all equipment used from fodder harvest to feeding and watering of animal. These equipment are forage mowers, mower conditioners, rakes, balers, bale loader, silage machine, bale and silage wagons, fodder mixer, animal feed grinder, feed delivery and distribution machines, and watering systems. Also, straw chopper is mainly used to process the residues of crops such as wheat, lentil, chickpea e.g. because they are an important alternative feed which should be utilized as much as possible, particularly in a year when feed supplies are limited, in Turkey as well as in developing countries [7]. In livestock production, animals require moderate amounts of water for good production. Many types of containers can be used to supply water for animals.

Regular yard cleaning in livestock production is important because it helps to optimize livestock performance. Numerous types of machines are used for yard cleaning and manure processing. Scrapers, wheeled front-end loaders and double-sided blades mounted on the front of a tractor are commonly used as manure cleaning and processing machines. The straws are used to help building up a manure pack and allow easier manure removal. This is especially important in calving areas [4].

The item of livestock equipment best known to the public is possibly milking equipment and its associated milking parlor. Traditionally the milking of cows has always been a laborious task performed twice a day seven days a week and any aspect of this task that is possible to automate has been looked on positively by farmers [10]

While the use of mechanical and electronic equipment reduces the need for human labor, saves time and increases production, efficiency, accuracy and product quality, it cause high installation and repair costs. Small enterprises rarely apply mechanization and automation technology for animal husbandry because holdings have to be enough large for proper and best utilization of agricultural machines. Therefore, development of

mechanization in livestock production depends on the existence of large farms and it is more suitable for commercial and institutional farms.

The aim of this paper is to evaluate the current situation of the livestock enterprises and mechanization in Turkey.

## **MATERIALS AND METHODS**

In this study, the current situation and problems of mechanization in the livestock enterprises is investigated. For this purpose, Statistical Indicators of Turkish Statistical Institute and Republic of Turkey Ministry of Food-Agriculture-Livestock was used to determine the level of mechanization in livestock production in Turkey. Akdemir [1] reported that the main indicator of agricultural mechanization in a country was the number of tractors and machineries per agricultural farm. Therefore, in this study, the level of livestock mechanization was determined by dividing the number of tractors and machineries commonly used in livestock production by enterprises. Also, the results of the previous studies carried out on the determination of the mechanization structure of livestock enterprises in different regions of Turkey were evaluated in concept of this study.

## **RESULTS AND DISCUSSIONS**

The development of livestock mechanization in a country depends upon farm type, size and structure as well as livestock production systems and social-economic factors. In Turkey as well as many countries in the world, the term mechanization is unfortunately mostly used for crop cultivation, livestock mechanization is not well examined. This may result from that many machineries used in livestock production is not used in crop cultivation and crop cultivation is more common agricultural application than livestock production. In fact, the agricultural mechanization strategy of a country ought to compose both crop and livestock production. The results of this study are examined in two different subtitles, which named “the structure

of the livestock enterprises in Turkey” and “mechanization status in livestock enterprises” because the structure of enterprises has significant effect on development of mechanization in livestock production.

### The structure of the livestock enterprises in Turkey

A significant part of the country's population in Turkey is engaged in agriculture. According to agricultural statistical results of Turkish Statistical Institute, there are 3,076,649 agricultural enterprises. Of these enterprises, 62.3% are engaged in both crop and animal production, 37.2% are only crop production, and 0.5% is only animal breeding. In records of Turkish Statistical Institute, it is stated that the number of enterprises engaged in both crop production and animal husbandry was 2,074,439 and that the number of enterprises engaged in only animal husbandry was 72,679 [13].

The Turkish livestock sector is characterized by small-scale farms and domestic breeds, which are better able to adapt to the harsh climate of eastern Turkey but are less productive. Serttas [11] stated that the main livestock producing region of Turkey are the east Anatolia region, despite less suitable topographical and climatic conditions, and according to a new support system announced at the end of 2009, Turkish government pays for 30% of construction costs and 40% of equipment and breeding cattle purchase costs for new livestock farms with over 50 head in East and Southeast Anatolia. Also, it is seen that there are several new investments in large modern farm operations with more than 100 dairy cattle in recent years [11].

Vural and Fidan [15] reported that livestock production in Turkey is done in different forms. The first one is family farm animal husbandry type, which each family has 1-10 animals on average. This type of livestock production has both an activity for family consumption and an income-generating activity. The second type of livestock enterprises is landless livestock production systems. In this enterprise, the 1-2 animals are bred for family consumption. Another common practice is to make livestock

production as a subsidiary activity in addition to crop production. Specialized and modern livestock enterprises follow this animal husbandry. Development of mechanization in livestock production is affected by enterprises type. The level of mechanization is lower in the family type enterprises than in the modern livestock enterprises. The mixed livestock enterprises including both crop and livestock production contribute efficient utilization of land, labor, equipment and other resources.

Table 1 shows that the total number of cattle in 2016 was 58,673,710 which 24.4 % were bovine animals including cattle, culture, cross-bred and, domestic; 75% were sheep and goat; and 0.5% were the animals including horse, camel, donkey, pig [13].

Table 1. Number of animals by type and races in Turkey

| Types of animals      | Number (Head)     | Share in bovine animals, sheep and goat and others (%) | Share in total animals (%) |
|-----------------------|-------------------|--|----------------------------|
| <b>Total</b>          | <b>58,673,710</b> |  | <b>100.0</b>               |
| <b>Bovine animals</b> | <b>14,323,941</b> | <b>100.0</b>   | <b>24.4</b>                |
| Cattle                | 14,182,876        | 99.0   | 24.2                       |
| Culture               | 6,501,105         | 45.8   | 11.1                       |
| Cross bred            | 5,845,759         | 41.2   | 10.0                       |
| Domestic              | 1,836,012         | 12.9   | 3.1                        |
| Buffalo               | 141,065           | 1.0  | 0.2                        |
| <b>Sheep and goat</b> | <b>44,034,062</b> | <b>100.0</b>   | <b>75.0</b>                |
| Sheep                 | 33,239,147        | 75.5   | 56.7                       |
| Merino                | 2,261,507         | 6.8  | 3.9                        |
| Domestic              | 30,977,640        | 93.2   | 52.8                       |
| Goat                  | 10,794,915        | 24.5   | 18.4                       |
| Ordinary goat         | 10,566,011        | 97.9   | 18.0                       |
| Angora goat           | 228,904           | 2.1  | 0.4                        |
| <b>Other</b>          | <b>315,707</b>    | <b>100.0</b>   | <b>0.5</b>                 |

Source: TUIK, 2017. [13].

The Enterprise size according to number of bovine, sheep and goats in Turkey is given in Table 2. It is seen in Table 2 that the enterprises having 1-9 head bovine animals is 81% of the bovine enterprises and the enterprises ratio having 10-50 head sheep and goat has the highest ratio among the enterprise size according to number of sheep and goats. This shows that the average size of livestock enterprise is very small in Turkey. The fact that the livestock enterprises are very small results in low productivity and prevents establishment of mechanization and automation in production and causes costly production and low marketability; and also makes the production

fragile against economic fluctuations. As farm sizes increase and as extensive livestock production becomes more intensive, old farm buildings may be abandoned (or used for other purposes) and are replaced by new buildings. These new buildings may incorporate new technologies including one or more of the following: mechanized feeding, mechanized manure handling, automatic ventilation control, and heating/cooling systems using autonomous or conventional energy supplies [10].

Table 2. The Enterprise size according to number of bovine, sheep and goats in Turkey

| Enterprise size according to number of bovine animals (head) | Ratio of enterprise having bovine animals to total enterprise | Ratio of animals in enterprises to total Bovine animals | Enterprise size according to number of sheep and goats (head) | Ratio of enterprise having sheep and goats to total enterprise | Ratio of animals in enterprises to total sheep and goats |
|--|---|---|---|--|--|
| 1-4  | 59.7  | 21.6  | 1-4   | 18.6   | 1.0  |
| 5-9  | 21.3  | 21.3  | 5-9   | 10.8   | 1.6  |
| 10-19  | 12.8  | 25.4  | 10-19   | 17.2   | 4.9  |
| 20-49  | 5.4   | 22.9  | 20-49   | 25.3   | 16.8   |
| 50-149   | 0.7   | 7.0   | 50-149  | 21.1   | 36.1   |
| 150-299  | 0.0   | 1.2   | 150-299   | 5.6  | 24.1   |
| 300+   | 0.0   | 0.6   | 300+  | 1.5  | 15.6   |
| <b>Total</b>   | <b>100.0</b>  | <b>100.0</b>  | <b>Total</b>  | <b>100.0</b>   | <b>100.0</b>   |

Source: TUIK, 2017. [13]

### Mechanization status in livestock enterprises

Livestock mechanization has involved using of equipment by engine-driven equipment instead of human energy. These equipment are driven by tractors or they are self-propelled equipment. The number of machine used in livestock enterprises and the number of machine per enterprise is given in Table 3. In Turkey, unlike agriculture, the studies relating to adoption and impact of technologies in animal husbandry are limited and sporadic. As looking at Table 3, it is seen that the number of tractor and the number of tractor per livestock enterprise were 1,273,531 and 0.59, respectively in Turkey. The number of agricultural trailers per enterprises was the highest and mobile milking machine followed this machine. The number of tractor and agricultural trailers per livestock enterprise is

higher than other machines used in livestock husbandry. This situation result from intensive use of those machines in field crop production as well as animal production. In Turkey, the mixed livestock enterprises including both crop and livestock production is included the 62.3% of agricultural enterprises. Therefore, some of agricultural machineries such as tractor, trailer, leveling blade can be used in both livestock and crop production. The most of enterprises does not have the equipment necessary for barn cleaning, watering, feeding and milking.

There have been the previous studies on the determination of the mechanization structure of livestock enterprises in different regions of Turkey. Elmaz et al [6] assessed the status of dairy cattle farming in Burdur province, an important region for milk production in Turkey. They determined that Milking was performed using portable milking machines in most enterprises (93%) and manure was hand-cleaned in 72.8% of the barns, and cleaned with a tractor scraper in 27.2%. They reported that the farms are smaller than in developed countries although larger than the mean size in Turkey. This situation significantly affects the development of mechanization in livestock husbandry. Bakir [2] determined the structure, barns properties, ventilation, lighting, drinking, feeding, dung cleaning facilities and the effect of barns on the cattle in Van province. In the result of the study, it was found that a hand-milking rate was 90.9%. Also, VGTHM [14] reported that using of milking machine is very low in Van region. This shows that there are great differences among regions with regard to the development of livestock mechanization in Turkey. Güzel and Aybek [8] evaluated the structural and mechanization features of Kahramanmaraş dairy farms. They determined that the number of tractors and agricultural machinery in livestock enterprises increased as the size of the farm increased. The authors found that the number of tractor and machine per livestock enterprise were 0.76 tractor/enterprise and 8.59 machine/ enterprise, respectively. They stated that the most and the least labor used in enterprises were in barn cleaning (3 labors) and in watering (1 labor),

respectively, and both feeding and milking tasks sustained two labor for each. Kırmacı and Pinar [9] reported that the mechanization level of cattle breeding were not enough level in Samsun Region. Selli et al. [12] reported that one of the main problems of the animal husbandry sector in GAP Region of Turkey is that the enterprises are very small and fragmented. They stated that approximately 80% of more than 3 million rural enterprises in Turkey have 1-4 animals and 85% of the active cattle breeding enterprises have less than 10 animals and the same situation is also valid for the sheep breeding enterprises. Such a situation is one of the main reasons of low productivity and prevents establishment of organization in production and causes costly production and low marketability; and also makes the production fragile against economic fluctuations. Boyar and Yumak [3] determined the level of mechanization of feed and forage production, using of mechanization equipment and its problems in Isparta and Burdur provinces. They reported that 60.4 % of dairy cattle farmers were the owners of fodder mechanization equipment. Especially baler and silage machine have been used by rent. Several types of mowers were used for forage harvest, but generally two-drum type mower was preferred. The using of silage in these provinces was found to be higher than that of average of Turkey. Feed mills have been used by 66 % of all dairy cattle farmers.

In Turkey, although livestock mechanization problems may vary according to regions, the main problems can be defined as follows:

-The fact that the livestock enterprises are very small results in low productivity and prevents development of mechanization.

-Most of the farms have no specific designed farm building with specific space per animal, feeding alley, manger, gutter and drainage system, ventilation system.

-Lack of knowledge on effective usage and maintenance of machineries used in livestock farms.

The analysis of the current livestock production in Turkey shows that the development of livestock production can be achieved only at using effectively new

technologies. Innovations allow producers to realize fully the genetic potential of animal, use rationally fodder, energy, financial and human resources and fixed assets as well as to produce high quality and environmentally safe products. Also, using of new technologies in livestock production will result in positive effect on social life of rural area, including the decrease in the use of hard dairymaid labour and increasing prestige of workers, who are involved in high-technology operations on the farm.

Table 3. The machine types used in livestock enterprises, number of machine, number of machines per enterprise in Turkey

| Machine Type                | The number of machines (number) | The number of machines per enterprise (machine/enterprise) |
|-----------------------------|---------------------------------|--|
| Tractor                     | 1,273,531                       | 0.5931   |
| Hay rake                    | 1,151.69                        | 0.0536   |
| Farmyard Manure Spreaders   | 4,382                           | 0.0020   |
| Reaper                      | 5,723.4                         | 0.0267   |
| Reaper-Binder               | 9,305                           | 0.0043   |
| Baler                       | 2,152.0                         | 0.0100   |
| Mower                       | 8,450.0                         | 0.0395   |
| Hay Silage Machine          | 5,227                           | 0.0024   |
| Corn Silage Machine         | 2,634.7                         | 0.0123   |
| Feed Processing Machine     | 2,897.9                         | 0.0135   |
| Hatching Machine            | 1,285                           | 0.0006   |
| Brooder                     | 1,005                           | 0.0005   |
| Milking Plant               | 10,057                          | 0.0047   |
| Mobile Milking Machine      | 30,179.5                        | 0.1406   |
| Agricultural Trailers       | 11,377.09                       | 0.5299   |
| Tractor Drawn Water Tanker  | 2,106.97                        | 0.0981   |
| Straw Machine               | 1,797.8                         | 0.0084   |
| Straw conveyor and unloader | 1,562.1                         | 0.0073   |
| Feed spreading trailer      | 3,356                           | 0.0016   |
| Loader used on farm         | 5,030.4                         | 0.0234   |
| Leveling Blade              | 1,887.3                         | 0.0088   |
| Cream separator             | 17,726.8                        | 0.0826   |
| Churner                     | 2,492.97                        | 0.1161   |

Source: TUIK, 2017. [13].

## CONCLUSIONS

Mechanization is the use of mechanical and electronic equipment to reduce the need for human labor. It has been used for carrying out various farm operations like feed preparation, feeding, milking, barn cleaning, animal cooling, environmentally controlled housing etc in the livestock farms and grazing lands. Positive points of mechanization save time, requires less labor, improves product quality,

increases production, efficiency, accuracy and safety. Negative points include high installation and repair costs; hence it is more suitable for commercial and institutional farms.

In the result of this study, it was seen that that average size of livestock enterprise was very small in Turkey. The fact that the livestock enterprises were very small resulted in low productivity and prevents establishment of mechanization and automation in production and causes costly production and low marketability.

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## ANALYSIS OF TOURISM CIRCULATION IN A TOURIST ACCOMMODATION UNIT IN BUCHAREST MUNICIPALITY

Adelaida Cristina HONTUȘ, Cristiana TINDECHE

University of Agronomical Sciences and Veterinary Medicine - Bucharest, Faculty of Management, Economical Engineering in Agriculture and Rural Developments, 59, Mărăști Boulevard, District 1, 011464 Bucharest, Romania, E-mails: adelaidahontus@yahoo.com, tindeche\_cristina@yahoo.com

**Corresponding author:** adelaidahontus@yahoo.com

### Abstract

*According to some appreciations regarding the formation of the image in tourism it can be concluded that a satisfied tourist, satisfied with the place where he spent his vacation, by transmitting the information, of his value, can influence another five potential tourists to spend in the future, the holiday at the place of stay, while a tourist dissatisfied with the quality of services, especially by the tourism staff, influences ten potential tourists. Tourism is an important component of a community planning and economic development strategy in an area. If an area or region has important natural attractions, historical or cultural vestiges, sports facilities, event organizing facilities, and other similar assets, the promotion and tourism development of an area or region may attract more visitors, potential tourists in that community who will spend time and spend money to take advantage of these benefits. Bucharest is the most important urban center of Romania (currently with a population six times the size of the second largest city in Iași), it is not only a place attracting tourists but also the starting point for many of the areas tourists in the country. The purpose of this paper was to carry out a study on the evolution of tourist traffic at the level of one of the hotels in Bucharest. Thus, following the takeover of the statistical data on the tourist traffic, from the National Institute of Statistics Bucharest, as well as from the hotel taken into study, there were calculated some of the most significant indicators and indices regarding the tourist demand and offer, which allowed to interpret the evolution of the tourist traffic to the accommodation unit.*

**Key words:** tourist traffic, tourist density, monthly tourist traffic, average tourist stay, tourist attractiveness

### INTRODUCTION

Bucharest is one of the developing tourist cities of Europe. With more than 2.4 million inhabitants, along with the metropolitan area, the Capital of Romania is the sixth city of the European Union [4].

In tourism, the new trend shows that quality is important rather than quantity [1]. For Bucharest, the solution is to focus more on the income earned per tourist than on the number of arrivals. Not the number, but the cost per tourist is the most important [3]. Tourists should be encouraged to spend more time in Bucharest and in the nearby tourist regions to spend more [2]. The economic goal is to extend the stay for 3-4 days for tourists [6].

The number of foreign tourists visiting Bucharest was 1,104,515 in 2016, + 11.35% as against 2015. Out of this total, 1,068,251

had accommodation in hotels. The total number of overnight stays was 1,869,820, or 1.69 nights per foreign tourist. Romania received 2,480,824 foreign tourists last year, so Bucharest has hosted nearly a half of them. For the Capital of Romania there is an important increase over the last years: 2015 - 991,949, 2014 - 864,504, 2013 - 729,833, 2012 - 676,778 foreign tourists.

In 2010, there were 598,067 foreign tourists in Bucharest, so their number has doubled in only 7-8 years. Also, 822,404 Romanians were present in Bucharest in 2016. So, the number of foreign tourists is higher.

Romania could be considered one of the most beautiful countries in Europe because of its nice landscapes, rich traditions and culture, but its touristic potential is not enough utilized. [15]. In Europe, Romania is one of the countries where the number of arrivals has been increasing constantly in the past years.

The only exception is the years of the economic crisis, but the same tendency appeared in these years throughout the whole continent and worldwide. Romania is on 34th position on the list of tourist arrivals [15].

The development of the tourism is considered a priority economic option, having in mind the high potential for a large variety of tourism types. The planning of the destinations and the availability of resources are destined to support the strategies of sustainable tourism development in Romania [14].

In 2015, tourism represented 7 % of the world exports in goods and services. For this reason, it is situated on the 3rd position after fuels and chemicals and ahead of food and automotive products [12].

Tourism industry includes a large variety of subsectors such as: accommodation, food service, transportation, retail, attractions, entertainment events (cultural, sport, scientific etc) and facilities [11]. The most important component of tourism industry is "hospitality" consisting of accommodation and food services [5]. The engine of tourism development is tourism workforce and employment [12].

Tourism is an economic activity which could contribute to the reduction of unemployment in the world, as it has done so far, but the quality of its employees is the driver of its development. [13].

Bucharest, the most important urban center of Romania (currently with a population six times the size of the second largest city in Iasi), is not only a place attracting tourists but also the starting point for many of the areas tourism in the country [5]. The large parks and lakes, which give the capital the note of the "garden town", are the attractions of the immediate vicinity: the forest and 5 Lake Snagov (including the renovated monastery on an island in the middle of the lake), Mogoșoaia - with the palace of Constantin Brâncoveanu, Pustnicu Forest, Cernica and Pasărea Monasteries, Băneasa Forest (with the largest zoo in Romania), Căldărușani Lake and Monastery (founded during the reign of Matei Basarab). The Outdoor Village Museum (the second most important in Europe after the one

in Stockholm), the Romanian Peasant Museum, the National History Museum or churches from the 16th to 17th centuries should not be bypassed by tourists. Contemporary art lovers can admire and even buy paintings by contemporary artists from art galleries in the city center [16]. From the fifteenth century to the end of the feudal age, despite the great natural calamities and wars, the city of Bucharest experienced a continuous economic and social development, becoming one of the main urban centers.

The capital, through its status, dominates both the metropolitan area and its adjacent territories [6]. The capital of Romania must integrate into the structure of the Great Urban Centers of Europe - a condition for the efficient development and capitalization of existing resources and of its own potential in the context of economic and cultural globalization [7]. Bucharest, through its position and role as Capital of Romania, must be part of the spatial-balanced structure of Europe's regional urban centers in order to capitalize on its own potential and in the context of increasing the economic competition between European cities and regions. [10]

## MATERIALS AND METHODS

This paper is based on an analysis of tourist demand and supply from a tourist accommodation unit in Bucharest. The aim of this paper is to determine the degree of attractiveness of the hotel studied and the degree of tourism development in Bucharest. The research carried out consists of analyzing the evolution of the tourist circulation at "Phoenicia Grand Hotel", by calculating and interpreting the most significant tourist indicators and indices.

The paper is based on the statistical data provided by "Phoenicia Grand Hotel" as well as by the national institute of statistics 2017. The reference period was 2012-2016.

The main indicators considered were: *No. total overnight stays (Romanians + foreigners)*, *No. Romanian overnight stays*, *No. overnight stays*, *No. total tourists (Romanians + foreigners)*, *No. Romanian tourists*, *No. Foreign tourists*,

*No. Accommodation at "Phoenicia Grand Hotel", No. Total Accommodation at Hotels in Bucharest, Population of Bucharest Municipality and Bucharest City Area (Km<sup>2</sup>).*

The methods used in this research were the following: calculation of the main indicators and tourism indices, interpretation of the obtained results and analysis of the evolution regarding the tourist circulation.

The tourism indexes and indicators calculated for "Phoenicia Grand Hotel" are as follows: *Index of global tourist demand change, Index of (Romanian and foreign) demand variation in time, Index of (domestic and foreign) demand variation in time, The average length of stay, Monthly traffic coefficient, The quarterly tourist traffic ratio, The monthly concentration coefficient, Share of hotel (B&B) capacity out of total accommodation capacity on County, Index of overnight stay evolution, Hotel occupancy indicator, Tourist density indicator in relation to population density, Tourist density indicator in relation to area*

The analysis and interpretation of these tourist traffic indicators help us to see the degree of development of tourism in Bucharest, as well as the degree of occupancy of the hotel studied.

## RESULTS AND DISCUSSIONS

### ***Presentation of "Phoenicia Grand Hotel"***

Situated in the Băneasa area, a Northern district of Bucharest, the "Phoenicia Grand Hotel" is an impressive 26,000 m<sup>2</sup> hotel, 15 minutes from Bucharest International Airport Henri Coandă and 10 minutes from the Romexpo exhibition center ( Photo 1).



Photo 1. Phoenicia Grand Hotel

Source: <https://www.hotels.com/>

<http://phoeniciahotels.ro/en/business/phoenicia-grand-hotel>, Accessed on November 2, 2017

Hotel "Phoenicia Grand" offers spacious and luxurious rooms with free WiFi, cable TV and air conditioning. All include tea / coffee facilities and a complimentary bottle of water. The 3 restaurants within the complex serve delicious dishes from around the world. The restaurants provide international, Lebanese and Italian dishes.

The entertainment facilities include a spa area and a private club. In addition, guests have free private parking and 10 conference rooms.



Photo 2. Restaurant in the hotel.

Source: <https://www.hotels.com/>;

<http://phoeniciahotels.ro/en/business/phoenicia-grand-hotel>, Accessed on November 2, 2017

Guests can enjoy the relaxing atmosphere of the lobby bar, as well as a variety of oriental cafes and teas, or make use of the spa and beauty center services.

The entertainment facilities include a spa area and a private club. In addition, guests have free private parking and 10 conference rooms.

The most appreciated facilities: free parking, free WiFi, airport transfer, fitness room, non-smoking rooms, family rooms.

The most popular tourist attractions are: The "Dimitrie Gusti" Village Museum, at a distance of 2.3 km, the Arc de Triomphe at a distance of 2.8 km, the Romanian Peasant Museum at a distance of 4.1 km, The National Museum of Natural History "Grigore Antipa" at a distance of 4.3 km, the National Museum of Art located 6 km away, the Ministry of Health at a distance of 6 km, the Cișmigiu Garden located at a distance of 6 km, the National Opera 6 km away, the National Theater 6 km away, the Botanical Garden located 6 km away.

**Analysis of tourist demand and tourist offer at "Phoenicia Grand Hotel"**

Table 1. Statistical data on tourism indicators at "Phoenicia Grand Hotel"

| Indicators   | 2012      | 2013      | 2014      | 2015      | 2016      |
|--|-----------|-----------|-----------|-----------|-----------|
| Nr. total overnight stays (Romanians + foreigners) | 142,994   | 135,224   | 130,878   | 119,444   | 146,732   |
| Nr. Romanian overnight stays                       | 59,808    | 56,032    | 54,250    | 50,448    | 55,480    |
| Nr. overnight stays                                | 83,186    | 79,192    | 76,628    | 68,996    | 91,252    |
| Nr. total tourists (Romanians + foreigners)        | 70,497    | 67,112    | 64,939    | 58,722    | 72,866    |
| Nr. Romanian tourists                              | 28,904    | 27,516    | 26,625    | 24,224    | 27,240    |
| Nr. Foreign tourists                               | 41,593    | 39,596    | 38,314    | 34,498    | 45,626    |
| Nr. Accommodation at "Phoenicia Grand Hotel"       | 696       | 696       | 696       | 696       | 696       |
| Nr. Total Accommodation at Hotels in Bucharest     | 18,531    | 17,854    | 18,434    | 18,564    | 19,030    |
| Population of Bucharest Municipality               | 1,886,866 | 1,875,389 | 1,865,563 | 1,853,402 | 1,844,312 |
| Bucharest City Area (Km <sup>2</sup> )             | 228       | 228       | 228       | 228       | 228       |

Source: "Phoenicia Grand Hotel" Database, 2017 and National Institute of Statistics Database, 2016

The evolution of the tourist indicators at the "Phoenicia Grand Hotel" was as follows:

The number of overnight stays for the total number of tourists (Romanians + foreigners) had a downward trend, with the exception of the last year, 2016, when the total number of overnight stays increased by 27,288 compared to the previous year.

The same evolution took place during the overnight stays of Romanian and foreign tourists.

The total number of tourists (Romanians + foreigners) registered a decreasing evolution, except for the year 2016, when the total number of tourists increased by 14,144 compared to the previous year.

Both the number of Romanian and foreign tourists had the same evolution.

The number of accommodation places in Bucharest was almost constant at about 18,500 places, and in the last year of study, 2016, the number of accommodation places increased by about 500.

The population in Bucharest had a decreasing evolution, during the analyzed period, the decrease being of 42,554 inhabitants in 2016 compared to the first year of study, 2012.

Table 2. Number of tourists per month in 2016 at "Phoenicia Grand Hotel"

| Month     | Types of tourists | Number |
|-----------|-------------------|--------|
| January   | Total             | 3,937  |
|           | Romanians         | 1,776  |
|           | Foreigners        | 2,161  |
| February  | Total             | 4,856  |
|           | Romanians         | 2,311  |
|           | foreigners        | 2,545  |
| March     | Total             | 4,659  |
|           | Romanians         | 2,051  |
|           | foreigners        | 2,608  |
| April     | Total             | 6,957  |
|           | Romanians         | 2,531  |
|           | foreigners        | 4,426  |
| May       | Total             | 9,234  |
|           | Romanians         | 1,628  |
|           | foreigners        | 7,606  |
| June      | Total             | 6,609  |
|           | Romanians         | 2,108  |
|           | foreigners        | 4,501  |
| July      | Total             | 4,614  |
|           | Romanians         | 1,729  |
|           | foreigners        | 2,885  |
| August    | Total             | 4,397  |
|           | Romanians         | 1,791  |
|           | foreigners        | 2,606  |
| September | Total             | 7,267  |
|           | Romanians         | 3,210  |
|           | foreigners        | 4,057  |
| October   | Total             | 7,607  |
|           | Romanians         | 2,873  |
|           | foreigners        | 4,734  |
| November  | Total             | 7,184  |
|           | Romanians         | 2,711  |
|           | foreigners        | 4,473  |
| December  | Total             | 5,545  |
|           | Romanians         | 2,521  |
|           | foreigners        | 3,024  |

Source: "Phoenicia Grand Hotel" Database, 2017

**1). Index of global tourist demand change:**

$$C_t = (\text{No. Overnights current year} / \text{no. Overnights previous year}) * 100$$

$$\Delta CG_{0-i} = \frac{CG_i}{CG_0} \cdot 100 \text{ [8,9]}$$

Table 3. Index of global tourist demand change, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel"                           | 2012   | 2013    | 2014    | 2015    | 2016     |
|---|--------|---------|---------|---------|----------|
| Total number of tourists (Romanians + foreigners) | 70,497 | 67,112  | 64,939  | 58,722  | 72,866   |
| ΔCG (%)   |        | 95.19 % | 96.76 % | 90.42 % | 124.08 % |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The index of the global tourist demand change for "Phoenicia Grand Hotel" during the analyzed period had an oscillating evolution. From 95.19% in 2012-2013, it increased by 1.57% over the period 2013-2014, and in 2014-2015 it decreased by 6.34%, and in the last period 2015-2016, reaching an increase of 33.66%.

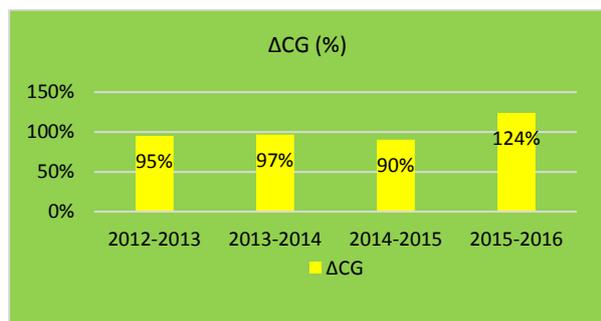


Fig.1. Index of global tourist demand change, "Phoenicia Grand Hotel", 2012-2016 (%)

## 2. Index of (Romanian and foreign) demand variation in time

$$Ici = [No. \text{ Romanian tourists per current year} / (No. \text{ Romanian tourists} + No. \text{ Foreign tourists}) \text{ current year}] * 100$$

$$Ice = [No. \text{ Foreign tourists per current year} / (No. \text{ Romanian tourists} + No. \text{ Foreign tourists}) \text{ current year}] * 100$$

$$\Delta CI_{0-i} = \frac{CI}{CG} \cdot 100; \Delta CE_{0-i} = \frac{CE}{CG} \cdot 100 \quad [8,9]$$

The indices of the distribution of the domestic tourism demand during the analyzed period had a constant evolution.

Table 4. Index of (Romanian and foreign) demand variation in time, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel"                     | 2012    | 2013    | 2014    | 2015    | 2016    |
|---|---------|---------|---------|---------|---------|
| No. total tourists (Romanians + foreigners) | 70,497  | 67,112  | 64,939  | 58,722  | 72,866  |
| No. Romanian tourists                       | 28,904  | 27,516  | 26,625  | 24,224  | 27,240  |
| No. foreign tourists                        | 41,593  | 39,596  | 38,314  | 34,498  | 45,626  |
| ΔCI (%)                                     | 41.00 % | 41.00 % | 41.00 % | 41.25 % | 37.38 % |
| ΔCE (%)                                     | 58.99 % | 58.99 % | 58.99 % | 58.74 % | 62.61 % |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

Excluding the last year of study, 2016, when it dropped slightly from the previous years by about 4%.

The index of the distribution of global external tourism demand during the analyzed period had a constant evolution. Excluding the last year of study, 2016, when it grew slightly over the previous years, about 4%.

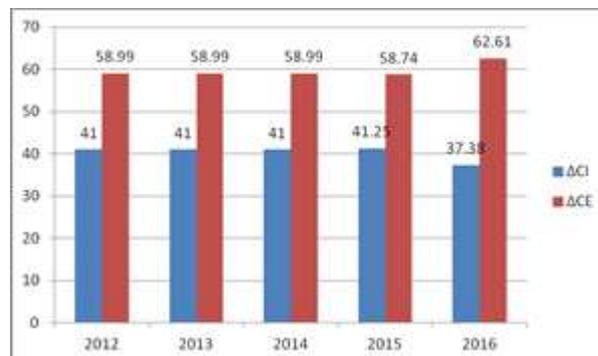


Fig.2. Index of (Romanian and foreign) demand variation in time, "Phoenicia Grand Hotel", 2012-2016 (%)

## 3. Index of (domestic and foreign) demand variation in time:

$$Ici = (No. \text{ Romanian tourists per current year} / No. \text{ Romanian tourists per previous year}) * 100$$

$$Ice = (No. \text{ Foreign tourists per current year} / No. \text{ Foreign tourists per previous year}) * 100$$

$$ICE_{0-i} = \frac{CE_i}{CE_0} \cdot 100 \quad ICI_{0-i} = \frac{CI_i}{CI_0} \cdot 100 \quad [8,9]$$

Table 5. Index of (domestic and foreign) demand variation in time, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel" | 2012   | 2013   | 2014   | 2015    | 2016     |
|-------------------------|--------|--------|--------|---------|----------|
| No. Romanian tourists   | 28,904 | 27,516 | 26,625 | 24,224  | 27,240   |
| No. foreign tourists    | 41,593 | 39,596 | 38,314 | 34,498  | 45,626   |
| ICI (%)                 | -      | 95.19% | 96.76% | 90.98 % | 112.45 % |
| ICE (%)                 | -      | 95.19% | 96.76% | 90.04 % | 132.25 % |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The index of time variation of domestic tourism demand during the analyzed period had an oscillating evolution. From 95.19% in the 2012-2013 period, it fell by around 4% between 2014 and 2015, after which it had an increase of 21.5% in the last period, 2015-2016.

The same trend was observed in the time-varying index of external tourism demand, from 95.19% in the period 2012- 2013, decreased by about 5% between 2014 and 2015, after having increased by 42.21 % in the last period, 2015-2016.

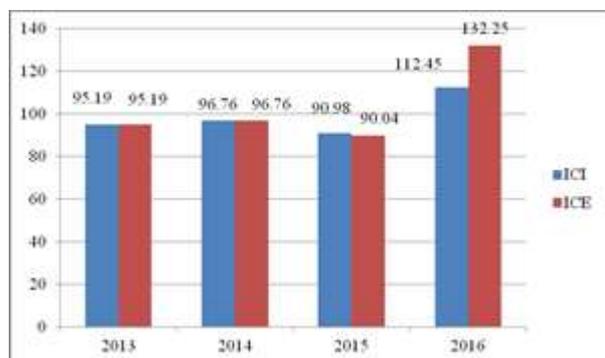


Fig.3. Index of (domestic and foreign) demand variation in time, "Phoenicia Grand Hotel", 2012-2016 (%)

4. The **average length of stay** for each accommodation facility, the number of days is replaced by the number of overnight stay registered in the accommodation records, as follows:

$$S_H = \frac{NH}{T} \text{ (days) [8,9]}$$

where:  $NH$  - number of recorded overnight stay;

$T$  - number of tourists arriving;

$S_H$  - average stay in the hotel.

Table 6. The average length of stay, "Phoenicia Grand Hotel", 2012-2016

|  |         |         |         |         |         |
|--|---------|---------|---------|---------|---------|
| Nr. total overnight stays (Romanians + foreigners) | 142,994 | 135,224 | 130,878 | 119,444 | 146,732 |
| Nr. Romanian overnight stays                       | 59,808  | 56,032  | 54,250  | 50,448  | 55,480  |
| Nr. overnight stays                                | 83,186  | 79,192  | 76,628  | 68,996  | 91,252  |
| Nr. total tourists (Romanians + foreigners)        | 70,497  | 67,112  | 64,939  | 58,722  | 72,866  |
| Nr. Romanian tourists                              | 28,904  | 27,516  | 26,625  | 24,224  | 27,240  |
| Nr. Foreign tourists                               | 4,193   | 39,596  | 38,314  | 34,498  | 45,626  |
| S total (days)                                     | 2.03    | 2.01    | 2.02    | 2.03    | 2.01    |
| S Romanian (days)                                  | 2.07    | 2.04    | 2.04    | 2.08    | 2.04    |
| S foreign (days)                                   | 2.00    | 2.00    | 2.00    | 2.00    | 2.00    |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The average stay at the "Phoenicia Grand Hotel" for both the total number of tourists and for Romanian tourists and foreign tourists was an average of 2 days.

$\text{Total average stay} = \frac{\text{Nr. Total overnight stays (foreign + Romanian)}}{\text{No. Total Tourists (Romanian + foreign)}}$

$\text{Romanian tourists stay} = \frac{\text{no. Romanian overnight stays}}{\text{no. Romanian tourists}}$

$\text{Stay for foreign tourists} = \frac{\text{no. foreign overnight tourist}}{\text{no. foreign tourists}}$

5. **Monthly traffic coefficient** is calculated as a ratio between the number of tourists in month with maximum traffic ( $LM$ ) and the number of tourists in month with minimum traffic ( $lm$ ) – for 2016 year

$$C_{monthly} = \frac{LM}{lm}, \text{ where } C_{monthly} \geq 1 \text{ [8,9]}$$

$$C_{monthly} = (9,234/3,937) = 2.34$$

Table 7. Monthly traffic coefficient, "Phoenicia Grand Hotel", 2012-2016

| Indicators         | Maximum tourist traffic - May 2016 | Minimal tourist traffic January 2016 |
|--------------------|------------------------------------|--------------------------------------|
| No. Total tourists | 9,234                              | 3,937                                |
| C monthly          | 2.34                               |                                      |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

**6. The quarterly tourist traffic ratio is calculated as a ratio between the number of tourists in the maximum tourist traffic trips (TM) and the number of tourists in the minimum tourist traffic (tm) - for 2016**

$$C_{quarterly} = \frac{TM}{tm}, \text{ where } C_{quarterly} \geq 1$$

The minimum value of these coefficients is (1) and, the higher it is, the more pronounced the seasonality.

$$C_{quarterly} = (22,800/13,452) = 1.69$$

Table 8. The quarterly tourist traffic ratio, "Phoenicia Grand Hotel", 2012-2016

| Indicators         | Maximum tourist traffic Third Quarter 2016 | Minimal tourist traffic First Quarter 2016 |
|--------------------|--|--|
| No. Total tourists | 22,800                                     | 13,452                                     |
| C quarterly        | 1.69                                       |  |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

**7. The monthly concentration coefficient is calculated by dividing the number of tourists recorded during the highest-traffic month by the total number of tourists during a year  $A_t$ .**

**$C_c = [No. \text{ Tourists per each month} / (No. \text{ Romanian tourists} + No. \text{ Foreign tourists}) \text{ per year of calculation}] * 100$**

$C_c = \frac{LM}{A_t}$  [8,9], will be calculated for each month of 2016.

The  $C_c$  value is between 0.083 and 1.

$$A_t = 72,866 \text{ tourists}$$

Table 9. The monthly concentration coefficient per month in 2016 at "Phoenicia Grand Hotel"

| "Phoenicia Grand Hotel"                                       |        |
|---|--------|
| $A_t =$ No. Total tourists (Romanians + foreigners)/year 2016 | 72,866 |
| Cc January  | 0.054  |
| Cc February   | 0.066  |
| Cc March  | 0.063  |
| Cc Aprilie  | 0.095  |
| Cc May  | 0.126  |
| Cc June   | 0.090  |
| Cc July   | 0.063  |
| Cc August   | 0.060  |
| Cc September  | 0.099  |
| Cc October  | 0.104  |
| Cc November   | 0.098  |
| Cc December   | 0.076  |

Source: Own calculations based on "Phoenicia Grand Hotel" Database - Table 2, 2017

The monthly tourist concentration in the last year of study, 2016, was maximum in May, and the minimum value was recorded in January.

**8. Share of hotel (B&B) capacity out of total accommodation capacity on County**

$$I_{cc} = \frac{LC}{LH} \cdot 100 \text{ [8,9]}$$

where:  $LH$  - the total accommodation capacity of hotels in Bucharest;

$LC$  - total accommodation capacity at "Phoenicia Grand Hotel"

Table 10. Share of accommodation capacity "Phoenicia Grand Hotel" in total accommodation capacity in hotels in Bucharest

|  | 2012   | 2013   | 2014   | 2015   | 2016   |
|--|--------|--------|--------|--------|--------|
| Accommodation capacity at "Phoenicia Grand Hotel" (LC) | 696    |        |        |        |        |
| Accommodation capacity in hotels in Bucharest (LH)     | 18,531 | 17,854 | 18,434 | 18,564 | 19,030 |
| Icc (%)  | 3.75%  | 3.89%  | 3.77%  | 3.74%  | 3.65%  |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

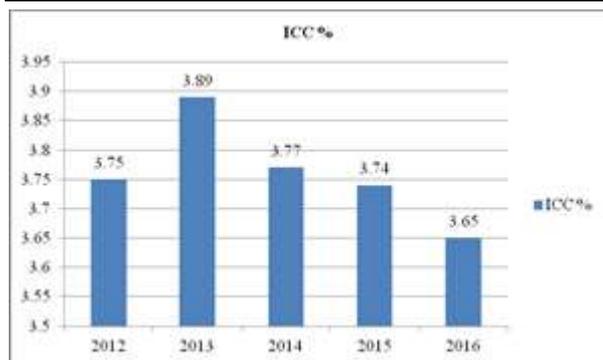


Fig.4. Share of accommodation capacity "Phoenicia Grand Hotel" in total accommodation capacity in hotels in Bucharest (%)

The share of accommodation capacity of "Phoenicia Grand Hotel" in the total accommodation capacity in hotels in Bucharest, during the analyzed period, had a constant evolution, of about 3.70%.

### 9. Index of overnight stay evolution:

$I_N = (No. \text{ overnight stay per current year} / No. \text{ overnight stay per previous year}) * 100$

$$\Delta N = \frac{NH_i}{NH_0} \cdot 100 \quad [8,9]$$

Table 11. Index of overnight stay evolution, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel"                                    | 2012    | 2013    | 2014    | 2015    | 2016    |
|--|---------|---------|---------|---------|---------|
| Nr. total tourist overnights (Romanians + foreigners)      | 142,994 | 135,224 | 130,878 | 119,444 | 146,732 |
| Nr. overnight Romanian tourists                            | 59,808  | 56,032  | 54,250  | 50,448  | 55,480  |
| Nr. overnight foreign tourists                             | 83,186  | 79,192  | 76,628  | 68,996  | 91,252  |
| $\Delta N$ for total tourists (Romanians + foreigners) (%) | -       | 94.57%  | 96.79%  | 91.26%  | 122.85% |
| $\Delta N$ for Romanian tourists (%)                       | -       | 93.69%  | 96.82%  | 92.99%  | 109.97% |
| $\Delta N$ for foreign tourists (%)                        | -       | 95.20%  | 96.76%  | 90.04%  | 132.26% |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The evolution of overnight stays for total tourists (Romanians + foreigners) had an oscillating evolution during the analyzed period. From 94.57% in the 2012-2013 period

it increased by 28% between 2015-2016 and in the period 2014-2015 it had a 3% decrease compared to the first period.

The evolution of overnight stays for Romanian tourist overnight had an oscillating evolution during the analyzed period. From 93.69% in the 2012-2013 period it increased by 16% between 2015-2016 and in the period 2014-2015 it had a 0.7% decrease over the period 2012-2013.

The evolution of overnight stays for total foreign tourist overnight had an upward trend during the analyzed period. From 95.20% in 2012-2013 it increased by 37% between 2015-2016.

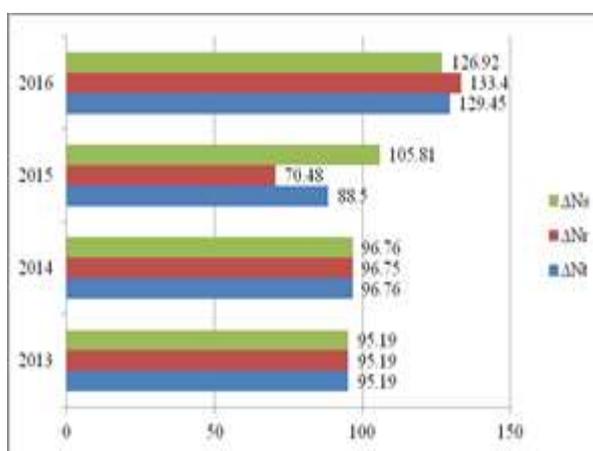


Fig.5. Index of overnight stay evolution, "Phoenicia Grand Hotel", 2012-2016 (%)

### 10. Hotel occupancy indicator

Reflects the use of supply for a given period of time, i.e. hotel activity depending on its capacity:

$$Cuc = [No. \text{ overnight stays (no. tourist days)} / (No. \text{ beds} * \text{ no. days running})] * 100$$

$$G_o = \frac{NH \cdot 100}{LH \cdot Z} = \frac{NT \cdot S}{LH \cdot Z} \cdot 100 \quad [8,9]$$

where:

- $G_o$  - occupancy, percentage;
- $NH$  - number of overnight stays;
- $LH$  - number of beds in hotels;
- $Z$  - number of supply days = 365 days;
- $NT$  - number of tourists;
- $S$  - average length of stay.

Table 12. Hotel occupancy indicator, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel"   | 2012    | 2013    | 2014    | 2015    | 2016    |
|---|---------|---------|---------|---------|---------|
| No. overnight stays (NH) total tourists (Romanian + foreign) at "Phoenicia Grand Hotel" | 142,994 | 135,224 | 130,878 | 119,444 | 146,732 |
| No. accommodation units (LH) at "Phoenicia Grand Hotel"                                 | 696     |         |         |         |         |
| G <sub>0</sub> (%)  | 56.29%  | 53.23%  | 51.52%  | 47.02%  | 57.76%  |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The occupancy rate of the hotel "Phoenicia Grand Hotel" had a downward trend during the analyzed period, except for the last year, when it had an increase in the occupancy rate of about 11% compared to the previous year. From an occupancy rate of 56.29% in 2012 reaching an occupancy rate of about 58% in 2016.

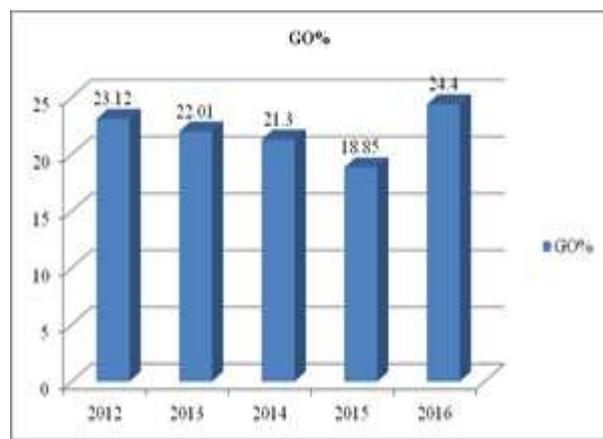


Fig.6. Hotel occupancy indicator, "Phoenicia Grand Hotel", 2012-2016 (%)

### 11. Tourist density indicator in relation to population density

$$D_{t_i} = \frac{T_{t_i}}{Population} \quad (\text{tourists/ no. inhabitants})$$

[8,9]

where:

$T_{i-0}$  – no. total Romanian + foreign tourists;  
 Pop – the population of Bucharest

Table 13. Tourist density indicator in relation to population density, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel"                     | 2012      | 2013      | 2014      | 2015      | 2016      |
|---|-----------|-----------|-----------|-----------|-----------|
| Nr. total tourists (Romanians + foreigners) | 70,497    | 67,112    | 64,939    | 58,722    | 72,866    |
| Population of Bucharest                     | 1,886,866 | 1,875,389 | 1,865,563 | 1,853,402 | 1,844,312 |
| D <sub>t</sub> (tourists/no. inhabitants)   | 0.037     | 0.035     | 0.034     | 0.031     | 0.039     |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The tourist density of the "Phoenicia Grand Hotel" in relation to the population of Bucharest had a constant evolution, during the analyzed period, of 0.034 (tourists / number of inhabitants).

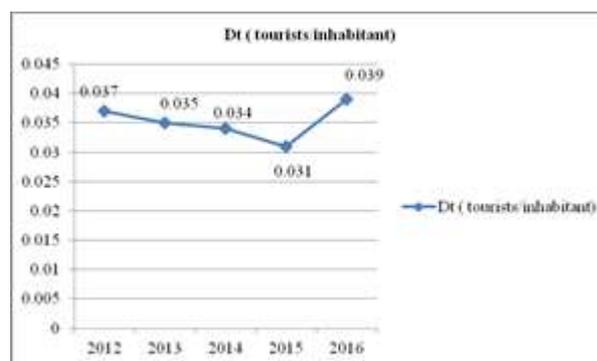


Fig.7. Tourist density indicator in relation to population density, "Phoenicia Grand Hotel", 2012-2016 (no. of tourists/no. of inhabitants)

### 12. Tourist density indicator in relation to area

$$D_{t_i} = \frac{T_{t_i}}{Surface} \quad (\text{tourists/km}^2) \quad [8,9]$$

where:

$T_{i-0}$  – no. total Romanian + foreign tourists;  
 S - Bucharest area.

Table 14. Tourist density indicator in relation to area, "Phoenicia Grand Hotel", 2012-2016

| "Phoenicia Grand Hotel"                     | 2012   | 2013   | 2014   | 2015   | 2016   |
|---|--------|--------|--------|--------|--------|
| No. total tourists (Romanians + foreigners) | 70,497 | 67,112 | 64,939 | 58,722 | 72,866 |
| Bucharest area (km <sup>2</sup> )           | 228    |        |        |        |        |
| D <sub>t</sub> (tourists/km <sup>2</sup> )  | 309.19 | 294.35 | 284.82 | 257.55 | 319.58 |

Source: Own calculations based on "Phoenicia Grand Hotel" Database, 2017

The tourist density of the "Phoenicia Grand Hotel" in relation to the area of Bucharest during the analyzed period had a descending evolution, from a density of 309.19 (tourists / km<sup>2</sup>) in 2012 decreased to 2015 to 257.55 (tourists / km<sup>2</sup>), and the last year 2016 had an increase in density of 62.03 (tourists / km<sup>2</sup>).

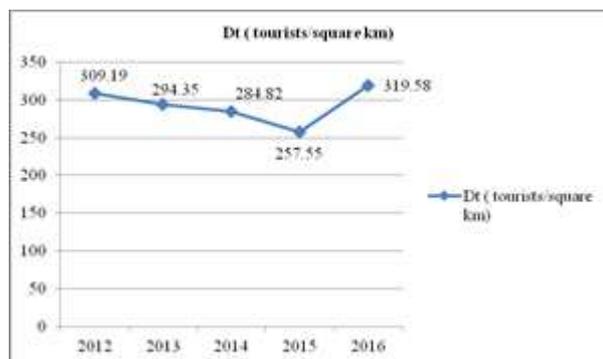


Fig. 8. Tourist density indicator in relation to the number of population, "Phoenicia Grand Hotel", 2012-2016 (tourists/square km)

## CONCLUSIONS

In Bucharest, tourists' arrivals increased during the analyzed period, reflecting a higher demand for the tourist attractions of our capital, as well as the surroundings.

At the "Phoenicia Grand Hotel," the number of tourists was rising during the period under review as well as the number of overnight stays. However, the occupancy rate of the hotel "Phoenicia Grand Hotel" had a downward trend during the analyzed period, except for the last year, when it had an increase in the occupancy rate of about 11% compared to the previous year. From a occupancy rate of 56.29% in 2012 reaching a occupancy rate of about 58% in 2016.

The monthly tourist concentration in the last year of study, 2016, peaked in May, and the minimum value was recorded in January.

The distribution of global domestic tourism demand during the analyzed period had a constant evolution of approximately 41% and the distribution of global external tourism demand had a constant evolution of approximately 58%. The tourist density of the "Phoenicia Grand Hotel" in relation to the population of Bucharest had a constant

evolution, during the analyzed period, of 0.034 (tourists / number of inhabitants).

As a result of the analysis, we can say that the "Phoenicia Grand Hotel" is a hotel sought by tourists, both Romanians and foreigners. The quality of the services offered, the hospitality and the accommodation conditions, make this hotel a top choice of hotels.

The variety of attractions Bucharest and its surroundings offer, make the number of tourists increase. Cultural heritage, historical sites, landscapes, gastronomy and accommodation units are all for your pockets.

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## SUSTAINABLE MANAGEMENT FOR GRASSLAND AGROECOSYSTEM RESOURCES

**Pompilica IAGARU, Liviu MARCUTA, Alina MARCUTA, Romulus IAGARU**

Lucian Blaga University of Sibiu, 10 Victoriei, Romania, Phone: +40269216062,  
Fax:+40269217887, Mobile:+40729950222, Email: romulus.iagaru@ulbsibiu.ro,  
liviumarcuta@yahoo.com, alinamarcuta@yahoo.com

**Corresponding author:** romulus.iagaru@ulbsibiu.ro

### **Abstract**

*The activity of an agricultural enterprise is run within an ecosystem, it being characterized by intertwining and integration of the two components. The achievement of this relationship depends on the resulting performance, which requires organization policies and strategies to be adopted for the biotechnical and economic processes. The agricultural ecosystem is essentially rendered artificial; therefore, it should be monitored and run according to well-defined rules, in order to preserve and improve not only biodiversity but also quality and profitability of production. Considering the above mentioned subject matter, this paper proposes an ambitious undertaking, i.e. an interdisciplinary approach to issues regarding the sustainable development management of grasslands in the context of biodiversity conservation and improvement. This approach is not easy, despite the relevant interrelation between economic and biotechnological elements; nevertheless, it is supported by a successful management of the resources specific of pasture agro-ecosystem. The paper leads to the general conclusion that the promotion of eco-technical practices within the grassland agro-ecosystem results in a multifunctional meadow, primarily focused on obtaining a pastoral value with a corresponding loading expressed in livestock units per hectare of pasture, i.e. biodiversity conservation and improvement of known, as Romanian grasslands are known for their varied floristic composition of high biodiversity indices.*

**Key words:** biodiversity, biotechnological, conservation, sustainable, economic, ecosystem, management

### **INTRODUCTION**

The paper assumes that a sustainable agriculture development should aim at increasing production capacity whilst maintaining natural resources.

Agricultural ecosystems consist of specific subsystems, as our attention is being focused on the pasture agro-ecosystem, of which main objective is designing and implementation of long-term economically viable measures capable of providing a high pastoral value, namely biodiversity conservation and improvement [3,7]. Basically, we aim at integrating the sustainability principles into the grassland agro-ecosystem management, i.e. the life cycle management of the grassland agro-ecosystem and the resulting products in accordance with the objectives of the sustainable development management of grasslands concept. For this purpose, it is necessary to include other activities in addition to those specific to agricultural management;

the newly included activities should be dedicated to stimulating biodiversity, ensuring harmonious development and integration of the grassland ecosystem in an environmentally friendly medium. It follows that a sustainable development management of the grassland agro-ecosystem is a complex process that relies on organizing, administration and management, as opposed to natural ecosystems that are self-organizing and cannot be maintained without human action. Man must intervene with external energy, i.e. crop energy, under two forms: biological (human and animal labor) and technological (machines, equipment, etc.) [6]. The relevance of the topic addressed lies in the fact that the status of permanent grassland is marked by a continuous process of pollution and damage due to human activities and natural phenomena such as excess moisture, drought, salinity, erosion, etc. This requires action aimed at restoring permanent grassland in order to introduce it into the economic cycle and to

ensure its multi-functionality, outlining the need to preserve and improve biodiversity amid the existence of “different floral structures of higher biodiversity indices compared to many European countries” [5]. A sustainable development of the grassland agro-ecosystem is an urgent problem and we will attempt to provide a solution below. For this purpose, the diagnosis of the permanent grassland plays a decisive role in identifying its specificity, in order to design and implement long-term economically viable measures capable of providing a high pastoral value, namely biodiversity conservation and improvement. Our research aimed to achieve a high pasture value, *i.e.* biodiversity conservation and improvement by promoting the sustainable resource management of the specific measures characterizing the grassland agro-ecosystem, with a special focus on fertilization

## MATERIALS AND METHODS

The experiment was located on the North-Eastern top of the Cindrel mountains, at an altitude of approximately 1,430 m, near the Păltiniș mountain resort, on the summit called Vălari, covered by red fescue (*Festuca rubra*). Land exposure was Southern with a slight slope, approximately 5 %. The area was surrounded with vast spruce forests and large areas of natural grasslands. Weather conditions were characterized by annual average air temperatures below 5°C on the slopes and the peaks of the middle mountains (4.5°C Păltiniș – top, 4°C - Păltiniș resort), falls below 0°C on the high mountain peaks [1]. *Average annual rainfall* reached 910 mm in the middle mountains (Păltiniș) and increased to 1,350 mm on the alpine tops. On the Păltiniș experimental field, the soil was acid-brown belonging to the cryptosporidium subtype (hidden spore characters) on acid rock, of which morphologic, physical and chemical properties were as follows: small-medium grainy structure, slightly glomerular in the first 30 cm, polyhedral, sub-angular in the Bv horizon; loamy-sandy-dusty to loamy at 30 cm size fits the profile; low levels of absolute and

apparent density, influenced by the high content in organic matter; good total porosity; the high content in organic matter, slightly or increasingly moist indicates a strongly moist soil (raw humus) with a high share of folic acids; pH varied between 4.62-5.10 in the aqueous extract and 3.78 -4.27 in the saline extract, indicating a strongly acidic reaction; the degree of base saturation values, of less than 30%, indicated an oligo-basic soil.

Knowing that grasslands in the area used to be utilized for both grazing and haymaking, we performed two similar experiences on the same location, one for each mode of use.

The experiment was conducted during a three year - time period, according to the method of subdivided lots with four separate blocks (replications) - each block consisting of three plots: unfertilized control, fertilized with manure (20 t/ha) and fertilized with minerals (N<sub>100</sub>P<sub>50</sub>K<sub>100</sub>). The blocks were further divided into two variants (for haymaking and grazing, respectively), each having an area of 10m<sup>2</sup> (5x2m). In the haymaking variant, production consisted in the scythed grass and after grass, while in the grazing one, based on *Festuca rubra*, three harvests were performed when plants reached their grazing height. Dry matter was determined by oven method. Yields were obtained by weighing the harvest immediately after mowing. Sampling was carried out following the dew disappearance, *i.e.* at noon and in the afternoon. The floristic composition was determined by the double meter method, that analyzes grass by linear vegetation surveys for each group. We chose the volume method consisting in identification of points located 5 cm away from each other into a circle of 2 cm diameter. Thus, we assigned a grade from 1 to 6, the sum of grades within a dot being 6, for each species grown within the area described above, which was measured at every 5 cm.

The design and implementation of measures aimed at restoring permanent grassland in order to introduce it into the economic cycle and to ensure multifunctionality and biodiversity preservation and improvement, starts from the diagnosis of vegetation state and production potential characterizing the grassland under study. For this purpose, we

determined the floristic composition by preparing reports based on the double meter method. The data allowed calculation of the pasture value of the grasslands, as a result of the sum between the percentage of species participation in the grass coverage and their corresponding quality index, which we subsequently divided by 5, according to the following formula:

$$V.P. = \Sigma PC (\%) \times IC/5 \quad (1)$$

where: VP = pasture value indicator (0-100);  
PC = participation in grass cover (%);  
IC = fodder quality index.

## RESULTS AND DISCUSSIONS

The floristic composition resulting from the diagnosis showed that Poaceae was predominant (67%) in yield formation and the grassland layer, where the main species was *Festuca rubra*. Other fodder-important Poaceae present in this type of grassland were *Antoxatum odoratum*, *Agrostis rupestris*, *Agrostis capillaris*, *Cynosurus cristatus*, *Phleum alpinum*, *Poa pratensis*. The share of fodder plants belonging to the Fabaceae family was low (17%) and exemplified by such species as: *Trifolium repens*, *Trifolium pratense*, *Trifolium alpestre*, *Lotus corniculatus*, plus *Genista tinctoria*. Plants from other families had a low share in the floristic composition and were represented by: *Achillea millefolium*, *Alchemilla vulgaris*, *Taraxacum officinale*, *Leontodon autumnalis*, *Plantago lanceolata*, *Plantago media*. We also encountered plants with no or low fodder value, such as *Veronoca chamaedris* and *Rumex acetosela*, and even harmful plants such as *Nardus stricta* that equals or exceeds the share of *F. rubra*, the *Festuca rupicola* and *Genista tinctoria* species. Bushes and shrubs were also present: *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Juniperus sibirica*, *Pinus mugo*, etc. In conclusion, it is estimated that the analyzed grassland had a poor floristic composition represented by 23 species of low fodder value, of which 10 belonged to the Poaceae family, 5 to the Fabaceae family and

8 to other botanical families. This showed that, although they represented an important fodder resource, grasslands were decaying as a result of poor management over the past recent years, requiring adoption of a sustainable management strategy leading to higher pasture value, as well as biodiversity conservation and improvement.

The pasture of the analyzed grasslands was estimated as being of a medium value, which required the application of value-adding works aimed at biodiversity conservation and improvement. The works consisted in destroying the molehills and removal of the woody vegetation, autumn and spring fertilization. The experiment used both mineral and organic fertilizers. The overseeding was carried out to make a mixture of fodder plants suitable for mixed exploitation. This was done both to cover the vegetation-free areas following the destruction of the moss and wood vegetation and to improve the floral composition using a mixture consisting of: *Poa pratensis*, *Festuca pratensis*, *Trifolium repens*, *Lotus corniculatus*.

The impact of these works on the analyzed grassland showed an improvement in production and forage quality, which required special attention to biological resources and the use of organic materials as strategies of the sustainable management adopted in grassland agroecosystem [4].

The evolution of floristic composition throughout the experimental period, both in the variant used for haymaking and the grazing one, showed that plants belonging to Poaceae family were predominant among the participating species, followed by Fabaceae and other botanical families. Analyzing the evolution of the main plant species within each participating group (Table 1), we see that the following Poaceae species were predominant: *Festuca rubra* (27% in V<sub>2</sub> and 32% in V<sub>3</sub>), followed by *Agrostis capillaris* (8% in V<sub>2</sub> and 9% in V<sub>3</sub>) and *Poa pratensis* (6% in V<sub>2</sub> and 5% in V<sub>3</sub>), the other species being under-represented. For the Fabaceae family, the share of the species was fairly uniform, with a slight predominance of *Trifolium repens* (6% in V<sub>2</sub> and 5% in V<sub>3</sub>), followed by *Lotus corniculatus*

(6% in V<sub>2</sub> and 3% in V<sub>3</sub>). The plants belonging to other botanic families included both fodder species, such as *Achillea millefolium* (4% in V<sub>2</sub> and 6% in V<sub>3</sub>) and *Taraxacum officinale* (3% in V<sub>2</sub> and 3% in V<sub>3</sub>), as well as other species

*Veronica chamaedrys* (8% in V<sub>2</sub> and 9% in V<sub>3</sub>) or soil-acidity indicators such as *Campanula abietina*, *Rumex acetosella*.

Table 1. Calculation of the pasture value over the entire experimental period

| Species   | V1 – unfertilized |      |            | V1 – manure 20 t/ha |      |              | V3 – N <sub>50+50</sub> P <sub>50</sub> K <sub>100</sub> |     |              |
|---|-------------------|------|------------|---------------------|------|--------------|--|-----|--------------|
|   | %PC               | IC   | PC x IC    | %PC                 | IC   | PC x IC      | %PC  | IC  | PC x IC      |
| <b>Poaceae</b>                                  | <b>67.0</b>       |      |            | <b>62.0</b>         |      |              | <b>70</b>  |     |              |
| <i>Festuca rubra</i>                            | 30.0              | 3    | 90.0       | 27.0                | 3    | 81.0         | 32.0   | 3   | 96.0         |
| <i>Antoxacum odoratum</i>                       | 7.0               | 1    | 7.0        | 3.0                 | 1    | 3.0          | 4.0  | 1   | 4.0          |
| <i>Agrostis rupestris</i>                       | 5.0               | 1    | 5.0        | 6.0                 | 1    | 6.0          | 4.0  | 1   | 4.0          |
| <i>Agrostis capillaries</i>                     | 4.0               | 3    | 12.0       | 8.0                 | 3    | 24.0         | 9.0  | 3   | 27.0         |
| <i>Briza media</i>                              | 4.0               | 1    | 4.0        | 1.0                 | 1    | 1.0          | 2.0  | 1   | 2.0          |
| <i>Cynosurus crestatum</i>                      | 3.0               | 3    | 9.0        | 2.0                 | 3    | 6.0          | 3.0  | 3   | 9.0          |
| <i>Pheum alpinum</i>                            | 3.0               | 2    | 6.0        | 3.0                 | 2    | 6.0          | 4.0  | 2   | 8.0          |
| <i>Poa pratensis</i>                            | 2.0               | 3    | 6.0        | 6.0                 | 3    | 18.0         | 5.0  | 3   | 15.0         |
| <i>Nardus stricta</i>                           | 6.0               | x    | X          | 1.0                 | x    | X            | 2.0  | x   | X            |
| <i>Festuca rupicola</i>                         | 3.0               | 1    | 3.0        | 2.0                 | 1    | 2.0          | 2.0  | 1   | 2.0          |
| <i>Trisetum flavescens</i>                      | -                 | -    | -          | 3.0                 | 4    | 12.0         | -  | -   | -            |
| <i>Poa annua</i>                                | -                 | -    | -          | -                   | -    | -            | 3.0  | 2   | 6.0          |
| <b>Leguminous plants</b>                        | <b>17.0</b>       |      |            | <b>21</b>           |      |              | <b>12</b>  |     |              |
| <i>Trifolium repens</i>                         | 3.0               | 4    | 12.0       | 6.0                 | 4    | 24.0         | 5.0  | 4   | 20.0         |
| <i>Trifolium pratense</i>                       | 3.0               | 4    | 12.0       | 4.0                 | 4    | 16.0         | 2.0  | 4   | 8.0          |
| <i>Trifolium alpestre</i>                       | 5.0               | 2    | 10.0       | 4.0                 | 2    | 8.0          | 1.0  | 2   | 2.0          |
| <i>Lotus corniculatus</i>                       | 4.0               | 4    | 16.0       | 6.0                 | 4    | 24.0         | 3.0  | 4   | 12.0         |
| <i>Genista tinctoria.</i>                       | 2.0               | x    | -          | 0.5                 | x    | X            | 1.0  | x   | X            |
| <i>Oxalis acetosella</i>                        | -                 | -    | -          | 0.5                 | x    | X            | -  | -   | -            |
| <b>Other families</b>                           | <b>16.0</b>       |      |            | <b>17</b>           |      |              | <b>18</b>  |     |              |
| <i>Achillea millefolium</i>                     | 5.0               | 2    | 10.0       | 4.0                 | 2    | 8.0          | 6.0  | 2   | 12.0         |
| <i>Alchemila vulgaris</i>                       | 2.0               | 2    | 4.0        | 2.0                 | 2    | 4.0          | 3.0  | 2   | 6.0          |
| <i>Taraxacum officinale</i>                     | 2.0               | 2    | 2.0        | 3.0                 | 2    | 6.0          | 3.0  | 2   | 6.0          |
| <i>Leontodon autumnalis</i>                     | 1.0               | 1    | 1.0        | 1.0                 | 1    | 1.0          | 1.0  | 1   | 1.0          |
| <i>Plantago lanceolata</i>                      | 2.0               | 2    | 4.0        | 2.0                 | 2    | 4.0          | 2.0  | 2   | 4.0          |
| <i>Plantago media</i>                           | 2.0               | 2    | 4.0        | 1.0                 | 2    | 2.0          | 1.0  | 2   | 2.0          |
| <i>Veronica chamaedris</i>                      | 1.0               | x    | -          | 1.5                 | x    | X            | 0.5  | x   | x            |
| <i>Runex acetosela</i>                          | 1.0               | x    | -          | 1.0                 | x    | X            | 0.5  | x   | x            |
| <i>Potentilla erecta</i>                        | -                 | -    | -          | 1.5                 | 1    | 1.5          | 0.5  | 1   | 0.5          |
| <i>Campanula abietina</i>                       | -                 | -    | -          | 0.5                 | x    | X            | 0.5  | x   | x            |
| <i>Luzula luzuloides</i>                        | -                 | -    | -          | 0.5                 | x    | X            | -  | -   | -            |
| <b>TOTAL</b>                                    | <b>23</b>         |      | <b>216</b> | <b>28</b>           |      | <b>259.5</b> | <b>26</b>  |     | <b>247.5</b> |
| Pasture value                                   | 43                |      |            | 51.9                |      |              | 49.5   |     |              |
| Pasture value assessment / UVM*ha <sup>-1</sup> | Average           | 1.12 |            | Good                | 3.02 |              | Average-good   | 2.9 |              |

Source: Own determinations.

The evolution of the floristic composition stressed that the application of measures to improve permanent natural grasslands contributed to biodiversity conservation and improvement, acting both for the conservation and improvement of natural resources, and the improvement of grassland quality and

profitability. Thus, Table 1 shows an increase in number of the species on the grassland from 23 species in the controls to 28 species on the manure-fertilized grassland and 26 species into the mineral-fertilized soil. This shows the method of integrating the activities of agrifood and agricultural products in the sense of

biodiversity preservation and increase by observing sustainable development principles. Grassland biodiversity is influenced by several management factors, among which fertilization, oversowing, rational use [2].

In our experiment, the most important impact on grassland biodiversity resulted from organic fertilization (Table 1), manifested both in its structure, by an increase in number of species, and in the floristic composition, by the increase in share of valuable plants [8,9].

## CONCLUSIONS

Sustainable development of the grassland agroecosystem is complex and long, requiring an organized application of complex measures and works ensuring soil protection and a sustainable protection of the degraded lands. Reconstruction of a permanent grassland in the analyzed area is necessary, due to the level of degradation.

This measure should be directed towards adoption of specific measures aimed at changing soil fertility, favoring the presence of leguminous plants in plant structure and environmental protection.

Land use decisively contributes to sustainable development of the grassland, emphasizing its mixed use by a combination of corresponding fodder plants.

The reconstruction measures applied to the studied grassland led to the change in its natural productivity by the implementation of some specific measures – molehill destruction and removal of woody plants, autumn and spring fertilization both with mineral and organic fertilizers, followed by oversowing in order to obtain a combination of fodder plants suitable for mixed use.

Manure fertilization was an adequate management strategy for biodiversity conservation and improvement.

The evolution of the floristic composition shows that the application of the improvement measures for the permanent natural grassland contributed to biodiversity conservation and improvement both for the conservation and improvement of the natural resources, and the

quality and profitability improvement of the grassland.

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## STRATEGIC MANAGEMENT OF THE RURAL AREA SUSTAINABLE DEVELOPMENT RESPECTING THE PRINCIPLE OF BIOECONOMICS AND ECOECONOMICS AS BASICS FOR PROTECTING THE ENVIRONMENT

Romulus IAGARU, Pompilica IAGARU

Lucian Blaga University of Sibiu, 10 Victoriei, Romania, Phone: +40269216062, Fax:+40269217887, Mobile:+40729950222, Email: romulus.iagaru@ulbsibiu.ro

**Corresponding author:** romulus.iagaru@ulbsibiu.ro

### Abstract

*The development of the rural area, of the rural community respectively, constitutes a complex and up to date research subject because it relies on two basic elements closely interdependent: the source of sustainable resources that may generate development and, the inhabitants of the rural area representing both factor of action and consume as beneficiaries of the development. In this context, the present approach to conduct research leading to the design of strategic options for the development and diversification of the rural economy according to the principles of bio and ecoeconomy is justified and will try to meet the challenge of identifying those elements that lead to integration of the main activities in rural areas (agriculture, aquaculture, fishing, forestry, manufacturing, etc.), and to diversification of the rural economy while maintaining a balance between the need to preserve and promote rural tradition and impending modernization of rural life. It catalyzes the need to identify specific solutions to rural development imposed by its characteristics, by the change across all activities in rural areas and frequent reorganizations, or continuous adaptations to cope with changes produced both in and outside the countryside and which evolve over time and are characterized by dynamic random or unpredictable new elements.*

**Key words:** rural, development, diversification strategy, preservation, modernization, bioeconomy, economy

### INTRODUCTION

In the process of rural development special attention should be given to elements that characterize the authentic rural and give it individuality, specificity and authenticity. These features that form the golden triangle of rural protection and development should be developed and used sustainably, to keep them unaltered [6,8]. Achieving these goals is possible, as it is widely accepted by professionals, with the adoption and implementation of the sustainable rural development concept described as a "process in which the community is actively involved in all initiatives to mobilize their own resources available for the social, economic and ecological benefit of the community" [5]. Characteristic of Romanian rural area, of rural communities, for a long period of time was the abundance of natural resources which resulted in some progress at economic, technical and political level which triggered major changes in the area affecting mainly primary activity -

agriculture with implications for the rural economy and way of life of rural communities and the relationships between rural and urban areas, leading to drastic reduction of natural resources to putting them in danger. All these predict the pace of change for rural regions bringing both challenges and favorable opportunities. So, change is inevitable; sustainable development helps to achieve in an economically responsible way from the environment point of view and equitable from the social point of view and at the same time fighting for keeping the traditions [8].

Under these conditions economic and social concerns of international organizations, of the governments of the contemporary world, of civic organizations, scientists and experts in various fields became more intense with the goal to prevent, "saving" rural degradation. How can sustainable rural development be achieved, is a growing problem today, and we try to give an answer below, noting that a crucial role is the strategic diagnosis in order to develop strategic options of which the most

relevant ones to be selected for adoption and implementation.

Strategic management is the means by which one can adopt the most relevant strategies for sustainable development of rural areas leading to balanced economic development, to the expansion of media and information, to the development of non-agricultural activities, and the establishment of networks and partnerships between national agencies, civil society organizations and international organizations [7].

In this context, the bio-economic and eco-economic approach becomes particularly important for achieving the targets of sustainable development, which emphasizes the need to overlap the ecology of economy, the need to integrate environmental requirements in assessing economic activities [1].

The context in which such changes are implemented is not exactly favorable as the Romanian rural area continues to face "numerous problems both in terms of physical-geographical, demographic, economic, and housing viewpoints and from the point of view of social infrastructure and related services" [3].

The novelty and originality of the work lies in addressing the strategic management of sustainable rural development through the principles of bio and ecoeconomics in formulating, adopting and implementing the most relevant policy options knowing that "critical environmental problems are closely related to scientific, technological and information progress of human society, but at the same time, only the existence of generalized progress of the human race itself can not automatically solve environmental problems that people and accelerated development of mankind since the industrial revolution created.

The decisive factor is the willingness of human society as a whole to solve existing problems" [4].

At the same time one also must not forget that "modern economy should be based on fundamental rules of natural and artificial

ecosystems (anthropogenic or anthropic) to save the in danger planet and civilization" [1].

## MATERIALS AND METHODS

The studies targeted Sibiu Depression – a uniform area that has a remarkable habitat and geoproductive potential that paved the way for the emergence of a particular rural life and culture and an original approach to geographical reality, of relationships between the environment and the humans living in it, using it for their own needs and which, in all probability, they have the duty to give value and new potential [7].

The major objective of the research is the design of strategic options for the development of the rural area based on bio-economy and eco-economy and connected to the rural environment, supported by biodiversity, aimed at solving the problems of the rural area concerning both the rural economy and the protection of the environment.

The research aimed to both identify problems and potential economic development in the context of environmental protection, and to help better targeting policy measures for sustainable rural development.

To achieve the overall objective we identified three specific strategic objectives: (i) Identification of alternatives for economic development in rural areas and designing policy options to promote a unified and coherent set of criteria and principles of sustainable development, innovation and ICT for efficient use of human, natural, energy, material and information resources. (ii) Formulation of strategic recommendations to enhance the adaptation and development process of the rural economy in accordance with the requirements of sustainable development, with the values and global regulations concerning the environment, agriculture and tradition, promoting biodiversity, conservation of the environment and traditional landscape.

(iii) Increasing and stabilizing the rural population's incomes as consequence of the households' engagement in a wide range of

activities corresponding to economic opportunities existing in the micro-region.

## RESULTS AND DISCUSSIONS

To diagnose the countryside in Sibiu Depression PESTEL model was used, whose usefulness is recognized in the context of globalization in that it highlighted some particular aspects of the studied community which allow economic environment adaptation and its resistance to frequent change occurring at the level of the environment [2]. Thus, local factors of rural development acquire the ability to better respond to actual conditions and therefore better develop and implement policies, development strategies, collaborations and consultations with all partners involved in rural development. For a better and more complete knowledge of the socio-economic characteristics of the studied rural area SWOT analyses were used. These methods are commonly used to identify strengths and weaknesses, external opportunities and threats that an organization or units faces [8]. At the basis of the SWOT analysis were the data collected using semi-structured interviews conducted with key local factors and interested parties (stakeholders). Application of the above methods led to the consolidation of the idea that the improvement of the physical infrastructure is considered by the respondents as the most important factor in rural economic development in addition to rural tourism and agrotourism supported by the exceptional tourism potential of the area together with the food industry of tradition in the area contributing to a better recovery of agricultural products. Other considered important factors were improved IT infrastructure, agricultural production and agricultural services. It also can be seen that all stakeholders consider that the strengths of sustainable rural economic development are great tourism and agricultural potential. Beside them, are mentioned two industrial parks, forestry and wood industry and local brands constituting visit cards of the

countryside of Sibiu Depression. The analysis also highlights the problems of sustainable development of rural economy due to the existence of Sibiu Depression in rural areas of weaknesses such as lack of knowledge necessary for attracting European funds for most of the farmers and entrepreneurs, lack of development strategies and sustainable vision in a large number of communities, lack of jobs for young people with higher education and not least poor educational infrastructure in small villages. Among the identified threats the highest scores were recorded the following: lack of action to support businesses in rural areas, local factors inability to create partnerships to attract funds, low interest of farmers to form associations and hence reduced bargaining power which makes, lack of policies and strategies to promote and support the products obtained in the areas, for which they are considered the most powerful threats targeted against development and diversification of the rural economy. What could bring more sustainable rural economic development is the best use of the opportunities manifested in the rural area of Sibiu Depression. Those on which to focus attention are: the development of rural tourism and agritourism, food industry development, public services, agricultural production and infrastructure. Development of public services and tourism infrastructure development are two opportunities that fit well with current international trends aimed at increasing the share of non-agricultural activities in rural areas. Evidence of the most relevant strengths and weaknesses, opportunities and threats enabled a SWOT presenting only the most relevant strengths and weaknesses, opportunities and threats for development and diversification of the rural economy in Sibiu Depression. Based on SWOT document analysis presented above, we showed relatively easy problems of development and diversification of the rural economy, we proceeded to establish the causes for problems by designing a problem – tree (Fig. 1) and to establish solutions to solve them by designing an objectives – tree

(Fig. 2) for the development and diversification of the rural economy in Sibiu Depression.

The data obtained as a result of research conducted on the used methods of analysis

(PESTEL, SWOT and focus group) formed the basis of discussions at a meeting with interested parts of Sibiu Depression which were presented the brief of research results.

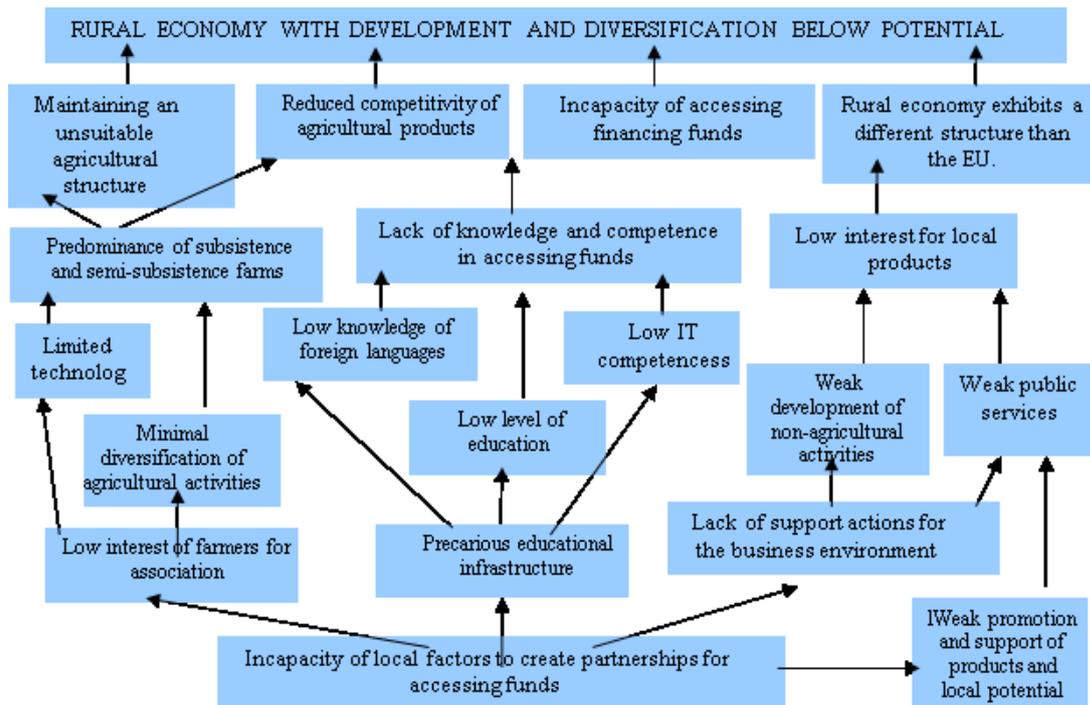


Fig. 1. Problem-Tree for the development and diversification of economic activities in the rural areas of Sibiu Depression

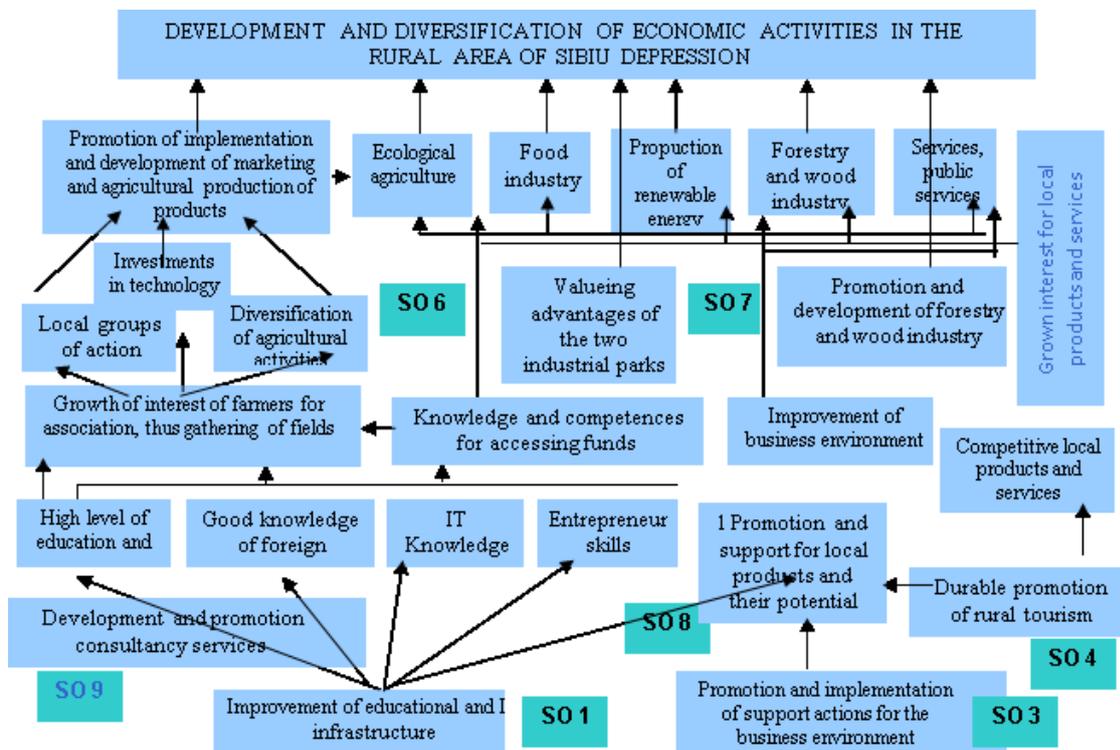


Fig. 2. The objectives-tree for economic activities development and diversification in the rural area of Sibiu Depression

## CONCLUSIONS

The addressed research area is part of the global research where each country in the light of its own experience in the Community and the reality of its own rural communities, is concerned with setting its own goals, strategies and measures for the development and diversification of the rural economy as every rural area is characterized by natural, cultural and spiritual diversity.

The development and diversification of the rural economy is also a strategic tool contributing to the flattening of economic and social disparities that occur in the countryside in different regions, between urban and rural areas of the country, caused by the varying endowment with natural resources, physical, human, financial capital etc.

The present research begins by highlighting the role of the socio-economic analysis in studying rural multidisciplinary scientific context, followed by a strategic approach to rural development with the study of major research methods for the two aspects, the quantitative and qualitative one respectively, and choosing the best for the strategic assessment of the rural area according to its characteristics and ends with the strategic assessment of the rural area of Sibiu Depression for the rural development and diversification of the rural economy representing the case study of the research.

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## CURRENT STATE, DEVELOPMENT OPPORTUNITIES AND PROMOTION OF RURAL AND AGRICULTURAL TOURISM IN BULGARIA

Ivan KILIMPEROV

Agricultural University - Plovdiv, Department of Tourism Bulgaria, 4000 city of Plovdiv, 12, Mendeleev Blvd., +359 32 654 200, Email: i.kilimperov@gmail.com

*Corresponding author:* i.kilimperov@gmail.com

### **Abstract**

*The niche market of rural and agricultural tourism in Bulgaria is underdeveloped, although our country has excellent natural and anthropogenic resources for their development. The rich cultural and historical heritage, the well-preserved nature, the centuries-old traditions and culinary development create prerequisites for a unique rural tourism product. There are also opportunities to create an integrated tourist service based on rural tourism to contribute to some competitive advantages of destination Bulgaria. A key problem in this direction is the low level of popularity of rural and agricultural tourism in Bulgaria. This is complemented by the relatively low level of professional (theoretical) qualification of those who offer rural tourist services. Reserves to overcome this problem can be found in the creation of training demonstration centers. The goal of the paper is to determine the status and opportunities for development and promotion of rural and agricultural tourism in Bulgaria. For the purpose of screening have been used methods such as analysis, synthesis, monitoring and some statistical methods. To sum up, the following conclusions can be made: 1) Bulgaria has the necessary resources and opportunities for development of rural and agricultural tourism; 2) The development of rural tourism in Bulgaria is at a relatively good level; 3) There is a diversity with regard to the accommodation facilities, but this diversity is missing in terms of the services offered; 4) reserves can be sought in improving the quality of the services offered as well as of the accommodation facilities typical for rural tourism] 5) The promotion of the rural tourism product in the country can be achieved by means of developing demonstration centers.*

**Key words:** rural and agricultural tourism, opportunities, integrated tourism, demonstration centers

### **INTRODUCTION**

Rural and agricultural tourism are relatively poorly developed niche markets in Bulgaria, despite the available resources and opportunities for their development. A national strategy has also been developed that includes adequate measures for developing sustainable forms of tourism [10]. One of the opportunities to achieve sustainable development of the regions is the development of rural tourism [6]. Rural tourist services have been developed to a certain level though, but in fact agricultural tourism in Bulgaria is not available. Nevertheless, it can be argued that Bulgaria has the necessary resources for the development of agricultural tourism. Agricultural tourism is placed on an intermediate level between the health of the individual and the influencing factors. This level allows to work both ways, awarding it an important role in the structure of

the quality of life and hence of economic growth [3].

The development of specialized forms of tourism will significantly strengthen the position of the country in the international tourism market. For this purpose an analysis of the current state of rural and agricultural tourism in Bulgaria is needed as well as a necessity to outline the key opportunities for their development and promotion.

It is clear that the so called “massification” of contemporary tourism causes significant problems of economic, social, cultural and environmental character [8].

Having in mind globalization and its effects on tourism, there is an urge for complete change in the tourism product policy [7].

A possible solution is the development of rural tourism in its various forms, the development of an integrated tourist service based on the combination of various forms of specialized

tourism, as well as the development of the “slow tourism” concept [4].

Another means for the development of rural and agricultural tourism, including training of employees in this field, is the development of demonstration centers for rural and agricultural tourism.

It is also possible to bind rural tourist services to the services and animation of the visitors of the city of Plovdiv [2], which has been chosen as Cultural Capital of Europe for 2019.

Therefore, tourist services in the rural areas are able to support local population and communities in developing economic diversity [9].

## MATERIALS AND METHODS

For the purpose of this study a thorough analysis of the registered tourist facilities in the country was conducted. The aim was to bring the current state of the rural and agricultural tourism in Bulgaria.

Since no national statistics are maintained on rural tourist facilities at national level, for the purposes of this study all the registered 3-star facilities operating in rural areas in the country were regarded as rural and agricultural tourist facilities.

For the purpose of screening have been used methods such as analysis, synthesis, monitoring, case study and some statistical methods.

## RESULTS AND DISCUSSIONS

Often rural and agricultural tourism are perceived as synonyms. Despite the close relationship between them – there are certain key specificities that form the specific characteristics of rural tourism, on one hand and agricultural tourism as its variety, on the other hand.

Table 1 shows a summarized information about distribution of registered accommodation facilities in the country as a whole and in villages – by number and relative share, based on the information provided by the Ministry of Tourism.

Table 1. Distribution of accommodation facilities

| Type                | Distribution              |              |               |
|---------------------|---------------------------|--------------|---------------|
|                     | Total number              | In villages  |               |
|                     |                           | In number    | In percentage |
| Bungalow            | 281                       | 68           | 24.20         |
| Country house       | 101                       | 40           | 39.60         |
| Holiday Village     | 7                         | 2            | 28.57         |
| Motel               | 25                        | 5            | 20.00         |
| Camping             | 18                        | 7            | 38.89         |
| Boarding-house      | 20                        | 7            | 35.00         |
| Holiday House       | 140                       | 29           | 20.71         |
| <b>Guest-house</b>  | <b>1,205</b>              | <b>421</b>   | <b>34.94</b>  |
| <b>Family hotel</b> | <b>739</b>                | <b>166</b>   | <b>22.46</b>  |
| <b>Guest room</b>   | <b>2,933</b>              | <b>557</b>   | <b>18.99</b>  |
| <b>Hotel</b>        | <b>1697</b>               | <b>268</b>   | <b>15.79</b>  |
| Hostel              | 17                        | 1            | 5.88          |
| <b>Total</b>        | <b>12,494<sup>1</sup></b> | <b>1,571</b> | <b>12.57</b>  |

<sup>1</sup>Total number of the registered accommodation facilities in the country.

Source: Ministry of tourism (electronic registers)

The share of accommodation facilities in villages, in percentage, is presented in Fig.1.

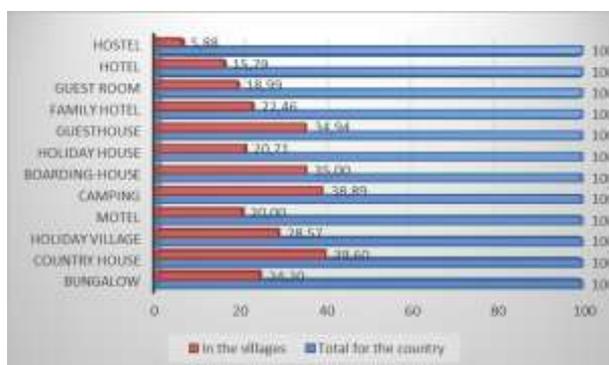


Fig. 1. Relative share of accommodation facilities in villages (by type of accommodation)

No small part of the facilities serve the tourists on the Black Sea coast. The conclusion is that the niche market of rural tourism in our country is undeveloped. It is also worrying that the existing rural tourist facilities are mainly focused on hotel services, i.e. accommodation, without the specific rural animation, which has its own explanation.

Another rather negative observation is that the share of rural guest-houses is only 34.94%, including those on the Black Sea coast. Similar, even worse is the situation in family

hotels. Their relative share in villages is 22.46%.

These results are graded as rather negative due to the fact that guest-houses and family hotels constitute the main accommodation option of rural tourism as well as for the agricultural tourism.

The share of the different types of accommodation in rural tourism is varied and relatively balanced, at least in terms of the main types. It is understandable – the largest is the share of guest rooms (35.46%), followed by guest-houses with a relative share of 26.80%, hotels and family hotels, respectively with shares of 17.06% and 10.57%.

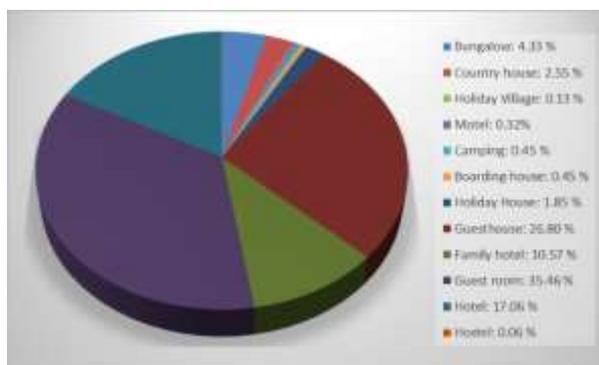


Fig. 2. Relative share of accommodation facilities in villages (by type)

According to the data from the Ministry of tourism, the significantly larger share belongs to the family hotels, because some of the accommodation facilities, registered as “hotels”, are in fact family hotels and are included in the Hotel Register.

The high relative share of the guest rooms, to a larger extent, describes the key features of the rural tourism product offered in Bulgaria, namely – the main service, “accommodation”, with minimal commitment on behalf of the tourist facilities’ owners to their guests and the time spent in the relevant town or village.

To a large extent these results are due to the fact that nearly 38% of registered accommodation facilities in the Bulgarian villages are located in the Black Sea region, which also determines the characteristics of the offered service. The main service is “the accommodation”, while some hotels offer meal options to their guests.

The situation with respect of the classification of accommodation facilities is also unfavorable. Although, in general terms, the hygienic and domestic conditions of rural tourism in Bulgaria are at a relatively high level, as it is obvious from the figures below – lower star-rated facilities are predominant.

According to the Bulgarian legislation, the main accommodation facility in rural tourism – family houses, family hotels, guest rooms - is rated up to three stars. However, the highest category (three stars) is the least represented one. This is obvious from the analysis carried out of the main accommodation facilities in villages – guest-houses, family hotels, hotels and guest rooms.

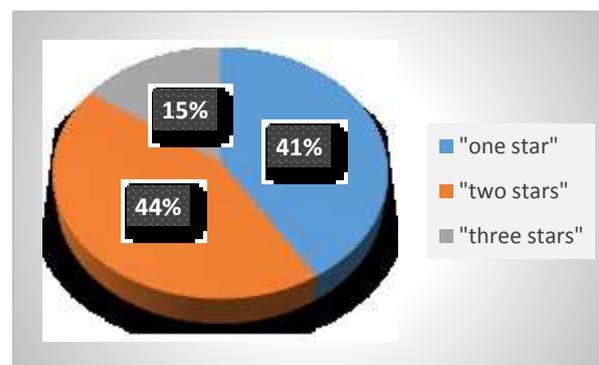


Fig. 3. Distribution of guest-houses by star rating, in percentages

As shown in Figure 3, the guest-houses are dominated by the share of two-star houses: 44%. One-star rated facilities constitute 41% of the guest-houses registered in villages. The share of the highest-rated accommodation facilities of this type – three stars, is only 15%. The situation of the family hotels in relation to the highest rated category is similar (Figure 4). Here, the domination of the three-star family hotels is even more pronounced with a relative share of 52%, followed by the two-star family hotels with a share of 35%. The accommodation facilities of this type, rated as three-star facilities - the highest for this type - is only 13%.

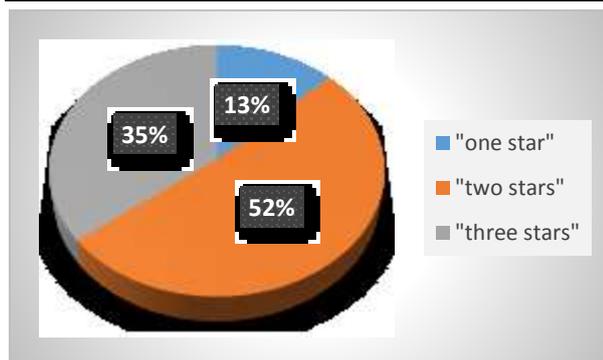


Fig. 4. Distribution of family hotels by star rating, in percentages.

The analysis continues with the distribution of the hotels, which is relatively more balanced; this is most likely due to the fact that a large part of them are close to established tourist destinations, which requires a higher rating. The distribution by star-rating is shown in Figure 5.

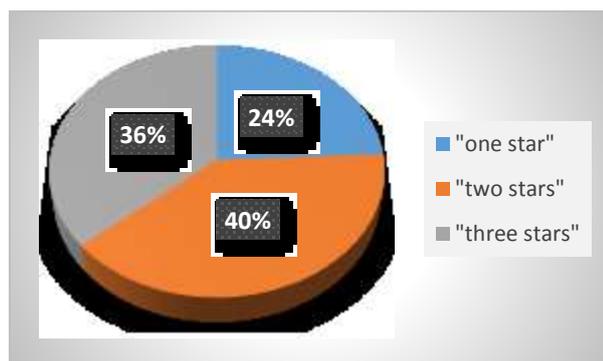


Fig. 5. Distribution of hotels by star rating, in percentages

Again, the two-star hotels are leading, with a relative share of 40%. In this category of accommodation the second position is for two-star hotels and last are one-star hotels. The relative shares are 36% and 24%, respectively. The distribution of guest rooms is shown in Figure 6. According to the Bulgarian legislation the highest rating for them is also three stars, which is least covered among the guest rooms registered in villages, with a relative share of only 8%. Another fact is that about 70% of them serve tourists on the Bulgarian Black Sea coast.

The two-star rooms have the predominant share of this type of accommodation, with a relative share of 51%. Two-star hotels are with a relative share of 41%.

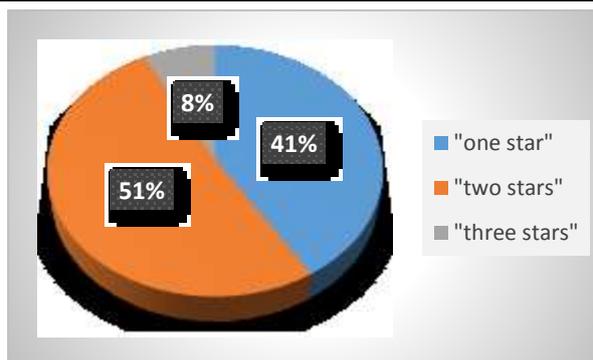


Fig. 6. Distribution of guest rooms by star rating, in percentages

Based on the current available information the following conclusions can be drawn regarding the state of the rural (and agricultural) tourism in Bulgaria with regard mostly to the accommodation facilities and their functional organization, which is positively correlated to them, as well as to the rural tourist services offered in them:

- Of all the registered accommodation facilities in the country, the share of those in villages is only 12.57%, which gives reason to argue that the niche market of rural (and agricultural) tourism in Bulgaria is poorly developed;
- With regard to the main types of accommodation, typical for rural and agricultural tourism, i.e. guest-houses, family hotels, hotels (rated up to three stars) and guest rooms, there is also a comparatively low relative share compared to the total accommodation facilities registered in the country, which is aggravated by the fact that a large part of these facilities are registered in the Black Sea villages;
- In the distribution by type of accommodation facilities in villages, unsurprisingly (in view of the territorial distribution - the villages of the Black Sea are predominant) the guest rooms are predominant, followed by the guest-houses, hotels and family hotels;
- Based on the predominant forms of management of rural tourist facilities, as well as on their territorial distribution in villages, the conclusion is that with respect to the services offered by them the focus is on the main tourist services – accommodation and meal, given that a large number of facilities do not even offer meal;

-The commitment of the tourist facilities' owners to their guests is low;

-Specific rural animation – activities related to the village daily life – agriculture, holidays, folklore, specific cuisine, etc. are not available, or are available to a very low extent;

-Low-rated main types of accommodation facilities are predominant – guest-houses, family hotels, guest rooms and hotels, as the most strongly represented in all groups are the two-star facilities;

-The availability of a lower-rated accommodation facility and weak owners' commitment to their guests is an attestation as to lower the service prices;

-An image is created of cheap rural tourism destinations and low quality services;

In addition to the above-mentioned conclusions, a number of other ones can be drawn up in relation to the current state of the rural tourism in Bulgaria.

Many problems related to the development of rural and agricultural tourism can be derived, but there are those whose solution should be of the highest priority. As a whole, agricultural tourism is not developed in Bulgaria, therefore it is largely meaningless to bring forth problems related to its development and, respectively, the search for opportunities to solve them.

It is absolutely not the case when it comes to rural tourism. Despite the limited supply of rural tourist services, as well as the prevailing lower-rated facilities, there is still some development of rural tourism. The problems mentioned below (without pretending to be fully comprehensive) can be classified as priority ones to be solved out, which is the basis for developing and offering a high-quality and competitive rural tourism product. The following main problems can be determined:

-Lower-rated accommodation facilities are prevalent – requirements to the projects under Measure 6.4;

-lack of informal institutions;

-poor infrastructure and tourism superstructure;

-sometimes there is lack of adequate state policy - allocation of funds; decentralization of

structures in the regions; strategy for development of rural regions, rural and agricultural tourism;

-unification by star-rating system;

-the rural tourism is not sufficiently reflected in the National Strategy for sustainable development of rural tourism;

-insufficient and at times inadequate action by the non-governmental organizations;

-funding;

-Social tourists

-lack of knowledge of the philosophy of rural tourism and its product on behalf of those who offer rural tourist services as well as on behalf of the employees in state institutions and some of the lecturers in the universities;

-misunderstanding of the nature of rural tourism by consumers themselves;

-Lack of qualified personnel – commitment to vocational training and university education;

-Lack of an adequate system for evaluating the opportunities for development of rural and agricultural tourism in order to determine regions that have priority to receive subsidies, etc.

Reserves to solve some of these problems can be sought in the increase of the quality of the offered services, specialization of the service, by building on traditions, customs, culture, culinary and agricultural development. For this purpose it is necessary the owners and service personnel engaged in rural and agricultural tourism to have a high level of qualification. It is also necessary the consumers themselves to have a high level of knowledge of the product and its advantages.

Demonstration centers provide good opportunities in this respect. In Bulgaria, however, there are no such centers, hence the idea can be perceived as an innovative for the country. The idea is to establish integrated demonstration centers for rural tourism and organic farming [5], where to demonstrate the traditions in the field of agriculture, responding at the same time to the modern requirements of consumers regarding the high-quality and ecological characteristics of the food offered. There are also opportunities for demonstrations in the field of rural tourism by means of re-creating rural houses typical for the respective

regions, observing the architectural and construction traditions. Emphasis is placed on the demonstration of dishes (with products produced in the farm), holidays, customs, rituals and rites typical for the respective region. The ultimate goal is to demonstrate full tourist service based on the philosophy of rural tourism.

Another opportunity to promote the services of rural and agricultural tourism is to combine them with services from other forms of specialized tourism. The idea includes the establishment of an integrated tourist service based on the expansion of popular tourist services such as Spa, Wellness, etc., with services typical for the rural, agricultural, ecological, cultural, etc. types of tourism [1].

## CONCLUSIONS

To sum up, the following conclusions can be drawn:

- Bulgaria has the necessary resources and opportunities for development of rural and agricultural tourism;
- The development of rural tourism in Bulgaria is at a relatively good level;
- There is a diversity with regard to the accommodation facilities, but this diversity is missing in terms of the services offered;
- Reserves can be sought in improving the quality of the services offered as well as of the accommodation facilities typical for rural tourism;
- Agricultural tourism in Bulgaria is not developed, despite the available conditions;
- The niche market of rural and agricultural tourism in Bulgaria is poorly developed;
- If integrated demonstration centers are constructed, there will be reserves for improvement of the quality of services offered as well as for preparing highly qualified personnel to work in rural and agricultural tourism;
- The promotion of the rural tourism product in the country can be achieved by means of developing demonstration centers;
- Opportunities for development and promotion of Bulgarian rural tourism product may also be sought in offering an integrated tourist service.

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## RESEARCH ON THE SUPPLY AND CONSUMER DEMAND FOR RURAL TOURISM IN EASTERN RHODOPE

Ivanka LULCHEVA, Krasimir ALEKSANDROV

Agricultural University - Plovdiv, Bulgaria, 4000, 12, Mendeleev Blvd., Plovdiv, Phone: +359 (32) 654 200, Fax: +359 (32) 633 157, Emails: kasienit@gmail.com, ivanka.lulcheva@yahoo.com

**Corresponding author:** kasienit@gmail.com

### **Abstract**

*Rural tourism in Bulgaria is a relatively fast growing and newly-established alternative form of tourism. In recent years, there has been a positive tendency towards increase of the interest in practicing this type of tourism, increase of the number of tourists who have visited rural regions and have used its services, as well as towards diversifying the elements of the offered tourism product. A prerequisite for the sustainable development of rural tourism in Bulgaria and, in particular, in the research territory in the Eastern Rhodopes, is the abundant resource available to our country; already existing or newly established rural regions/villages which contain the main elements of rural tourism – natural and ecological conditions; specific culture, art, folklore; attractive traditions (customs, rituals); authentic cuisine; agricultural and other specific activities. Village holiday market is growing at precisely the time when the future of many rural areas is uncertain due to changes in agricultural policy or the increasing attractiveness of urban life. Rural tourism seems to be among the most suitable tools to revive the dying rural regions, such as the villages and municipalities in the Eastern Rhodopes, as well as to provide opportunities for economic and social development of the regions. The aim of this research is to analyze the tourist services offered as well as the consumer demand for rural tourism in the Eastern Rhodopes. The main methods used in the present study are the inquiry method, the method of analysis and synthesis. The survey was conducted during the period 30.10.2016 - 30.04.2017 and it included 16 questions. 190 questionnaires were correctly filled in and returned. Based on the results achieved in this research we have made some conclusions that may be of great use to the parties concerned, who live in the municipalities in the Eastern Rhodopes, to help them develop the territory as a destination for rural tourism, as well as to the owners and managers of rural tourism facilities to offer a more qualitative, comprehensive and competitive tourism product.*

**Key words:** rural tourism, research, rural tourism supply and demand, Eastern Rhodopes

### **INTRODUCTION**

Tours to villages and rural regions already occupy second place after the seaside holidays. This tendency also applies to Bulgaria. According to the Bulgarian Association for Alternative Tourism (BAAT), the interest in rural areas has intensified. The increase in demand for rural tourism products is about 6%. In Bulgaria the niche market of rural tourism is still not sufficiently busy, although there are significant prerequisites for its development. A part of the tourist facilities that offer rural tourism are a form of diversification of the agricultural production, which contributes to improving the welfare of the families and population in the municipality. Another part of the tourist facilities are specific, specialized, independent organizational forms (economic structures), performing targeted activities in

the field of tourism services. This part includes the following tourist facilities family hotels, guest-houses, boarding houses, etc., which are independent organizational and economic business structures, they have nothing to do with the agricultural farm.

In mountain and rural regions, there is an important production segment in which motivated and innovative entrepreneurs are involved, where tourism is linked to the quality of agriculture and is an economic lever for the growth of the region, as well as a form of protection of the territory that may be at risk. Therefore, tourism services in the rural areas are able to support local population and communities in developing economic diversity. [5]

In the specialized literature a number of authors interpret the essence of “rural tourism” concept and give their definitions.

There is no single, generally accepted, definition for it, but the existing ones can help us bring out some of its basic elements that characterize it: holiday in a rural area; traditions and folklore; traditional dishes; rural lifestyle; contact with nature and people; humanism; agriculture; divergence; "host-guest" connection, etc. [3]

It is exactly the main elements of rural tourism that are the subject of its supply and demand. The consumer interest in rural tourism is determined by several key factors that can be managed.

Rural tourism in the different European countries is organized by taking into account their national specificities: culture, traditions, geographic resources, etc. It is not only the countries, but the individual regions themselves that try to create their own, different model of organization of rural tourism [1].

The aim of this research was to analyze the tourist services offered as well as the consumer demand for rural tourism in Eastern Rhodopes, so we conducted a survey of the opinions and attitudes towards rural tourism in the region of Eastern Rhodopes among the residents of towns and villages in the Plovdiv, Pazardzhik, Stara Zagora and Haskovo regions.

Based on the results achieved in this research we have made some conclusions that may be of great use to the parties concerned, who live in the municipalities in the Eastern Rhodopes, to help them develop the territory as a destination for rural tourism.

## MATERIALS AND METHODS

In analyzing rural tourism supply and the consumer interest in rural tourism in the research municipalities in the Eastern Rhodopes, a two-step approach was applied: A pilot survey and an actual one were conducted. The aim of the pilot survey was to approbate the actual questionnaire and to enrich the overall analysis by introducing additional information as well as more fully to encompass the current state and problems of rural tourism in the research region.

For the successful implementation of the empirical survey on the supply and consumer interest in rural tourism in the research area, a plan was draw up for the organization of the survey and it comprised the following successive stages:

First stage: Sample formation. The population that took part in the survey consisted of individuals, real and potential users of rural tourism product in the research region, regardless of the time of consumption of the service. The survey was conducted with 190 (in planned 205) individuals.

Second stage: Elaboration of a timetable for the conduct of the survey in time. The survey was conducted during the period 30.10.2016 - 30.04.2017 and it included 16 questions. 190 questionnaires were correctly filled in and returned.

Third stage: Development of structured questionnaires.

When developing the actual questionnaire, the corrected and enriched questionnaire of the pilot survey was used as a basis to be applied in the actual survey, as the aim was to ensure purposefulness, completeness and comparability of the data.

The questions were grouped in the following subject blocks and they concerned:

- level of awareness about rural tourist facilities;
- the attracting factors as conditions and prerequisites for rural tourism;
- the factors (motivators) for rural tourism;
- level of satisfaction from the rural tourism.



Fig. 1. The territory of the Eastern Rhodopes  
Source: Ministry of Agriculture, Food and Forests.

## RESULTS AND DISCUSSIONS

The tourism product offered in the research region includes accommodation (bed), meals, entertainment activities, etc.

The main means of accommodation is the rural house - 38.5% of the total number of rural tourist facilities, 20% of the tourist facilities are small family hotels, 18.7% - villas for rent, 17.8% - hotels and country houses. It is exactly the country house and traditional rural lifestyle and atmosphere that is the main focus and essence of the rural tourism concept. That is why the country house is the facility to provide this specialized type of tourism. The combination of a country house and a small hotel is also positive - 17.8%.

The majority of the rural tourist facilities – 42.7% of the total number - offer accommodation and meal – the two main elements of the tourism product, which means a more comprehensive tourism product and better service for tourists. The traditional local cuisine reflects the culture of the local population and is an element of the regional development as well as an important tourism resource.

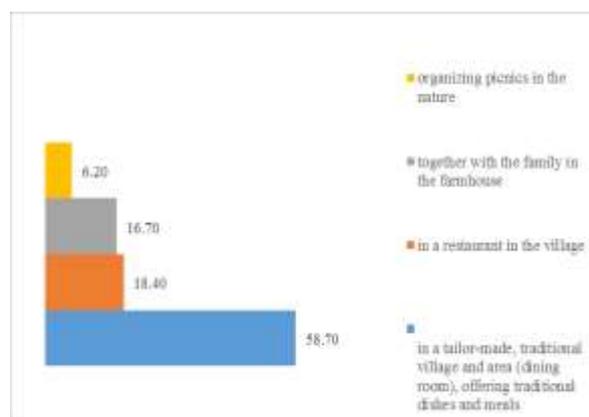


Fig. 2. Answer to the question: „How is eating organized?“, (%)

Source: Own research.

Particular attention must be paid to the possibilities for the production, certification and marketing of high-quality local food, and imposing a local trademark of traditional agricultural products of a given region (terroir) [4].

Nearly 20% of the tourist facilities use their own infrastructure for arranging

accommodation only. A more complete tourism product – accommodation and meal plus attractions and entertainment is offered only by 16.5% of the rural tourist facilities.

The meal, being a main element of the tourism product, in the majority of tourist facilities was organized according to the rural tourism concept - traditional regional food and dishes were served in a specially arranged, unique, traditional dining-room (58.7%). The other option of organizing the meal was also in line with the rural tourism concept - together with the family in the country house - 16.7%. Or, a total of 75.4% of the owners organized rural tourism radically different from the mass one, and it contained in itself the two main elements of the rural tourism product. Many traditional dishes and products are threatened by extinction due to the globalization and industrialization of agriculture. Rural tourism supports the “slow life” concept. Its general health effect on human body is invariably associated with the slow eating as counterpoint and antipode of the low-quality fast food which is of no particular nutritional value. [2]

The organization of the additional element to the tourism product - attractions and entertainment activities for tourists was also in line with the intrinsic characteristic of rural tourism. The location of tourist facilities makes it possible for the visitors to be close to nature. The unique natural landmarks, the rich historical heritage, architectural and cultural assets that date back from the prehistoric, antique, medieval and Bulgarian national revival periods in the research region are a priceless potential resource for rural tourism development. This is one of the main motivating factors for tourists to visit and choose these tourist facilities. 27.7% of the tourist facilities organized walks in the nature at the request of the tourists. Almost the same is the number of those interested in getting acquainted with the local historical and cultural landmarks. 12.4% of the tourists preferred these tourist facilities because of the possibility to carry out health-strengthening procedures – eco walks, playgrounds for sport, horse, donkey and mule trail riding in the mountain, cycling, etc. More than 75% of the consumers

looked for an additional service. That is why the organization of additional services such as: excursions in the nature, to historical and cultural landmarks, organization of sports events, ethnographic and cultural initiatives, etc. may result in increase of the interest in the respective tourist facility as well as in increase of the number of consumers of rural tourism product.

From the survey carried out, it can be summarized that the potential of the Rhodope villages and the surrounding countryside is not fully exploited. Only 16% of the owners perceived the additional activities as part of the comprehensive tourism product – main activity.

The research reveals the main motivating factors that govern the consumption of tourism product. Nearly half of the consumers of rural tourism (47.5%) visited tourist facilities in these municipalities because of the atmosphere and the service they were offered in these tourist facilities - traditional Rhodope atmosphere, 21.7% of them visited the region because of the untouched nature and clean air, about 10.9% of them came to explore the cultural and historical landmarks, 10% of them came because of the traditional Rhodope cuisine. 7.4% of consumers were attracted because of the low prices. Only 3.2% were willing to engage in agricultural activities. Most often willingness to participate in agricultural activities is expressed by people whose main profession and work is associated with high neuropsychic overload, static position of the body during daily work, all-day work with computer and work in enclosed spaces. This category of tourists seeks physical movement, relaxation by means of active agricultural work, in addition to the other elements of rural tourism product. The majority of rural tourism lovers do not show interest in participating in agricultural work. This fact is also indicative for the insufficient development of agricultural tourism.

It is notable that very often the reason for choosing a particular tourist facility is not a single factor but a number of them. In particular, for the research municipalities in the Eastern Rhodopes the main motivating factors

were the opportunity for the consumers to be in the countryside, in a different, authentic, traditional Rhodopes atmosphere. The combination of nature, history, culture, traditions multiplies these motivating factors. The complete correspondence between expectations and experience guarantees an expected effect for the tourists from their trip, visit and experience. This effect is even more important for the owner and manager of the tourist facility because it will lead to a repetition of the visit, to attraction of new customers, and will generate more incomes and profit.

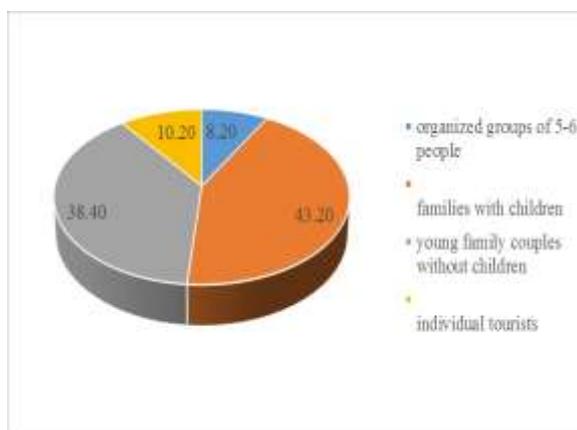


Fig. 3. Answer to the question: „Which types of tourists most often visit your sites?“(%)  
Source: Own research.

Regarding the age structure of visitors, the research shows that young people, aged between 31 and 44, were prevalent. They were 36.5% of the total number of visitors. These were working people, who came mainly on weekends. The natural and anthropological landmarks in the region attracted a large number of older visitors – aged between 45 and 59. They were 27.7% of the total number of visitors. They were also in working age and chose for their weekly rest the atmosphere of the Rhodope village. Nearly 20% of the total number of visitors were young people – aged between 16 and 30 years, who diversified their holiday by staying at rural tourist facility in the Rhodope villages. The low proportion of people over 60 years can mostly be explained by a shortage of financial resources. 70% of the visitors have higher and secondary education.

The share of visitors who have primary education is high – 26% .

Regarding the organization of the visit, the research found out that nearly half of the visitors were married couples with children – 43.2%. The share of young married couples without children is also high – 38.4%. These data are indicative of the genuine desire in young people to get acquainted with and to explore the history, culture and traditions in the different ethnographic regions. Rural tourist facilities were less frequently visited by organized groups of 5-6 people. - only 8.2% of the total number of visitors. Almost the same is the number of the individual visitors. The prevalence of married couples who seek rural tourism product is a very positive phenomenon. It is a prerequisite for strengthening the family and at the same time it provides a healthy family atmosphere for children and instills in them love for the family traditions, patriarchal spirit and preservation of Bulgarian identity.

Since the majority of visitors were in working age, it is logical to have a high relative share of visits during the weekend – 47.3%. Non-working people visited the region mainly on weekdays. There is already a tradition in Bulgaria: to “escape” from home when there is a larger number of public holidays. On the positive side, a large number of Bulgarians prefer to stay in the country. 36.5% of the total number of visitors of the rural tourist facilities in the Eastern Rhodopes visited the region precisely at this time.

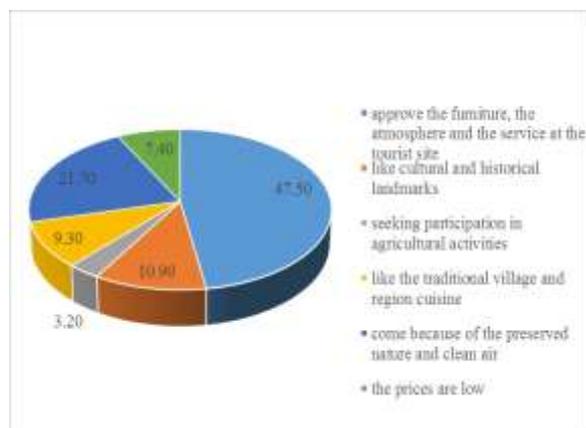


Fig. 4. Answer to the question: „What is the main reason your users choose your site?“, (%)

Source: Own research.

The tourists from the country prevail – 63.7%, from EU countries – 12.4%, from neighboring Greece, Macedonia and Romania – 14.2%. Summer is the most desired holiday season in the Rhodope villages – 43.2% of the total number of visitors. About 23% of the visitors came in spring and autumn. A rural tourist facility promotes itself mainly by producing advertising materials - brochures, catalogues and prospectuses – 42.6% of the facilities, 25% - through the Internet, 15% - through travel agencies.

From the literature review regarding the nature of rural tourism it becomes clear that the main elements of its content, which are the motives for its implementation, are: learning, recreational, social and economic motive, questions in that direction were included in the survey. According to the consumers in the survey, the first reason to make the holiday in the rural area attractive, was "the presence of a typical rural lifestyle and unique rural environment". In the contemporary modern, urbanized society the life of the individual can be described as dynamic, stressful and hectic. Hence the need emerges to escape from this dynamics and hectic environment and to head to another, totally different, simpler and more peaceful world. The authentic rural environment offers a different experience; it heightens the idyllic feeling that you are part of the surrounding untouched nature with all its colors, diverse flora, fauna, relief, etc. It is in this environment that the recreation process takes place - the recovery of our body and soul. The possibility of solitude amidst a clean and beautiful natural environment attracts a large number of tourists. Therefore, if promotional packages of the tourist facilities include additional services, such as mountain trekking, field walks, walks among vineyards and orchards, mountain meadows and pastures, it will attract a large number of visitors, especially young people. A great number of tourists, lovers of rural tourism, indicated the price of the tourist service as one of the factors to prefer rural tourism to the conventional, traditional one. According to the data, the accommodation in a rural setting is considerably cheaper for the tourists than a

holiday in a large, though not so luxury, hotel. The fact that the financial motive is one of the factors for the development of rural tourism is not undermined in the literature about rural tourism. The tourism market has a very large number of potential consumers who practice rural tourism because they cannot afford higher costs to organize their holiday.

From the answers to the questions in the questionnaire it has become clear that a great number of tourists looked forward to the additional activities to enrich their experience, their professional and hobby interests, to satisfy their curiosity. The more diversified the structure of the rural tourist product is, the more abundant the opportunities offered are, the greater is the consumer demand for the rural tourist product. This requires consolidation – formal and informal, of the owners’ efforts – hoteliers, restaurateurs,

managers, entrepreneurs in the field of entertainment and other cultural activities, local authorities, etc., in order to promote and present a quality and comprehensive tourism product. The Rural Development Program has introduced the “integrated rural tourism” concept, with a view to further expanding and enhancing the content of rural tourism and the rural tourist product. This broader range should include all types of tourism that can be carried out in a given rural region. In this way, according to the Rural Development Program, an opportunity will be created for tourism activities to be developed more comprehensively and coherently, also it will be possible to attract more investments, to support the private initiative, to more fully absorb project and program financial funding, thus the existing differences between the different regions will be gradually deleted.

Table 1. Ranking of tourists' preferences (rural tourism) in the Eastern Rhodopes

| Rank | Young single people       | Young married couples Age 30-40 | Married couples Age 40-50        | Elder people Age 50-65                          | Tourists above the age of 65       |
|------|---------------------------|---------------------------------|----------------------------------|---|------------------------------------|
| 1    | mountain trekking         | passive recreation              | nature walks                     | sightseeing tours                               | nature walks                       |
| 2    | dinner near the fireplace | local cuisine                   | getting acquainted with the farm | traditional meal                                | passive recreation                 |
| 3    | attending a restaurant    | nature walks                    | local cuisine                    | passive recreation                              | getting acquainted with old crafts |
| 4    | sightseeing tours         | mountain trekking               | passive recreation               | getting acquainted with the family and the farm | sunbathing                         |
| 5    | passive recreation        | attending a restaurant          | excursions                       | sunbathing                                      | local cuisine                      |

Source: Author's study in the Eastern Rhodopes

From the survey carried out it has become clear that almost all tourists who stayed at a house with a yard and farm, above all, looked for recreation and rest. Passive recreation and sunbathing were among the preferences of tourists, no matter where they have ranked them. Mountain trekking and mountain walks were a preference of tourists from all age groups. Since the guest-houses and family hotels in the research region do not offer any specific additional services, logically, they were visited by people who looked for a holiday in the beautiful mountain. There were relatively few tourists who had come to the

region to look for cultural and historical landmarks. The tourists from both elder groups showed interest in the farm and old crafts. The tourists of younger age sought the diners near the fireplace or a visit to a restaurant or other entertainment venue.

The villages in the research region are surrounded by unspoiled landscapes, there are a number of natural phenomena, eco walks, marked starting points for hiking and mountain trekking. In order to develop rural tourism and to attract tourists, the available tourism resources located on the territory of the Eastern Rhodopes must be brought to and maintained

in good condition. The next step is to turn these resources into tourist attractions. To prepare advertising prospectuses of these places, and to deliver these to travel agencies, tour operators, to be displayed somewhere prominently, in the foyer of the guest house or the family hotel, so that all visitors can see them, get acquainted with them and be intrigued to see these places, to get to know and learn more about them. The municipality should also utilize even the smallest resource in the region and turn it into a “pulling power” to attract tourists.

## CONCLUSIONS

The main accommodation facility is the country house and the supply of traditional rural lifestyle and atmosphere is the main focus and essence of the rural tourism concept. A total of 75.4% of the owners organized rural tourism radically different from the mass one, and it contained in itself the two main elements of the rural tourism product - accommodation and meal.

From the survey carried out, it can be summarized that the potential of the Rhodope villages and the surrounding countryside is not fully exploited. Only 16% of the owners perceived the additional activities as part of the comprehensive tourism product – main activity.

The consumers, when choosing a tourist destination, are guided by reasons and needs which can be satisfied by the elements of the rural tourism product;

Now, based on this research, a profile of the average consumer of the rural tourism product can be drawn up: it is the average Bulgarian, educated, living in urban conditions, with medium to high incomes, their opinion has great importance and influences the organization of rural tourism. This profile gives reason to believe that in the future the demand for this type of tourism will grow.

The demand for an integrated tourism product combining in itself rural tourism and elements of balneotherapy, culturally-informative and recreational mountain tourism, is increasing. This requires consolidation – formal and informal, of the owners’ efforts – hoteliers,

restaurateurs, managers, entrepreneurs in the field of entertainment and other cultural activities, local authorities, etc., in order to promote and present a quality and comprehensive tourism product.

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## STUDY REGARDING CERVIDAE EVOLUTION, IN GIURGIU COUNTY, BETWEEN 2006 - 2015

Marius MAFTEI, Elena Narcisa POGURSCHI, Iulian VLAD, Lucia NISTOR

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti, District 1, 11464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40744 6474 10, Emails: mariusmaftei@gmail.com, elena.pogurschi@gmail.com, vladiul@yahoo.com.

**Corresponding author:** mariusmaftei@gmail.com

### Abstract

*This is just a partial study for an ample research regarding evolution of species from Cervidae family in Romania. The programme is developed in collaboration with Romanian Hunter's Federation. The main purpose of this study is to reveal the reality, to find causes and to elaborate long term strategies in direction of biodiversity conservation, especially for wild game. In the last years the Romanian hunters indicate that the number of roe deer population decreasing, because of intensive agriculture and also because of high number of predators (bear, wolf and lynx population). The analysis is based on the official data from national evaluation of sedentary game in Giurgiu County. Hunting territories in this area are managed by National Forest Authority, county associations of hunters and other associations for conservation of biodiversity and management of hunting territories. The real cervidae livestock was analyzed between 2006 and 2015 by county, and sex, and in comparison with the optimal livestock (maximal number of individuals who can leave in a hunting area without causing damage to the agricultural fields or in the forest). Considering the new agricultural techniques and technologies it is relatively normal to find a numerical depreciation of wild game. In analysed period in Giurgiu County, the cervidae populations is good and representative. Also, there were analyzed the differences between what can be seen in hunting territories and what is reported. As a conclusion, the official evaluation is not perfect and the problem is to put together population from fence area (intensive growth) with the population from free area. In this case, it is needed to evaluate exactly the livestock and to developed a long term strategy for conservation of biodiversity.*

**Key words:** cervidae, evaluation, game, Giurgiu

### INTRODUCTION

It is a certitude that in the hunting areas the number of game species has decreasing. This situation was detected by hunters, no matter the hunting territories that they used for hunting. All over the world, scientific organizations, hunter's associations and organizations involved in environmental protection collaborate in the direction of conservation of the environment and biodiversity, implicitly in the protection of wildlife. The subjects of this researches are mainly the members of cervidae species. A lot of researches have as principal subject the red deer, especially in North America and in North – Western European countries. The themes aim are deep, detailed topics, mainly focused on the influences of the special and general environment on behavior, growth rate, etc., as well as pathological aspects. So, in Scotland, S.D. Albon, F.E.

Guinness, T.H. Clutton-Brock, studies the influence of climatic variation on the birth weights of Red deer [1]. In Slovakia, Trdan S., Vidrih M., Vesel A., Bobnar A., shows that, at the forest border, because of red deer grazing, the herbal production is damaged with 50% [14]. In this case, probably they have a big density or it is a temporary agglomeration. In 2000, J. Slate L., E. B. Kruuk, T. C. Marshall, J. M. Pemberton, T. H. Clutton-Brock, analyzing a red deer population in the Islands of Rum (Scotland), demonstrate that inbreeding depression influences lifetime breeding success in wild population of red deer [13]. In Europe, a big project was "Big carnivores in Carpathians" (1995-2003) developed by WWF in Romania. The aim of this project was to analyze the wild livestock of brown bears, wolves, lynx and wild cat and to determinate the status of this species. The conclusions was that all this four species of predators are

endangered and must be protected. It is interesting that in the middle of '90's, some Romanian researchers show that the Romanian brown bear was the biggest livestock from Europe [4]. More than that, the brown bear real number was almost three times bigger than the optimal number [10] (optimal population – maximum number of individuals who can live in an area without depreciating forest and agricultural crops [8]). Protection of this predators led to decreasing of prey species, especially of that species that cohabitate in the same area with the brown bear and wolf. We refer here especially to red deer and roe deer. In almost the same time, from South, a new predator arrive in Romania: the jackal (*Canis Aureus*). In the past, some individual of *Canis Aureus* was observed in South-East of Romania, more exactly in Dobrogea area, and especially in Danube Delta. But this time, jackals was hunted in Alba County, at more than 400 km from the South border. In comparison with foxes, jackals prefers small game and roe deer and red deer kids. In the absence of a predator, the number of jackals has increased numerically and has expanded vertiginously. It is a fox competitor and, due to superior physiological and morphological characteristics, he became the predominant predator of the roe deer and even red deer, preferring the youth, but not getting back in front of the mature specimens, especially in the case of roe deer. In this situation, when in the field the red deer has become a rarity, and the red deer it is obvious at a lower level, it is a must to know the real livestock and the real evolution of species, in order to developing medium and long-term strategies for the conservation of cervidae species. We cannot leave aside the economic aspects, the deer representing the second species of hunting interest in Romania (after the rabbit) [3], and the deer, by the species characteristics and hunting fees practiced.

Regarding the fallow deer, it is not a autochthonous species. In Romania the fallow deer was imported, for the first time, in centuries I-II, by Romans, being bred in fence area. After barbarians invasion, the fallow deer escape from this fence areas and became

wild[9, 11]. In 1830 fallow deer were colonized in a forest with an area of 4,000 ha, situated along Crisul Negru, (today's territory of Hungary), on the border with Romania. Due to the existence of the wolves, entire stock grew hard. Because of this, in 1900 the forest and a part of the agricultural land has closed. Due to the favorable conditions the fallow deer stock has grown so much that it has created important forest damage. So, after about 15 years (roughly in 1915) the fence area has disbanded and it is supposed that some fallow deer has moved to the forest of Socodor, located at 9-12 km [2]. In 1918 the fallow deer in Romania numbered 500 individuals grouped in nine cores. The only individuals who lived in freedom were at Savarsin and Socodor, Arad County [5].

In 2007, according to the "Report on Romania's state of forests in 2007" the fallow deer livestock from freedom was evaluated at 5,700 specimens [6]. Unfortunately, the economical value and the interest for hunting this species is low. More than that, due to physiological, ethological and morphological characteristics, the fallow deer is a food competitor for roe deer and red deer.

## MATERIALS AND METHODS

It was analyzed the official data from national evaluation of sedentary game in Giurgiu County area, more exactly for roe deer, fallow deer and red deer and it was calculated statistics, in order to have a better view of situation. The hunting territories in this county are managed by National Forest Authority, county associations of hunters and other associations for conservation of biodiversity and management of hunting territories.

It was analyzed the livestock of Cervidae between 2006 and 2015 by sexes, and in comparison with optimal livestock, in accordance with the rating keys for hunting territories [7, 12].

There were also used some statistics like average population, standard deviation, error of average, and variability coefficient in order to have a better overview of the population evolution. In other way, our study is based on

the official reports of hunting areas administrators, centralized at ministerial level, due to the fact that the evaluation of cervidae species, on such a large area, involves a huge number of observers and a lot of time (in according with the methodological norms for game evaluation in Romania). More than that, a correct evaluation must be done in the same time for all 42 hunting areas from Giurgiu County (over 300,000 ha), Romania.

## RESULTS AND DISCUSSIONS

Analyzing the data from Table 1 and Figure 1, we can easily observe that the livestock is relatively stable until 2012, when the fallow deer population increasing from 84 to 136 individuals.

Table 1. Real livestock of cervidae in Giurgiu County

| Year | Roe Deer (heads) | Fallow Deer (heads) | Red Deer (heads) |
|------|------------------|---------------------|------------------|
| 2006 | 2,157            | 78                  | 115              |
| 2007 | 2,180            | 78                  | 110              |
| 2008 | 2,293            | 83                  | 121              |
| 2009 | 2,351            | 82                  | 110              |
| 2010 | 2,398            | 84                  | 105              |
| 2011 | 2,391            | 86                  | 105              |
| 2012 | 2,369            | 84                  | 105              |
| 2013 | 2,407            | 136                 | 102              |
| 2014 | 2,503            | 189                 | 101              |
| 2015 | 2,669            | 268                 | 100              |

Source: Own calculation

As we expected, the roe deer is dominating, from numerical point of view, the other two species, being the most important species of big game in south east, after the wild boar.

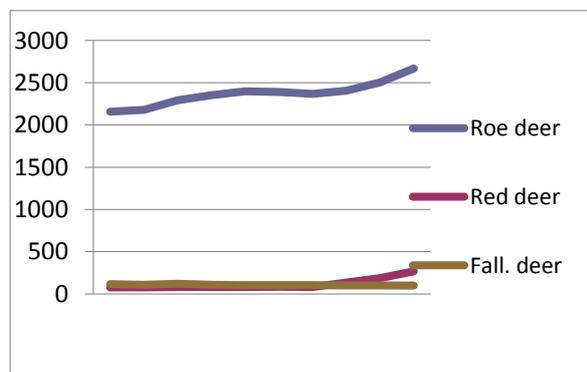


Fig. 1. Graphic representation of cervidae evolution  
Source: Own determination

For red deer, the individuals are mainly located in the meadow of the Danube. In the rest of Giurgiu County we can find red deer in only one hunting fence areas - Singureni. The fallow deer is breeding al in two hunting fence areas: Singureni and Bolintin.

Analyzing by species we find, in red deer population (figure 2), an increasing number of males starting from 2013 till 2015, with an yearly average of 42.85% in 2013, 32.5% in 2014 and 24.53% in 2015. Females and youth livestock have almost the same evolution (41.67% in 2013, 39.67% in 2014, etc.).

The natural increasing rate for red deer is normally 15%. This situation, revealed above, it is a unreal due to the fact that in official evaluation was put together the individuals from free area and individuals from hunting fence areas, even if this last individuals does not have the same legal regulation. We can say that this is a huge mistake because we have now an inexact, an unreal image of red deer situation.

The statistics calculated for red deer is presented in table 2

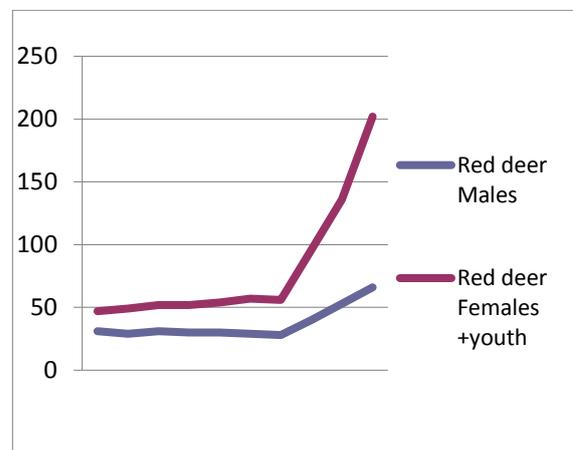


Fig. 2. Graphic representation of red deer evolution  
Source: Own determination

We must say that the fallow deer it is breed in these two fence areas: Bolintin (administrated by National Forest Authority) and Singureni (administrated by Hunters Association "Bradul"). In this last case we talk about a mixt breeding: wild boar, fallow deer, roe deer and red deer. Calculated statistics for this species is presented in table 3.

Table 2. Calculated statistics for red deer

| Specification | Red deer           |       |                 |
|---------------|--------------------|-------|-----------------|
|               | Total, from which: | Males | Females & youth |
| 2006          | 78.00              | 31.00 | 47.00           |
| 2007          | 78.00              | 29.00 | 49.00           |
| 2008          | 83.00              | 31.00 | 52.00           |
| 2009          | 82.00              | 30.00 | 52.00           |
| 2010          | 84.00              | 30.00 | 54.00           |
| 2011          | 86.00              | 29.00 | 57.00           |
| 2012          | 84.00              | 28.00 | 56.00           |
| 2013          | 136.00             | 40.00 | 96.00           |
| 2014          | 189.00             | 53.00 | 136.00          |
| 2015          | 268.00             | 66.00 | 202.00          |
| X             | 116.80             | 36.70 | 80.10           |
| STDEV         | 64.04              | 12.84 | 51.29           |
| Sx            | 21.35              | 4.28  | 17.10           |
| CV%           | 54.83              | 34.99 | 64.03           |

Source: Own calculation

In Figure 3 it is represented graphically the evolution of fallow deer in Giurgiu County.

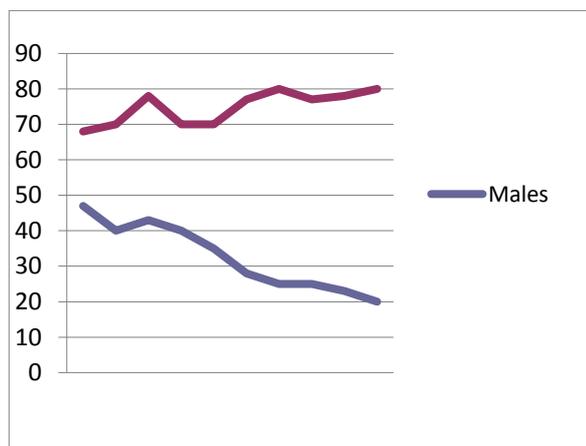


Fig. 3. Graphic representation of fallow deer evolution  
 Source: Own determination

In the male case it is obvious a numerical involution (-42.55%). For females and youths we record a constantly increasing but with a low intensity (about 17.65% between 2006 – 2015). From economically point of view, the increasing of fallow deer population it is not a good idea. Hunters interest for this type of cervidae is low, and the hunting and economic value is also low. In comparison with the others two species of cervidae that was analyzed, the fallow deer is cheap, being lower than red deer and near the red deer, as we can observe in Figure 3.

Table 3. Calculated statistics for fallow deer

| Specification | Fallow deer      |       |                 |
|---------------|------------------|-------|-----------------|
|               | Total, of which: | Males | Females & youth |
| 2006          | 115.00           | 47.00 | 68.00           |
| 2007          | 110.00           | 40.00 | 70.00           |
| 2008          | 121.00           | 43.00 | 78.00           |
| 2009          | 110.00           | 40.00 | 70.00           |
| 2010          | 105.00           | 35.00 | 70.00           |
| 2011          | 105.00           | 28.00 | 77.00           |
| 2012          | 105.00           | 25.00 | 80.00           |
| 2013          | 102.00           | 25.00 | 77.00           |
| 2014          | 101.00           | 23.00 | 78.00           |
| 2015          | 100.00           | 20.00 | 80.00           |
| X             | 107.40           | 32.60 | 74.80           |
| STDEV         | 6.65             | 9.54  | 4.71            |
| Sx            | 2.22             | 3.18  | 1.57            |
| CV%           | 6.19             | 29.25 | 6.30            |

Source: Own calculation

In roe deer population we observe a constant trend, with low fluctuation. In male case we remark an involution, from numerical point of view, between 2010 – 2011 (-9.41%). In 2012 the increasing was insignificant - only 0.12%, in 2013 and 2014 we talk about +3.58%, and in 2015 we observe an increasing of 7.03%. Graphic representation of roe deer evolution is presented in Fig. 4 and statistics in Table 4. The roe deer females record an increasing between 2006 and 2011.

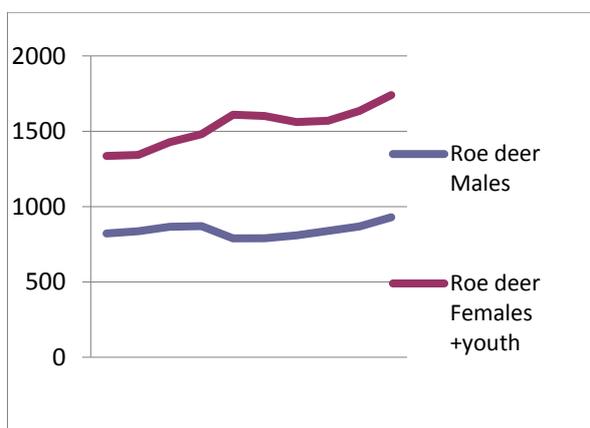


Fig. 4. Graphic representation of roe deer evolution  
 Source: Own determination

Table 4. Calculated statistics for roe deer

| Specification | Roe deer           |        |                 |
|---------------|--------------------|--------|-----------------|
|               | Total, from which: | Males  | Females & youth |
| 2006          | 2,157.00           | 821.00 | 1,336.00        |
| 2007          | 2,180.00           | 837.00 | 1,343.00        |
| 2008          | 2,293.00           | 865.00 | 1,428.00        |
| 2009          | 2,351.00           | 871.00 | 1,480.00        |
| 2010          | 2,398.00           | 789.00 | 1,609.00        |
| 2011          | 2,391.00           | 790.00 | 1,601.00        |
| 2012          | 2,369.00           | 809.00 | 1,560.00        |
| 2013          | 2,407.00           | 838.00 | 1,569.00        |
| 2014          | 2,503.00           | 868.00 | 1,635.00        |
| 2015          | 2,669.00           | 929.00 | 1,740.00        |
| X             | 2,371.80           | 841.70 | 1,530.10        |
| STDEV         | 148.10             | 43.07  | 130.95          |
| Sx            | 49.37              | 14.36  | 43.65           |
| CV%           | 6.24               | 5.12   | 8.56            |

It is interesting to analyze that from 2012 till 2013 we observe a decreasing of females and youths, at fix one year difference from the decreasing of males.

All this situation can be attribute to the decreasing number of youths because of inadequate sex ratio. Practically some females was not mated.

The principal factors was the moment of resigning of management contracts for hunting areas. In this case, a large part of administrators extract the game a little bit illogical. Attention! Maintaining a sex ratio, in roe deer population, 1 female for 1.1 or maximum 1.5 males it is a good measure to maintain a good and strong population.

## CONCLUSIONS

The evaluation of game population is totally unclear. Some species, like fallow deer, are absent in free hunting areas but appear in national evaluation because of breeding in fence areas. It is a must to have an evaluation only for free hunting areas and separately for fence hunting areas.

Exaggerate extraction of roe deer males, and an unbalanced sex ratio can lead to decreasing of population from numerical and qualitative point of view.

We strongly recommend:

- Compulsory, for hunting areas administrators, to maintain a population with an ascendant trend till to the optimal population;
- Implication of hunters in surveillance of obligatory action of administrators (evaluation, feeding, etc.);
- Active implication of national hunting area administration in game evaluation;
- Compulsory, for hunting areas administrators, to maintain the sex ratio and all technical parameters in order to conserve and preserve biodiversity;
- Realization of some areas reports regarding principal factors who influenced the diagnosis keys;
- Respect the term: "selection hunting";
- Diversification of fence hunting areas activity in direction of repopulation in free hunting areas.

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## BEEKEEPING SUPPORT IN THE EUROPEAN UNION COUNTRIES

**Janusz MAJEWSKI**

Warsaw University of Life Sciences – SGGW, Department of Agricultural Economics and International Economic Relations, 166 Nowoursynowska Str., 02-787 Warszawa, Poland  
Phone:+048/225934112; E-mail: janusz\_majewski@sggw.pl

**Corresponding author:** janusz\_majewski@sggw.pl

### *Abstract*

*The analysis and support structure of the beekeeping sector in the European Union countries was analyzed. The level of support for this sector of agriculture in the years to come increased and in the years 2017-2019 is 72 million EUR per year. The amount of support beekeeping depends mainly on the number of hives. The average value of support for bee colony in most countries ranges from 4.35 to 4.63 EUR per year. The amount of support expressed as the equivalent of beekeeping honey indicating little relevance of this action, since the value of the support is equal to the EU average of 0.65 kg multiflorous honey, that varies from 0.3 to 1.33 kg.*

**Key words:** beekeeping, support, national apicultural programmes

### INTRODUCTION

Beekeeping plays an important role for the European Union's economy and environment. In addition to bee products such as honey, bee wax, pollen, propolis, royal jelly, bees are responsible for pollination of about 80% of plant species. Pollinating insects, especially honey bees, account for about 35% of the world's crop production [9]. The global crop pollination rate was estimated at 153 billion EUR a year and 14.2 billion EUR in the EU [4]. In turn, Leonhardt et al. (2013) estimate the value of insect pollination in EU countries at 14.6 billion EUR annually [5]. Morse and Calderone (2000) demonstration that in the United States this value increased from 9.3 billion USD in 1989 to 14.6 billion USD in 2000 [7]. In England crops pollination value was estimated at over 918 million GBP in 2007 [1]. In Poland, based on data from 2004, the value of pollination of major entomophilous plants was estimated at 720 million EUR [10]. In turn, for 2012, the value of major entomophilous crops was estimated at over 825 million EUR [6].

Beekeeping is a specific human activity, because its effects are consumed not only by beekeepers but also by farmers and the community. This is due to the influence of bees on the yield and quality of crops, as well as on

biodiversity. This points to the need to support beekeeping from external resources, and since 1997, one of the objectives of the Common Agricultural Policy (CAP) has been to improve the situation in the beekeeping sector. The forms of support for this sector of agriculture have changed and are currently (2017) governed by Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organization of agricultural products and repealing the Council Regulations EEC No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007.

The aim of the work is to determine the size and direction of beekeeping support in the EU countries and to try to evaluate it. The compilation of the value of support in each country and the conversion of this size to the bee family was compiled.

### MATERIALS AND METHODS

In this paper were used data on beekeeping in the EU published by the European Commission and the literature on the subject. Simple statistical measures and linear trend functions were used to determine the relationship between the size of beekeeping support and the number of bee colonies. For calculations used in Microsoft Excel 2013.

## RESULTS AND DISCUSSIONS

The beekeeping statistics in the EU countries indicate its development. The number of bee colonies in the EU increased from 13.6 million hives in 2008-2010, to more than 15.7 million in 2014-2016, ie. 15% (not included Croatia, which is a member of the EU since 1 July 2013). These changes were not the same throughout the Union. In the EU-15 countries this increase was 8%, while in the EU-12 almost 20%. However, in the six EU-15 countries (Belgium, Denmark, Germany, Ireland, Luxembourg, Finland) and two EU-12 countries (Bulgaria, Slovenia) there was at this time decline in the number of bee colonies from 2% to 29%. This indicates a great variety of changes taking place in this industry. In the rest of the EU, the number of bee colonies remained similar (Sweden, United Kingdom) or increased, with the increase in the three countries (Lithuania, Malta, Romania) by over 50% [2, 3].

The support of the beekeeping sector in the EU 2017-2019 is € 72 million per annum under the national support programs [2]. This is an increase of 9% over the corresponding program in 2014-2016. With a maximum of half of the disbursed funds could come from the EU budget and the other half from national budgets.

The amount of support beekeeping in the EU depends on the number of bee families. Four countries (Spain, France, Romania and Greece) with the largest number of bee families can use almost half of the funds from the beekeeping support programs (Fig. 1). The dependence between the value of beekeeping support in EU countries and the number of bee colonies is illustrated by the data presented in Figure 2.

By calculating the amount of support from bee keeping programs in the EU average, it can be said that in most countries it is close to and ranges from 4.35 to 4.63 EUR/beehive.

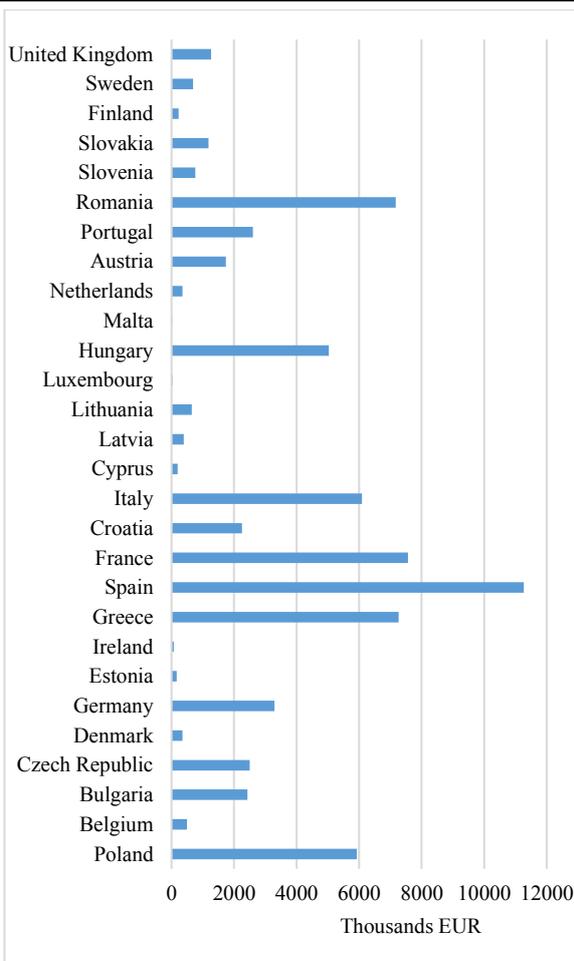


Fig. 1. Annual beekeeping support in the European Union countries in the framework of national beekeeping programmes in 2017-2019

Source: [2].

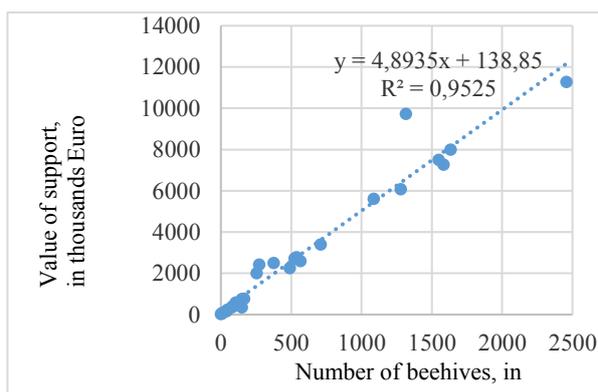


Fig. 2. The dependency between the level of beekeeping support and the number of bee colonies in EU countries

Source: own calculation based on [2, 3].

Only in Denmark and Estonia were these values lower (respectively 2.32 and 4.00 EUR/beehive), and in Malta the value of support per hectare was the highest among all countries and amounted to 5.3 EUR/beehive (Fig. 3).

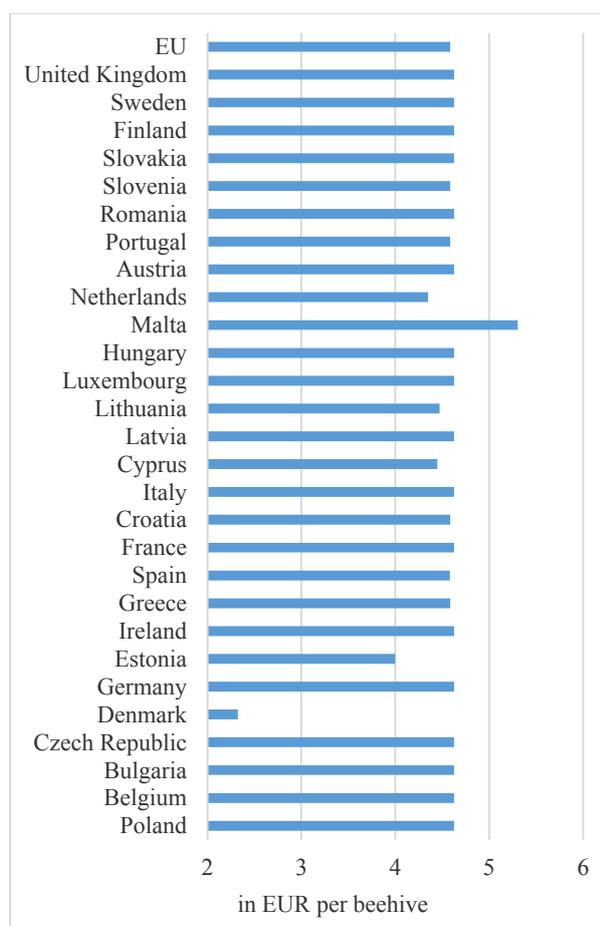


Fig. 3. The amount of beekeeping support in the EU in terms of bee colony  
Source: see figure 2.

In addition to a significant amount of support it is also his destiny. As in previous years, the Member States were able to determine the allocation of funds for specific purposes. The following objectives were identified for which measures could be allocated:

- a - technical assistance to beekeepers and beekeepers' organizations,
- b - combating beehive invaders and diseases, particularly varroasis,
- c - rationalization of transhumance,
- d - measures to support laboratories for the analysis of apiculture products,
- e - restocking of hives,
- f - applied research programs,
- g - market monitoring,
- h - enhancement of product quality.

Member States were able to determine what proportion of the funds they intended to spend on specific goals. Therefore, in the various EU countries, the number of goals selected for

implementation and their contribution to the national support amount was varied (Fig. 4). Only the Netherlands allocated all resources for one purpose, ie combating beehive invaders and diseases, especially varroasis. The other countries had a more diversified structure of spending support, and nine of them (Belgium, Croatia, Denmark, Germany, Hungary, Italy, Lithuania, Slovakia and Sweden) allocated funds for all the specified goals.

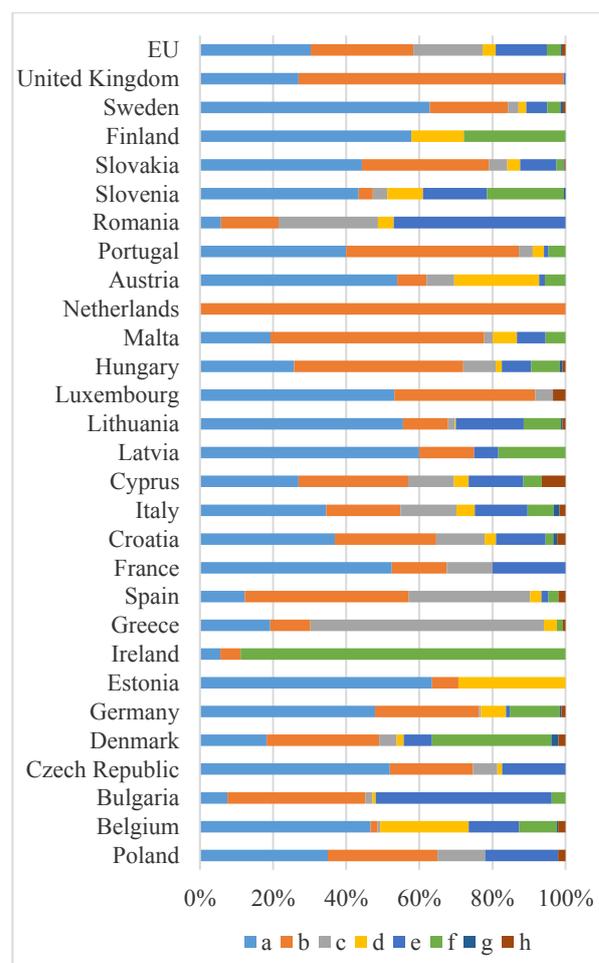


Fig. 4. The structure of beekeeping support in EU countries according to the purpose of support  
Source: see Figure 2.

Diversification of beekeeping in the EU can also be seen in the prices of honey and its production costs in different countries. According to national apiculture programmes, the average estimated cost of producing one kilogram of honey in EU countries ranged from less than 2 EUR in the Czech Republic to 12 EUR in Malta. On average in UE countries, the cost of producing honey kilograms was estimated at 4.32 EUR. The cost of honey

production in the EU-15 countries was more than 20% higher than in the EU-12, which can be explained by lower production costs in this part of the EU.

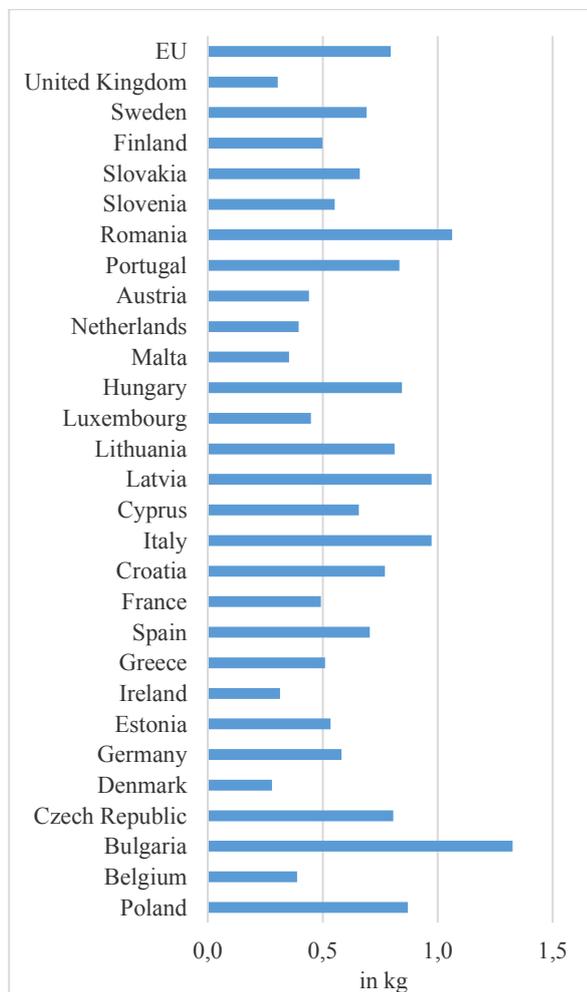


Fig. 5. The amount of support for the bee family, defined as the equivalent of multiflorous honey in the European Union countries (producer prices included)  
Source: see Figure 2.

In the case of honey prices, there is a similar situation. Estimated honey prices at the side of production in the EU-15 were over 40% higher than in the EU-12 (9.4 and 6.6 EUR/kg respectively). It should also be noted that there is considerable variation within the groups of countries. In the EU-15 countries the lowest price was recorded in Italy (4.75 EUR/kg) and the highest in the United Kingdom (15.18 EUR/kg). In the EU-12 countries, the lowest average price of honey at the side of production was in Bulgaria (3.45 EUR/kg) and the highest in Malta (15 EUR/kg).

Such large price and cost diversification of apiculture in EU countries makes it difficult to determine the importance of beekeeping support. Therefore, the amount of support per one bee family was calculated and the amount of honey produced should be calculated to balance the amount of support. The average price of honey candy at the side of production in different EU countries was estimated.

The amount of support for one bee family in the EU is equivalent to 0.65 kg of honey (Fig. 5). There is a strong correlation between the price of honey and the amount of support expressed in kilograms of honey (Pearson's correlation coefficient -0.868). The highest value of support expressed by the volume of honey was characterized by Bulgaria (1.33 kg) and Romania (1.06 kg). Relatively high values of support were obtained in Latvia, Italy, Poland, Hungary, Portugal, Lithuania and the Czech Republic at the level equivalent from 0.8 to 1.0 kg of honey. In turn, the lowest support expressed in terms of honey was obtained in Denmark, United Kingdom, Ireland and Malta, the countries with high prices of domestic honey.

## CONCLUSIONS

Beekeeping plays an important role in the economies of European Union countries. Its role, besides providing bee products, is primarily the pollinating of entomophilous plants. Bee pollinating is a kind of environmental service. Therefore beekeeping should be supported by external resources, including resources from the EU budget.

All EU countries participate in the beekeeping program. For the years 2017-2019, the annual amount of support is 72 million EUR per year. The distribution of resources among the Member States primarily takes into account the number of bee families. The average value of support for bee colony in EU countries was 4.58 EUR. In most countries the amount for bee stalk varies from 4.35 to 4.63 EUR. The value of support colonies converted into the equivalent of honey multiflorous set at a level equivalent to the value of 0.3 to 1.33 kg of honey.

The value of support for the beekeeping sector in the EU appears to be insufficient, especially considering the effects of pollinating bees. It is advisable to increase the amounts and ways to support this sector of agriculture.

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## MARKET ANALYSIS OF SELECTED AGRICULTURE COMMODITIES CULTIVATED ON AGRICULTURAL LAND IN SLOVAKIA REGIONS FROM THE PERSPECTIVE OF SUSTAINABLE DEVELOPMENT

Kristína MANDALOVÁ, Marián KOTRLA, Martin PRČÍK

Slovak University of Agriculture in Nitra, Faculty of European Studies and Regional Development, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovak Republic, Phone: + 421 (37) 6415613

*Corresponding author:* marian.kotrla@gmail.com

### *Abstract*

*The Slovak Republic is divided into 8 regions according to NUTS 3. From the total area of Slovakia, the agricultural land occupies 49.16% of the territory, which is 2401293 ha. The most productive land suitable for growing selected agricultural commodities is located in the regions of Western Slovakia. In terms of agricultural land it is undoubtedly extremely important to understanding the potential of economic profitability of the production units by growing different crops. The basic methods for the analysis of the market in selected agricultural commodities were mainly the situation and outlook reports from National Agricultural and Food Centre Branch: Research Institute of Agriculture and Food Economics and materials from Soil Science and Conservation Research Institute, Slovak republic. The paper evaluates the use of land with regard to crop production, particularly of selected commodities - grains and oilseeds during the period 2001 to 2016 and a market analysis of these commodities in Slovakia. The crop production is essential for the sustainable development of the country and its regions while meeting the needs of the population and stabilizing of the living conditions. The volume of the total grains and oilseeds supply in Slovakia sufficiently covers domestic consumption and part of the production can also be exported outside Slovakia because it does not foresee significant changes in the development of the different directions of grain utilization in domestic agri-food market. On the basis of the analysis, it is possible to note the lagging of agricultural production in Slovakia by half to the average of the EU countries.*

**Key words:** crop production, grains, oilseeds, sustainable development, Slovak regions

### INTRODUCTION

Europe is one of the most intensive continents in the world with the highest share of land used by the population, production systems (including agriculture and forestry) and infrastructure. Soil is a limited resource. Land use is one of the main reasons for changing the environment, which has a significant impact on the quality of life and ecosystems, as well as on infrastructure management. Most often the land is related to economic values and generally includes the production function or the socio-economic functions of the soil (source of raw materials, space for human economic activity and housing construction), which simultaneously reduce the value of options and alternatives. Activities in the agricultural sector are primarily based on the exploitation of the production function of agricultural land. The dependence of financial returns on agriculture (especially crop

production) on the land of productivity is statistically highly convincing. In recent years, there are changes in land use and agricultural landscape. Land use according to [4] means linking human activities to land cover. And changes in land use and land cover are largely related to changes in the exploitation of land. The growing demand on land resources has resulted in environmental stress and intensification on land use, which is successful in increasing food production and is detrimental to the environment. Land use and its environmental impact are mentioned by authors like [5] and [3]. Slovakia is considered as agricultural country. Agricultural land in Slovakia covers almost 50% of the entire area. The largest share is arable land, about 60% of the total area of agricultural land. Agricultural land is part of the land fund. It consists of different types of land which are used for agricultural production and crop production. By means of the application the land is divided

into arable land, vineyards, orchards, lands temporary overgrown with grass or used for growing perennial fodder crops and fallow land. According to [8] functioning land tenure systems are crucial for efficient agricultural production and more diversified land use in regions. Focusing on economic efficiency should not, however, obscure the crucial role of land tenure and land policy for equity and social balance as well as environmentally sound development. Authors [6] and [7] evaluate the economic aspect of the agricultural land market. They focus on the regions of Slovakia, specifically the Nitra region. In the paper we will focus mainly on crop production, since in slovak agriculture has important role wheat, barley, corn, potatoes and oilseed production. Quality production in agriculture is in the interest of every country and therefore should be paid enough attention to food preparation and processing in terms of their importance to society. One of the basic indicators of success is also an indicator of profitability and crop production. The company's ability to make a profit and recover the capital invested in production can be defined as profitability and at the same time states that the profitability on agriculture has several distinguishing features. Particular account must be taken to the intensity of land as a production factor. A special feature of agricultural production is the amount of profit that we must also consider at the acreage unit. Primary production in agriculture inherently is depending on the land. Land is the basis for growing plants. It's most important and most significant feature is its production capacity, thus fertility. Proper use and management of land fertility is increasing. It provides nutrition of the population and is also a source of nutrition in the livestock sector. Crop production is the interest of many authors that specified it in their works [10] [2] and [1].

## **MATERIALS AND METHODS**

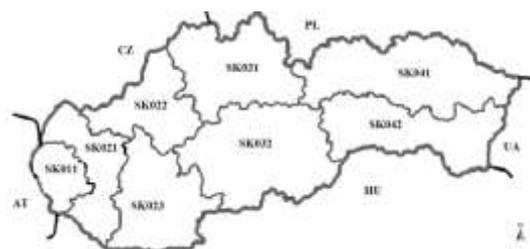
The paper has been processed on the basis of data from the situation and outlook reports, which are compiled on selected commodities, crop and livestock production in collaboration

with the Department of Trade and Promotion of Ministry of Agriculture and Rural Development of the Slovak Republic. Contains analysis of the development of outlook reports for evaluated commodity in economic and calendar years, information on regulatory and market support policy in Slovakia and the EU, pricing information and information on commodity markets in the EU and worldwide. Reports prepared research team of the department of agrarian market and are continuously provided to members of the expert committees, government bodies and their organizational units and relevant professional bodies. Reports are baseline source in the processing of various policy documents, analyses, comparative studies, theses and dissertations and market information for the wider public. Situation and outlook reports are issued exclusively in the online version on the website National Agricultural and Food Centre Branch: Research Institute of Agriculture and Food Economics. Frequency of each output is one or two times a year. Specifically, for grains it is twice a year, for oilseeds once a year. As with grains it is twice a year, the second report follows the report, which is published in June. For grains is given analysis of the market for grains (wheat, barley, rye, oats, maize and other grains) in Slovakia in the marketing year 2001/2002 to 2015/16. The marketing year for grains starts on 1st of July each year and ends 30th of June of the following year. The presented situation and outlook report for oilseeds assess the situation on the oilseeds market in the marketing year 2001/2002 to 2015/16 based on available data. The marketing year for oilseeds begins on 1st of July of the preceding year until 30th of June of the year.

Analysis of the soil in Slovak regions was calculated according the Information system of National Agriculture and Food Centre (Slovak republic) and Soil Portal. The yield of agriculture commodities were evaluated according the database STATdat.

Slovakia Regions were evaluated on the basis of the statistical territorial division – NUTS 3 (Nomenclature of Territorial Units for

Statistics). These administrative units represent a geographical area with an administrative authority that is empowered to take administrative or strategic decisions in accordance with the legal and institutional framework of the Member State of the EU. NUTS 3 are territorial units characterized as small regions for specific diagnoses. Slovakia is divided into 8 regions (Figure 1).



Legend: SK011 – Bratislava Region, SK021 – Trnava Region, SK022 – Trenčín Region, SK023 – Nitra Region, SK031 – Žilina Region, SK032 – Banská Bystrica Region, SK041 – Prešov Region, SK042 – Košice Region, AT – Austria, HU – Hungary, UA – Ukraine, PL – Poland, CZ – Czech

Fig. 1. Spatial definition of Slovak regions according to NUTS3

## RESULTS AND DISCUSSIONS

Knowing the potential opportunities of economic profitability of production units according to the cultivation of various crops is essential. The basis for determining the economic profitability of crops is a database of potential economic parameters valuated soil-ecological units developed on the basis of correlation dependence between soil production potential and real economic indicators in more than 250 farms.

The Figure 1 shows rate of crop production in Slovakia.

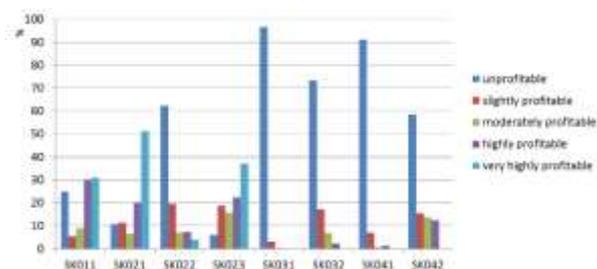


Fig. 2. Representation of soil categories according to potential rate of crop production in Slovakia regions [% of agricultural land]

Source: podnikmapy.sk, own processing

The Figure 2 shows representation of soil categories according to potential rate of crop production in Slovakia regions expressed in percentages of agricultural land. From Figure is clear that a large part of Slovakia regions is unprofitable and the highest rate of crop production can be found in western Slovakia regions (SK011, SK021 and SK023).

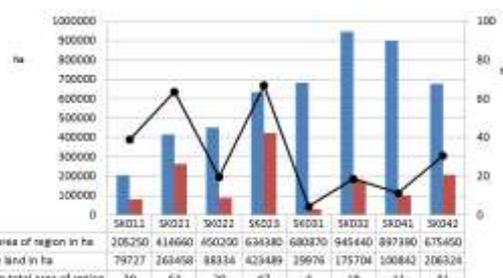


Fig. 3. Area of arable land suitable for growing selected commodities from the total area of Slovakia regions

Source: own processing

The possibilities of growing grains and oilseeds on arable land are markedly differentiated in individual regions of Slovakia (Figure 3). As mentioned above, the most suitable conditions are located in the regions of western Slovakia. The largest areas can be identified in the SK021 regions (64% of the area) and SK023 (67% of the area). The least suitable for cultivation are SK031 (4%), SK032 (19%) and SK041 (11%) regions. These regions have the least favourable climatic and geomorphological conditions for the cultivation of agricultural commodities.

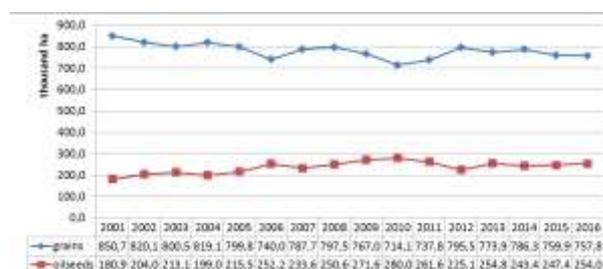


Fig. 4 Trend of grains and oilseeds areas in Slovak republic (thousands ha)

Source: Statistical Office of the Slovak republic, own calculation

The most important group of crops include grains and oilseeds. Grains are the most important crop in the entire group of plant production. Grains play crucial importance in human nutrition and livestock, provide

important raw material for the food, chemical and pharmaceutical industries, too. Range of grains related to their species diversity and broad economic recovery. Grains are represented in almost all growing areas. The grains include wheat, rye, corn, oats, sorghum and others.

The size of planed areas is an important factor in total production of monitored commodities. The figure 4 shows the trend of the area of grains and oilseeds in Slovakia. It is possible to see a decrease in the grains size (decrease by 11% compared to 2001) and an increase of oilseeds size to 40% compared to 2001.

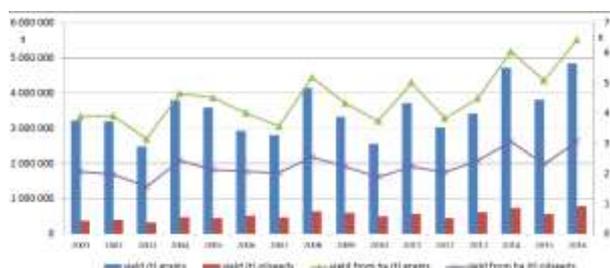


Fig. 5. The trend of yield of the grains and oilseeds in Slovakia for the years 2001 to 2016

The Figure 5 presents the evolution of grains and oilseeds productivity during the years 2001 to 2016. The trend of grains production has a volatile tendency depending on the natural conditions of the year. Nevertheless, the grains production is rising. The trend of oilseeds production on agricultural soils in the Slovakia regions has a stable increasing tendency.

Market analysis of agriculture commodities (grains and oilseeds) is expressed in the Figure 6 and 7.

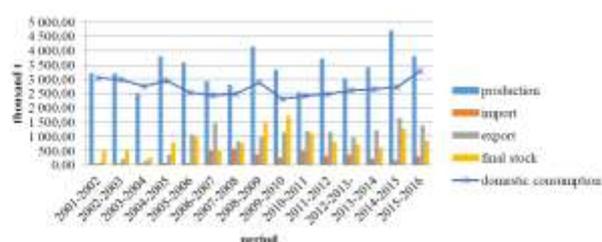


Fig. 6. Development of balance indicators of grains in total in Slovakia

Source: vuepp.sk, own processing

In the period 2003/2004 are monitored results affected by unfavourable weather conditions, mainly the lack of atmospheric precipitation

and record high temperatures. Especially during the maturation this situation adversely affected the mass volume of grain harvest in the current year. Slovakia's accession to the European Union in that marketing year was affected by foreign trade with grain, as are reflected in increased movement of grain between Slovak and other European Union countries as a result of the duty free regime.

In the marketing year 2006/07 grains in Slovakia were grown on a smaller area than in the previous cultivation period. Grain harvest was in the 2005/06 was less than in the previous marketing year. Final stocks of grains to 30 June 2006 represented a few thousand tons more than at the end of the marketing year 2004/05. In the marketing year 2006/07 grains in Slovakia were grown on a smaller area than the previous cultivation period. Grain harvest in the 2005/06 was lower than in the previous marketing year.

Area of grains in the marketing year 2007/08 compared to the previous period widened. Total grain production in the marketing year 2007/08 increased against the previous cultivation period. Harvest of grains in the marketing year 2007/08 was greater than in the previous marketing year. A final stock of grains at 30 June 2008 was lower in comparison to the stock situation at the end of the marketing year 2006/2007. The total supply of grains in marketing year 2007/08 due to lower harvest was less than the supply of the previous marketing year. Final stocks of grains at 30 June 2009 were in comparison to the stock situation at the end of the marketing year 2007/08 higher.

The marketing year 2008/09 was in terms and weather conditions favourable for grains, which led to a record production. High grains production in Slovakia in marketing year 2008/09 resulted in increasing supply of grains on the domestic market.

In the marketing year 2009/10 reached the total grain production reduction annually. The production was collected from an area of land that was smaller than the previous year. The total supply of grains produced of initial stocks, imports and production reached less than the in previous year. Reached grain

production in marketing year 2009/2010 was reduced annually.

In 2010, the yield of grains was significantly affected by unfavourable weather (floods). Grain was harvested from areas that were smaller than in the previous year. Despite the relatively high initial stocks and higher imports nearly doubled from a year earlier to our agrarian market offered for domestic consumption and export less grain than in the previous year. Total supply created in addition to the production and importation of initial stocks declined year on year, while import of grains was up.

Year 2011 in terms of reached production of grains assessed favourably. Gross domestic consumption has increased annually. The production was higher compared to 2010. Favourable weather conditions influenced the increase of harvest.

During the vegetation period in 2012 hit our area extremely drought, causing considerable damages to agricultural crops. In 2012, cereal production declined. Unfavourable weather conditions have shown the reduction of the average yield of grains. Decline in production was reflected in the total supply.

Favourable weather conditions during the vegetation period in 2013 reflected on increase of the average yield of grains. According to the Statistical Office of the Slovak Republic, grain production in 2013 increased annually and increased production was reflected in an increase in the total supply of grains.

Utilized acreage of grains in marketing year 2014/15 increase annually and the share of grains in total area of arable land in Slovakia have increased as well. In terms of achieving yields and production is year 2014 assessed very positively and in 2014 grains production reached a maximum since 2000.

Based on the development of the grains consumption especially in domestic consumption, in the marketing year 2015/16 was estimated annual decline in self-sufficiency of Slovakia in grains. In the 2015/16 marketing year, the area of the grains decreased. The intensity of crop production on several crops was negatively affected by the dry spring and above average hot summer.

Oilseeds are crops that provide vegetable fats and oils, which can be industrially obtain. In addition to oil from the seeds can also obtain moldings with high protein content, which is a valuable livestock feed. Vegetable oils are used to produce cooking oil, margarine and candles, cosmetics, glycerine, plastics, biodiesel and so on. The most important oil crops are: soybean, rapeseed, sunflower, flax, sesame and others. The year 2011 was in terms of crops, despite fluctuations in the weather in some regions of Slovakia for the majority of crops favourable and reflected the increase in harvest from one hectare. Due to favourable weather conditions during the vegetation was reached record crop. Oilseed production in Slovakia in 2011 declined. The highest share of the production of oilseed had rape, other shares belong to corn, sunflower, soybean, flax and poppy and mustard.

Climatic conditions in 2010 were unfavourable for farmers. Weather was full of extremes, hot and dry periods alternated with wet and cold. From mid-May the farmers were not able to enter the field. Crops were covered by water and a hailstorm destroyed. These conditions have caused low yields per hectare of oilseeds declined annually.

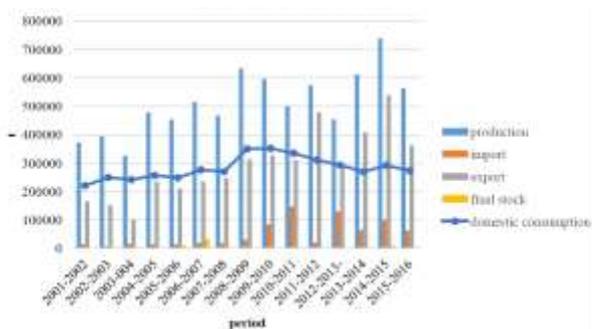


Fig. 7. Development of balance indicators of oilseeds in total in Slovakia

Source: vuepp.sk, own processing

Lack of rainfall in 2012 caused low yields per hectare of oilseeds, mainly rape. Winter temperature was within the long-term average. In March, significantly warmer, but at the end of this month and early April came true winter weather. This caused a delay of vegetation oilseeds. In some regions of the Slovak Republic was flooded oil, causing their digestion, respectively pest infestation. The

highest share of the production of oilseed rape had followed sunflower, soybean, flax, mustard and finally poppy.

Oilseed production in 2013 reached 612 thousand tons, which is the second highest production since 1993. The highest share of the production had oilseed rape followed by sunflower, soybean, flax, mustard and poppy.

In 2014, production reached a record volume of 738.667 tons. The highest share of the production had oilseed followed by sunflower, soybean, poppy, mustard and linen.

In 2015, climate conditions for growing oilseeds were optimal. Weather enables seeding without any problems. The problem has become pests. Farmers were forced to treat rapeseed crops several times. Winter was mild and did not produce hardly any downtime of crop areas. Spring oilseed treatment was carried out in a timely manner due to the fact that winter has ended prematurely. Period to harvest went smoothly and there was a decline in revenue, root system has sufficient thickness and length, summer heat and drought did not have any influence.

## CONCLUSIONS

About the use of the productive potential of soils decides in addition to soil and environmental parameters of given locality also economic factors. Agricultural land should fulfil also the economic function in addition to production and ecological functions. No one will create a financial loss on a soil for a long time. It is therefore on decision of a particular land user as it can exploit the potential of its land to gain profit.

Large part of Slovakia's regions is unprofitable and the highest rate of crop production can be found in western Slovakia regions (SK011, SK021 and SK023). The possibilities of growing grains and oilseeds on arable land are markedly differentiated in individual regions of Slovakia. The largest areas with the most suitable conditions can be identified in the SK021 regions (64% of the area) and SK023 (67% of the area). The least suitable for cultivation are SK031 (4%), SK032 (19%) and SK041 (11%) regions.

Balance of grains in Slovakia is varied. Production during the years has grown and declined. The largest decline occurred from the year 2014/2015 to 2015/2016, when production fell by 902.6 thousand tons and the largest increase occurred from the year 2007/2008 to 2008/2009, it represents an increase of 1343.76 thousand tons. Import grew rapidly from the year 2005/2006 to 2006/2007 by 447.7 thousand tons and largest decline occurred from the year 2007/2008 to 2008/2009 by 194.3 thousand tons. Regarding export, the largest increase observed from the year 2004/2005 to 2005/2006 by 703.4 thousand tons and the largest decline we note from the year 2006/2007 to 2007/2008 by 629 thousand tons. Final stock and domestic consumption during the selected period were accompanied by fluctuations, the final stock increased the most from the year 2007/2008 to 2008/2009 by 704.1 thousand tons, the biggest decrease of 591 thousand tons was from the year 2009/2010 to the following year. Domestic consumption grew the most in the last reporting year and most fell by 586.4 thousand tons from the year 2008/2009 to 2009/2010.

Based on the statements mentioned in the paper the total resources of grains adequately cover domestic consumption and a significant part of the surplus will be exported also outside Slovakia. The volume of the total supply of grains in Slovakia sufficiently cover domestic consumption and part of production can also be exported outside the territory of Slovakia as it is not expected significant changes in the development of various directions of use of grains for domestic agri-food market.

At the balance of oilseeds, we concluded that the production and final stocks reached the biggest drop from the year 2014/2015 to 2015/2016 and import and domestic consumption achieved the largest decline from the year 2010/2011 to 2011/2012. The largest increases over the years differed. The largest increase in export was achieved in the year 2010/2011 to 2011/2012, about 168,512 tons. At final stocks it was from the year 2005/2006 to 2006/2007 by 22,927 tons. Domestic

consumption increased the most from the year 2007/2008 to 2008/2009 by 79,759 tons.

Oilseeds in the current period have an important position for their various uses. Oilseed production in Slovakia is essential, as evidenced by a significant increase not only in production but also the fact that the structure of seeding occupies has a dominant position immediately after grains. Oil sector is significantly influenced by the nature of the market mainly rapeseed and sunflower, active support of manufacturing industry and penetration in the technical field (feedstuffs, cosmetics, pharmaceuticals, construction and biofuel). Their share in the structure of seeding from year to year increases. Oilseeds in the current period have an important position for their various uses. Market of oilseeds in the Slovak Republic since 1990 developed very favourably. It makes their substitutability in the nutrition of the population and livestock as well as growing interest in consumption of biodiesel.

## ACKNOWLEDGMENTS

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## STRUCTURE OF MILK PRODUCTION IN THE SOUTH WEST OLTENIA REGION, IN NATIONAL CONTEXT (2013-2015)

**Dragoş Mihai MEDELETE, Radu Lucian PÂNZARU**

University of Craiova, Faculty of Agronomy, 19 Liberty Street, 200421, Craiova, Romania, Phone: +40 072 712 967, Fax: + 40 251 418 475, E-mails: medelete@yahoo.com, rlp1967craiova@yahoo.com

**Corresponding author:** rlp1967craiova@yahoo.com

### **Abstract**

*The paper presents a synthetic overview of total milk production, discussing the main components (cow's milk and buffalo, respectively sheep's milk and goat's milk). Reference is also made to the national level of the indicators so as to achieve a spatio-temporal positioning of the analyzed region and of its component counties. It is noted that the South - West Oltenia Region does not exceed 12.50% for any analyzed indicator. Dolj county is the most important regional milk supplier and Mehedinţi County represents the administrative territorial unit with the lowest contribution to the regional level of the indicator.*

**Key words:** milk, production, buffalo, goat, sheep, cow

### **INTRODUCTION**

The field of animal husbandry appears as a supplier of raw materials to produce food and non-food products. From food, we report dairy and meat products [2].

From a food, hygienic or technological point of view, whole raw milk is the product obtained by milking the animals in lactation, unmodified in terms of the physio-chemical and organoleptic characteristics of the milk [6].

The chemical composition of milk depends on several factors. If one of the key factors is the species it can be shown that within the same species the chemical composition differs depending on the diet, race, individual, lactation month, maintenance status, etc. [4].

By the physicochemical composition (protein, dry matter, fat content, presence of impurities or inhibitors), the value of milk is appreciated or depreciated [3].

Milk and dairy products have a particularly important role to play in feeding populations in European countries [8].

The Milk and Dairy Sector is one of the most important in Romania's agriculture [7].

In cows, individual milk production is influenced by a number of factors that by their nature can be grouped into genetic factors and environmental factors [5].

The cows, sheep, goat and buffalo milk is taken over in the recovery circuit. The largest share comes from cow and sheep milk [1].

Milk is a highly perishable product, which requires a logistic system along the chain to facilitate consumer access to the required products in the shortest time, in proper form and in superior quality parameters [9].

### **MATERIALS AND METHODS**

To accomplish the work, several working methods were used, such as documentation, percentage method, comparison method, etc. The presented and processed information was extracted from the National Institute of Statistics' electronic database [10].

The indicator used was total milk production, presented at a general level (including calves' consumption), as well as those for dairy cows and buffaloes respectively sheep and goats.

The time comparison used fixed-index indices (2013 reference period), and the comparison in space went from the national level of the indicators to which the regional and county data were reported.

## RESULTS AND DISCUSSIONS

The actual production in the period 2013-2015, its dynamics and structure, as well as the national share are presented in Table 1 [10].

The total national production was 48,728 thousand hl in 2013, 50,535 thousand hl for

2014 and 49,156 thousand hl in 2015. The average of the period reached a level of milk production of 49,473 thousand hl. At the national level, the milk production dynamics had values exceeding the reporting base by 3.71% in 2014, by 0.88% in 2015 and by 1.53% for the average.

Table 1. Total milk production including calves' consumption (mii hl)

| Specification             | Year 2013 |        | Year 2014 |        | Year 2015 |        | Average** |        |                        |                             |
|---------------------------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|------------------------|-----------------------------|
|                           | Eff.*     | Dyn.** | Eff.*     | Dyn.** | Eff.*     | Dyn.** | Eff.*     | Dyn.   | Regional structure (%) | share at national level (%) |
| Total national            | 48,728    | 100    | 50,535    | 103.71 | 49,156    | 100.88 | 49,473.0  | 101.53 | -                      | 100                         |
| South-West Oltenia region | 4,845     | 100    | 5,073     | 104.70 | 4,977     | 102.72 | 4,965.0   | 102.48 | 100                    | 10.03                       |
| Dolj                      | 1,073     | 100    | 1,193     | 111.18 | 1,123     | 104.66 | 1,129.7   | 105.28 | 22.75                  | 2.28                        |
| Gorj                      | 947       | 100    | 984       | 103.91 | 956       | 100.95 | 962.3     | 101.61 | 19.38                  | 1.94                        |
| Mehedinți                 | 782       | 100    | 809       | 103.45 | 808       | 103.32 | 799.7     | 102.26 | 16.11                  | 1.62                        |
| Olt                       | 1,028     | 100    | 1,028     | 100.0  | 1,050     | 102.14 | 1,035.3   | 100.71 | 20.85                  | 2.09                        |
| Vâlcea                    | 1,015     | 100    | 1,059     | 104.33 | 1,040     | 102.46 | 1,038.0   | 102.27 | 20.91                  | 2.10                        |

\* <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR202A#>

\*\* own calculation

The South - West Oltenia Region recorded milk production as follows: 4,845 thousand hl in 2013, 5,073 thousand hl in 2014, 4,977 thousand hl for 2015 and 4,965 thousand hl at the average of the interval. The region highlights an upward trend with 4.70% in 2014 (104.70%), 2.72% in 2015 (102.72%), and 2.48% in the average of the analyzed range (102.48%).

For Dolj county, the yields recorded during the analyzed period were 1,073 thousand hl in 2013, 1,193 thousand hl in 2014, 1,123 thousand hl for 2015 and 1,129.7 thousand hl for the average period. In the county Dolj, the comparison of the comparison base (production in 2013) is 11.18% in 2014 (111.18%), 4.66% in 2015 (104.66%) and 5.28% in the average (105.28%).

Gorj county records an average milk production of 962.3 thousand hl, averaged on the basis of annual production of 947 thousand hl in 2013, 984 thousand hl in 2014 and 956 thousand hl in 2015. The dynamics show overruns of 3.91% 2014 (103.91%), 0.95% in

2015 (100.95%), and 1.61% in the average (101.61%).

Mehedinți county, due to the smaller number of animals it has, shows the lowest production values of 782 thousand hl in 2013, 809 thousand hl for 2014, 808 thousand hl for the year 2015 and 799.7 thousand hl for the average of the analyzed range. As a result of this situation, there are overtaking comparisons with 3.45% in 2014 (103.45%), 3.32% in 2015 (103.32%) and 2.26% in average (102.26%).

In Olt county, an average level of milk production of 1,035.3 thousand hl and sequential values of 1,028 thousand hl in 2013, 1,028 thousand hl in 2014 and 1,050 thousand hl in 2015 are found. The dynamically surprising increases were of 2.14% in 2015 (102.14%) and 0.71% of the average (100.71%) in Olt county.

Milk production in Vâlcea county was 1,015 thousand hl in 2013, 1,059 thousand hl for 2014, 1,040 thousand hl in the year 2015 and 1,038 thousand hl for the average of the analyzed interval. The dynamics is above the base of the reporting base with 4.33% in 2014,

2.46% in 2015 and 2.27% for the average of the range (104.33, 102.46 and 102.27%).

The structure of regional milk production highlights for the counties the increasing proportions as follows: 22.75% Dolj county, 20.91% Vâlcea county, 20.85% Olt county, 19.38% Gorj county, 16.11% Mehedinți county.

Compared to the level of the national milk production, the region and its component counties are registered with 10.03% of the region, 2.28% of Dolj county, 2.10% of Vâlcea county, 2.09% of Olt county, 1.94% of Gorj county and 1.62% of Mehedinți county.

The level of production of cow's milk and buffalo milk including calves' consumption is mentioned in Table 2 [10].

Table 2. Total production of cow and buffalo milk including calves' consumption (mii hl)

| Specification             | Year 2013 |        | Year 2014 |        | Year 2015 |        | Average** |        |                        |                             |
|---------------------------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|------------------------|-----------------------------|
|                           | Eff.*     | Dyn.** | Eff.*     | Dyn.** | Eff.*     | Dyn.** | Eff.*     | Dyn.   | Regional structure (%) | share at national level (%) |
| Total national            | 42,593    | 100    | 44,015    | 103.34 | 42,663    | 100.16 | 43,090.3  | 101.17 | -                      | 100                         |
| South-West Oltenia region | 4,064     | 100    | 4,297     | 105.73 | 4,185     | 102.98 | 4,182.0   | 102.90 | 100                    | 9.70                        |
| Dolj                      | 805       | 100    | 918       | 114.04 | 847       | 105.22 | 856.7     | 106.42 | 20.48                  | 1.99                        |
| Gorj                      | 871       | 100    | 905       | 103.90 | 874       | 100.34 | 883.3     | 101.41 | 21.12                  | 2.05                        |
| Mehedinți                 | 636       | 100    | 665       | 104.56 | 661       | 103.93 | 654.0     | 102.83 | 15.65                  | 1.52                        |
| Olt                       | 815       | 100    | 830       | 101.84 | 839       | 102.94 | 828.0     | 101.59 | 19.80                  | 1.92                        |
| Vâlcea                    | 937       | 100    | 979       | 104.48 | 964       | 102.88 | 960.0     | 102.45 | 22.95                  | 2.23                        |

\* <http://statistici.inssse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR202A#>

\*\* own calculation

The total national production was 42,593 thousand hl in 2013, 44,015 thousand hl for 2014 and 42,663 thousand hl in 2015. The average of the period reached a production level of 43,090.3 thousand hl. At national level, milk production dynamics had values exceeding the reporting base by 3.34% in 2014, 0.16% in 2015 and 1.17% on average (103.34, 100.16 and 101.17% respectively).

The South - West Oltenia Region recorded cow and buffalo milk production as follows: 4,064 thousand hl in 2013, 4,297 thousand hl in 2014, 4,185 thousand hl for 2015 and 4,182 thousand hl at the average of the interval. The region shows an upward trend with 5.73% in 2014 (105.73%), 2.98% in 2015 (102.98%), and 2.90% in the average of the analyzed range (102.98%).

For Dolj county, the production recorded during the analyzed period was 805 thousand hl in 2013, 918 thousand hl in 2014, 847 thousand hl for 2015 and 856.7 thousand hl for the average period. The county, in terms of

dynamics, presents the baseline comparisons (2013) as follows: 14.04% in 2014, 5.22% in 2015 and 6.42% in the average of the interval. Gorj county records an average of 883.3 thousand hl, averaged based on the annual outputs of 871 thousand hl in 2013, 905 thousand hl in 2014 and 874 thousand hl in 2015. The dynamics built out highlights overshoot of the reference of 3.90% in 2013, of 0.34% in 2015 and of 1.41% in the average of the period.

In Mehedinți county, the lowest values of the indicator are found: 636 thousand hl in 2013, 665 thousand hl for 2014, 661 thousand hl for the year 2015 and 654 thousand hl for the average of the analyzed interval. Existing increases (compared to the reporting deadline) were 4.56% in 2014, 3.93% in 2015 and 2.83% in the average.

For Olt county there is an average production level of 828 thousand hl and sequential values of 815 thousand hl in 2013, 830 thousand hl in 2014 and 839 thousand hl in the year 2015. If

we analyze the evolution over time, the indicator is notes increases of 1.84% in 2014, 2.94% in 2015 and 1.59% in the average.

The production in Vâlcea county was 937 thousand hl in 2013, 979 thousand hl for 2014, 964 thousand hl for the year 2015 and 960 thousand hl for the average of the analyzed interval. As a result of this situation, in the dynamics computed, only supra-unit values of the component indices are found: 104.48, 102.88 and 102.45% for 2014, 2015 and respectively the average of the period.

The structure of the regional milk production shows for the counties decreasing weights as

follows: 22.95% for Vâlcea county, 21.12% for Gorj county, 20.48% for Dolj county, 19.80% for Olt county, 15.65% for Mehedinți county.

Compared to the national production of cow's and buffalo milk production, including the consumption of calves, the region and its constituent counties are registered with 9.70% of the region, 2.23% of Vâlcea county, 2.05% of Gorj county, 1.99% of Dolj county, 1.92% of the county Olt and 1.52% Mehedinți county. The production of sheep and goat milk is presented in Table 3 [10].

Table 3 Total Sheep and Goat Milk Production (thousand Hl)

| Specification             | Year 2013 |        | Year 2014 |        | Year 2015 |        | Average** |        |                        |                             |
|---------------------------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|------------------------|-----------------------------|
|                           | Eff.*     | Dyn.** | Eff.*     | Dyn.** | Eff.*     | Dyn.** | Eff.*     | Dyn.   | Regional structure (%) | share at national level (%) |
| Total national            | 6,135     | 100    | 6,520     | 106.27 | 6,493     | 105.83 | 6,382.7   | 104.04 | -                      | 100                         |
| South-West Oltenia region | 781       | 100    | 776       | 99.36  | 792       | 101.41 | 783.0     | 100.26 | 100                    | 12.27                       |
| Dolj                      | 268       | 100    | 275       | 102.61 | 276       | 102.98 | 273.0     | 101.86 | 34.86                  | 4.28                        |
| Gorj                      | 76        | 100    | 79        | 103.95 | 82        | 107.89 | 79.0      | 103.95 | 10.09                  | 1.24                        |
| Mehedinți                 | 146       | 100    | 144       | 98.63  | 147       | 100.68 | 145.7     | 99.79  | 18.61                  | 2.28                        |
| Olt                       | 213       | 100    | 198       | 92.96  | 211       | 99.06  | 207.3     | 97.32  | 26.47                  | 3.25                        |
| Vâlcea                    | 78        | 100    | 80        | 102.56 | 76        | 97.43  | 78.0      | 100.0  | 9.96                   | 1.22                        |

\* <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR202A#>

\*\* own calculation

The total national production was 6,135 thousand hl in 2013, 6,520 thousand hl for 2014 and 6,493 thousand hl in 2015. The average of the period recorded a sheep and goat milk production of 6,382.7 thousand hl (+ 4.04% in dynamics). At national level, milk production dynamics have seen values exceeding the reporting base by 6.27% in 2014 and by 5.83% in 2015.

The South - West Oltenia region recorded outputs as follows: 781 thousand hl in 2013, 776 thousand hl in 2014, 792 thousand hl for 2015 and 783 thousand hl at the average of the interval. The region highlights a sinuous evolution of the indicator, with 1.41 or 1.20 percent outposts in 2015, overtaking by 0.26 percent for the average and declines in 2014 -0.64%.

For Dolj county, the recorded production was 268 thousand hl in 2013, 275 thousand hl in 2014, 276 thousand hl for 2015 and 273 thousand hl for the average. Baseline exceedances (2013) are 2.61% in 2014, 2.98% in 2015 and 1.86% in the mid-range.

Gorj county records an average production of sheep and goat milk of 79 thousand hl, averaged on the basis of the annual production of 76 thousand hl in 2013, 79 thousand hl in 2014 and 82 thousand hl in 2015. Dynamics highlights exceedances (of the reference period) by 3.95% in 2014, 7.89% in 2015 and 3.95% in the average of the period.

Mehedinți county, shows production values of 146 thousand hl in 2013, 144 thousand hl for 2014, 147 thousand hl for the year 2015 and 145.7 thousand hl for the average of the

analyzed interval. Consequence of this state of affairs is the dynamics formed, characterized by the existence of an over-unitary level (in 2015 100.68%) and two subunit levels in 2014 and the average of the period (98.63 and 99.79%).

For Olt county there is an average level of sheep and goat milk production of 207.3 thousand hl and sequential situations of 213 thousand hl in 2013, 198 thousand hl in 2014 and 211 thousand hl in 2015. The indicator dynamics only contains subunit values, which marks its downward trend.

The production in Vâlcea county was 78 thousand hl in 2013, 80 thousand hl for 2014, 76 thousand hl for the year 2015 and 78 thousand hl for the average of the analyzed interval. For this county there is an overstatement of the reporting base (+ 2.56% in 2014), a sub-unit level (-2.57% in 2015) and an equilateral value of the dynamic indexes for the average of the interval.

The structure of regional milk production shows, for the counties, the following weights: 34.86% for Dolj county, 26.47% for Olt county, 18.61% for Mehedinți county, 10.09% for Gorj county, 9.96% for Vâlcea county.

Compared to the level of the national milk production, the region and its counties are registered with: 12.27% of the region, 4.28% of Dolj county, 3.25% of Olt county, 2.28% of Mehedinți county, 1.92% of Gorj county and 1.22% of Vâlcea county.

## CONCLUSIONS

Considering the data presented in the previous chapters, on the evolution of milk production, both at the total level and for the main species, a series of conclusions.

Concerning the total national milk production including the consumption of calves, there is a fluctuating evolution.

A similar situation is also encountered in the case of total cow and buffalo milk production including calves' consumption.

The production of sheep and goat milk was, on average, 6382.7 thousand hl in the analyzed period, with an oscillating trend.

The South West Oltenia region shows a fluctuating evolution for all indicators analyzed.

At national level, regional production is recorded with variable weights as follows: 12.27% for sheep and goat milk, 10.03% for total production and 9.70% for cow's milk and buffalo milk.

The county structure is dominated by the county of Dolj, at general level and in the case of sheep and goat milk, Mehedinți county is the last place in total and for cow and buffalo milk. The "mountain" counties are predominant in the case of cow and buffalo milk production, and the "plains" counties in the sheep and goat milk production.

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## EFFECT OF RURAL GUIDE PROJECTS ON THE IMPROVEMENT OF RURAL SETTLEMENTS: EVIDENCE FROM IRAN

Mohammad Hossein MENHAJ<sup>1</sup>, Mohammad Sadegh ALLAHYARI<sup>2</sup>,  
Mohammad KAZEMI<sup>1</sup>

<sup>1</sup>University of Guilan, Faculty of Agricultural Science, Department of Rural Development, Rasht, Iran; Email: mmenhaj@guilan.ac.ir

<sup>2</sup>Islamic Azad University, Department of Agricultural Management, Rasht Branch, Rasht, Iran; Email: allahyari@iaurasht.ac.ir

**Corresponding author:** allahyari@iaurasht.ac.ir

### **Abstract**

*Rural guide project (RGP) is the first systemic and comprehensive national effort to spatially organize the villages. It is a major tool for the management of rural development. In this respect, the present study aimed to explore the impact of RGPs on the improvement of rural settlements in Southern Khaveh District of Delfan County, Lorestan Province, Iran. So, we applied comparative-casual methodology so that the villages where an RGP has been implemented were compared to those where no RGP has been implemented in terms of rural house indicators. The main data collection tool was a self-designed questionnaire whose validity was confirmed by a panel of academic professors in Guilan Province and the experts of Housing Foundation of Lorestan Province. The reliability of the questionnaire was estimated by Cronbach's alpha at 0.84. Data were analysed in SPSS<sub>19</sub> Software Package by descriptive statistics (tables of frequency distribution, mean, and standard deviation) and inferential statistics (Mann-Whitney U test). The results shows that RGP had a significant impact on the variables of strengthening, material quality, allocation of parking space, building beautifying, bathroom construction, inclusion of commercial space in the building, energy conservation, construction of houses with multiple floors, availability of civil engineers and experts, partitioning of building internal space, building ventilation, hygienic disposal of sewage, and internal space exposure to light. But, its effect was statistically insignificant on the use of novel material, the use of local material, and availability of hygienic drinking water. Also, it was revealed that in villages with an RGP, the highest satisfaction was found to be with the variables of village development, the transformation in village construction status, and the villagers' comfort and welfare. Also, the least satisfaction was with the variables of employment improvement and more investment on village.*

**Key words:** rural guide project, rural development, rural housing, Delfan County

### **INTRODUCTION**

Village is a form of settlements of human communities and is a natural and geographical unit with a set of living activities. It is directly associated with residence and housing and can fulfil all or most of its annual needs by itself. Villages are featured by their dependence on nature, water and soil so that their social, economic and structural systems are formed in a link with these factors; this is what distinguishes rural areas from urban areas [22]. Indeed, as the oldest form of human settlement, villages are the source and basis for the development of all countries. According to UN [23], over half of the world population lives in rural areas. Thus, the rural development has been prioritized to urban development because

of the importance of villages in economic, social and political development of the countries and the consequences of undeveloped rural areas including extensive poverty, increasing inequality, unemployment, immigration, urban marginalization, etc. [3](Azkia, 2004). Michael Todaro argues that the priority of rural development to urban development is not related to the fact that the majority of people in the third world live in rural areas; rather, it is required because the final solution for urban unemployment and high population density lies in the improvement of rural environment. Developing countries can take the steps towards the realization of development by establishing a balance in economic facilities between urban and rural areas and also, by

laying the ground for people's extensive participation in projects of national development and their enjoyment of their endowments [20]. Rural development schemes are a part of national development programs that are implemented to transform rural community's socio-economic structure. These schemes are fulfilled by government and its agencies in rural areas. This is of more importance in developing countries where governments afford their efforts to revive the structure of the villages to orient them with specific socio-economic goals.

A review of experience and background of various countries in rural development planning shows that diverse approaches and strategies have been applied since the 1950s. One is spatial-physical approach that emphasizes on the spatial dimensions of development planning, particularly the location, distance estimation, spatial dispersion and distribution, physical structure, and hierarchy. Overall, all geographical phenomena have two dimensions: content and physics. The former is related to socio-economic attributes and the latter refers to spatial properties and the appearance. The development in general and rural development in particular encompasses both socio-economic and spatial-physical dimensions. The socio-economic development would entail adverse consequences and would not sustain if spatial-physical development is ignored. On the other hand, mere emphasis on spatial-physical dimensions would be a waste of investment if socio-economic dimensions are overlooked [17].

Presently, an important structural element of rural settlements supporting poor villagers and alleviating the susceptibility of rural areas is to give a particular attention to physical aspects of social, economic and environmental activities of people in these areas. It means that the physical elements of rural settlements encompasses housing, secure environment, public utilities, infrastructural services and land uses. These elements consider maternal support and life quality improvement of villagers [15].

As a physical intervention, rural guide projects (RGPs) target the various economic, social, cultural, managerial, and institutional aspects. The approach governing RGPs emphasize the fact that the quality enhancement of physical structure would improve the socio-economic structure of the villages and would lay the ground for rural development [4]. Since RGPs are the most local plans that are directly associated with the villages and the rural communities, they are at present the most significant strategy to address rural problems. However, despite the extensive effort on the preparation and fulfilment of these schemes in Iran and the allocated funds, few studies have focused on the assessment of their impacts and consequences [6], which points out the need for their systematic exploration.

The historical background of guide plans show that after the Islamic Revolution of Iran, a significant attention was paid to villages and their self-sufficiency in agricultural production. Along with this policy, the physical transformation of rural areas was included in the agenda [10]. In this respect, a scheme – called 'Improvement Plan of Villages' – that was influenced by urban development model was implemented in one of the villages in Shahr-e Kord County by the Ministry of Roads & Urban Development in 1983. It was welcomed by policy-makers and officials [10] and was changed to a comprehensive scheme named *Rural Guide Plan* (under the responsibility of Islamic Revolution Housing Foundation) and *Rural Improvement Plan* (under the responsibility of former Jihad-e Sanazdegi Organization) with a regular budget allocated every year [17].

Human residential areas are characterized with evolvability and dynamics, so that the settlements have their own specific morphological according to their economic, social, political and cultural conditions. The physiography of rural areas has been evolved by specific cultural, social, economic and geographical conditions over the centuries. Formed through a gradual movement under the influence of socio-economic systems, the physical structure of villagers has been left unchanged with no essential transformations in

recent decades because of the immobility of these systems [14]. Since the villages in Iran are the home for over one-third of population (REF) who plays a significant role in economic, social and political development of the country, it is imperative to fulfil schemes for the physical development of rural areas in order to keep rural population in their own living and production space [9].

Villages are mostly deployed and extended spontaneously with no previous plan or map. The rural textures are suffering from some challenges rising from the inconsistency of socio-economic changes and physical structure. Most villages in Iran are old with old physical structure or at least there is old structure next to the new structure. The old structure of the villages is tailored with their prior economic, social, cultural and technological conditions and is not obviously consistent with the evolutions of rural life and conditions and the present lifestyle in rural areas [17].

The rural construction activities are among the major actions of the Islamic Republic Housing Foundation about the physical affairs of the villages in Iran. These activities are aimed to pave the way for the development of the rural areas and the just distribution of physical facilities in order to improve the environmental conditions of rural areas. Thus, these are coordinated with the goals of 20-Year Development Perspective of Iran as a national development document.

Anabestani [1] evaluated the impacts of rural guide schemes on the rural settlements in Western Razavi Khorasan Province. He showed that the schemes improved villagers' hope to reside in villages. But, although they were assessed to be successful in service supply, they have not been so successful in environmental aspect and attracting people's cooperation so that public people and officials have called for their revision due to the shortcomings in their preparation and fulfilment.

In an assessment of social consequences of rural improvement plans in Isfahan Province, Mousavi Ghahdarijani [11] concluded that the plans failed to supply new facilities and

services to the villages and that the villages were generally enjoying the pre-improvement facilities and services. Also, villagers were found to cooperate weakly with different dimensions of improvement plans and this cooperation was even weaker with decision-making and financial aspects. Although 70.8% of respondents stated their objection with orientation of the improvement plans, 86.9% expressed high satisfaction with them.

Azimi and Faroughi [2] reported that rural families who had been granted with rural housing loan were highly satisfied with the quality of their new houses. The satisfaction with the new house included such aspects as higher physical quality and resistance against natural disasters, more beautiful appearance, better materials and facilities inside the houses, better protection against natural factors, welfare facilities, and higher comfort.

Jamshidi and Jamini [7] explored the villagers' satisfaction with rural houses in Ravansar County. They reported that most villagers' satisfaction was lower than moderate. In addition, they found that six factors including hygienic, physical, economic, infrastructural, welfare and strength factors accounted for 80.8% of total variance of the variables (factors influencing villagers' satisfaction with their houses). According to Rafieian et al. [16](2010)'s study on the assessment of people's satisfaction with houses in Tehran, they were moderately satisfied with their houses. In a study on villagers' satisfaction with settlement in Komijan County, Shayan et al. [19] found that the satisfaction was lower than expected among 71% of people. Also, the satisfaction was not uniformly distributed and no village showed high or very high satisfaction. As educational level was increased, satisfaction was decreased and the physical, natural and economic aspects were the most effective factors on the dependent variable.

The present study aimed to explore the impact of rural guide projects (RGPs) on improvement of rural settlements in Southern Khavveh District, Delfan County, in Iran.

**MATERIALS AND METHODS**

The present study was a quantitative research based on comparative-casual methodology in terms of nature, an applied research in terms of objective, and a descriptive analysis in terms of variable control. The statistical population was composed of 39 villages in Southern Khaveh District in Lorestan Province, Iran, of which eight villages had guide schemes and 31 did not. Using Bartlett et al. [5]’s table of least sample size at the 95% confidence level, 112 people were sampled in villages with guide scheme and 110 individuals were sampled in villages without guide schemes. Geographically talking, the research was conducted in Southern Khaveh District of Delfan County located in Lorestan Province, Iran. Delfan County lies between the longitudes of 37°26' and 28°19' E. and the latitudes of 32°28' and 23°22' N. It covers an area of 254,623 ha in south-western Iran. According to the census of 2011, Delfan County has two districts, 10 rural centers and over 400 villages. Its population is 144,161 individuals in 35,598 families, of which 73,872 are male and 70,289 are female. Southern Khaveh District in this county is the home to

12,977 individuals in 3,456 families, of which 6,693 are male and 6,284 are female.

The main data collection tool was a self-designed questionnaire whose content validity was confirmed by a panel of academic professors and experts after its adjustment according to their advice. The questionnaire was found to be reliable by estimating Cronbach’s alpha (using SPSS<sup>19</sup> Software Package) at 0.84. It was composed of two sections. The first section was related to respondent’s demographic data and the second section included the main questions about house improvement indicators in which the items were weighted in five-point Likert type scale (1 = unimportant through 5 = very important). Data were analysed by descriptive statistics (table of frequency distribution, mean, and standard deviation) and inferential statistics (non-parametric Mann-Whitney U test).

**RESULTS AND DISCUSSIONS**

**Descriptive section**

The results showed that in villages with RGP, 73.2 percent of 112 respondents were male and in villages without RGP, 78.2 percent of 110 respondents were male (Table 1).

Table 1. Respondents’ demographic information

| Variable                      | Groups              | With RGP  |         | Without RGP |         | Mean (SD)        |                  |
|-------------------------------|---------------------|-----------|---------|-------------|---------|------------------|------------------|
|                               |                     | Frequency | Percent | Frequency   | Percent | With RGP         | Without RGP      |
| <b>Gender</b>                 | Male                | 82        | 73.2    | 86          | 78.2    |                  |                  |
|                               | Female              | 30        | 26.8    | 24          | 21.8    |                  |                  |
| <b>Age</b>                    | 16-25               | 19        | 17      | 33          | 20.9    | 37.29<br>(10.59) | 38.43<br>(15.12) |
|                               | 26-36               | 33        | 29.5    | 36          | 32.7    |                  |                  |
|                               | 37-47               | 34        | 30.4    | 33          | 30      |                  |                  |
|                               | 48-58               | 17        | 15.2    | 9           | 8.2     |                  |                  |
|                               | 59-73               | 9         | 8       | 9           | 8.2     |                  |                  |
| <b>Family size</b>            | 2-5                 | 82        | 73.2    | 80          | 72.7    | 4.45<br>(0.44)   | 5.25<br>(0.49)   |
|                               | 6-9                 | 30        | 26.8    | 28          | 25.5    |                  |                  |
|                               | 10-12               | 0         | 0       | 2           | 1.8     |                  |                  |
| <b>Marital status</b>         | Single              | 24        | 21.4    | 22          | 20      |                  |                  |
|                               | Married             | 88        | 78.6    | 88          | 80      |                  |                  |
| <b>Education</b>              | Illiterate          | 29        | 25.9    | 27          | 24.5    |                  |                  |
|                               | Elementary school   | 13        | 11.6    | 20          | 18.2    |                  |                  |
|                               | Intermediate school | 19        | 17      | 16          | 14.5    |                  |                  |
|                               | High school         | 25        | 22.3    | 25          | 22.7    |                  |                  |
|                               | Academic degree     | 26        | 23.2    | 22          | 20      |                  |                  |
| <b>Familiarity with RGP</b>   | Yes                 | 83        | 74.1    | 50          | 45.5    |                  |                  |
|                               | No                  | 29        | 25.9    | 60          | 54.5    |                  |                  |
|                               | Total               | 112       | 100     | 110         | 100     |                  |                  |
| <b>House destruction</b>      | Yes                 | 20        | 9       | 0           | 0       |                  |                  |
|                               | No                  | 92        | 91      | 110         | 110     |                  |                  |
| <b>Proximity to main road</b> | Yes                 | 76        | 67.9    | 40          | 36.4    |                  |                  |
|                               | No                  | 36        | 32.1    | 70          | 63.6    |                  |                  |

Source: Survey 2015.

The highest frequency in these two village groups was found to be in age groups of 37-47 years (34.2 percent) and 26-36 years (32.7 percent), respectively.

The highest frequency of family size was 73.2 percent in the class of 2-5 people in villages with RGP and 72.7 percent in the same class in villages without RGP. Among the respondents, the majority were married. The highest frequency was 78.6 percent in villages with RGP and 79.3 percent in those without RGP. According to the findings, it can be said that both groups were similar in terms of the educational level. Among respondents in

villages with and without RGP, 25.9 and 24.5 percent were illiterate, respectively (Table 1).

We found that among all respondents in villages with RGP, 64 individuals' houses were 60-100 m<sup>2</sup> as the highest frequency and one individual's house was 220-250 m<sup>2</sup> as the lowest frequency. The highest and lowest frequencies of house area in villages lacking RGP were related to the classes of 60-100 m<sup>2</sup> (75 individuals) and 250-300 m<sup>2</sup> (1 individual), respectively. Other background factors for both village groups are summarized in Table 2.

Table 2. Respondents' economic status and house features

| Variable  | Groups                              | With RGP  |         | Without RGP |         | Mean (SD)         |                   |
|---|-------------------------------------|-----------|---------|-------------|---------|-------------------|-------------------|
|   |                                     | Frequency | Percent | Frequency   | Percent | With RGP          | Without RGP       |
| House area (m <sup>2</sup> )                          | 60-100                              | 64        | 57.1    | 75          | 68.2    | 107.84<br>(0.582) | 104.04<br>(0.402) |
|   | 100-150                             | 45        | 40.2    | 24          | 21.8    |                   |                   |
|   | 150-200                             | 2         | 1.8     | 9           | 8.2     |                   |                   |
|   | 200-250                             | 1         | 0.9     | 1           | 0.9     |                   |                   |
|   | 250-300                             | 0         | 0       | 1           | 0.9     |                   |                   |
| Non-farming income<br>(× 10 <sup>7</sup> IRR)         | 0-10                                | 94        | 83.9    | 99          | 90      | 62533<br>(0.369)  | 55538<br>(0.497)  |
|   | 11-20                               | 18        | 16.1    | 9           | 8.2     |                   |                   |
|   | 21-30                               | 0         | 0       | 1           | 0.9     |                   |                   |
|   | 41-50                               | 0         | 0       | 1           | 0.9     |                   |                   |
|   | Total                               | 112       | 100     | 110         | 100     |                   |                   |
| Farming income<br>(× 10 <sup>7</sup> IRR)             | 0-10                                | 107       | 95.5    | 101         | 91.8    | 38736<br>(0.207)  | 56898<br>(0.391)  |
|   | 11-20                               | 5         | 4.5     | 6           | 5.5     |                   |                   |
|   | 21-30                               | 0         | 0       | 3           | 2.7     |                   |                   |
|   | Total                               | 112       | 100     | 110         | 100     |                   |                   |
|   | House price (× 10 <sup>7</sup> IRR) | 0-40      | 57      | 50.9        | 82      |                   |                   |
| 40-80   |                                     | 20        | 17.9    | 20          | 18.2    |                   |                   |
| 80-120  |                                     | 19        | 17      | 6           | 5.5     |                   |                   |
| 120-160   |                                     | 9         | 8       | 2           | 1.8     |                   |                   |
| 160-200   |                                     | 7         | 6.3     | 0           | 0       |                   |                   |
| Privately owned land price<br>(× 10 <sup>7</sup> IRR) | 0-40                                | 103       | 92      | 106         | 96.4    | 6090<br>(0.838)   | 35146<br>(0.245)  |
|   | 40-80                               | 1         | 0.9     | 3           | 2.7     |                   |                   |
|   | 80-120                              | 2         | 1.8     | 1           | 0.9     |                   |                   |
|   | 120-160                             | 3         | 2.7     | 0           | 0       |                   |                   |
|   | 160-200                             | 3         | 2.7     | 0           | 0       |                   |                   |
| Privately owned shop price<br>(× 10 <sup>7</sup> IRR) | 0-70                                | 105       | 93.8    | 108         | 98.2    | 20827<br>(0.515)  | 2471<br>(0.212)   |
|   | 70-140                              | 3         | 2.7     | 1           | 0.9     |                   |                   |
|   | 140-280                             | 3         | 2.7     | 1           | 0.2     |                   |                   |
|   | 280-350                             | 1         | 0.9     | 0           | 0.2     |                   |                   |
| Number of residing years in village                   | 5-15                                | 8         | 1.7     | 8           | 7.3     | 36.26<br>(1.021)  | 35.39<br>(0.938)  |
|   | 15-30                               | 35        | 31.3    | 42          | 38.2    |                   |                   |
|   | 30-45                               | 42        | 37.5    | 42          | 38.2    |                   |                   |
|   | 45-60                               | 19        | 17      | 13          | 11.8    |                   |                   |
|   | 60-73                               | 8         | 7.1     | 5           | 4.5     |                   |                   |

Source: Survey 2015

\$1≈32000IRR

### House improvement indicators

According to Table 3, the villagers in villages with RGP are more interested in the application of house improvement indicators related to the quality of construction material, the use of novel materials (iron, cement), and compliance

with energy (heating/cooling) conservation. Also, the least interest was found to be directed to the variables of inclusion of a commercial space in the house, the use of local materials (stone and wood), and availability of civil engineers and experts.

Table 3. House improvement indicators in villages with an RGP

| Rank | Indicator                                   | Very low (%) | Low (%) | Moderate (%) | High (%) | Very high (%) | M    | SD    |
|------|---|--------------|---------|--------------|----------|---------------|------|-------|
| 1    | Material quality                            | 0            | 0.9     | 12.7         | 57.1     | 31.3          | 4.19 | 0.651 |
| 2    | Use of novel material                       | 0            | 3.7     | 8.9          | 58.9     | 29.5          | 4.15 | 0.687 |
| 3    | Energy conservation                         | 4.5          | 5.4     | 12.5         | 29.5     | 48.2          | 4.12 | 1.105 |
| 4    | Light exposure of internal space            | 0            | 4.5     | 23.2         | 39.3     | 33            | 4.01 | 0.865 |
| 5    | Strengthening regulation                    | 0            | 2.7     | 25           | 50.9     | 21.4          | 3.91 | 0.754 |
| 6    | Bathroom construction                       | 0.9          | 5.4     | 31.3         | 27.7     | 34.8          | 3.90 | 0.977 |
| 7    | Hygienic drinking water availability        | 0.9          | 0.9     | 39.3         | 43.8     | 15.2          | 3.71 | 0.464 |
| 8    | Hygienic disposal of sewage                 | 3.6          | 7.1     | 24.1         | 45.5     | 19.6          | 3.71 | 0.983 |
| 9    | Internal space partitioning                 | 0.9          | 7.1     | 38.4         | 43.8     | 9.8           | 3.54 | 0.804 |
| 10   | House ventilation                           | 1.8          | 10.7    | 36.6         | 34.8     | 16.1          | 3.53 | 0.949 |
| 11   | House beautifying                           | 0            | 8       | 52.7         | 26.8     | 12.5          | 3.44 | 0.814 |
| 12   | Parking space                               | 1.8          | 12.5    | 42           | 32.1     | 11.6          | 3.39 | 0.914 |
| 13   | Construction of houses with multiple floors | 4.5          | 34.8    | 27.7         | 27.7     | 5.4           | 2.95 | 1.012 |
| 14   | Inclusion of commercial space               | 24.1         | 41.1    | 9.8          | 12.5     | 12.5          | 2.48 | 1.322 |
| 15   | Availability of experts                     | 25           | 33.9    | 24.1         | 10.7     | 6.3           | 2.39 | 1.157 |
| 16   | Use of local materials                      | 23.2         | 58      | 15.2         | 2.7      | 0.9           | 2.00 | 0.759 |

Source: Survey 2015

As can be seen in Table 4, the parameters most interested in villages without RGP were the compliance with strengthening regulations (building safety), the quality of construction materials, the use of novel materials (iron, cement), and availability of hygiene drinking water. Also, the least interested parameters included the inclusion of a commercial space in the building, the use of local materials (stone, wood), availability of civil engineers and experts, construction of houses with multiple floors (Table 4).

According to data presented in Table 5, the respondents in the villages with RGP are most satisfied with the variables of village development and construction, the change in village construction status, and villagers' welfare and well-being, among all variables related to the satisfaction with rural transformation. Also, they expressed their least satisfaction with the variables of employment improvement and more investment in the village.

Table 4. House improvement indicators in villages lacking a RGP

| Rank | Indicator                                   | Very low (%) | Low (%) | Moderate (%) | High (%) | Very high (%) | M     | SD    |
|------|---|--------------|---------|--------------|----------|---------------|-------|-------|
| 1    | Use of novel material                       | 3.6          | 4.5     | 22.6         | 33.6     | 34.5          | 3.91  | 1.045 |
| 2    | Material quality                            | 0.9          | 6.4     | 22.7         | 5        | 20            | 3.82  | 0.859 |
| 3    | Hygienic drinking water availability        | 1.8          | 7.3     | 29.1         | 35.5     | 26.4          | 3.77  | 0.983 |
| 4    | Strengthening regulation                    | 2.7          | 6.4     | 31.8         | 43.6     | 15.5          | 3.63  | 0.917 |
| 5    | Energy conservation                         | 6.4          | 13.6    | 19.1         | 44.9     | 16.4          | 3.51  | 1.115 |
| 6    | Light exposure of internal space            | 2.7          | 11.8    | 37.3         | 30.9     | 17.3          | 3.48  | 1.002 |
| 7    | Hygienic disposal of sewage                 | 8.2          | 11.8    | 24.5         | 44.5     | 10.5          | 3.38  | 1.092 |
| 8    | Bathroom construction                       | 7.3          | 13.6    | 45.5         | 18.2     | 15.5          | 3.213 | 1.093 |
| 9    | Internal space partitioning                 | 3.6          | 20      | 45.5         | 22.7     | 8.2           | 3.54  | 0.804 |
| 10   | House ventilation                           | 6.4          | 16.4    | 43.6         | 27.3     | 6.4           | 3.11  | 0.971 |
| 11   | Parking space                               | 7.3          | 11.8    | 49.1         | 26.4     | 5.5           | 3.11  | 0.942 |
| 12   | House beautifying                           | 5.5          | 22.7    | 40           | 26.4     | 5.5           | 3.04  | 0.967 |
| 13   | Construction of houses with multiple floors | 8.2          | 47.3    | 28.2         | 13.6     | 2.7           | 22.5  | 0.925 |
| 14   | Use of local materials                      | 30.9         | 45.5    | 19.1         | 4.5      | 0             | 1.97  | 0.829 |
| 15   | Availability of experts                     | 40           | 36.4    | 16.4         | 4.5      | 2.7           | 1.94  | 0.998 |
| 16   | Inclusion of commercial space               | 48.2         | 26.4    | 17.3         | 4.5      | 3.6           | 1.89  | 1.078 |

Source: Survey 2015

Table 5. Post-RGP satisfaction and changes in villages with a RGP

|                               | Very low (%) | Low (%) | Moderate (%) | High (%) | Very high (%) | M    | SD    |
|-------------------------------|--------------|---------|--------------|----------|---------------|------|-------|
| Development and construction  | 11.6         | 30.4    | 42.9         | 13.4     | 1.8           | 2.63 | 0.920 |
| Credit availability           | 20.5         | 33      | 39.3         | 5.4      | 1.8           | 2.35 | 0.927 |
| Change in construction status | 4.5          | 18.7    | 58           | 12.5     | 6.3           | 2.97 | 0.864 |
| Informing                     | 36.6         | 42      | 14.3         | 4.5      | 2.7           | 1.95 | 0.966 |
| Cooperation                   | 30.4         | 32.1    | 27.7         | 6.3      | 3.6           | 2.21 | 1.058 |
| Reduced immigration           | 17.9         | 57.1    | 19.6         | 1.8      | 3.6           | 2.16 | 0.865 |
| Reverse immigration           | 19.6         | 53.6    | 23.2         | 3.6      | 0             | 2.11 | 0.752 |
| Comfort and welfare           | 8.9          | 31.5    | 42           | 13.4     | 4.5           | 2.73 | 0.952 |
| Improved employment           | 48.2         | 39.2    | 11.6         | 0.9      | 0             | 1.65 | 0.719 |
| Higher investment             | 37.5         | 41.1    | 16.1         | 4.5      | 0.9           | 1.90 | 0.890 |

Source: Survey 2015

Table 6. Kolmogorov-Smirnov (K-S) test to check normality

|                              | Kolmogorov-Smirnov test |     |         | Shapiro-Wilk test |     |         |
|------------------------------|-------------------------|-----|---------|-------------------|-----|---------|
|                              | Test statistic          | df  | p-value | Test statistic    | df  | p-value |
| House improvement indicators | 0.072                   | 222 | 0.007   | 0.976             | 222 | 0.001   |

Source: Survey 2015

Overall, we can conclude that the villagers living in villages where an RGP has been implemented are not fully satisfied with how it has been fulfilled (Table 5).

To decide on how to test house improvement parameters, we used the Kolmogorov-Smirnov (K-S) test and the Shapiro-Wilk test.

Results in Table 6 revealed that the significance level of the data did not have a normal distribution. Thus, we applied non-parameter Mann-Whitney U test for the hypotheses (Table 6).

Table 7. Means comparison test for house improvement parameters between two groups

| Rank  | Indicator                                   | Mean ranks |             | Mann-Whitney U | p-value |
|-------|---|------------|-------------|----------------|---------|
|       |   | With RGP   | Without RGP |                |         |
| 1     | Strengthening regulation                    | 120.42     | 102.42      | 5161.50*       | 0.025   |
| 2     | Material quality                            | 124.25     | 98.52       | 4732.50**      | 0.001   |
| 3     | Parking space                               | 119.71     | 103.14      | 5240.00*       | 0.040   |
| 4     | House beautifying                           | 123.25     | 99.53       | 4843.50**      | 0.003   |
| 5     | Bathroom construction                       | 130.68     | 91.97       | 4011.50**      | 0.000   |
| 6     | Use of novel material                       | 116.98     | 105.92      | 5546.50        | 0.168   |
| 7     | Inclusion of commercial space               | 126.04     | 96.70       | 4532.00**      | 0.000   |
| 8     | Use of local materials                      | 112.98     | 110.08      | 6004.00        | 0.721   |
| 9     | Energy conservation                         | 130.08     | 95.58       | 4079.00**      | 0.000   |
| 10    | Construction of houses with multiple floors | 123.42     | 99.37       | 4825.50**      | 0.003   |
| 11    | Availability of experts                     | 124.11     | 98.66       | 4747.50**      | 0.002   |
| 12    | Internal space partitioning                 | 126.25     | 96.48       | 4508.00**      | 0.000   |
| 13    | House ventilation                           | 123.93     | 98.80       | 4763.00**      | 0.002   |
| 14    | Hygienic disposal of sewage                 | 120.22     | 102.62      | 5183.00*       | 0.030   |
| 15    | Light exposure of internal space            | 127.67     | 95.04       | 4349.00**      | 0.000   |
| 16    | Hygienic drinking water availability        | 108.18     | 114.88      | 5788.00        | 0.410   |
| Total | House improvement indicators                | 134.19     | 88.40       | 3618.50**      | 0.000   |

\* p < 0.05      \*\* p < 0.01

Source: Survey 2015

According to Table 7 presenting the results of Mann-Whitney U to test the hypotheses, it was found that among house improvement parameters including the variables of strengthening regulations, material quality, inclusion of parking space, building beautifying, bathroom construction, inclusion of commercial space in building, energy conservation, construction of houses with multiple floors, availability of civil engineers and experts, internal space partitioning, building ventilation, hygienic disposal of sewage, and the light exposure of internal space, the hypothesis  $H_1$  regarding the significant difference between villages with RGP and those without RGP is confirmed and the null hypothesis,  $H_0$ , regarding the lack of such difference is rejected. Also,  $H_1$  is accepted and  $H_0$  is rejected for the variables of the use of novel material, the use of local material, and availability of hygienic drinking water. Overall, it can be stated that as a symbol of rural development and mechanization, the implementation of RGPs can significantly influence house improvement indicators.

## CONCLUSIONS

The results imply that RGPs have not been completely implemented in any of the studied villages and they have been halted at the level of square and road construction. Only *Barkhordar* Village has enjoyed a relatively complete implementation of the project since it is located near the main road. Unfortunately, in constructional projects including RGPs, all villages are assumed to be identical, so similar actions are taken for all of them. Guide projects are limited merely to physical dimension and the improvement of the roads whose only eminent consequence is the facilitation of commute. This road improvement has failed to lead to successful development because development is mainly related to proper economic ground, whereas the studied rural guide projects have only been limited to the improvement of structures in physical aspect. The increase in land price has been another consequence of rural guide projects which can be both positive and negative. Since the price

difference between lands around main road and those in other parts of the village is deepened, people's socio-economic base is transformed which may foment the old conflicts and disputes. Also, dissatisfaction with damage compensation is another result of RGPs in the studied villages. Although the Islamic Revolution Housing Foundation has developed some policies to offset the damages to people (e.g. rehabilitation loan, material supply, etc.), they have been gradually neutralized and/or the damage does not match the compensation. This is clearly visible in the studied villages. In total, we can conclude that RGPs have been significantly effective on most physical variables and house improvement parameters of the study and they have been quite successful in the improvement of settlements and their physical status. These results are confirmed by most relevant studies (e.g. [2, 8, 12, 13, 18, 21]).

According to the results, the following recommendations can be drawn:

(i) The consideration of local consultants. People's attitudes towards the project would be useful because the complete implementation of the project and its facilitation require such an attitude in local community. This would contribute to public people's more serious, informed and constructive cooperation in the project.

(ii) Rural guide project coordination with rural community's features. The copying of urban guide plans and the use of a single project without including the specific economic, social and cultural attributes of the village would fail to succeed. It is imperative to get villagers involved in the development and implementation of guide projects which should be considered by the officials of villages in Nurabad County.

We also need to examine the mechanism of rural guide project development and implementation and to recognize their drawbacks.

Also, it is necessary to examine if rural guide projects can be considered as base schemes in the development of long-term development plan of the villages.

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## STUDY CONCERNING THE IMPROVEMENT OF GLUTENOUS BISCUITS CHARACTERISTICS USING FOOD ADDITIVES

George MOISE

“Lucian Blaga” University of Sibiu, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Sibiu, Romania, Phone: 0040269234111, Fax: 0040269234111, E-mail: georgemoise@yahoo.com

*Corresponding author:* georgemoise@yahoo.com

### *Abstract*

*This paper aimed to improve the properties of gluten biscuits using food additives. For the research, sodium metabisulphite and cysteine antioxidants, were used, and their influence on the properties of gluten biscuits was observed. Sodium metabisulphite had a good effect on biscuits taste and external appearance, and also for the mastication process, finally with a positive impact on biscuits sales. Cysteine has a moisture-reducing effect compared to sodium metabisulphite, an aspect very important for product's consistency.*

*Key words:* glutenous, additives of food, biscuits.

### INTRODUCTION

Biscuits are minced products obtained by baking a loaf dough made from: flour, sugar, fats, eggs, honey, glucose, milk, flavors, chemical and biochemical lances, and the like. Cookies are obtained from a chemically or biochemically fermented dough and are considered to be products with low moisture content and very good organoleptic properties. Due to the large number of raw and auxiliary materials used, their different proportions and the technological processes used, the range of biscuits is very rich [1].

It is not possible to distinguish between materials that provide the nutrients of biscuits and what contributes to integrating their personality in the presentation and evaluation of the tasting, each of which contributes a certain amount of potential, thus providing some potential [1-3].

Wheat flour is the basic matter, which accounts for more than 50% of the biscuit composition. The main types of flour used to make biscuits are white. The manufacturing process and the quality requirements of biscuits require that the meals destined for this production meet certain physico-chemical and technological requirements.

The actual product of the biscuit manufacture begins with the dough preparation [4-7].

The purpose of preparing the dough is to produce a table with corresponding characteristics, the requirements of the assortment being uniformly found under differentiated conditions, depending on the group of biscuits for which it is intended, and consists in the operations by which the incorporation of all the components into the homogeneous mass. For this purpose, the preparation and dosing of the framing materials is required [9,11].

Biscuits are one of the most important groups of pasta products. By the composition and shaping of the dough, by filling, decorating with creams and glazes, as well as by the packing variants, a great variety of assortment is achieved.

### MATERIALS AND METHODS

The quantity of the sample will be calculated so that for each taster you can get about 100g of the product.

Sample preparation is done in a separate room other than the tasting room.

Samples will be prepared identically (the same amount, in the same way of vessels, of the same size, of the same material, white) [8,13].

Sample coding:

It is done according to STR 3196-83

Performing the analysis:

After receiving the samples to be analyzed, the tasters complete the standard form with the personal data and enter the coding rules on the test vessels in the form. He then proceeds to the examination and evaluation of the organoleptic traits on the basis of the 5-point scale points (1-5).

- Exterior appearance (shape, surface and color)
- Appearance on the section
- Smell
- Taste
- Behavior with mastication

Examination of the external appearance is done on the whole product, checking whether the shape, the upper and the lower surface, as well as the color correspond to the analyzed product [7,10,13]. In order to evaluate stratification, porosity, and therefore sectional appearance, the product will be cut into smaller halves and fractions.

The smell is appreciated for the whole product and cut, by deep inspiration a few times. The taste and behavior of mastication is appreciated by taking small portions of the product into 2-3 slices (2-3 biscuits).

After tasting each sample, the residual taste of the oral cavity, with drinking water at room temperature, will be eliminated [9,13].

Sensory analysis will be carried out in perfect quiet and hygienic conditions, without hurry, with a relaxation pause of 2 minutes between samples. When the number of samples is large, groups of 4 products (of the same assortment) will be made, and after tasting a group, a 15-minute break will be made.

After examining each test, the results will be included in the analysis forms

#### Scoring ladder:

Scoring ladders used to assess each organoleptic trait of products are the 5 and 6 point ladders.

#### Calculation:

The formula is:  $P_{mp} = P_{mnp} \times f_p$

The terms according to STR 3196-83 are:

- individual score (I)
- Unmatched average score ( $P_{mnp}$ )
- participation factor-importance ( $f_{pi} = f_i$ )
- transform factor ( $f_t$ )
- weighting factor ( $f_p = f_2$ )

- weighted average factor ( $P_{mp}$ )

To complete the study, we completed three work samples.

**Sample 1 - Dough gluten biscuits:** Flour, Water, Ammonium bicarbonate, Sodium bicarbonate, Salt, Plantol, Liquid glucose, Glucose-fructose syrup, Sugar.

**Sample 2 - Dissolving gluten biscuits with sodium metabisulfite:** Flour, Water, Ammonium bicarbonate, Sodium bicarbonate, Salt, Plantol, Liquid glucose, Glucose-fructose syrup, Sugar, Sodium metabisulfite (4g per 100kg flour)

**Sample 3 - Dissertation of gluten biscuits with cysteine:** Flour, Water, Ammonium bicarbonate, Sodium bicarbonate, Salt, Plantol, Liquid glucose, Glucose-fructose syrup, Sugar, Cysteine (12g per 100 kg flour)



Fig.1. Samples of gluten biscuits subjected to sensory analysis (orig.)

The following steps were taken to make biscuits:

- Mixing the ingredients (water temperature = 40°C)
- Kneading at the blender at 1 minute speed and 2.5 minutes at high speed
- Allow the dough to rest
- Laminate and roll the dough
- Gluten-shaped biscuits
- Baking the biscuits
- The gluten biscuits are allowed to cool.



Fig.2. Mixer for biscuits (orig.)

**Sample 1 - Dough gluten biscuits:**

Weight of training - 93gr/ 0pcs  
 Crude product dimensions: Length = 51-52 mm, Width = 48.5-49 mm, Thickness = 3.5 mm

Finished product dimensions: Length = 53-54 mm, Width= 48-49 mm, Thickness = 5.5-6 mm

**Sample 2- Dissolving gluten biscuits with sodium metabisulfite:**

Weight of training - 92gr/10 pcs  
 Crude product dimensions: Length = 54.5-55 mm, Width = 49-49.5 mm, Thickness = 3.5-4 mm

Finished product dimensions: Length = 55.5-56 mm, Width= 49-49.5 mm, Thickness = 5.5-5.8 mm

**Sample 3-Dissertation of gluten biscuits with cysteine:**

Weight of training - 92gr/10 pcs  
 Crude product dimensions: Length = 53-53.5 mm, Width = 49-49.5 mm, Thickness = 3.5 mm

Finished product dimensions: Length = 54.5-55 mm, Width = 49.4-49.7 mm, Thickness = 5-5.5 mm.

The calculation of the factors is presented in Table 1.

The sum of the factors of participation - importance is equal to 1. The preliminary assessment is done according to STR 3196-83. If the individual score of 0, 1 or more of the tasters is given, the analysis is repeated for the particular grading [12,13].



Fig.3. Determination of the dimensions of gluten biscuits (orig.)

Table 1. Calculation of the factors

| The organoleptic traits examined | Participation factors Importance FPI | Factor of transformation $f_t = f_i$ | Factor de weighting $F_p$ |
|----------------------------------|--------------------------------------|--------------------------------------|---------------------------|
| Exterior appearance              | 0.25                                 | 4                                    | 1.0                       |
| Appearance in section            | 0.10                                 | 4                                    | 0.4                       |
| Smell                            | 0.10                                 | 4                                    | 0.4                       |
| Taste and aroma                  | 0.40                                 | 4                                    | 1.6                       |
| Behavior in mastication          | 0.15                                 | 4                                    | 0.6                       |

**Calculation of the total score: Calculation mode:**

The group leader calculates the weighted average score for each skill by multiplying the unweighted average score by the weighting factor, which is expressed in a decimal without rounding. Then the weighted average values obtained for the five qualifying categories are summed up, the sum obtained represents the total score of the respective product [13].

**Research methods used to determine the physico-chemical properties of gluten biscuits; Thermobalance method**

It is based on the loss of sample mass by evaporation of water by heating at 130-150° C under intense air circulation for 30 minutes.

**Thermal humidity meter/digital thermobalance programmable:**

Automatic portable and laboratory automatic digital device very easy to use; is the world's most performing line of thermo-volumetric

line adapted with a new infrared red radiation system IDR (infrared DARK Radiator) and the BOOST electronic system for very fast determinations.

**Benefits:**

- Easy to use features
- very precise determination
- Meets the highest international quality standards.
- Thanks to the smart heating system (CHS) and the Boost system (which is also adjustable), results are achieved in a very short time and with high precision.
- Adapted to an "Auto-Stop" system that allows settings by percentage (%) or time (sec)
- The statistical functions can be set.
- Saves 20 sets of reports/results.
- Anti-Theft System

With the printer, the results can be printed according to GLP and HACCP, within a time range of 0.1 to 7 minutes.

**Weighing system by model:**

- Weighing range: 120 g, for XM120.
- Minimum weighing test: 0.2 g,
- Precision weighing: 0.001mg,
- Reading accuracy: 0.001 g,
- Measuring accuracy: 1mg,

**Drying Process:**

- Reproducibility: 1g/0.2%, 10g/0.02%,
- Reading precision: 0.01%.
- Reproducibility: 1g/0.2%, 10g 0.02%,

**Temperature range:**

- Temperature range: 30°C and 250°C,
- Temperature ranges are in 1°C increments,
- temperature range: 2 points at 100°C and 160°C,
- Intervals: Boost (very fast) +1 for XM60 + 3 model for XM120

**Calibration modes:**

- Balance (balance part): with a calibration weight,
- Temperature: calibrate in 2 steps (100°C and 160°C) with temperature sensor.

- features
  - RS 232 serial interface with PC and printer connection,
  - Has built-in memory for 5 complete programs,
  - LCD Touch Screen/Touch Control (XM120)
- Certificates and Associated Documents:

- Quality Certificate ISO 9001: 2000,
- Certificate of conformity
- CE marking
- Warranty Warranty 24 months
- Operating manual

The sensory analysis was done on the 3 samples of biscuits and was performed by 5 tasters who gave notes for: appearance, appearance in the section, smell, taste, mastication behavior.



Fig.4. Samples of gluten biscuits subjected to sensory analysis (orig.)

**RESULTS AND DISCUSSIONS**

The results of the tasters were centralized in the individual tables for each sample, then each sample was compared to each other.

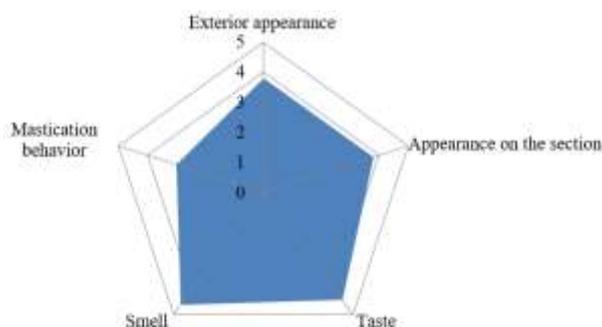


Fig.5. Results of Sensory Analysis for Sample 1

The sample that obtained the best results in sensory analysis is sample 2, gluten biscuits with sodium metabisulphite addition. Sample 2 obtained an average score of more than 2 points from the control sample, and sample 3,

the cysteine, obtained 1.8 points more than the control sample.

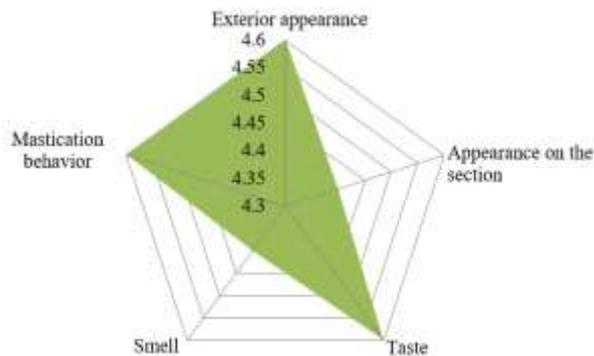


Fig.6. Results of Sensory Analysis for Sample 2

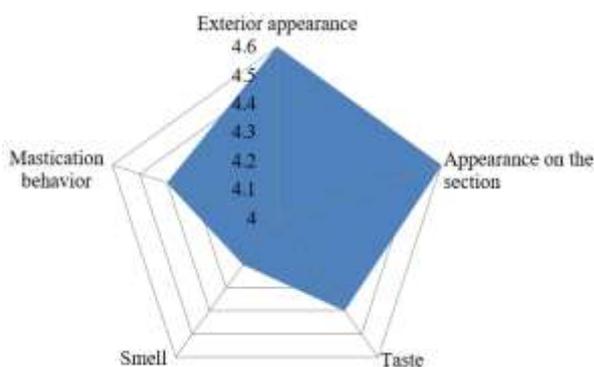


Fig.7. Results of Sensory Analysis for Sample 3

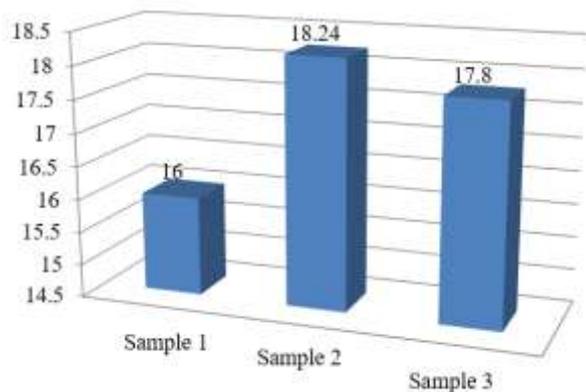


Fig. 8. Results of Sensory Analysis for all the samples

From this, we can conclude that any one of them improves the sensory properties of gluten biscuits.

From the figures above, it is noted that although the difference between the two loops is not very high, however, the sodium metabisulphite sample proved to be better than that with cysteine.

Effect of food additives on product humidity  
 To study the effect of food additives on product humidity, the moisture content of the dough

before baking and the moisture content of the finished product was determined to observe the evolution of moisture.



Fig.9. Analytical balance used for weighing samples (orig.)



Fig.10. Determination of the moisture content of the biscuit dough (orig.)

From Fig.12, it can be seen that from the control sample, the dough obtained from the sloping samples has lower humidity. After baking, it can be seen that although sample 3 (cysteine sample) humidity dropped by more than one percentage point from the control sample, sample 2 (sodium metabisulphite sample) had higher moisture compared to the control sample.



Fig. 11. Determination of humidity of gluten biscuits (orig.)

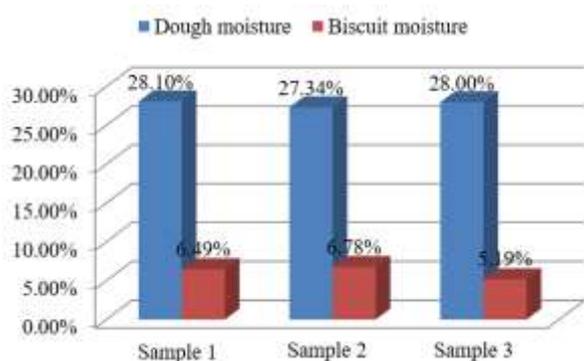


Fig. 12. Moisture of analyzed samples

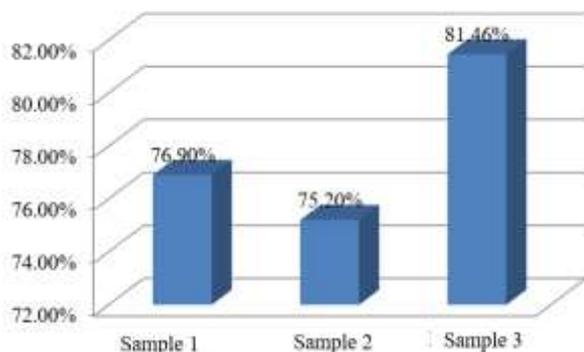


Fig. 13. The ratio of dough moisture to moisture content of gluten biscuits

From Fig. 13 it can be seen that in sample 3 (the cysteine sample) has the highest ratio between the moisture content of gluten biscuits and dough. From here we can deduce that cysteine reduces the moisture content of the finite product. It can also be seen from the figure that

the addition of added metabisulphite increases the moisture from the control sample.

## CONCLUSIONS

The purpose of this paper is to study the effect of food additives on the sensory and physico-chemical properties of gluten biscuits.

As a result of our analysis of the samples of gluten biscuits, we can draw more conclusions. The sample that obtained the highest sensory analysis results was the addition of sodium metabisulphite, and it also achieved the highest result in taste, mastication and external appearance, which are the most important characteristics of biscuits. Another important aspect is the taste of the product, which is important for 75% of the people who participated in the study.

As a result of the physico-chemical analyzes, there was a clear difference in the different types of chopsticks on biscuits. In terms of product humidity, it has been observed that cysteine has a moisture-reducing effect, and sodium metabisulphite has seen an increase in moisture in biscuits. This is important because the moisture content of biscuits greatly impacts the product's consistency.

Ultimately, the most important aspects of the product are its taste and appearance, as these two characteristics influence the sale of the finished product.

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## RESEARCHES ON THE INFLUENCE OF SOIL AND CLIMATE CONDITIONS IN THE ROMANIAN PLAIN AND TECHNOLOGICAL CHAINS ON THE CAPACITY TO MAINTAIN THE APPLES QUALITY-CASE STUDY

Nicoleta OLTENACU, Andrei Radu IOVA, Elena LASCAR

University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Emails: nicoleta\_oltenacu@yahoo.com, andrei\_anglia@yahoo.com, elenalascar@yahoo.co.uk.

*Corresponding author:* nicoleta\_oltenacu@yahoo.com

### *Abstract*

*The success of fruit storage in storehouses is conditioned and depends largely on the environment factors, on applied technology and storage conditions. The better the optimal factors are known on which the growth and formation of the fruit depends, when and how to manipulate and transport the fruit, the more secure the premise for the success for the good preservation of fruit is. It is absolutely necessary to know the main factors that must be taken into account in order to bring into storehouse only fruit corresponding to this purpose. The experiments were organized in comparative variants in the case of apples based on 6 homologated varieties of apple (Florina, Generos, Golden Delicious, Idared, Jonathan and Redix) present in the current assortment in Moara Domneasca farm and in Romania. After 120 days of storage, determinations were made concerning: evolution of the soluble dry matter content; evolution of some components; organoleptic appraisal (appearance, firmness, taste). The results showed that, after storage, the dry matter content, the titratable acidity, the total sugar content and the vitamin C content recorded an increased or decreased evolution depending on variety, compared to the initial content.*

*Key words:* evolution, solids content, storage, titratable acidity, varieties

### INTRODUCTION

In Romania, the apple tree crop has very favorable soil and climate conditions for obtaining high quality production[4].

The current variety of apple in our country comprises varieties, divided into three groups, namely: summer varieties, autumn varieties and winter varieties.

Once with Romania's integration into the European Union, product quality requirements were aligned with European standards, on the one hand to facilitate trade, but also to raise living standards to the same standards[12].

In order to achieve superior quality, in addition to the technological processes applied in the orchard, the fruits must be used according to an appropriate technology, which allows the quality to be maintained at the highest rates, from harvesting to delivery to the consumer[3]. Competition in internal and foreign markets determines producers and re-evaluers to

improve both the crop systems and the flow of apple fruit[9].

That is why there are permanent concerns in the modernization of the material base and the appropriate technologies regarding the use of apples in the fresh state[7].

Preserving fruit in the best conditions, for as long as possible and with the lowest quantitative and qualitative depreciation, can be done by taking into account a whole complex of factors [1].

The factors influencing preservation can be divided into several groups, namely: the group of factors contributing to the formation and growth of fruit in plantations; group of factors and conditions of harvesting, handling and transport of fruit; group of environment factors of fruit storage [2].

The success of fruit storage in storehouses is conditioned and depends to a large extent on the factors belonging to the first two groups. The better what are the optimal factors are known on which the growth and formation of

the fruit depends, when and how to manipulate and transport the fruit, the more secure the premises for the successful preservation of the fruit [10].

It is absolutely necessary to know the main factors that must be taken into account in order to introduce into the storage only fruit corresponding to this purpose [5].

The nutritional value of fruits and vegetables is mainly due to their richness in minerals and vitamins, low molecular weight carbohydrates, dyes [6].

The main quality characteristics of fruits and vegetables determine their qualitative value [8].

Determinations made as well as the analysis of the obtained results aimed at following the behaviour of some apple varieties to the action of the technological factors used and the evolution of some chemical components during the maintaining period [11]. The researches aimed to establish the capacity to preserve the fresh fruit quality of the existing varieties in the variety grown at Moara Domneasca, on the preluvosoil type soil.

## MATERIALS AND METHODS

The apples introduced into experiment were represented by 6 homologated varieties of apple (Florina, Generos, Golden Delicious, Idared, Jonathan and Redix) present in the current assortment in Romania and in intensive orchard from Moara Domneasca Farm. The fruits belong 2016 fruitage and were harvesting at commercial maturity. The analyses were

made to a sample of 15 uniform fruits from each variety. They were stored in the freezing cells of the specialized storehouse within Moara Domneasca. The technology used consisted in the application of a number of 12 phytosanitary treatments. With 3 of these treatments, Terra-Sorb® Complex foliar fertilizers at a dose of 1 l / ha. This is a bio-stimulator for foliar applications with a high content of free amino acids obtained by enzymatic hydrolysis, the only method to keep their completeness and, implicitly, their effectiveness. The Terra-Sorb Complex contains amino acids, nitrogen, boron, magnesium and other microelements to ensure a rapid resumption of vegetation to de-spring and to maximize the formation of productivity elements and the resistance of crops to stress factors. The product helps to better pollination and fructification and to better plant nutrition through nutrient content. In the autumn of 2015, the scarification work was carried out, followed by the disc-bearing work. In the spring, 200 kg of complex fertilizers of type N: P: K 15:15:15 were incorporated in a disc work. The climate regime is characterized by very hot summers and relatively cold winters with snow storm periods. During the year 2016, the recorded precipitations were 811.6 mm, the largest quantities being recorded during the months of May, June and August, exceeding the monthly multiannual averages (Table 1). Also, the annual average of temperatures was higher compared to the multi-annual average of 1981-2010.

Table 1. Temperatures and precipitations recorded during the year 2016

| Month     |      | I    | II   | III  | IV   | V    | VI    | VII  | VIII | IX   | X     | XI   | XII  | Rainfall |
|-----------|------|------|------|------|------|------|-------|------|------|------|-------|------|------|----------|
| 2016      | P mm | 62.6 | 35.6 | 67.8 | 64.6 | 71.0 | 114.8 | 4.2  | 88.8 | 83.2 | 164.2 | 51.8 | 3.0  | 811.6    |
|           | T °C | -5.6 | 3.2  | 7.6  | 14.3 | 15.9 | 22.4  | 24.2 | 23.1 | 18.9 | 9.7   | 5.3  | -2.1 | 10.7     |
| Average   | P mm | 33.6 | 31.6 | 38.3 | 51.3 | 66.5 | 84.5  | 77.8 | 64.7 | 55.0 | 43.5  | 41.5 | 44.8 | 633.1    |
| 1981-2010 | T °C | -2.1 | -1.0 | 3.5  | 9.3  | 14.9 | 18.3  | 20.2 | 19.7 | 14.8 | 9.6   | 3.8  | -0.8 | 9.8      |

Source: Stefanesti-Ilfov Weather Station

The experiments were organized in comparative variants in the apples based on the mentioned varieties, with 3 repetitions in each variant. The fruits were placed for storing in plastic pots for vegetables and fruit. The fruit storage duration was 120 days. During storage

the daily control of the thermo-hydric factors in the refrigeration room was performed to ensure that the optimal conditions for maintaining the quality are observed (temperature 0 ... 4 degrees Celsius and UR 90-95%) were observed. Determinations were

made on harvesting and at the end of the maintenance period. Determinations related to contents in soluble dry matter were made, to the evolution of some chemical components (titratable acidity, total sugar, C vitamin), to aspect, firmness, taste.

The determination of the soluble dry matter content was performed by the refractometric method, using the ABBE mass refractometer, with the expression of the results in percentage. The determination of chemical components (titratable acidity, total sugar and vitamin C) was performed by standardized laboratory methods, their evolution being evidenced by comparing the initial results with the data obtained at the end of the retention period. The titratable acidity was determined by the titrimetric method with results expressed in g malic acid/100g. The product, the sugar content was determined by the Bertrand method with the expression of the results in percent and the vitamin C by spectrophotometric method with the expression of the results in mg. acid ascorbic/100g of the product. The fruit firmness was performed with manual penetrometer type Effe -gi with large piston with the diameter of 11 mm, to a number of 25 fruits per variant, each fruit being penetrated in 4 points in the equatorial area, after the removal of skin in the penetration areas.

After 120 days of storage, determinations were made regarding the evolution of the soluble dry matter content, at the evolution of some components, at the organoleptic assessment (appearance, firmness, taste).

## RESULTS AND DISCUSSIONS

The initial soluble solids content SSC of the apples tested varied between 10.48-14.33% depending on the variety, with an average of 12.65% (Table 2). During storage, the apples showed increases of 1.88-69,85% or 3.42% decrease soluble content depending on the variant, the overall experience was an average increase of 17.15%. The highest increases in

SSC were recorded for Jonathan, followed by Generos (+ 32.94%). At the end of storage, the SSC of the apple was between 12.70-17.80% depending on the variety, with an average of 14.82%. The highest content was determined for Jonathan, followed by Generos (15.90%). The lowest SSC was recorded in the Idared variety with a value below 13%.

Table 2. Evolution of soluble solids content during apples storage

| Variety          | Soluble solids content (SSC) (%) |               |                |
|------------------|----------------------------------|---------------|----------------|
|                  | Initial storage                  | After storage | Difference (%) |
| Jonathan         | 10.48                            | 17.80         | +69.85         |
| Generos          | 11.96                            | 15.90         | +32.94         |
| Idared           | 13.15                            | 12.70         | -3.42          |
| Florina          | 14.33                            | 14.60         | +1.88          |
| Redix            | 13.50                            | 13.90         | +2.96          |
| Golden delicious | 12.46                            | 14.00         | +12.36         |
| <b>Average</b>   | <b>12.65</b>                     | <b>14.82</b>  | <b>+17.15</b>  |

Source: Own calculation.

The results on the dynamics of some chemical components during the apple storage are shown in Table 2. Initial values were recorded, immediately after harvesting and values measured after maintaining.

The data in Table 3 show the following: In apples, the initial titratable acidity content was 0.37-0.73% depending on the variety, with an average of 0.52%. Fruit with the highest acidity belonged to Jonathan variety (0.73%), and the lowest Redix variety followed by Golden delicious (0.40%).

During storage, both increases of 5.40-20.69% and decreases of 29.27-54.79% in the initial acidity content occurred, depending on the variant, the overall tendency was decreasing on an average by 23.08%.

After storage, the apple acidity was 0.27-0.70% depending on the variant, with an average of 0.40% variants. Fruits with the highest acidity belonged to Idared variety, followed by Florina variety (0.41%). The lowest acidity was determined in Golden delicious variety, followed by Generos variety (0.29%).

The initial total sugar content was at apples of 8.32-11.60% depending on the variety, with an average of 10.12%.

Table 3. Evolution of some chemical components at the harvest moment and after the apples storage

| Variety          | Titrable acidity (%) |             |               | Total sugar content (%) |             |               | Vitamin C (mg/100g) |             |              |
|------------------|----------------------|-------------|---------------|-------------------------|-------------|---------------|---------------------|-------------|--------------|
|                  | Initial              | Final       | Difference    | Initial                 | Final       | Difference    | Initial             | Final       | Difference   |
| Jonathan         | 0.73                 | 0.33        | -54.79        | 8.39                    | 7.47        | -10.97        | 8.10                | 8.80        | +8.64        |
| Generos          | 0.41                 | 0.29        | -29.27        | 8.32                    | 7.53        | -9.50         | 9.97                | 9.26        | -7.12        |
| Idared           | 0.58                 | 0.70        | +20.69        | 10.95                   | 8.87        | -19.00        | 10.04               | 9.78        | -2.59        |
| Florina          | 0.63                 | 0.41        | -34.92        | 11.38                   | 9.22        | -18.98        | 11.00               | 10.67       | -3.00        |
| Redix            | 0.37                 | 0.39        | +5.40         | 11.60                   | 8.90        | -23.28        | 10.30               | 9.70        | -5.83        |
| Golden delicious | 0.40                 | 0.27        | -32.5         | 10.05                   | 11.51       | +14.53        | 8.72                | 9.09        | +4.24        |
| <b>Average</b>   | <b>0.52</b>          | <b>0.40</b> | <b>-23.08</b> | <b>10.12</b>            | <b>8.92</b> | <b>-11.86</b> | <b>9.69</b>         | <b>9.55</b> | <b>-1.44</b> |

Source: Own calculation

The variants with the highest sugar content were Redix variety, Florina variety (11.38%) and Idared variety (10.95%), and the lowest, Generos variety followed by Jonathan variety (8.39%). During the storage, both increase of 14.53% and decrease of 9.50-23.28% of the total sugar content, depending on the variation, took place during the storage period, with the overall trend of decrease on an average by 11.86%.

After storage, the total apple sugar content was 7.47-11.51% depending on the variant, with an average of 8.92% variants. Fruits with the highest total sugar content belonged to Golden delicious variety, followed by Florina variety (9.22%) and Jonathan variety (7.47%) and Generos variety, 53%). The initial vitamin C content was in apples of 8.10-11.00 mg / 100g depending on the variety, with an average of 9.69 mg / 100g. The variants with the highest vitamin C content were Florina variety (11.00 mg/ 100g) and Redix variety (10.30 mg/100g), and the lowest Jonathan variety (8.10 mg/100g), followed by Golden delicious variety (8,72mg/100g) and Generos variety (9.97mg/100g), so values below 10 mg/100g. During storage, both increases by 4.24-8.64% and decreases by 2.59-7.12% in vitamin C occurred, depending on the variant, the overall tendency was decreasing on an average by 1.44%. After storage, the apple vitamin C content was 8.80-10.67 mg/100g depending on the variant, with an average of 9.55 mg / 100g variants. Fruits with the highest content of vitamin C belonged to Florina variety followed by Idared variety (9.78 mg/100g), and the lowest Jonathan variety (8.80 mg/100g) followed by Golden delicious variety (9.09 mg/100g). For the organoleptic assessment, tastings were conducted using the tasting sheets comprising a total of 3 assessment

criteria (appearance, texture, taste). The assessment was made using 100 points scale. Each of the three assessment criteria have different weight in the general scoring, depending on their importance (Table 4) This "aspect" is 15%, "firmness" is 35% and "taste" is 50%. Depending on the achieved score, 5 quality classes differentiate, according to table 4. The evolution of the organoleptic characteristics of apples (appearance, firmness, taste) after preservation are presented in table 5.

Table 4. Classification of fruit after scoring

| Quality classes | Points |
|-----------------|--------|
| Very good       | 80-100 |
| Good            | 60-79  |
| Acceptable      | 40-59  |
| Mediocre        | 20-39  |
| Not adequate    | 0-19   |

Source: The National Research\_Development Institute for Food Resources.

In terms of appearance, the apples were scored 9.00-15.00 points depending on the variant, with an average of 11.83 points. The Idared variety scored the highest score (14.57 points) of all the experimental variants, followed by Florina variety and Redix variety with 13.19 points and 12.23 points respectively. Variants Golden delicious got the lowest score on this indicator (9.00 points). At the end of the storage period, the apples firmness was evaluated with a score of 22.00 to 31.00 points, averaging 26.00 points. The Florina variety was best appreciated, scoring 30 points, followed by Idared variety with 31 points. The lowest score was recorded by Golden delicious variety (20 points), followed by Generos variety with 22.00 points. In terms of taste, the rating score ranged between 37.00 and 50.00 points, depending on the variant, with an average of 43.24 points. Among the studied varieties, the highest score was the Jonathan

variety, 50 points, and the lowest Generos variety with 37.00 points.

In terms of taste, only half of the variants in the research exceeded the score average, 43.24, these being Jonathan variety, Golden delicious variety and Idared variety.

The total score (look + firmness + taste) ranged between 69.61 and 89.80 points, depending on the variant, with an average of 81.08 points.

Table 5. Organoleptic appreciation of apples after storage

| Variety          | Organoleptic appreciation – score |                              |              |              | Rating    |
|------------------|-----------------------------------|------------------------------|--------------|--------------|-----------|
|                  | Appearance                        | Firmness kgf/cm <sup>2</sup> | Taste        | Total        |           |
| Jonathan         | 11.47                             | 27.00                        | 50.00        | 88.47        | Very good |
| Generos          | 10.61                             | 22.00                        | 37.00        | 69.61        | Good      |
| Idared           | 14.50                             | 31.00                        | 44.30        | 89.80        | Very good |
| Florina          | 13.19                             | 30.00                        | 42.56        | 85.75        | Very good |
| Redix            | 12.23                             | 26.00                        | 40.00        | 78.23        | Good      |
| Golden delicious | 9.00                              | 20.00                        | 45.60        | 74.60        | Good      |
| <b>Average</b>   | <b>11.83</b>                      | <b>26.00</b>                 | <b>43.24</b> | <b>81.08</b> | -         |

Source: Own calculation.

On the first place was Idared variety followed by Jonathan variety with 88.47 points and rating “very good”. The last place was the Generos variety with 69.61 points and rating “good”. The Golden delicious variety (74.60) achieved rating “good”.

## CONCLUSIONS

The highest content in SSC, immediately after harvesting, was recorded in Florina variety, 14.33%. It recorded an insignificant increase in the SSC content of only 1.88%, although it was a lower increase of the studied variants.

The lowest SSC content belonged to Jonathan variety, 10.48%, which at the end of the storage period recorded the highest increase in SSC value, 69.85%.

In general, after depositing in the conditions presented, there was an increase in the SSC content of all varieties taken in the study, the average value of the increase being of 17.15%. In terms of titratable acid content, both increases and decreases occurred. Increases were seen in Redix and Idared varieties (5.40%, respectively 20.69%).

The other varieties had significant declines with values contained between 20.69 and

54.79%. In general, varieties with a low titratable acidity content recorded an increase during storage, except for Golden delicious variety where acidity decreased after storage.

The sugar content recorded the storage period, in most cases, a decrease compared to the value recorded immediately after harvesting. The decreases averaged 11.86%. The exception was made by Golden delicious variety, with an increase in sugar content of 14.53%. In terms of vitamin C content, varieties with a low initial content (Jonathan and Golden delicious) recorded an increase after the storage period ranging between 4.24% and 8.64%. In the other varieties analyzed, there was a slight decrease of the vitamin C content, its average was 1.44%.

Total score (look + firmness + taste) ranged between 69.61 and 89.80 points, depending on variety. On the first place was Idared variety. The last place was Generos variety with 69.61 points.

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## SOME CONSIDERATIONS CONCERNING THE ROMANIAN PRODUCTION OF MAIZE IN EUROPEAN CONTEXT (2012 - 2014)

Radu Lucian PÂNZARU, Dragoş Mihai MEDELETE

University of Craiova, Faculty of Agronomy, 19 Liberty, 200421, Craiova, Romania, Phone: +40 741 180 976, Fax: + 40 251 418 475, E-mail: medelete@yahoo.com, rlp1967craiova@gmail.com

*Corresponding author:* medelete@yahoo.com

### Abstract

*Romania is recognized both in the world and at European level as a major country cultivating cereals. The area occupied by corn indicates the importance of culture for Romania, which is given by the yield per hectare relative to wheat, its food and feed value, as well as the relatively simple technology, suitable for mechanization and easy to substitute for living labor. It is noticed that Europe held 10.15% of the world's surface. The indicator has recorded a non-uniform evolution at continental level. The European total maize production represents 11.73 % of the global output. The evolution of the indicator shows an upward trend for all the analyzed areas, except for Northern Europe with fluctuating evolution. In the global context, it is noticed that Europe has exceeded the average world production by 15.44%. Romania appears as a great cultivator at European level, but this positive aspect is not supported by high performance levels.*

**Key words:** maize, cultivated area, total production, average production

### INTRODUCTION

Corn is, besides wheat, rice, soybean, one of the most important plants cultivated by man [5].

Due to the high ecological plasticity, corn is found almost anywhere in the world on the five continents, its spreading area reaching the northern hemisphere of 53<sup>0</sup> north latitude (in Canada and the Russian Federation) and the southern to 42-43<sup>0</sup> south latitude in New Zealand [1].

Maize can be grown on soils and under very different climatic conditions, it is not pretentious to the pre-plant and it carries the monoculture better than other cereals [8].

Romania is recognized as a major cultivating country in the world and European markets [2]. In this context, the approach of the proposed theme is justified.

Maize has traditionally occupied the largest area in Romanian agriculture and continues to occupy, along with wheat, over one third of the cultivated area [9].

The area occupied by corn indicates the importance of culture for Romania, which is given by the yield per hectare relative to wheat, by the bivalent, food and feed value, as well as by a relatively simple technology, suitable for

mechanization and easily substituted by living labor [7].

Other authors point out that the importance and economic benefits of maize production derive from the versatility of its use or use: fodder, industrial, agro-technical technology, export article and source of profit for agricultural holdings [4].

Obtaining optimal economic yields is largely influenced by the judicious choice of the most suitable hybrids for each crop area [6].

### MATERIALS AND METHODS

The information required for writing the paper was collected by accessing the databases with increased visibility [10].

The indicators used (area cultivated, total production and average production) refer to the period 2012-2014, and for the construction of the dynamic series, the average of the period.

The methods used in designing and editing were the documentation, the comparison, the percentage method. It was used as the comparison method based on the use of mobile base index calculated by formula:  $I_{bm} =$

$\frac{Y_n}{Y_{n-1}} \times 100$ , in which:  $Y_n$  - the level of indicator

for each component of the dynamic series;  $Y_{n-1}$  - the level of temporal sequence indicator considered as a basis for comparison or reference period [3].

Table 1 contains information on the evolution and structure of the area planted with maize at continental, zonal and national levels for the period 2012-2014 [10].

## RESULTS AND DISCUSSIONS

Table 1. The area cultivated with maize (ha)

| Specification   | Year       |         |          |            |                   |          |            |                   |          | Average       |                      |          |
|-----------------|------------|---------|----------|------------|-------------------|----------|------------|-------------------|----------|---------------|----------------------|----------|
|                 | 2012       |         |          | 2013       |                   |          | 2014       |                   |          | Eff. **       | Din. average/ 2014** | Str. %** |
|                 | Eff. *     | Din. ** | Str. %** | Eff. *     | Din. 2013/ 2012** | Str. %** | Eff. *     | Din. 2014/ 2013** | Str. %** |               |                      |          |
| Europe          | 18,090,827 | 100     | 100      | 18,843,603 | 104.16            | 100      | 18,751,055 | 99.51             | 100      | 18,561,828.33 | 98.99                | 100      |
| Eastern Europe  | 12,221,185 | 100     | 67.55    | 12,926,329 | 105.77            | 68.60    | 12,900,335 | 99.80             | 68.80    | 12,682,616.33 | 98.31                | 68.33    |
| Northern Europe | 25,800     | 100     | 0.14     | 30,000     | 116.28            | 0.16     | 29,100     | 97.0              | 0.15     | 2,830.00      | 9.25                 | 0.15     |
| Southern Europe | 3,278,975  | 100     | 18.13    | 3,243,520  | 98.92             | 17.21    | 3,184,281  | 98.17             | 1.98     | 3,235,592.00  | 101.61               | 17.43    |
| Western Europe  | 2,564,867  | 100     | 14.18    | 2,643,754  | 103.08            | 14.03    | 2,637,339  | 99.76             | 1.07     | 261,5320.00   | 99.17                | 14.09    |
| European Union  | 9,850,438  | 100     | 5.45     | 9,765,328  | 99.14             | 5.80     | 9,618,499  | 98.50             | 5.30     | 9,744,755.00  | 103.31               | 52.50    |
| Romania         | 2,722,180  | 100     | 1.05     | 2,515,541  | 92.41             | 13.35    | 2,504,419  | 99.56             | 13.36    | 2,580,713.33  | 103.05               | 13.90    |

\* <http://www.fao.org/faostat/fr/#data/QC> (18.12.2016)

\*\* own calculation

In 2012, the continental surface reached 18,090,827 ha, an area which increased by 4.16% in 2013 (an actual level of 18,843,603 ha), then the indicator declined in 2014 by 0.49% (18,751,055 ha), so that the average of the period reached 18,561,828.33 ha (98.99% - in dynamics).

At the level of Eastern Europe, the average of the indicator was 12,682,616.33 ha (-1.69% in dynamics), with extreme values of 12,221,185 ha in 2012 and 12,926,329 ha for 2013. There is a non-uniform trend of the indicator for the period analyzed.

Northern Europe cultivated 25,800 to 30,000 ha of maize (2012 and 2013 respectively), so the average of the period reached 28,300 ha. The dynamics of the indicator is fluctuating, with annual benchmarking of 1.16 times in 2013, and declines of 3.0 and 2.75% for 2014 and the average of the period.

For South Europe, an average of 3,235,592 ha has been recorded, which is based on yearly areas of 3,278,975 ha in 2012, 3,243,520 ha for 2013 (-1.08%) and 3,184,281 ha for 2014 (-1.83%).

Western Europe is characterized by a variable total cultivated area, from 2,564,867 ha in 2012 (baseline) to 2,643,754 ha in 2013 (+3.08%). Under these conditions (2,637,339 ha in 2014),

the average of the period reached 2,615,320 ha (-0.83% in dynamics). As such, it can be said that the indicator recorded a strictly uneven trend.

For the European Union, the minimum indicator level was 9,618,499 ha in 2014 and the maximum level was in 2012 (9,850,438 ha). The average of the period reached 9,744,755 ha (+1.31% in dynamics), due to the specific area of 2013 (9,765,328 ha).

Romania cultivated from 2,504,419 hectares to 2,722,180 ha in 2014 and 2012 respectively. The area evolved in descending order (decreases of 7.59 and 0.44% in 2013 and 2014 respectively). The average of the period reached 2,580,713.33 ha (+3.05% over the reporting period).

The structure of the cultivated surface is presented below. The year 2012 is characterized by the following structure: 67.55% Eastern Europe; 18.13% Southern Europe; 14.18% Western Europe; 0.14% Northern Europe. In 2013 the structure of the continental surface was as follows: 68.60% Eastern Europe; 17.21% Southern Europe; 14.03% Western Europe; 0.16% Northern Europe. For 2014, continental levels vary from 0.15% for Northern Europe to 68.80% for Eastern Europe, while for the other two areas

there are weights of 16.98 and 14.07% respectively in Southern Europe and Western Europe. The average of the analyzed period (18,561,828.33 ha) shows variable structures per zone, as follows: 68.33% eastern area, 17.43% southern area, 14.09% western area, 0.15% northern area.

For the European Union, variable weights are observed at continental level from 51.30% for 2014 to 54.45% for 2012.

Romania has grown an average of 13.90% of the European area, with 13.35% in 2013 and 15.05% respectively in 2012.

Table 2 contains information on the evolution and structure of total maize production at continental, zonal and national levels for the period 2012-2014 [10].

Table 2. Total maize production (t)

| Specification   | Year       |         |          |             |                 |          |             |                 |          | Average        |                       |          |
|-----------------|------------|---------|----------|-------------|-----------------|----------|-------------|-----------------|----------|----------------|-----------------------|----------|
|                 | 2012       |         |          | 2013        |                 |          | 2014        |                 |          | Eff. **        | Din. average / 2014** | Str. %** |
|                 | Eff. *     | Din. ** | Str. %** | Eff. *      | Din. 2013/2012* | Str. %** | Eff. *      | Din. 2014/2013* | Str. %** |                |                       |          |
| Europe          | 95,219,230 | 100     | 100      | 119,368,487 | 125.36          | 100      | 129,426,058 | 108.43          | 100      | 114,671,258.33 | 88.60                 | 100      |
| Eastern Europe  | 49,229,352 | 100     | 51.70    | 71,762,060  | 145.77          | 60.12    | 73,540,472  | 102.48          | 56.82    | 64,843,961.33  | 88.17                 | 56.55    |
| Northern Europe | 153,900    | 100     | 0.16     | 202,900     | 131.84          | 0.17     | 187,900     | 92.61           | 0.15     | 181,566.67     | 96.63                 | 0.16     |
| Southern Europe | 21,314,622 | 100     | 22.39    | 25,207,883  | 118.27          | 21.12    | 28,703,509  | 113.87          | 22.18    | 25,075,338.00  | 87.36                 | 21.87    |
| Western Europe  | 24,521,356 | 100     | 25.75    | 22,195,644  | 90.52           | 18.59    | 26,994,177  | 121.62          | 20.85    | 24,570,392.33  | 91.02                 | 21.43    |
| European Union  | 59,812,047 | 100     | 62.82    | 66,947,966  | 111.93          | 56.09    | 78,031,689  | 116.56          | 60.29    | 68,263,900.67  | 87.48                 | 59.53    |
| Romania         | 5,953,352  | 100     | 6.25     | 11,305,095  | 189.89          | 9.47     | 11,988,553  | 106.04          | 9.26     | 9,749,000.00   | 81.32                 | 8.50     |

\*<http://www.fao.org/faostat/fr/#data/QC> (18.12.2016)

\*\* own calculation

In 2012, continental production reached 95,219,230 t, production, which increased by 25.36% in 2013 (119,368,487 t), then the indicator increased by 8.43% (129,426,058 t) in 2014, so that the average of the period reached 114,671,258.33 t (88.60% - in dynamics).

At the level of Eastern Europe, the average of the indicator was 64,843,961.33 t (-11.83% in dynamics), with extreme values of 49,229,352 t in 2012 and 73,540,472 t for 2014. There is an upward trend of the indicator for the analyzed period.

Northern Europe obtained between 153,900 and 202,900 tons of maize (2012 and 2013 respectively), so that the average of the period reached 181,566.67 t. The dynamics of the indicator is fluctuating, the annual yields of the terms of reference being 1.31 times in 2013, and declines were 7.30 and 3.37% for 2014 and the average for the period respectively.

For South Europe, an average production level of 25,075,338 tones is established, based on annual yields of 21,314,622 tons in 2012,

25,207,883 tones for 2013 (+18.27%) and 28,703,509 tons for 2014 (+13.87%).

Western Europe is characterized by total variable production, from 22,195,644 t in 2013 (-9.48% in dynamics) to 26,994,177 t in 2014 (+21.62%). Under these conditions (24,521,356 t in 2012), the average of the period reached 24,570,392.33 t (-8.98% in dynamics). As such, it can be said that the indicator recorded an uneven trend.

For the European Union, the minimum level of the indicator was 59,812,047 t in 2012 and the maximum level was in 2014 (78,031,689 t). The average of the period reached 68,263,900.67 t (-12.52% in dynamics), and as a result of 2013 production (66,947,966 t).

For Romania there is an average of 9,749,000 t (-18.68% compared to 2014), with variation limits of 5,953,352 t in 2012 and 11,988,553 t in 2014 respectively. The indicator ascended (+89.89 and +6.04% in dynamics).

Regarding the zonal structure of total production, a series of considerations can be made. The year 2012 is characterized by the

following structure: 51.70% Eastern Europe; 25.75% Western Europe; 22.39% Southern Europe; 0.16% Northern Europe. In 2013 the structure of continental production was as follows: 60,12% Eastern Europe; 21,12% Southern Europe; 18.59% Western Europe; 0.17% North Europe. For 2014, continental levels vary from 0.15% for Northern Europe to 56.82% for Eastern Europe, while for the other two areas 22.18 and 20.85% respectively in South and Western Europe. The average of the analyzed period (114,671,258.33 t) shows variable structures per area, as follows: 56.55% Eastern, 21.87% Southern, 21.43% West, 0.16% North.

For the European Union, weights vary from 56.09% for the year 2013 to 62.82% for the year 2012.

At the national level, the weights registered in the European context reached: 6.25, 9.47, 9.26 and 8.50% for the four dynamic components of the dynamic series (2012, 2013, 2014 and the average of the period respectively).

Table 3 contains information on the evolution and positioning of average yield (kg/ha) of maize at continental, zonal and national levels for the period 2012-2014 [10].

Table 3. Average maize production (kg/ha)

| Specification   | Year  |         |   |       |                   |   |        |                   |   | Average |                    |   |
|-----------------|-------|---------|---|-------|-------------------|---|--------|-------------------|---|---------|--------------------|---|
|                 | 2012  |         |   | 2013  |                   |   | 2014   |                   |   | Eff. ** | Din. media/ 2014** | positioning towards the continental level (%)** |
|                 | Eff.* | Din. ** | positioning towards the continental level (%)** | Eff.* | Din. 2013/ 2012** | positioning towards the continental level (%)** | Eff.*  | Din. 2014/ 2013** | positioning towards the continental level (%)** |         |                    |   |
| Europe          | 5,263 | 100     | 100   | 6,335 | 120.37            | 100   | 6,902  | 108.95            | 100   | 6,167   | 89.35              | 100   |
| Eastern Europe  | 4,028 | 100     | 76.53   | 5,552 | 137.84            | 87.64   | 5,701  | 102.68            | 82.60   | 5,094   | 89.35              | 82.60   |
| Northern Europe | 5,965 | 100     | 113.34  | 6,763 | 11.38             | 106.76  | 6,457  | 95.48             | 93.55   | 6,395   | 99.04              | 103.70  |
| Southern Europe | 6,500 | 100     | 123.50  | 7,772 | 119.57            | 122.68  | 9,014  | 115.98            | 130.60  | 7,762   | 86.11              | 125.87  |
| Western Europe  | 9,561 | 100     | 181.66  | 8,396 | 87.82             | 132.53  | 10,235 | 121.90            | 148.29  | 9,397   | 91.82              | 152.39  |
| European Union  | 6,072 | 100     | 115.37  | 6,856 | 112.91            | 108.22  | 8,113  | 118.33            | 117.55  | 7,014   | 86.45              | 113.74  |
| Romania         | 2,187 | 100     | 41.55   | 4,494 | 205.49            | 70.94   | 4,788  | 106.54            | 69.37   | 3,778   | 78.91              | 61.26   |

\*<http://www.fao.org/faostat/fr/#data/QC> (12.12.2016)

\*\* own calculation

Average production per hectare continental ranged from 5,263 kg in 2012 to 6,902 kg in 2014, while the average of the period reached 6,167 kg. The dynamics of the indicator is an upward trend, the overruns of the reporting bases being 1.20 times in 2013 and 1.08 times for the year 2014, while for the average of the period there is a decrease of 10.65% compared to the comparison term.

Eastern Europe is characterized by an increasing evolution of the indicator, from 4,028 kg in 2012 to 5,552 kg in 2013 (+37.84%), to 5,701 kg in 2015 (+2.68%). Under these circumstances, the average of the period was lower than the comparison term, with 10.65% (5,094 kg).

Concerning the current situation in North Europe, there is an average of 6,395 kg

(-0.96% in dynamics) as well as a variable trend of the indicator as follows: 5,965 kg in 2012, 6,763 kg in the year 2013 (+13.38%), 6,457 kg for the year 2015 (-4.52%).

For South Europe, the indicator has an upward trend, with annual successive increases of 19.57% in 2013 and 15.98% in 2014. Under these conditions (actual levels of 6,500 kg in 2012, 7,772 kg in 2013 and 9,014 kg for 2014) decreases compared to the reporting basis occur only for the average of the period (7,762 kg and -13.89% respectively).

At the level of Western Europe, the oscillating trend of the indicator is found, the actual levels being 9,561 kg in 2012, 8,396 kg for 2013 (decrease by 12,18 compared to the comparison term - in dynamic), 10,235 kg in 2014 (+21.90%). As a result, an average of 9,397 kg (-8.18%) is reached.

If we analyze the EU-specific situation, we see an average of 7,014 kg (-13.55% in dynamic), averaged based on yearly sequential levels of: 6,072 kg in 2012, 6,856 kg for 2013 (+12.91%), 8,113 kg for 2014 (+18.33%).

Romania recorded an average level of 3,778 kg/ha (-21.08% in dynamics), with extreme levels of 2,187 kg/ha in 2012 and 4,788 kg/ha in 2014. The indicator dynamics are ascending (+105.49 and +6.54% in 2013 and 2014 against reporting bases).

Here is how to position the areas compared to the continental situation for the average yield of grain maize during the analyzed period (2012-2014). The year 2012 is characterized by the following situation: 181.66% Western Europe; 123.50% Southern Europe; 113.34% Northern Europe; 76.53% Eastern Europe.

In 2013, compared to the mainland situation, the regions are positioned as follows: 132.53% Western Europe; 122.68% Southern Europe; 106.76% Northern Europe; 87.64% Eastern Europe. For 2014, variable positioning of the continental zones is observed from 82.60% for Eastern Europe to 148.29% for Western Europe, while for the other two zones there are 93, 55 and 130.60% respectively North and South Europe respectively. The average of the analyzed period (6,167 kg) highlights variable positioning locations as follows: +52.39% Western Europe, +25.87% Southern Europe, +3.70% Northern Europe, -17.40% Europe East.

In the case of the European Union, there are positions on the continental situation as follows: 115.37% in 2012, 108.22% in 2013, 117.55% in 2014 and 113.74% in the average. Romania did not exceed the term of comparison in any year, registering only sub-unitary levels: 41.55% in 2012, 70.94% for 2014, 69.37% for 2014 and 61.26% for the average.

## CONCLUSIONS

The study led to the following conclusions:

- analyzing the global situation, it is noticed that Europe held 10.15% of the world area of 182,798,882 ha (the average of the period 2012-2014). The indicator has recorded a non-

uniform evolution at continental level, as is the case for Eastern Europe, Southern Europe and Western Europe. Unlike this trend, there are downward developments for the rest of the territorial units;

- analyzing the situation of total European production at the world level, there is a 11.73% share of the total world production of 977,174,180.67 t (average for the period 2012-2014). Evolution of the indicator has been increasing for all the analyzed areas, except for Northern Europe with a fluctuating evolution. The European Union provides 59.53% of the total continental production, up to about 7% over the cultivated area;

- in the global context, Europe has surpassed 15.44% of the world average production (5,342 kg/ha - the average of the period under review). The indicator is on an upward trend, except for the specific situation for North Europe (non-uniform train - as in the case of cultivated area and total production);

- Romania, appears as a great cultivator at European level (13.90% of the continental surface), but this positive aspect is not sustained by high performance levels (61.26% of the average continental production), which attracts by itself decreases relative to continental production (average share of only 8.50%);

- it would be ideal if Romania and Eastern Europe were to undergo a process of high recapitalization of agricultural production so that the existing potential would be greatly improved at the moment.

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## TRENDS IN TOURISM DEMAND IN THE TOP VISITED EUROPEAN COUNTRIES

Agatha POPESCU

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest Romania, Phone: +40213182564, Fax: +40213182888, Email: agatha\_popescu@yahoo.com

**Corresponding author:** agatha\_popescu@yahoo.com

### Abstract

*The paper aimed to analyze the main trends in tourism demand in the top European countries in terms of tourist arrivals, overnight stays, tourism intensity, receipts, receipts/arrival, receipts/inhabitant. The correlation coefficient and regression function were used to analyze the relationship between tourist arrivals and tourism receipts. The top visited countries in Europe registered 377.8 million international tourist arrivals in 2015, by 17.07 % more than 322.7 million in the year 2007. Their market share in the EU international tourist arrivals was 78.8 % and at the world level 31.55 %. The decreasing order of these countries based on their market share in the EU tourist arrivals is: France, Spain, Italy, Germany, United Kingdom, Austria, Greece, Poland, Netherlands, Croatia and Portugal. These countries contributed by USD 302.2 Billion to the EU receipts coming from tourism, representing 80.2 % of the EU receipts. In 2015, all these 11 countries registered 2,035 million overnight stays, representing 86.5 % of the total overnight stays in the EU. Based on this indicator, the decreasing order of these countries is: Spain, France, Italy, Germany, United Kingdom, Austria, Netherlands, Greece, Croatia, Poland and Portugal. The number of overnight stays/inhabitant, reflecting tourism intensity, varied between 16.9 in Croatia and 1.9 in Poland. While the receipts/tourist arrival varied between USD 1,323 in United Kingdom, and USD 532 in France, the receipts per overnight stay varied between Euro 88 in Germany and Euro 194 in Portugal, and the receipts/inhabitant varied between Euro 248 in Poland and Euro 1,909 in Austria. The correlation coefficient, the coefficient of determination and the regression equations attested that between the number of international tourist arrivals and tourism receipts is a positive strong correlation in case of United Kingdom and Croatia. In case of Greece and Germany it was found a moderate positive correlation, while in case of Austria, France, Italy, Netherlands, Poland, Portugal and Spain it was noticed a weak correlation. Therefore, the number of tourist arrivals reflects an increased tourism demand, but it can't entirely explain the growth of tourism receipts, which are determined by many other factors.*

**Key words:** demand, tourism, top European countries, tourist arrival, tourism receipts, regression

### INTRODUCTION

Tourism is the most dynamic branch of the world economy, a key driver of the economic development.

The international tourist flows have continuously increased. In 2016, there were recorded 1,235 international tourist arrivals and USD 1,220 Billion receipts from tourism at the world level [12].

In 2016, travel and tourism contributed by USD 2.3 trillion ( 3.1 %) to the globe GDP, while the its total tourism contribution accounted for USD 7.6 trillion ( 10.2 %).

Travel and tourism has directly generated 108.7 million jobs representing 3.6 % of the total world employment, and its total

contribution accounted for 292 million jobs with a share of 9.6 % in the globe employment. Also, travel and tourism contributed by 6.6 % to the total global exports and 30 % to the world service exports. Tourism comes on the 3rd position after chemicals and fuels, automotive products and food in the world export [14].

In 2015, Europe was visited by 603.7 million international tourists, of which 477.8 million ( 79 %) visited the EU countries. Europe is the most important tourist attraction in the world with a market share of 50.7 %, while the EU countries keep 40 % in the world international tourist arrivals.

Europe's receipts from international tourism accounted for USD 449 billion in 2015, representing 37.6 % of the world tourism

receipts. The EU receipts coming from international tourism accounted for USD 376.5 billion, representing 83.8 % of the Europe receipts and 31.5 % of the tourism receipts at the global level [12].

In the EU-28, in the non-financial business industry are operating 2.3 million enterprises assuring employment for 12.3 million persons, representing 9.1 % of the employment in this economic sector and 21.5 % of the employment in the service sector.

Tourism industry contributes by 3.7 % to the turnover and 5.6 % to the value added in the non-financial business economy of the EU [11].

As a concept, tourism demand is characterized by the number of persons who travels for various purposes and use tourist facilities and services in a different location away from the place of residence or work [1]. It was and still continue to be a subject of various research studies being analyzed in different ways: economically, socially, geographically, psychologically, and politically, depending on each author.

Various indicators are used to quantify tourism demand such as: tourist arrivals, tourist departures, tourism receipts, tourism expenditures, overnight stays, average length of stay, tourist density, tourist intensity, tourism function, as well as their determining factors: economic factors (GDP/capita and income/capita in the country of origin, tariffs and prices of tourism offer: accommodation, food, entertainment, transportation etc; exchange rate variation and service quality related to price), demographic factors (population and its structure by various criteria: such as age, education level etc), technical factors ( transport facilities, communication ways etc), psychological factors and cultural factors (tourist preferences, life style, habits, expectations), random factors: climate change, weather conditions, natural disasters, potential risk diseases, political instability, risk of terrorist attack etc. [2, 4, 5, 7, 9, 13 ].

These factors have been taken into account in different econometric models to estimate tourism demand more accurately. However,

most of the studies analyzed tourism demand based on the number of visitors and the related indicators [3, 8, 9, 10].

In this context, the paper aimed to present the trends in tourism demand in the top visited European countries: France, Spain, Italy, Germany, United Kingdom, Austria, Greece, Poland, Netherlands, Croatia, and Portugal, using international tourist arrivals, overnight stays in establishments with touristic function, international tourism receipts, and determining the correlation between arrivals and receipts, and the regression of receipts depending on international tourist arrivals and some other related important aspects in the period 2007-2015.

## MATERIALS AND METHODS

The main specific indicators taken into consideration to characterize tourism demand in the top visited European countries have been the following ones: (i) number of tourists arrivals, (ii) tourism receipts, (iii) overnight stays in establishments with touristic function, (iv) tourism intensity, (v) receipts/tourist arrival, (vi) receipts/inhabitant, (vii) correlation coefficient between tourism receipts and international tourist arrivals, (viii) coefficient of determination of the variation of tourism receipts depending on the variation of tourist arrivals, (ix) regression function for tourism receipts depending on tourist arrivals.

The data were collected from UNWTO Tourism Highlights and Eurostat Tourism Statistics Explained for the period 2007-2015. The main methodological aspects refer to the fixed index method used to evaluate the growth or decline the variables across the chronological series, according to the formula:  $IFB = (X_n/X_0) * 100$ .

The tourist intensity (TI) was determined based on the formula:

$$TD = \frac{\text{Overnight stays}}{\text{Permanent population of the country}}$$

The Pearson correlation coefficient was also calculated to evaluate the sense and intensity of the relationship between these indicators.

The linear regression equation,  $Y = bx + a$ , where Y is the dependent variable and X is the independent variable, was utilized to establish the relationship existing between tourism receipts and international tourist arrivals.

The data have been statistically processed using Excel facilities, and the results have been graphically illustrated and tabled.

## RESULTS AND DISCUSSIONS

The dynamics of international tourist arrivals in the world and Europe. The number of international tourist arrivals registered a spectacular increasing trend in the last decade. In 2015, it was reached the record figure of 1,196 Million international tourists arrivals, by 39.39 % more than in the year 2007 ( 858 million). The general trend had only one inflexion in the year 2009 when it was recorded a decline by 9.36 % compared to the year 2008, due to the economic crisis impact on tourists income ( Fig.1).

The number of international tourist arrivals also increased in Europe by 24.37 %, from 485.4 million in 2007 to 603.7 million in 2015. The impact of the economic crises in the European tourism was very small, in 2009 the decline was of only 0.5 % compared to the year 2008. But in 2011 and 2013, the number of international tourists declined by 3.61 %, and respectively by 5.34 % compared to the previous years ( Fig.1.).

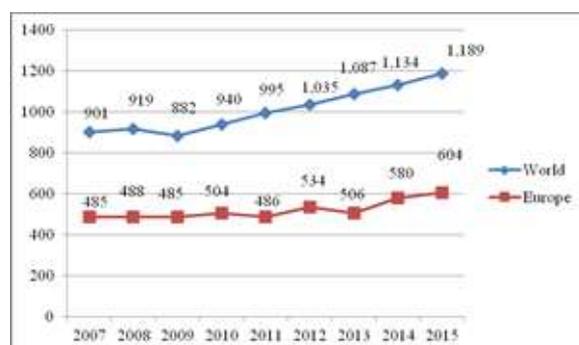


Fig.1. The evolution of the number of international tourist arrivals in the world and Europe, 2007-2015 (million)

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

The share of tourist arrivals in Europe in the international tourist arrivals at world level recorded a decline from 53.8 % in the year 2007 to 50.7 %, reflecting that Europe is still the most favored destination continent in the world. The decrease is justified but a new growing trend in international tourist flows to the Asian countries.

The role of Europe in the world tourism is justified by the large diversity of countries with beautiful landscapes, cultural heritage, historical places, and high quality services. The South Mediterranean countries are the most attractive with an increased share in the European international arrivals from 36.5 % in 2007 to 37.1 % in 2015, being followed by the Western countries with a share of 31.7 % in 2007 and 30.4 % in 2015. On the 3rd position are situated the Central and Eastern European countries which attracted 19.9 % of foreign tourists in 2007 and 20.10 % in 2015. The Northern European countries received 11.9 % of the international tourists in 2007 and 12.4 % in 2015 [12].

The European Union plays an important role in the European and world tourism. In 2015, the number of foreign tourists who visited the EU countries accounted for 477.8 million, being by 33.91 % higher than in the year 2009 ( 356.8 million).

The share of the EU in the Europe's international arrivals increased from 73.50 % in 2009 to 79.14 % in the year 2015 [12].

**The dynamics of international tourism receipts at world and Europe level.** As a consequence of the increased number of international tourists, the tourism receipts grew up by 39.39 % in the analyzed period. In 2015, it accounted for USD 1.196 Billion compared to USD 858 Billion in 2007.

The increase of tourism receipts in Europe was small, just 3.2 %, in 2015 accounting for USD 449.5 Billion compared to USD 435.3 Billion in the year 2007. Even though the number of tourists arrivals increased, the reduction of the length of stay mainly after the economic crisis has led to a slight growth in tourism receipts (Fig.2.).

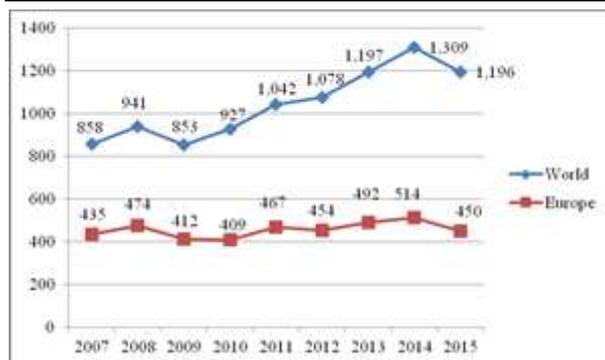


Fig.2. The evolution of the international tourism receipts in the world and Europe, 2007-2015 (USD billion)

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

The share of the Europe to the international tourism receipts in the world declined from 50.73 % in 2007 to 37.58 % in the year 2015 as a result of the diminished duration of stay and amount of money the tourists were disposed to spend [12].

In 2015, the contribution of various groups of European countries to the Europe's receipts coming from tourism activities was the following one: the South Mediterranean countries were on the top position with the highest contribution, 39.2 %, the Western European countries were on the 2nd position with 32.4 %, the Northern European countries were on the 3rd position with 17.2 % and Central and Eastern European countries on the 4th position with 11.2 %.

In 2015, the tourism receipts registered by the EU accounted for USD 376.5 Billion, being almost equal with the receipts recorded in 2011. However, they were by 12 % less than in 2014, when it was recorded the highest level of receipts.

The share of the EU in the Europe's tourism receipts increased from 81 % in 2011 to 83.7 % in the year 2015 [12].

**The evolution of international tourist arrivals in the top visited European countries.** In almost all the top visited European countries, the number of international tourist arrivals increased in the analyzed period. In 2015, the number of tourists arrival accounted for: 84.4 million in France, 68.5 million in Spain, 50.7 million in Italy, 35 million in Germany, 34.4 million in United Kingdom, 26.7 million in Austria, 23.6

million in Greece, 16.7 million in Poland, 15 million in Netherlands, 12.7 million in Croatia, and 10.1 million in Portugal.

In 2015, these figures were higher than in 2007 by: 4.45 % in France, 16.69 % in Spain, 16.28 % in Italy, 43.4 % in Germany, 11.3 % in United Kingdom, 28.8 % in Austria, 46.58 % in Greece, 12.08 % in Poland, 36.36 % in Netherlands, 36.55 % Croatia, but by 17.9 % lower in Portugal (Fig.3.).

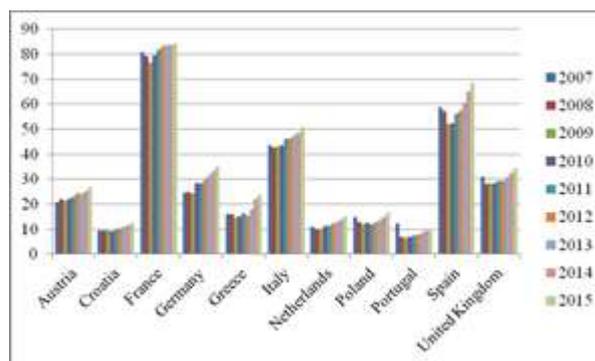


Fig.3. The evolution of the number of international tourist arrivals in the top European countries, 2007-2015 (million)

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

These 11 European countries totalized 322.7 million international tourist arrivals in 2007 representing 66.4 % in the total tourist arrivals in Europe and 35 % in total arrivals in the world. In 2015, they totalized 377.9 million tourists, by 17.1 % more than in 2007. This figure represented 62.3 % of Europe's tourist arrivals and 31.8 % of the world tourist arrivals. Therefore, the number of tourists arrivals recorded a slight reduction both at the European and at the globe level.

**The evolution of international tourist receipts in the top visited European countries.** Tourism receipts recorded an increasing trend in a few countries, but also a decreasing trend in other countries of this top group. In 2015, international tourism receipts accounted for: USD 56.4 billion in Spain, USD 45.5 billion in United Kingdom, USD 44.9 billion in France, USD 39.4 billion in Italy, USD 36.9 billion in Germany, USD 18.2 billion in Austria, USD 15.7 billion in Greece, USD 13.2 billion in Netherlands, USD 12.7 billion in Portugal, USD 10.5 billion in Poland, and USD 8.8 billion in Croatia.

Compared to the level recorded in 2007, in 2015 the growth rate was: +25.7 % in Portugal, +17.8 % in United Kingdom, + 2.5 % in Germany and + 1.2 % in Greece, but - 0.8 % in Netherlands, - 1% in Poland, -2.1 % in Spain, -2.7 % in Austria, - 4.4 % in Croatia, -7.6 % in Italy and - 17.2 % in France ( Fig.4).

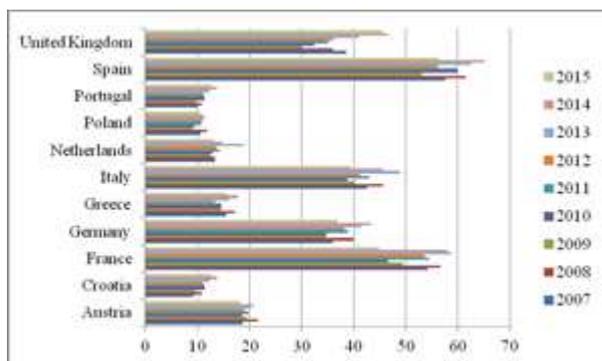


Fig.4.The evolution of the international tourism receipts in the top European countries, 2007-2015 (USD billion)  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

These 11 European countries totalized USD 306.4 billion international tourism receipts in 2007 representing 70.3 % in the total tourism receipts in Europe and 35.7 % in total receipts at the world level. In 2015, they totalized USD 306.1 billion, by 0.1 % less than in 2007.

In the same year, this figure represented 68.09 % of Europe's tourism receipts and 25.5 % of the tourism receipts at the world level. Therefore, the number of tourism receipts recorded a reduced share both at European and at globe level.

**The market share of the top visited European countries** in the number of tourist arrivals and tourism receipts recorded in the EU and at the world level is presented in Table 1.

Table 1.The market share of the top visited European countries in the number of tourist arrivals and tourism receipts in the EU and worldwide in the year 2015 (%)

| Country        | Market share in tourist arrivals (%) |              | Market share in tourism receipts (%) |              |
|----------------|--------------------------------------|--------------|--------------------------------------|--------------|
|                | In the EU                            | In the world | In the EU                            | In the world |
| Austria        | 5.5                                  | 2.2          | 4.8                                  | 1.5          |
| Croatia        | 2.6                                  | 1.06         | 2.3                                  | 0.7          |
| France         | 17.7                                 | 7.09         | 11.9                                 | 3.8          |
| Germany        | 7.3                                  | 2.9          | 9.8                                  | 3.1          |
| Greece         | 4.9                                  | 1.9          | 4.2                                  | 1.3          |
| Italy          | 10.6                                 | 4.3          | 10.5                                 | 3.3          |
| Netherlands    | 3.1                                  | 1.2          | 3.5                                  | 1.1          |
| Poland         | 3.5                                  | 1.4          | 2.8                                  | 0.9          |
| Portugal       | 2.1                                  | 0.8          | 3.4                                  | 1.06         |
| Spain          | 14.3                                 | 5.8          | 15.0                                 | 4.7          |
| United Kingdom | 7.2                                  | 2.9          | 12.1                                 | 3.8          |
| Total          | 78.8                                 | 31.55        | 80.3                                 | 25.26        |

Source: Own calculation based on the data provided by UNWTO Tourism Highlights [12].

**The evolution of the total number of overnight stays in the top countries of the European tourism.** Taking into account the total number of overnight stays ( both resident and non-resident), the situation by top European country is presented in Fig.5.

In all the top European countries, the number of overnight stays increased in the analyzed period. In 2015, the number of overnight stays accounted for 422 million in Spain, 410 million in France, 392 million in Italy, 378 million in Germany, 114 million in Austria, 104 million in Netherlands, 99 million in

Greece, 71 million in Poland and 71 million in Croatia, and 59 million in Portugal. In United Kingdom, because of the lack of data, the analysis concluded that in 2012 the number of overnight stays accounted for 303 million.

In 2015, these figures were higher than in 2007 by: 86.8 % in Croatia, 52.3 % in Greece, 35.7 % in France, 29 % in Poland, 22.9 % in Portugal, 19.2 % in Germany, 18.2 % in Netherlands, 12.8 % in Austria, 10.4 % in Spain, 3.9 % in Italy. In the year 2012, in United Kingdom, the overnight stays were by 15.6 % higher than in 2007.

These 11 European countries totaled 2,035 million overnight stays in 2007 representing 86.5 % of the total overnight stays in the EU-28 which accounted for 2,352 million. In 2012, the overnight stays totaled 2,262 million, being by 11.15 % higher than in 2007.

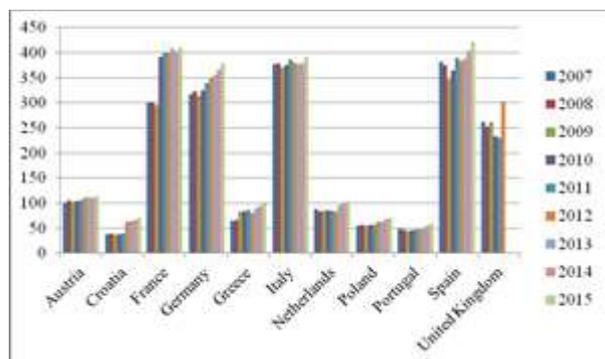


Fig.5. The evolution of the total overnight stays ( resident and non-resident) in the top countries of the European tourism, 2007-2015 (Million)

Source: Own design based on the data provided by Tourism Statistics, Eurostat Tourism Statistics Explained [11].

**The evolution of the number of overnight stays of the non-resident tourists in the top European countries.**

In all the top European countries, the number of overnight stays belonging to the foreign tourists increased in the analyzed period. In 2015, the number of foreigners' overnight stays accounted for:

269.4 million in Spain, 192.6 million in Italy, 130.4 million in France, 80.3 million in Austria, 78.8 million in Germany, 78.2 million in Greece, 65.6 million in Croatia, 38.9 million in Portugal, 37.3 million in Netherlands, and 13.8 million in Poland. In 2012, in United Kingdom, the number of overnight stays belonging to the foreign tourists accounted for 105.4 million.

In 2015, these figures were higher than in 2007 by: 94.6 % in Croatia, 62.5 % in Greece, 44.8 % in Germany, 35.5 % in Portugal, 33.6 % in Netherlands, 26.6 % in Poland, 20.2 % in France, 19.5 % in Spain, 17.8 % in Italy, 12.3 % in Austria. In the year 2012, in United Kingdom, the foreigners' overnight stays were by 24.4 % higher than in 2007 ( Fig.6.).

These 11 European countries totaled 857.2 million overnight stays in 2007 representing 85 % of the total foreigners' overnight stays in

the EU-28 which accounted for 1,007.8 million. In 2012, they totaled 986.6 million, being by 15.1 % higher than in 2007.

The share of the overnight stays of the non-resident tourists in the total overnight stays (resident and non-resident) in these eleven countries taking into consideration was 42.12 % in 2007 and 43.61 % in 2012, reflecting the increasing interest of foreigners to visit these EU states.

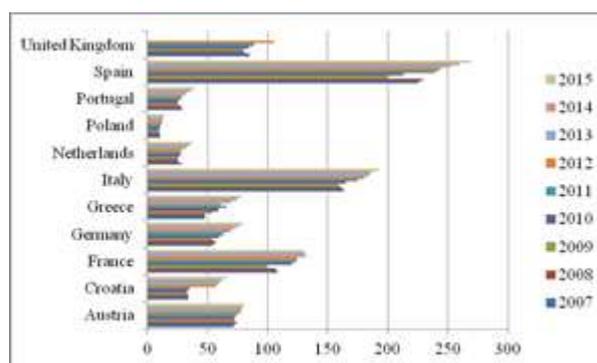


Fig.6. The evolution of the total overnight stays of the non-resident tourists in the top countries of the European tourism, 2007-2015 (Million)

Source: Own design based on the data provided by Tourism Statistics, Eurostat Tourism Statistics Explained [11].

**The evolution of the tourism intensity varied from a country to another depending on the total number of overnight stays ( resident and non-resident) and the permanent population.**

In 2015, the tourism intensity was the following one: 16.9 overnight stays/capita in Croatia, 13.3 overnight stays/capita in Austria, 9.1 overnight stays/capita in Greece, 9.1 overnight stays/capita in Spain, 6.4 overnight stays/capita in Italy, 6.2 overnight stays/capita in France, 6.2 overnight stays/capita in Netherlands, 5.5 overnight stays/capita in Portugal, 4.7 overnight stays/capita in United Kingdom, 4.7 overnight stays/capita in Germany, and 1.9 overnight stays/capita in Poland.

The average of the EU-28 in 2015 accounted for 5.47 overnight stays/inhabitant. Therefore, the number of overnight stays/capita was higher than the EU-28 average in Austria, Netherlands, France, Italy, Spain, Greece Croatia and Portugal, and smaller in Germany and United Kingdom.

In 2015, the tourism intensity was higher than in 2007 by: 92 % in Croatia, 54.2 % in Greece 35.7 % in Poland, 31.9 % in France, 20.5 % in Germany, 19.5 % in Portugal, 14.8 % in Netherlands, 9.3 % in United Kingdom, 9 % in Austria, and 7% in Spain (Fig.7).

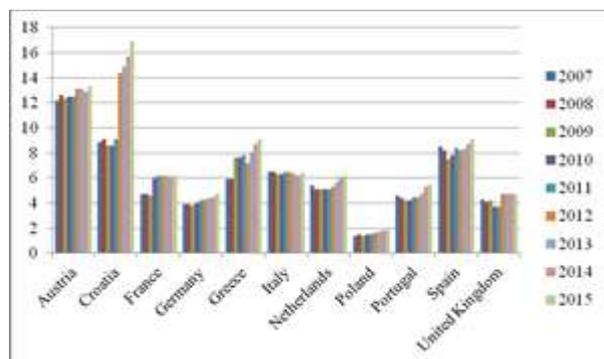


Fig.7.The evolution of tourism intensity in the top countries of the European tourism, 2007-2015 (Number of total overnight stays/inhabitant)

Source: Own design based on the data provided by Tourism Statistics, Eurostat Tourism Statistics Explained [11].

**Receipts/international tourist arrival** is one of the indicators which reflects the tourism efficiency. If at the world level, in 2015, it was registered USD 1,006/international tourist arrival, by 5.6 % more than in the year 2007, in Europe, the level of this indicator decreased by 17 % from USD 897 in the year 2007 to USD 745 in the year 2015. This happened because of the relative decline in tourist arrivals, the reduction of the length of stay and the tourists' amount of money spent during their visit in a destination country.

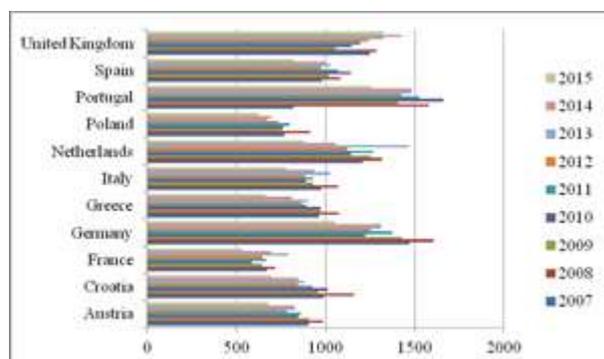


Fig.8.The evolution of receipts/international tourist arrival in the top countries of the European tourism, 2007-2015 (USD/tourist arrival)

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

In 2015, the receipts/international tourist arrival in the top countries of the European tourism accounted for: USD 1,323 in United Kingdom, USD 1,257 in Portugal, USD 1,054 in Germany, USD 880 in Netherlands, USD 823 in Spain, USD 777 in Italy, USD 693 in Croatia, USD 682 in Austria, USD 665 in Greece, USD 629 in Poland, and USD 532 in France.

In 2015, the level of this indicator was lower than in 2007 as follows: - 31 % in Greece, -30 % in Croatia, - 28.6 % in Germany, -27.2 % in Netherlands, -24.5 % in Austria, -20.8 % in France, -20.5 % in Italy, - 18.5 % in Poland, - 16.2 % in Spain. But in only two countries, the receipts/international tourist arrival increased as follows: + 53 % in Portugal and + 5.9 % in United Kingdom ( Fig.8).

**Receipts/overnight stay and receipts/inhabitant in the top countries of the European tourism.**

The receipts/overnight stay varied between Euro 88/overnight stay in Germany and Euro 194/overnight stay in Portugal. In all these top countries, this indicator was higher than the EU-28 average, which accounted for Euro 42/overnight stay in the year 2015.

Table 2. Receipts/overnight stay and receipts/inhabitant in the top countries of the European tourism in the year 2015

|                | Receipts/overnight stay ( Euro) | Receipts/inhabitant ( Euro) |
|----------------|---------------------------------|-----------------------------|
| EU-28          | 42                              | 228                         |
| Austria        | 144                             | 1,909                       |
| Croatia        | 112                             | 1,894                       |
| France         | 101                             | 622                         |
| Germany        | 88                              | 410                         |
| Greece         | 143                             | 1,296                       |
| Italy          | 91                              | 585                         |
| Netherlands    | 114                             | 705                         |
| Poland         | 133                             | 248                         |
| Portugal       | 194                             | 1,070                       |
| Spain          | 121                             | 1,094                       |
| United Kingdom | 136                             | 633                         |

Source: Own calculation design based on the data provided by Tourism Statistics, Eurostat Tourism Statistics Explained [11].

The receipts coming from tourism/inhabitant accounted for Euro 228/capita at the EU-28 level in 2015. In the analyzed countries, this

indicator varied between Euro 248 in Poland and Euro 1,909/capita in Austria ( Table 2). These indicators reflect the efficiency of tourism activity at the EU-28 level as well as in each of the analyzed countries.

**The regression of tourism receipts depending on the international tourist arrivals.** At world level, it was found a strong positive correlation,  $r = 0.945$  between tourism receipts and international tourist arrivals. The determination coefficient showed that 89.38 % of the variation of tourism receipts is determined by the variation in international tourist arrivals. The regression function confirmed that at the global level tourism receipts depend on the number of international arrivals (Fig.9).

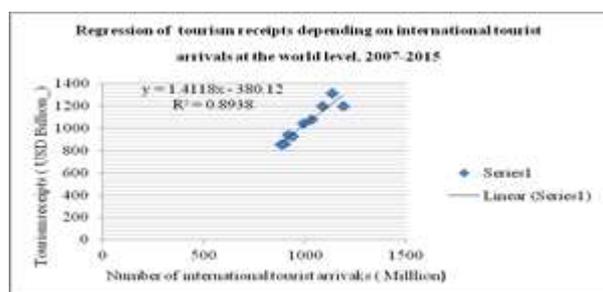


Fig.9. Regression of tourism receipts depending on the number of international tourist arrivals at the world level, 2007-2015

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

For Europe, it was found a moderate positive correlation,  $r = 0.363$  between tourism receipts and international tourist arrivals. The

determination coefficient showed that only 13.20 % of the variation of tourism receipts is determined by the variation in international tourist arrivals, the difference being caused by other factors.

The regression equation reflects the same (Fig.10).

Between the number of tourist arrivals and tourism receipts it was noticed a positive strong correlation in case of United Kingdom and Croatia, a moderate positive correlation in case of Greece and Germany and a weak correlation in case of Austria, France, Italy, Netherlands, Poland, Portugal and Spain (Table 3).

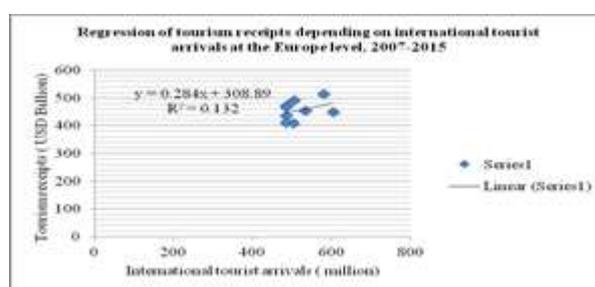


Fig.10. Regression of tourism receipts depending on the number of international tourist arrivals at the Europe level, 2007-2015

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

The coefficients of determination reflected that only in case of United Kingdom and Croatia, more than 84.39 %, and respectively 62.86 % of the variation in tourism receipts is caused by the variation of the number of international tourist arrivals.

Table 3. Correlation, coefficient of determination and regression for tourism receipts depending on the international tourist arrivals in the top European countries, 2007-2015

| Country        | Correlation coefficient $r_{xy}$ | Coefficient of determination $R^2$ | Regression equation $Y = bx + a$ |
|----------------|----------------------------------|------------------------------------|----------------------------------|
| Austria        | 0.064                            | 0.0041                             | $Y = 0.0363x + 20.421$           |
| Croatia        | 0.792                            | 0.6286                             | $Y = 0.9277x + 1.7997$           |
| France         | 0.213                            | 0.0457                             | $Y = 0.4164x + 19.068$           |
| Germany        | 0.449                            | 0.2018                             | $Y = 0.343x + 28.287$            |
| Greece         | 0.550                            | 0.303                              | $Y = 0.240x + 11.283$            |
| Italy          | 0.1153                           | 0.0133                             | $Y = 0.1388x + 36.449$           |
| Netherlands    | 0.1086                           | 0.01118                            | $Y = 0.3737x + 9.6029$           |
| Poland         | 0.245                            | 0.0601                             | $Y = 0.1298x + 8.8577$           |
| Portugal       | 0.2066                           | 0.0427                             | $Y = 0.141x + 10.266$            |
| Spain          | 0.3119                           | 0.0973                             | $Y = 0.21318x + 46.618$          |
| United Kingdom | 0.9186                           | 0.8439                             | $Y = 2.322x - 32.228$            |

Source: Own calculations based on the data provided by UNWTO Tourism Highlights [12].

In all the other countries taken into consideration, the coefficient of determination had a low value, reflecting that the variation of tourism receipts is much more caused by other range of factors and only in a small measure by the number of international tourist arrivals (Table 3).

The same remarks are confirmed by the regression equations presented for each country of the top Europe tourism in Table 3. The regression function of tourism receipts depending on tourist arrivals in each country taken into consideration is illustrated graphically in the Figures 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21.

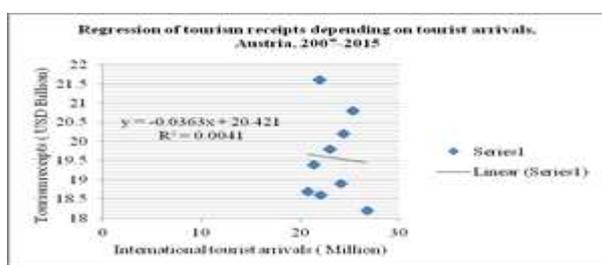


Fig.11. Regression function of tourism receipts depending on tourists arrivals in Austria, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

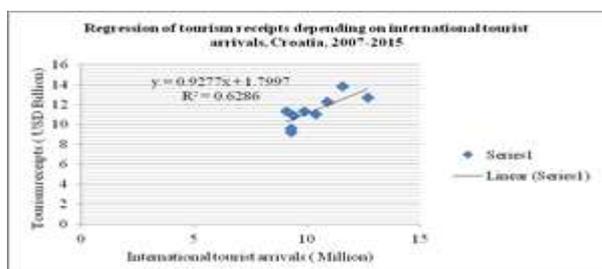


Fig.12. Regression function of tourism receipts depending on tourists arrivals in Croatia, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

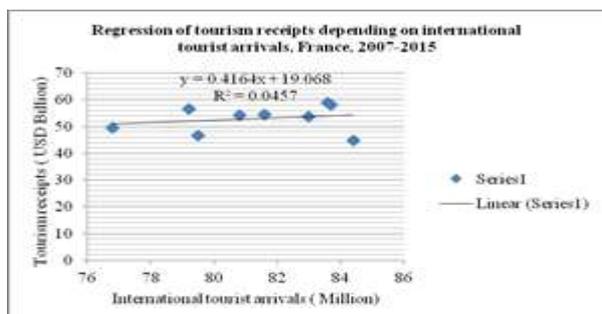


Fig.13. Regression function of tourism receipts depending on tourists arrivals in France, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

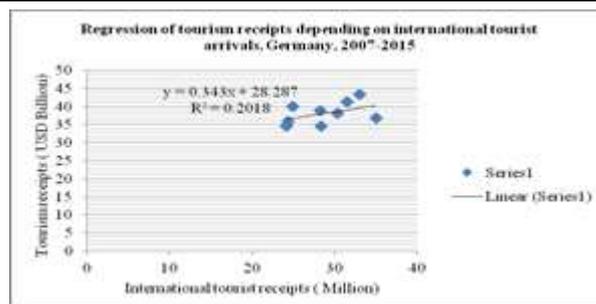


Fig.14. Regression function of tourism receipts depending on tourists arrivals in Germany, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

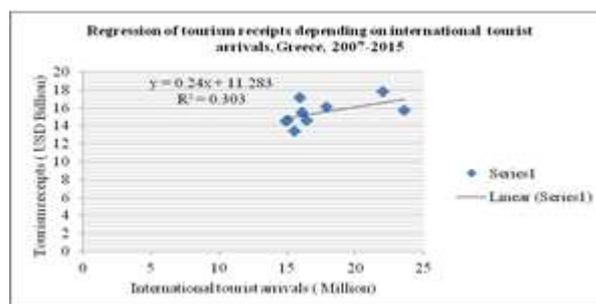


Fig.15. Regression function of tourism receipts depending on tourists arrivals in Greece, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

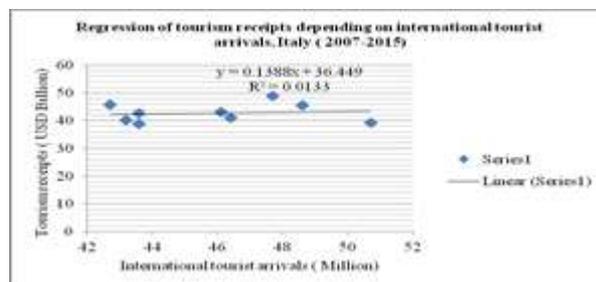


Fig.16. Regression function of tourism receipts depending on tourists arrivals in Italy, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

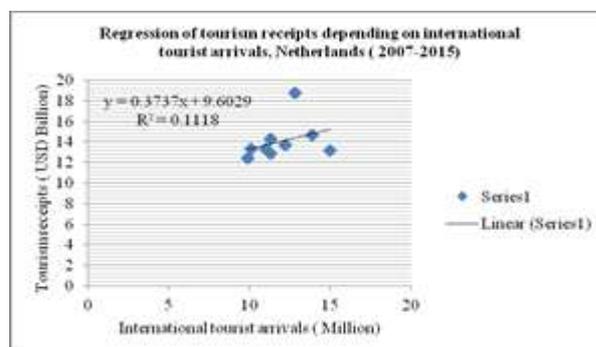


Fig.17. Regression function of tourism receipts depending on tourists arrivals in Netherlands, 2007-2015  
Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

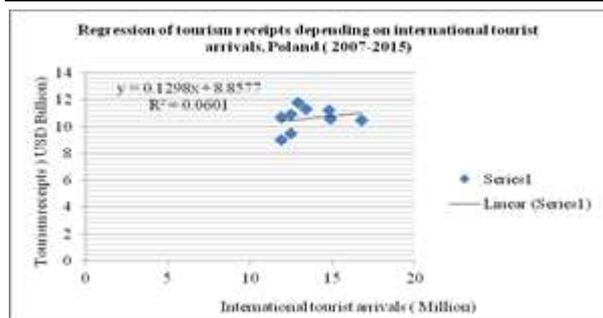


Fig.18. Regression function of tourism receipts depending on tourists arrivals in Poland, 2007-2015

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

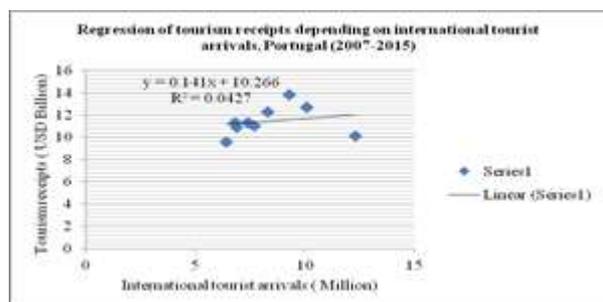


Fig.19. Regression function of tourism receipts depending on tourists arrivals in Portugal, 2007-2015

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].



Fig.20. Regression function of tourism receipts depending on tourists arrivals in Spain, 2007-2015

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

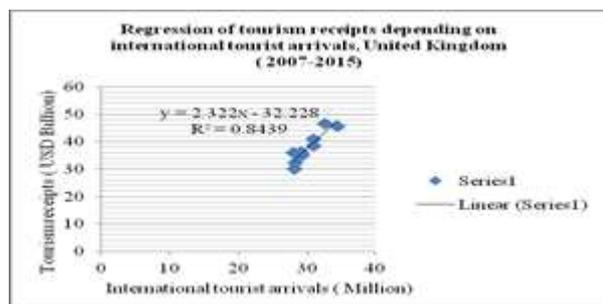


Fig.21. Regression function of tourism receipts depending on tourists arrivals in United Kingdom, 2007-2015

Source: Own design based on the data provided by UNWTO Tourism Highlights [12].

## CONCLUSIONS

Europe is the most favored tourist destination, in the year 2015, absorbing 601 million visitors, representing 50.7 % of the international tourists arrivals.

About 479 million foreign tourists, meaning 79 % of the Europe visitors and 40.2 % of international tourist arrivals worldwide were attracted by the EU countries in the year 2015. In the same year, Europe contributed by USD 450 Billion, meaning 37.5 % to the world tourism receipts. The EU registered USD 376 billion receipts from international tourism, representing 83.7 % of the Europe receipts and 31.5 % of the receipts at the world level.

The top visited countries in Europe belong to the EU. Their market share in the international tourist arrivals at the EU level was 78.8 % and at the world level 31.55 % in the year 2015, while their market share in the EU receipts from tourism was 80.3 % and in the world receipts 25.26 %.

In the decreasing order, in 2015, the most visited countries in the EU were: France ( 17.7 %), Spain (14.3 %), Italy ( 10.6 % ), Germany ( 7.3 %), United Kingdom ( 7.2 %), Austria ( 5.5.%), Greece ( 4.9 %), Poland (3.5 %), Netherlands ( 3.1 %), Croatia ( 2.6%) and Portugal ( 2.1%).

Based on the number of overnight stays, the decreasing order of these countries was the following one: Spain 15.1 %, France 14.7 %, Italy 14.1 %, Germany 13.6 %, United Kingdom 10.9 %, Austria 4.11 %, Netherlands 3,7%, Greece 3.6 %, Croatia 2.6 %, Poland 2.5 %, and Portugal 2.1 %. All these 11 countries totaled 2,035 million overnight stays, representing 86.5 % of the total overnight stays registered in the EU.

While the number of international tourist arrivals registered a slight decline, the number of the total overnight stays increased in the analyzed period.

The share of the overnight stays of the non-resident tourists in the total overnight stays (resident and non-resident) in these eleven countries increased up to 43.61 % in 2015.

The highest tourism intensity varied between 16.9 overnight stays/inhabitant in Croatia and 1.9 overnight stays/inhabitant in Poland.

The receipts/tourist arrival varied between USD 1,323 in United Kingdom, and USD 532 in France. However, tourist receipts/arrival increased only in Portugal and United Kingdom, while in the other countries declined in various proportions ranging between -31 % in Greece and -16.2 % in Spain.

The receipts per overnight stay varied between Euro 88 in Germany and Euro 194 in Portugal, while the receipts/inhabitant varied between Euro 248 in Poland and Euro 1,909 in Austria.

At the world level it was noticed a strong correlation between the number of international tourist arrivals and the tourism receipts, but at the Europe level, the correlation was a moderate one.

The regression equations attested that between the number of international tourist arrivals and tourism receipts is a positive strong correlation in case of United Kingdom and Croatia, a moderate positive correlation in case of Greece and Germany and a weak correlation in case of Austria, France, Italy, Netherlands, Poland, Portugal and Spain. This indicates that besides tourist arrivals, there are other factors influencing tourism receipts in the EU top visited countries.

As a final conclusion, tourism demand in the top visited European countries is continuously increasing grace to their rich and diverse cultural heritage, beautiful landscapes, and high quality services. The number of tourist arrivals is a key indicator reflecting tourism demand, but not enough to explain the increase of tourism receipts, which are determined by many other factors which should be taken into consideration for a more comprehensive analysis.

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## ANALYSIS OF TOURISM OFFER AND DEMAND SYNERGY IN BUCHAREST-ILFOV, ROMANIA, IN THE PERIOD 2008-2015

Agatha POPESCU

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest Romania, Phone: +40213182564, Fax: +40213182888, Email: agatha\_popescu@yahoo.com

**Corresponding author:** agatha\_popescu@yahoo.com

### Abstract

*The paper aimed to analyze the synergy between the development of tourism offer and demand in the Bucharest-Ilfov area, Romania, based on the empirical data provided by the National Institute of Statistics for the period 2008-2015 and using modern methods such as: fixed index, correlation coefficient, regression function. The results emphasized a growth in the number of accommodation units for tourists, in close relationship with the development of inbound and domestic tourism. In 2015, the Bucharest-Ilfov area had 182 establishments for tourists' accommodation, and 21,600 places and recorded 1.85 million tourist arrivals of which 56.7 % foreigners, and 3 million overnight stays, of which 58 % belonging to the international tourists. While the Romanian tourists' overnight stays in tourist accommodation units increased by 24.75 %, the overnight stays belonging to the foreign tourist increased by 58 %. Hotels are the most preferred type of accommodation units both by foreigners and Romanians in this area. The number of accommodation units is strongly and positively influenced by tourists arrivals and overnight stays as proved by the correlation coefficients ( $r_{xy} = 0.859$  and, respectively,  $r_{xy} = 0.930$ ). This was also proved by the regression models between the number of accommodation units and tourist arrivals,  $Y = 27.42325X + 129.6964$ , and the number of accommodation units and overnight stays  $Y = 22.8486X + 113.537$ . The variation of the number of accommodation units is determined 93.08 % by the variation of overnight stays and 73.85 % by the variation in tourist arrivals. As a final conclusion, it was proved the synergy between the tourism offer and demand in the Bucharest-Ilfov area, an aspect which has to represent the fundamental of the development strategy of accommodation capacity in terms of establishments.*

**Key words:** demand, tourism, Bucharest-Ilfov, Romania, synergy

### INTRODUCTION

The number of persons who travels for various purposes in a different location away from their residence place and use tourist facilities and services defines the concept of tourism demand [5].

Tourism demand has three forms: inbound tourism including the international tourists arriving in a special destination, domestic tourist demand including the local tourists visiting their country of origin and outbound tourism including the travels of the residents abroad.

Tourism demand is frequently measured by international tourist arrivals in accommodation establishments [15,16, 18], international tourist expenditure [23], the overnights spent at destination [10, 21], the length of stay at destination, tourist consumption [17], tourism density, tourism intensity, and tourism function

[17]. Tourism demand is influenced by a large variety of economic, demographic, technical, psychological, and dummy factors, which must not be ignored and should be included in the econometric models, besides tourist arrivals and overnight stays which are commonly used [2, 3].

Tourism flows have a deep impact of tourism offer and tourism offer stimulate the development of tourism flows among other factors. Obviously, between tourism offer and demand is and must be a close relationship.

Tourism is an important economic branch of the economy and in a continuous development in Romania. In 2016, the direct contribution of Romania's tourism to GDP accounted for USD 2.5 billion, representing 1.3 % of GDP, and its total contribution reached USD 39.3 billion, representing 5.2 % of GDP. Also, tourism has directly contributed by 197,500 jobs, representing 2.4 % of total employment in the

country, and the total contribution accounted for 513,500 jobs, i.e. 6.2 % of the total employment. Visitors' exports were USD 2,177 million, representing 2.8 % of Romania's exports, and investments in tourism were USD 3.6 billion, representing 8.1 % of total investments in the country [24].

This was a result of the growth recorded in tourism flows mainly in the last decade. In the period 2008-2013, the number of Romanian tourist arrivals increased by 12.89 % from 5.5 million to 6.2 million, due to the growth in of household income resulting an increase in spending on tourism activities. More than 70 % arrivals were registered in hotels in 2013. In the same period, the foreign tourist arrivals in Romania increased from 1.4 million in 2008 to 1.7 million in 2013, meaning by 17.15 % more than in 2008. About 88 % of the foreign tourists preferred accommodation in hotels and 8.8 % preferred motels. This increase was stimulated by the rationale tourism strategy, a good relationship between the tourism offer quality and price, the alignment of tourism offer to the international standards to delivery high quality services at affordable prices, diversification of leisure-entertainment services [1, 3].

The touristic demand in Romania has followed a similar trend with the GDP curve as the touristic demand is strongly correlated with the level of population disposable income [19].

This has confirmed that the modernization of tourism infrastructure including: accommodation, transportation, treatment and leisure facilities is deeply influenced by the tourist traffic [9].

The evolution of tourism in a country has proved a flexible adaptation of accommodation capacity in different areas in close relationship with the potential number of tourists and their preferences for the comfort categories of various accommodation units. Foreign tourists' preferences are more oriented to hotels of high comfort category compared to those of the Romanian tourists [22].

Accommodation has the highest share among the tourism services in a perceived destination by visitors. In Romania, the highest quality of accommodation services is in hotels. The most numerous hotels are in Constanța, Ilfov,

Bucharest, Brașov and Prahova counties. In Bucharest there are 22 % of the total number of hotels existing in the county residencies [4]. In terms of overnight stays, Romanians preferred mainly Bucharest and county capitals, spas and health resorts, and the seaside, while foreigners preferred Bucharest and county capitals, other localities and mountain resorts. About 70 % of the accommodated tourists came from the EU countries such as Germany, Italy, France, United Kingdom and Hungary, but also from Turkey, and in a small measure from Asia, and USA. The net use index of the accommodation capacity was 25.9% in 2012, dropping from 33.4% in 2005 [20].

In most cases, European funds have financially supported the growth of the structures of reception with functions of tourist accommodation. Not only the old accommodation units have been modernized, but also new units have been built, especially hotels and rural hostels [3].

In this context, the paper aimed to analyze the dynamics of tourism offer and demand in Bucharest-Ilfov area in the period 2008-2015 and to establish the relationships between tourist arrivals and overnights stays as independent variables on tourism accommodation establishments and places as dependent variables. For this reason, besides the fixed indices characterizing the evolution of these indicators, the paper was focused on the correlation coefficients, the determination coefficients as well as on the regression econometric models.

## MATERIALS AND METHODS

### The study area.

Bucharest is the capital of Romania, the most important industrial and commercial center, and also the core of the educational, artistic, cultural and entertainment institutions, mass-media and transport nodes of the country. It is the 10th position based on its population (1,883,425 inhabitants) in the EU-28, but the metropolitan area of Bucharest totalizes 2.2 million inhabitants [13].

The Bucharest-Ilfov area consists of Bucharest and the Ilfov County, being situated in the South-Eastern part of Romania, having the following geographical coordinates: 25°49'50" - 26°27'15" East longitude and 44°44'30" - 44°46' 5" Nordic latitude. The relief is characteristic to the Vlasia Field, situated at 100 km distance from the Carpathians, 200 km from the Black Sea and 60 km from the Danube River.

The surface of the Bucharest-Ilfov area is 1,821 square kilometers, of which 87.5 % represents the territory of the Ilfov County and 12.5 % the area of the capital.

The capital has an important international role linking Europe to Asia, and also it is a nodal point between the Central and South Eastern Europe by means of its highroads, and railway routes, as well as by the two most important international "Henri Coanda" Otopeni and "Aurel Vlaicu" airports.

The climate is specific temperate-continental, characterized by four seasons, and large temperature differences among winter and summer seasons.

Bucharest is situate along the Dambovitza river, and has many lakes and parks, of which the most important is the Herastrau Park, Cismigiu Garden and the Botanical Garden [11].

In 2010, Bucharest and the Ilfov County contributed by 25.3 % to Romania's GDP, and the GDP/inhabitant is by 240 % higher in this area than the national average. The most important economic branches developed in this area are: electronics, electrotechnique industry, chemical industry, buildings, services, etc.

In Bucharest there are the seats of Romania's Parliament, Government and Presidency, as well as of various education, cultural and research institutions.

Among the most important tourist attractions in Bucharest, there are: The Parliament House considered the 2nd building in the world as volume after the Pentagon, The Cotroceni Royal Palace and Museum, the Village Museum, the Museum of the Romanian Peasant, the historical Center of the city, the Old Court Complex and the Manuc Inn, the National Museum of History, the "Grigore

Antipa" National Museum of Natural History, the National Military Museum, the National Museum of Art, the Museum of Art Collections, the Triumph Arch, the Romanian Athenaeum, the National Theater, the Opera House, The Romanian Patriarchate Cathedral, the Kretzulescu Church, the Stavropoleos Church, the Victory Avenue etc [2]

In the Ilfov Country there are also a series of important tourist attractions such as: Vlasia, Caldarusani, Snagov Forests, a lot of lakes suitable for fishing, nautical sports, hunting, and the cultural values represented mainly by monasteries such as: Caldarusani, Cernica, Snagov, Samurcasesti, but also by the Ghica Palace, the Stirbei Palace, and Therme, the largest spa in Europe [14]

**Data collection.** In order to set up this paper, the empirical data have been collected from the National Institute of Statistics, Tempo online Data base for the period 2008-2015.

**The main specific indicators taken into consideration** to characterize tourism offer and demand in the Bucharest-Ilfov area have been the following ones: (i) the number of establishments for tourist accommodation, of which hotels; (ii) the share of tourist accommodation units in the Bucharest-Ilfov region in the total number of establishments for tourist accommodation existing in Romania; (iii) the share of hotels in the Bucharest-Ilfov region in the total number of hotels existing in Romania; (iv) the number of places (beds) existing in the establishments for tourist accommodation, of which hotels in the Bucharest-Ilfov area; (v) the share of the number of places in tourist accommodation units in the Bucharest-Ilfov region in the total number of places existing in the establishments for tourist accommodation in Romania; (vi) the share of places existing in hotels in the Bucharest-Ilfov region in the total number of places in hotels existing in Romania; (vii) the number of tourist arrivals (total, Romanian and foreign) in the Bucharest-Ilfov region; (viii) the share of the total tourist arrivals in the Bucharest-Ilfov region in the total tourist arrivals in Romania; (ix) the share of the Romanian tourist arrivals in the Bucharest-Ilfov region in the Romanian tourist arrivals in

Romania; (x) the share of the foreign tourist arrivals in the Bucharest-Ilfov region in the foreign tourist arrivals in Romania; (xi) the number of overnight stays ( total, Romanian and foreign) in the Bucharest-Ilfov region; (xii) the share of the total overnight stays in the Bucharest-Ilfov area in the total overnight stays in Romania; (xiii) the share of the Romanians' overnight stays in the Bucharest-Ilfov area in the Romanians' overnight stays in Romania; (xiv) the share of the foreigners' overnight stays in the Bucharest-Ilfov area in the foreigners' overnight stays in Romania.

**The methods applied in this research work** have been different depending on the objectives of the study.

All the indicators mentioned above have been studied in their dynamics using the *Fixed Index Method*, based on the general formula:  $I_{FB} = (X_n / X_1) * 100$ , where:  $X$  = the variable taken into consideration,  $n = 1, 2, 3, \dots, i$ , the years of the chronological series. The index was used to reflect the changes of each indicator in the year 2015 compared to the level recorded in the year 2008, considered term of reference.

*The linear regression* was used to analyze the relationship between: (a) the number of tourist accommodation units,  $Y$ , the dependent variable on the number of tourist arrivals,  $X$ , the independent variable, (b) the number of tourist accommodation units,  $Y$ , the dependent variable on the number of tourist overnight stays,  $X$ , the independent variable, (c) the number of places ( beds) in tourist accommodation units,  $Y$ , the dependent variable on the number of tourist arrivals,  $X$ , the independent variable, (b) the number of places ( beds) in tourist accommodation units,  $Y$ , the dependent variable on the number of tourist overnight stays,  $X$ , the independent variable,

The formula of the linear regression was

$$Y = a + bX \quad (1)$$

where: "a" is the constant term and "b" is the regression slope, and  $X$  is the vector of the independent variable. The values of the estimators of the regression parameters, a and b were determined using Least Square Method to solve the linear system of equations.

*The Fisher's test* was used to check the availability of the regression model.

*The Pearson correlation coefficient* was used to identify the links existing between the pairs of indicators mentioned above at the linear regression, and it was determined using the formula:

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}} \quad (2)$$

The values of the correlation coefficients were interpreted according to Evans (1996) [8].

Excel/Data analysis facilities were used to process the empirical data, and then the results were tabled and illustrated in graphics and interpreted.

## RESULTS AND DISCUSSIONS

### Tourism Offer in Bucharest-Ilfov area

#### (a) *The dynamics of the establishments of tourists reception with functions of tourist accommodation.*

The number of tourism establishments in Bucharest-Ilfov area increased by 10.97 % from 164 units in the year 2008 to 182 units in the year 2015. At the same time, the number of hotels also followed an ascending trend, but a more dynamic one, increasing by 37.23 % from 94 units in the year 2008 to 129 units in the year 2015 ( Fig.1.).

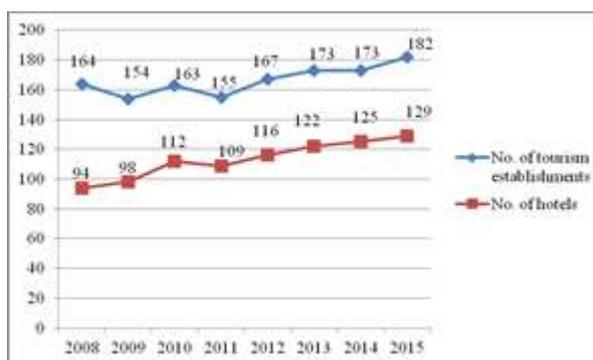


Fig.1. The evolution of the number of tourism establishments, of which hotels in Bucharest-Ilfov area, 2008-2015 (number)

Source: NIS Tempo-online data base, 2017 [12]

The share of the tourism establishments in the Bucharest-Ilfov area in the total number of tourism establishments in Romania is very small, and varied between 3.35 % in 2008 and

2.66 % in 2015, reflecting a continuous decline. This is because in general, the accommodation capacity in terms of the number of units in the country has a more dynamic evolution, as long as more Romanian and foreign tourists are also interested to visit other regions of Romania.

The share of hotels existing in the Bucharest-Ilfov area in the total number of hotels existing in Romania was 8.46 % in 2008 and 8.35 % in 2015.

**(b) The dynamics of the number of places (beds) in tourism establishments of tourists reception with functions of tourist accommodation.**

The number of places (beds) in tourism establishments in Bucharest-Ilfov area increased by 14.28 % from 18.9 thousands in the year 2008 to 21.6 thousands in the year 2015. At the same time, the number of places (beds) existing in hotels also increased by 14.60 % from 17.8 thousands in the year 2008 to 20.4 thousands in the year 2015 (Fig.2.).

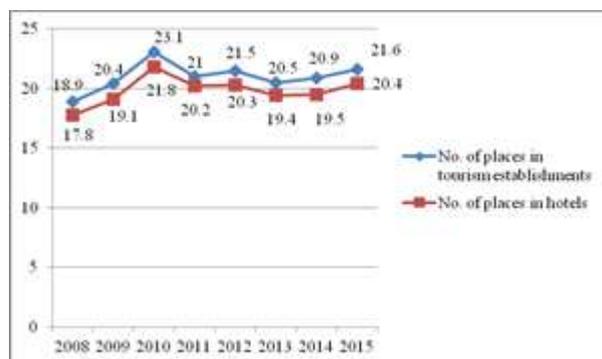


Fig.2. The evolution of the number of places (beds) existing in tourism establishments, of which hotels in Bucharest-Ilfov area, 2008-2015 (thousands)

Source: NIS Tempo-online data base, 2017, [12]

The share of places (beds) existing in tourism establishments in the Bucharest-Ilfov area in the total number of places (beds) existing in tourism establishments in Romania has registered a slight growth from 6.43 % in 2008 to 6.57 % in 2015.

The share of places existing in hotels of the Bucharest-Ilfov area in the total number of places belonging to the hotels existing in Romania was 10.64 % in 2008 and 10.74 % in 2015, reflecting the maintenance of relatively constant situation.

**Tourism demand in Bucharest-Ilfov area**

**(i) The dynamics of the total tourist arrivals (Romanians and foreigners).**

The number of tourist arrivals, including both the Romanians and foreigners, in tourism establishments of the Bucharest-Ilfov area, increased by 79.61 % from 1.03 million in 2008 to 1.85 million in 2015.

At the same time, the number of tourist arrivals, including both the Romanians and foreigners, in hotels existing in the Bucharest-Ilfov region has grown up by 78.21 % from 1.01 million in 2008 to 1.8 million in 2015 (Fig.3.).

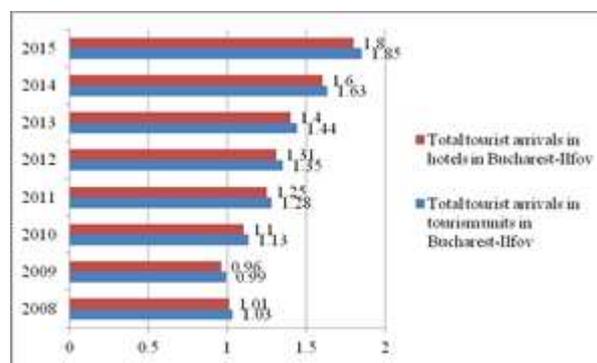


Fig.3. The evolution of the total tourist arrivals (Romanians and foreigners) in tourism accommodation units and in hotels in Bucharest-Ilfov area, 2008-2015 (million)

Source: NIS Tempo-online data base, 2017, [12]

The figures showed that most of tourists preferred accommodation in hotels, as long as the share of tourists arrivals in hotels is very high, 98 % in 2008 and 97.3 % in 2015.

The share of total tourists arrivals in the Bucharest-Ilfov region in the total tourist arrivals in Romania varied between 14.57 % in 2008 and 18.63 % in 2015, while the share of total tourists arrivals in hotels in the Bucharest-Ilfov area in the total tourist arrivals in hotels in Romania varied between 19.30 % in 2008 and 24.72 % in 2015.

**(ii) The dynamics of the Romanian tourist arrivals.**

The number of the Romanian tourist arrivals in tourism establishments of the Bucharest-Ilfov area increased by 77.77 % from 0.45 million in 2008 to 0.8 million in 2015.

At the same time, the number of the Romanian tourist arrivals in the hotels existing in the Bucharest-Ilfov area has grown up by 72.72 %

from 0.44 million in 2008 to 0.76 million in 2015 (Fig.4.).

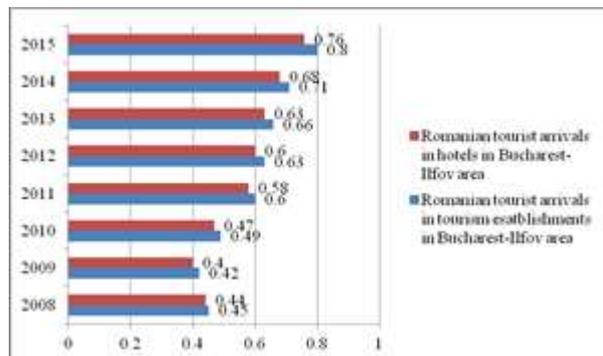


Fig.4.The evolution of the Romanian tourist arrivals in tourism accommodation units and in hotels in Bucharest-Ilfov area, 2008-2015 (million)

Source: NIS Tempo-online data base, 2017, [12]

The share of Romanian tourists accommodated in hotels in the Bucharest-Ilfov area in the Romanian tourist arrivals in tourism establishments in this region was 97.7 % in 2008 and 95 % in 2015, reflecting their preference for a comfortable accommodation and high quality services.

The share of the Romanian tourist arrivals in the Bucharest-Ilfov region in the Romanian tourist arrivals in Romania varied between 8.08 % in 2008 and 10.38 % in 2015, while the share of Romanian tourists arrivals in hotels in the Bucharest-Ilfov area in the Romanian tourist arrivals in hotels in Romania varied between 11.09 % in 2008 and 14.41 % in 2015.

**(iii)The dynamics of the Foreign tourist arrivals.** The number of the foreign tourist arrivals in tourism establishments of the Bucharest-Ilfov area increased by 81.03 % from 0.58 million in 2008 to 1.05 million in 2015, reflecting a higher growth rate compared to the Romanian tourists.

At the same time, the number of the foreign tourist arrivals in the hotels existing in the Bucharest-Ilfov area has grown up by 82.45 % from 0.57 million in 2008 to 1.04 million in 2015 (Fig.5.).

The share of the foreign tourists accommodated in hotels in the Bucharest-Ilfov area in the foreign tourist arrivals in tourism establishments in this region was 98.2 % in 2008 and 99 % in 2015.

The share of the foreign tourist arrivals in the Bucharest-Ilfov region in the foreign tourist arrivals in tourism establishments in Romania varied between 39.6 % in 2008 and 46.98 % in 2015, while the share of foreign tourists arrivals in hotels in the Bucharest-Ilfov area in the foreign tourist arrivals in hotels in Romania varied between 44.36 % in 2008 and 52.15 % in 2015.

It is obvious that foreign tourists have a few times (4-5 times) higher share tourism establishments and mainly in hotels in Bucharest-Ilfov area, and also in Romania.

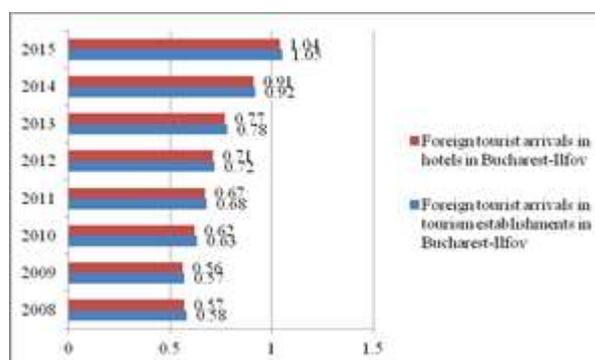


Fig.5.The evolution of the foreign tourist arrivals in tourism accommodation units and in hotels in Bucharest-Ilfov area, 2008-2015 (million)

Source: NIS Tempo-online data base, 2017, [12]

**(iv)The dynamics of the total overnight stays (Romanians and foreigners).**

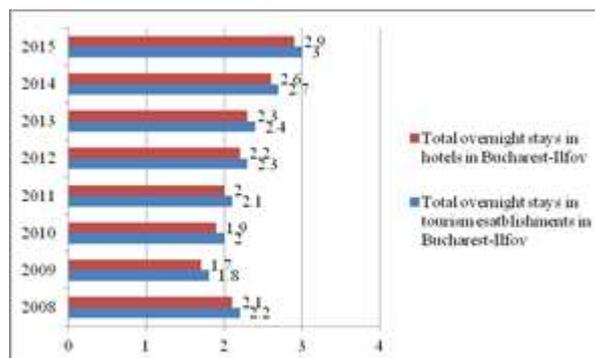


Fig.6.The evolution of the total overnight stays (Romanian and foreign) in tourism accommodation units and in hotels in Bucharest-Ilfov area, 2008-2015 (million)

Source: NIS Tempo-online data base, 2017, [12]

The number of overnight stays, belonging both to the Romanians and foreigners, in tourism establishments of the Bucharest-Ilfov area, increased by 36.36 % from 2.2 million in 2008 to 3 million in 2015.

At the same time, the number of overnight stays, including both the Romanians and foreigners, in hotels existing in the Bucharest-Ilfov region has grown up by 38.09 % from 2.1 million in 2008 to 2.9 million in 2015 (Fig.6.). The figures showed that most numerous overnight stays were recorded in hotels, 95.4 % in 2008 and 96.6 in 2015.

The share of total overnight stays in tourism establishments in the Bucharest-Ilfov region in the total overnight stays in Romania varied between 10.67 % in 2008 and 12.92 % in 2015, while the share of total overnight stays in hotels in the Bucharest-Ilfov area in the total overnight stays in hotels in Romania varied between 13.01 % in 2008 and 16.38 % in 2015.

**(v) The dynamics of the Romanians' overnight stays.** The number of overnight stays, belonging to the Romanians in tourism establishments of the Bucharest-Ilfov area, increased by 24.75 % from 1.01 million in 2008 to 1.26 million in 2015.

At the same time, the Romanians' overnight stays in the hotels existing in the Bucharest-Ilfov region has grown up by 26.31 % from 0.95 million in 2008 to 1.2 million in 2015 (Fig.7.).

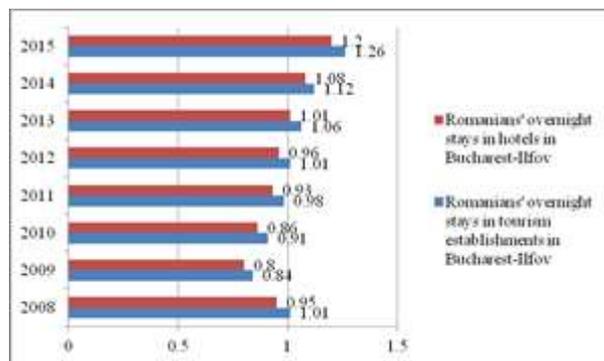


Fig.7. The evolution of the Romanians' overnight stays in tourism accommodation units and in hotels in Bucharest-Ilfov area, 2008-2015 (million)

Source: NIS Tempo-online data base, 2017, [12]

Also, in this case, the figures showed that about 94-95.2 % of overnight stays of the Romanian tourists were registered in hotels in the analyzed period.

The share of the Romanians' overnight stays in tourism establishments in the Bucharest-Ilfov region in the Romanians' overnight stays in Romania varied between 5.8 % in 2008 and

6.61 % in 2015, while the share of the Romanians' overnight stays in hotels in the Bucharest-Ilfov area in the Romanians' overnight stays in hotels in Romania varied between 7.07 % in 2008 and 8.52 % in 2015.

**(vi) The dynamics of the foreign tourists' overnight stays.** The number of overnight stays belonging to the foreigners in tourism establishments of the Bucharest-Ilfov area, increased by 48.33 % from 1.20 million in 2008 to 1.78 million in 2015.

At the same time, the foreigners' overnight stays in the hotels in the Bucharest-Ilfov area has grown up by 49.57 % from 1.17 million in 2008 to 1.75 million in 2015 ( Fig.8.).

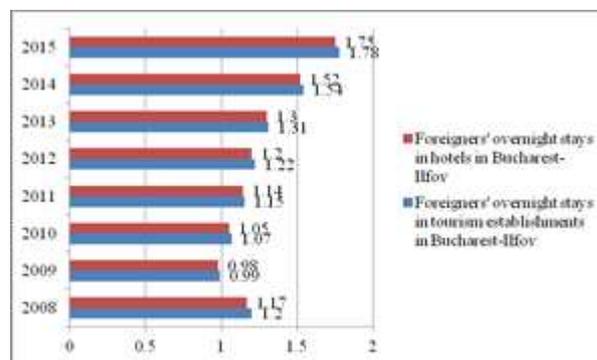


Fig.8. The evolution of the foreigners' overnight stays in tourism accommodation units and in hotels in Bucharest-Ilfov area, 2008-2015 (million)

Source: NIS Tempo-online data base, 2017, [12]

The figures showed that about 97.5 % of overnight stays in 2008 and 98.3 % in 2015 of the foreign tourists were recorded in hotels.

The share of the foreigners' overnight stays in tourism establishments in the Bucharest-Ilfov region in the foreigners' overnight stays in Romania varied between 35.76 % in 2008 and 39.82 % in 2015, while the share of the foreigners' overnight stays in hotels in the Bucharest-Ilfov area in the foreigners' overnight stays in hotels in Romania varied between 40.86 % in 2008 and 44.75 % in 2015.

**The coefficients of Pearson correlation between the main indicators taken into consideration.** The values of the coefficients of correlations were high for the number of accommodation units and tourist arrivals ( $r_{xy} = 0.859$ ) and for the number of accommodation units and tourist overnight stays ( $r_{xy} = 0.930$ ),

reflecting a positive and strong relationship between these two pairs of indicators.

Table 1. The coefficients of correlation between various pairs of indicators

| The pair of indicators for which it was determined the coefficient of correlation    | Correlation coefficient, $r_{xy}$ |
|--|-----------------------------------|
| Number of accommodation units (Y) and Tourist arrivals (X)                           | $r_{xy} = 0.859$                  |
| Number of accommodation units (Y) and Tourist overnight stays (X)                    | $r_{xy} = 0.930$                  |
| Number of places in tourist accommodation units ( Y) and Tourist arrivals (X)        | $r_{xy} = 0.260$                  |
| Number of places in tourist accommodation units ( Y) and Tourist overnight stays (X) | $r_{xy} = 0.065$                  |

Source: Own calculation based on NIS Tempo-online data base, 2017, [12]

But, it was found a low coefficient of correlation between the number of places in tourist accommodation units and tourist arrivals ( $r_{xy} = 0.260$ ) and a very low correlation coefficient between the number of places in tourist accommodation units and tourist overnight stays ( $r_{xy} = 0.065$ ), reflecting a positive but weak relationship between these two pairs of tourism indicators ( Table 1).

**The regression functions between the main indicators taken into consideration.**

***The regression function estimated between the number of accommodation units***

*depending on tourists' arrivals* was the following one:

$$Y = 27.42325X + 129.6964$$

The determination coefficient,  $R^2 = 0.738556$  reflected that 73.85 % of the variation in the number of accommodation units for tourists is due to the variation of the number of tourists' arrivals. This confirms the validity of the regression model.

The Standard Error,  $St\ Err = 5.2472$  reflects how much the observed values deviate from the theoretical value situated on the regression slope (Fig.9).

The availability of the regression model is also confirmed by  $F\text{-test} = 16.949$ , this statistical value being higher than the tabled value, as also attested by  $Sign. F = 0.00623$ .

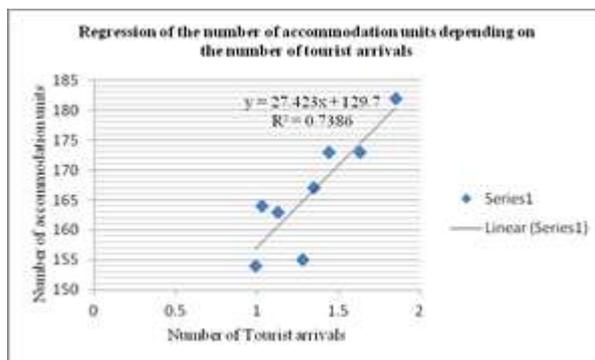


Fig.9. The regression function of the number of tourism accommodation units depending on the number of tourist arrivals in Bucharest-Ilfov area, 2008-2015  
Source: INSSE Tempo-online data base, 2017, [12]

Table 2. The estimated regression model for the number of tourist accommodation units depending on the number of tourists' arrivals in the Bucharest-Ilfov area

| Regression statistics |                     |                       |               |                |                       |                  |
|-----------------------|---------------------|-----------------------|---------------|----------------|-----------------------|------------------|
| Multiple R            | 0.859393            |                       |               |                |                       |                  |
| R Square              | 0.738556            |                       |               |                |                       |                  |
| Adjusted R Square     | 0.694982            |                       |               |                |                       |                  |
| Standard Error        | 5.2472              |                       |               |                |                       |                  |
| Observations          | 8                   |                       |               |                |                       |                  |
| ANOVA                 |                     |                       |               |                |                       |                  |
|                       | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |                  |
| Regression            | 1                   | 466.6752175           | 466.6752      | 16.949         | 0.00623               |                  |
| Residual              | 6                   | 165.1997825           | 27.5333       |                |                       |                  |
| Total                 | 7                   | 631.875               |               |                |                       |                  |
|                       | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i>      | <i>Upper 95%</i> |
| Intercept             | 1296964             | 9.100218              | 14.25201      | 7.46187        | 107.4289              | 151.9638         |
| X Variable 1          | 27.42325            | 6.661019              | 4.116375      | 0.00623736     | 11.1243               | 43.7121          |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [12]

The parameters of the regression model are situated among the following confidence

intervals:  $107.4289 < a < 151.9638$  and  $11.1243 < b < 43.7121$  (Table 2).

**The regression function between the number of accommodation units depending on tourists' overnight stays** was the following one:

$$Y = 22.8486X + 113.537$$

The determination coefficient,  $R^2 = 0.93085$  reflected that 93.08 % of the variation in the number of accommodation units for tourists is due to the variation of the number of tourists' overnight stays. This confirms the validity of the regression model.

The Standard Error,  $St\ Err = 0.379$  reflects how much the observed values deviate from the theoretical value situated on the regression slope

The availability of the regression model is also confirmed by  $F\text{-test} = 38.938$ , this statistical value being higher than the tabled value, as also attested by  $Sign. F = 0.000784$ .

The parameters of the regression model are situated among the following confidence intervals:  $92.5661 < a < 134.509$  and  $13.88905 < b < 31.8082$  (Fig.10, Table 3).

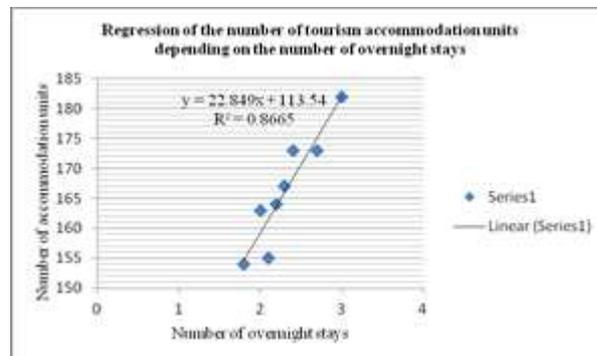


Fig.10. The regression function of the number of tourism accommodation units depending on the number of overnight stays in Bucharest-Ilfov area, 2008-2015  
Source: INSSE Tempo-online data base, 2017, [12]

Table 3. The estimated regression model for the number of tourist accommodation units depending on the number of tourists' overnight stays in the Bucharest-Ilfov area

| Regression statistics |         |                     |                       |               |                |                       |                  |
|-----------------------|---------|---------------------|-----------------------|---------------|----------------|-----------------------|------------------|
| Multiple R            | 0.93085 |                     |                       |               |                |                       |                  |
| R Square              | 0.8664  |                     |                       |               |                |                       |                  |
| Adjusted R Square     | 0.844   |                     |                       |               |                |                       |                  |
| Standard Error        | 0.379   |                     |                       |               |                |                       |                  |
| Observations          | 8       |                     |                       |               |                |                       |                  |
| ANOVA                 |         |                     |                       |               |                |                       |                  |
|                       |         | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |                  |
| Regression            |         | 1                   | 547.5103              | 547.5103      | 38.938         | 0.000784              |                  |
| Residual              |         | 6                   | 84.36472              | 14.06079      |                |                       |                  |
| Total                 |         | 7                   | 631.875               |               |                |                       |                  |
|                       |         | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i>      | <i>Upper 95%</i> |
| Intercept             |         | 113.537             | 8.570567              | 13.24738      | 1.14336        | 92.5661               | 134.509          |
| X Variable 1          |         | 22.8486             | 3.661582              | 6.240097      | 0.000784       | 13.88905              | 31.8082          |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [12]

**The regression function between the number of places in tourism accommodation units depending on tourists' arrivals** was the following one:

$$Y = 1.050278X + 19.58275$$

The determination coefficient,  $R^2 = 0.06812$  reflected that only 6.81 % of the variation in the number of places in tourism accommodation units is due to the variation of the number of tourists' arrivals. This does not confirm the validity of the regression model.

The Standard Error,  $St\ Err = 1.249282$  reflects a relatively high deviation of the observed values deviate from the theoretical value situated on the regression slope

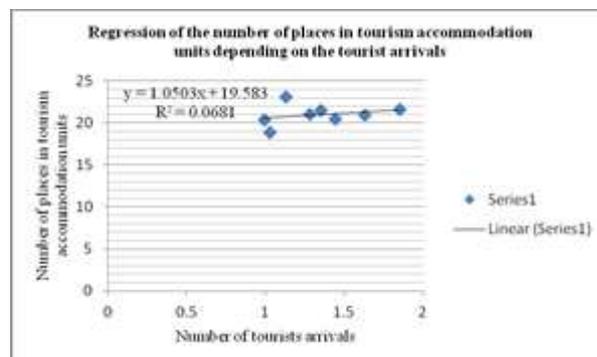


Fig.11. The regression function of the number of places in accommodation units depending on the number of tourist arrivals in Bucharest-Ilfov area, 2008-2015  
Source: INSSE Tempo-online data base, 2017, [12]

The invalidity of the regression model is also confirmed by  $F\text{-test} = 0.43859$ , this statistical

value being lower than the tabled value, and this is also attested by Sign. F= 0.532399.

The parameters of the regression model are situated among the following confidence intervals:  $14.28122 < a < 24.88429$  and  $-2.83025 < b < 4.930802$  (Fig.11, Table 4).

**The regression function between the number of places in tourism accommodation units depending on tourists' overnight stays** was the following one:

$$Y = 0.20143X + 20.5214$$

The determination coefficient,  $R^2 = 0.00423$  reflected that only 0.42 % of the variation in the number of places in tourism accommodation units is due to the variation of the tourists' overnight stays (Fig.12).

This does not confirm the validity of the regression model.

The Standard Error,  $St\ Err = 1.291394$  reflects a high deviation of the observed values deviate from the theoretical value situated on the regression line.

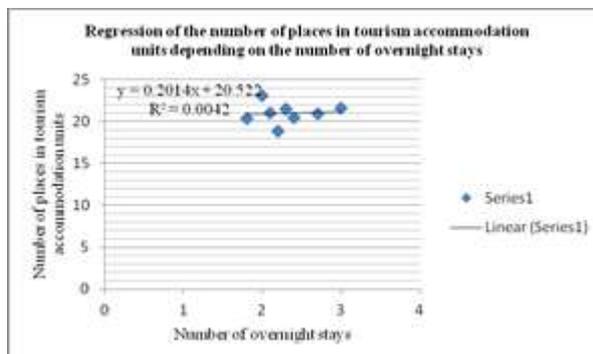


Fig.12. The regression function of the number of places in tourism accommodation units depending on the number of overnight stays in Bucharest-Ilfov area, 2008-2015

Source: INSSE Tempo-online data base, 2017, [12]

Table 4. The estimated regression model for the number of places in tourist accommodation units depending on the number of tourists' arrivals in the Bucharest-Ilfov area

| Regression statistics |                     |                       |               |                |                       |                  |
|-----------------------|---------------------|-----------------------|---------------|----------------|-----------------------|------------------|
| Multiple R            | 0.260998            |                       |               |                |                       |                  |
| R Square              | 0.06812             |                       |               |                |                       |                  |
| Adjusted R Square     | -0.08719            |                       |               |                |                       |                  |
| Standard Error        | 1.249282            |                       |               |                |                       |                  |
| Observations          | 8                   |                       |               |                |                       |                  |
| ANOVA                 |                     |                       |               |                |                       |                  |
|                       | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |                  |
| Regression            | 1                   | 0.68451               | 0.684519      | 0.43859        | 0.532399              |                  |
| Residual              | 6                   | 9.36423               | 1.560705      |                |                       |                  |
| Total                 | 7                   | 10.04875              |               |                |                       |                  |
|                       | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i>      | <i>Upper 95%</i> |
| Intercept             | 19.58275            | 2.166621              | 9.03838       | 0.000102       | 14.28122              | 24.88429         |
| X Variable 1          | 1.050278            | 1.585886              | 0.662266      | 0.53239        | -2.83025              | 4.930802         |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [12]

The invalidity of the regression model is also confirmed by F-test= 0.025515, a statistical value lower than the tabled value, and this is also attested by Sign. F= 0.87833.

The parameters of the regression model are situated among the following confidence intervals:  $13.2992 < a < 27.7441$  and  $-2.88418 < b < 3.28704$  (Table 5).

## CONCLUSIONS

The paper analyzed the tourism offer and demand in the Bucharest-Ilfov area in the period 2008-2015.

The results pointed out that the number of establishments of tourists reception with functions of tourist accommodation in this region has increased in the analyzed period by 10.97 %, while the number of hotels increased by 37.23 %. In 2015, in this area there were 182 tourism establishments and 129 hotels.

The number of places in establishments for tourists' accommodation increased by 14.28 %, while the number of places in hotels raised by 14.60 %.

In 2015, in the Bucharest-Ilfov area, there were 21,600 places in tourist accommodation units, of which 20,400 places in hotels.

Table 5. The estimated regression model for the number of places in tourist accommodation units depending on the number of tourists' overnight stays in the Bucharest-Ilfov area

| Regression statistics |                     |                       |               |                |                       |                  |
|-----------------------|---------------------|-----------------------|---------------|----------------|-----------------------|------------------|
| Multiple R            | 0.06507             |                       |               |                |                       |                  |
| R Square              | 0.00423             |                       |               |                |                       |                  |
| Adjusted R Square     | -0.16172            |                       |               |                |                       |                  |
| Standard Error        | 1.291394            |                       |               |                |                       |                  |
| Observations          | 8                   |                       |               |                |                       |                  |
| ANOVA                 |                     |                       |               |                |                       |                  |
|                       | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |                  |
| Regression            | 1                   | 0.042552              | 0.042552      | 0.025515       | 0.87833               |                  |
| Residual              | 6                   | 10.0062               | 1.6677        |                |                       |                  |
| Total                 | 7                   | 10.04875              |               |                |                       |                  |
|                       | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i>      | <i>Upper 95%</i> |
| Intercept             | 20.5214             | 2.951642              | 6.952636      | 0.000439       | 13.2992               | 27.7441          |
| X Variable 1          | 0.20143             | 1.261023              | 0.159736      | 0.878331       | -2.88418              | 3.28704          |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [12]

All these reflected that tourism offer in the Bucharest-Ilfov area have been continuously developed in order to satisfy better tourists' requirements.

In the analyzed period, the number of total tourists' arrivals in the establishments for tourists' accommodation increased by 79.61 %, while the number of arrivals in hotels raised by 78.21 %.

Compared to the growth of 77.77 % in Romanian tourists' arrivals in tourism accommodation units and 72.72 % in hotels, the number of foreign tourists' arrivals in tourism accommodation units increased by 81.95 % and in hotels by 82.45 %, reflecting a more dynamics growth rate.

The number of total overnight stays increased by 36.36 % in tourist accommodation units and by 38.09 % in hotels.

However, like in case of tourist arrivals, the foreign tourists recorded a higher number of overnight stays by 48.33 % in tourism accommodation units and by 49.57 % in hotels, while the Romanian tourists registered by 24.75 % more overnight stays in tourism accommodation units and by 26.31 % in hotels. Therefore, in 2015, it was recorded 1.85 million tourist arrivals, of which 0.8 million, that is 43.24 % belonged to the Romanian tourists and 56.76 % to the foreign tourists.

In the same year, there were recorded 3 million overnight stays in tourism accommodation units, of which 42 % belonged to the Romanian tourists and 58 % to the foreign ones.

Hotels are the most preferred units of accommodation by foreign tourists, and also by the Romanians.

Between the number of accommodation units and the number of overnight stays, as well as between the number of accommodation units and the number of tourist arrivals is a strong positive relationship, as conformed by the correlation coefficients, whose values were:  $r_{xy} = 0.930$  and, respectively,  $r_{xy} = 0.859$ . The number of places is not influenced by the number of tourists arrivals and the number of overnight stays, as proved by the weak coefficients of correlation,  $r_{xy} = 0.260$ , and respectively,  $r_{xy} = 0.065$ .

The same idea was confirmed by regression function between the number of accommodation units depending on tourists' arrivals whole estimated model was  $Y = 27.42325X + 129.6964$ , with an R squared = 0.738556, and by the regression function between the number of accommodation units and the number of overnight stays whose estimated model was:  $Y = 22.8486X + 113.537$  with R squared = 0.93085. The correct form of these regression models was attested by Fisher's test.

The study proves that the number of places in tourist accommodation units is not influenced by tourists arrivals or overnight stays, but by other factors.

Therefore, the relationship between tourism offer and tourism demand in the Bucharest-Ilfov area has proved the synergy between the development of the accommodation capacity in

terms of accommodation units and the increase of tourists arrivals and overnights stays.

The tourism agents must take into consideration the growth of inbound and domestic tourism in terms of overnight stays and arrivals in setting up the strategy of the development of tourist accommodation establishments.

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## ANALYSIS OF SHEEP AND GOATS LIVESTOCK AND MILK AND MEAT PRODUCTION IN ROMANIA, 2007-2016

Agatha POPESCU

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest Romania, Phone: +40213182564, Fax: +40213182888, Email: agatha\_popescu@yahoo.com

**Corresponding author:** agatha\_popescu@yahoo.com

### Abstract

*The paper aimed to analyze the trends in sheep and goat livestock, at national level and in the territory, animal density, milk and meat production, meat consumption, meat export, import and trade balance based on the empirical data provided by the National Institute of Statistics and Eurostat Data base in the period 2007-2016. For 11,358 thousand sheep and goats in 2016, Romania comes on the 4th position in the EU after United Kingdom and Spain. Also, it is on the 5th position for sheep and goats density (85.5heads/100 ha) after Greece, United Kingdom, Spain and Netherlands. Sheep and goats are raised all over the country, but sheep are mainly grown in the Central area, NW, W, and SE, while goats are especially in SE, S West Oltenia, S Muntenia, and N E. In Romania the concentration of sheep and goats livestock in the territory is a moderate one, as confirmed by the Herfindhal-Hirschman and Gini-Struck indices. In 2016, sheep and goat milk production accounted for 6,113 thousand hl in 2016, but only 6.95 % is collected by the industrial units, the remaining is destined to cover household needs. Sheep and goat meat production reached 182 thousand tonnes in 2015, reflecting a high growth rate (65 %) in the analyzed period. Sheep and goat meat is mainly produced in the SE, S Muntenia and W. Romania comes on the 10th position in the EU for sheep meat production after United Kingdom, Spain, France, Ireland, Greece, Italy, Germany, Netherlands, and Portugal. Romania is a net exporting country of sheep meat, as long as it has a surplus, and the domestic consumption is low. Romania has a high potential for producing more meat for the internal market and export. This requires the organization of sheep and goats raising associations specialized in young sheep males fattening, with a corresponding farm size to assure a high production and carcass quality. The national aids and coupled support help the breeders to develop meat and milk production in this sector.*

**Key words:** sheep, goats, livestock, concentration, milk, meat, production, trade, Romania

### INTRODUCTION

Sheep and goats are ruminants which could produce more milk and meat to feed the world population. Sheep and goats produce healthy milk and meat for human consumption. Their milk is rich in protein and fats, lactose and calcium, and other minerals and vitamins. The therapeutic effects of the goat milk are benefic for the people allergic to cow milk [17].

Sheep and goat meat is tasty, flavored and succulent, has a high nutritive and energy value [1].

In 100 g sheep milk, there are: 82.9 % water, 5.5 % protein, 5.9 % fat, 4.7 % casein, 4.8 % lactose, 197.5 mg calcium, 138 mg potassium, 141 mg phosphorus, 39 mg sodium, 19.5 mg magnesium, while in 100 g of goat milk there are: 87.6 % water, 3.7 % protein, 3.8 % fat, 2.4 % casein, 4.1. % lactose, 130 mg Calcium,

185.5 mg potassium, 109 mg phosphorus, 39.5 mg sodium, 14.5 mg magnesium.

In 100 g of sheep meat, there are: 144 kilocalories, 20 g proteins, 6.5 g fats, water 72 %, while in 100 g of lamb meat has 62 % water, 260 kilocalories, 18 g proteins, 20 g fats, and also B and C vitamins, calcium, iron. In 100 g goat meat, there are: 143 calories, 27 g proteins, 30.5 g fats, A, B, C,D,E,K vitamins, and iron [3, 7].

At the world level, in 2008, sheep and goats livestock accounted for 861.9 million heads, and respectively 1,087.2 million heads, the ratio between the two species being 1/1.25. Sheep are mainly raised in Asia (42 %) and Africa (26.7%)[2].

In 2013, world sheep livestock accounted for 1,172.8 million heads, of which Asia 44.8 %, Africa 27.73 % and Europe 11% [6]. In 2013, world goats livestock reached 1,005.6 million

heads, of which Asia 59.3 % and Africa 35 % [26].

World sheep milk production accounted for 10,4 million metric tonnes, of which Asia 46.54 % and Africa 23.5 % in the year 2014 [6]. In 2013, goat milk production reached 17.8 million MT [26].

World sheep meat accounted for 8.9 million MT, of which Asia 49.7 %, Africa 19.6 %, Oceania 13.5% and Europe 12.7 % [6]. And world goats meat production reached 5.3 million MT in 2012 being by 7.5 % higher than in 2008 [26].

A high demand for sheep meat is still available in the countries with a long tradition in production and consumption such as Australia, New Zealand, United Kingdom, Argentina and in the Arabian and African countries.

In the Western and Transoceanic countries, consumer preferences are oriented mainly to the meat produced by young fattened animals (35-49 kg/head at 5-6 month age), in the South-Eastern Europe, consumers prefer lamb meat (12-14 kg/head at the age of 45-55 days; 20-26 kg at 100 days), and in the Middle East countries it is preferred meat coming from the culled adult animals which are fattened for about 30-40 days. Meat coming from adult animals is extremely required for export in the Middle East countries [25].

Raising sheep and goats, people from the rural areas could have a useful activity in their household and farm, producing milk and meat for their family needs and for the market as well. Sheep and goats are able to graze the lands unsuitable for cultivated crops, in the marginal areas, and also the pastures and meadows. In this way, they do not compete with humans and other species for cereals consumption. At the same time, they could be a source of natural manure improving soil fertility, and also an important factor for preserving biodiversity, maintaining the local breeds and avoiding the "genetic erosion" caused by the utilization of specialized crossbreds [5, 11].

In the EU, there are 87.1 million sheep and 12.78 million goats, and the livestock has varied from a year to another, with a slight increase to 2016. The main EU countries

raising sheep are United Kingdom (23.82 million), Spain (15.96 million) and Romania (9.88 million), representing 49.66 % of the EU sheep livestock. The main countries growing goats are: Greece (3.9 million), Spain (3 million) and Romania (1.48 million), all together accounting for 66.19 % of the total EU goats livestock.

Sheep meat production recorded an important growth due to the contribution of about 85 % brought by United Kingdom, Spain, France, Ireland and Greece to the EU sheep meat output, while goat meat production is produced by Greece, Spain and France which together assure 93 % of the EU goat meat output [12].

The entry of the CEECs in the EU has determined a new orientation in sheep and goat raising from producing milk, live lambs, and wool, to produce meat and milk for the local and European market, and wool and skins for the domestic needs. Most of sheep and goats are grown in small subsistence and semi-subsistence households characterized by a low productivity in close connection with the low reproduction performance. However, a refreshment in sheep and goat sector is observed during the last years due to opportunities for live animals and meat export [24].

In Romania, sheep and goat raising is a traditional activity closely linked to transhumance in the Balkan area. Sheep and goats growing is advantaged in Romania due to its geographical position, the large variety of relief: mountains, hilly areas and plains with about 33 % of each, large surfaces of pastures (3.3 million ha) and meadows (1.5 million ha), representing 14 % and respectively 7 % of the total 14.6 million ha agricultural land.

Sheep and goats are well adapted to the local climate conditions, and are raised in small subsistence and semi-subsistence farms, requiring low maintenance costs and low energy consumption. Their milk and meat have a lower production cost compared to other farm species. The two species are a source of jobs and income for the local population and a factor of environment protection and development [27].

Sheep and goats could be grown in the marginal areas (mountain and submountain areas, etc) with semi-natural vegetation, contributing to the preservation of natural biodiversity, and at the same time stimulating production even in the subsistence and semi subsistence extensive systems of animal production by means of pastorship, transhumance and organic agriculture. More than these, sheep growing will continue the history of the Romanians within the Carpathian-Danube-Pontic space as a proof of the nation existence [8, 9].

In this context, the purpose of the paper was to analyze the dynamics of sheep and goat sector in Romania the period 2007-2016 emphasizing the main trends and Romania's potential in producing milk and meat for the local and EU market.

The evolution of the sheep and goat livestock, and its dispersion in the territory by micro regions, and its concentration degree in terms of Herfindhal-Hirschman index and Gini - Struck index. Also, the performance in milk and meat production, mainly in the industrial units have been also approached. Finally, the paper makes some remarks on sheep and goat meat export, import and trade balance.

## MATERIALS AND METHODS

**Data collection.** In order to set up this paper, the empirical data have been collected from the various sources such as: Eurostat Statistics Explained, and National Institute of Statistics, Tempo online Data base for the period 2007-2016.

**The main specific indicators taken into consideration** have been the following ones: sheep and goat livestock, the density of sheep and goat per 100 ha, the distribution of sheep and goats in the territory by micro region, the livestock structure by micro region, the concentration degree of sheep and goats in the country, sheep and goat milk production at national level and collected by the industrial units, sheep and goat meat production at national level and collected by the industrial units, meat consumption, meat export, import and trade balance, Romania's position among

the EU countries regarding sheep and goat livestock and meat production.

**The applied methodology** consists of:

*Fixed Index Method* was used to reflect the changes of the variable value in the analyzed period, based on the formula:  $I_{FB} = (X_n / X_1) * 100$ , where: X = the variable taken into consideration, n= 1,2,3...i, the years of the chronological series. The term of reference was the year 2007=100.

**Statistical parameters:** mean, standard deviation, and variation coefficient.

**Herfindhal-Hirschman Index (HHI)** was used to determine the concentration degree, based on the formula:

$$HHI = \sum_{i=1}^n g_i^2 \quad (1)$$

**Gini-Struck Index (GSI)** was used to assess the concentration degree based on the formula:

$$GSI = \sqrt{\frac{n \sum_{i=1}^n g_i^2 - 1}{n-1}} \quad (2)$$

**Comparison method** was used to point out the position of Romania among the other EU countries regarding sheep and goat livestock and meat production.

The main results were tabled, illustrated in graphics and interpreted.

## RESULTS AND DISCUSSIONS

**Sheep and goat livestock** has registered a continuous increase in the analyzed period.

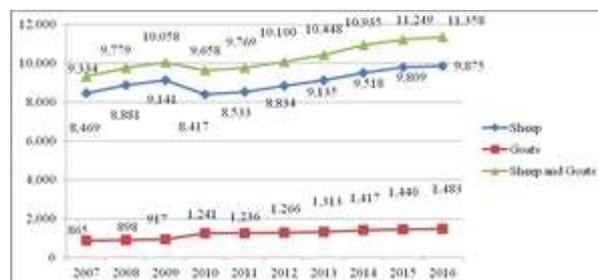


Fig.1. The dynamics of sheep, goats and sheep and goats livestock in Romania, 2007-2016 (Thousand heads)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

The number of sheep grew up by 16.60 % from 8,469 thousand heads in the year 2007 to 9,875 thousand heads in the year 2016.

At the same time, the number of goats recorded a higher growth rate accounting for 71.44 % in the same interval of time, increasing from 865 thousand heads in 2007 to 1,483 thousand heads in the year 2016.

Taking into account sheep and goats together, the livestock increased by 21.68 %, from 9,334 thousand heads in 2007 to 11,358 thousand heads in 2016 (Fig.1.)

According to Eurostat, in 2016, Romania came on the 4th position for the sheep and goats livestock, accounting for 9.88 sheep and 1.48 goats million heads, after United Kingdom ( 23.82 sheep and 0.10 goats million heads) and Spain ( 15.96 sheep and 3.09 goats million heads).

Romania's sheep and goats livestock represented 11.3 % of the number of sheep and 11.6 % of the number of goats in the EU-28 ( Table 1).

Table 1. Romania's position among the top EU countries growing sheep and goats in 2016

| Country        | Sheep livestock |       | Goats livestock |       |
|----------------|-----------------|-------|-----------------|-------|
|                | Million heads   | %     | Million heads   | %     |
| EU-28          | 87.10           | 100.0 | 12.78           | 100.0 |
| United Kingdom | 23.82           | 27.3  | 0.10            | 0.8   |
| Spain          | 15.96           | 18.3  | 3.09            | 24.2  |
| Romania        | 9.88            | 11.3  | 1.48            | 11.6  |
| Greece         | 8.74            | 10.0  | 3.89            | 30.4  |
| Italy          | 7.28            | 8.3   | 1.03            | 8.0   |
| France         | 7.16            | 8.2   | 1.20            | 9.3   |
| Ireland        | 3.44            | 3.9   | -               | -     |
| Portugal       | 2.07            | 2.3   | 0.35            | 2.7   |
| Germany        | 1.57            | 1.8   | 0.18            | 1.4   |
| Bulgaria       | 1.36            | 1.5   | 0.24            | 1.8   |
| Total          | 81.28           | 92.9  | 11.57           | 89.4  |

Source: Own calculation based on the data from Eurostat, Sheep population, Annual data, [14]

However, the growth of sheep and goat livestock is benefic for the EU-28 where it is an unbalanced demand/offer of sheep meat in the market. In the EU-28, the population of sheep declined by 1.5 % in the period 2007-2016, with just a slight increase in the year 2016 compared to 2015.

The highest decrease of 3.7 % was achieved by the goats population between 2010 and 2016. However, in 2016, the goats livestock in the EU increased by 2 % compared to 2015.

Romania has deeply contributed to the growth in goats number by +43 thousand heads, besides other contributors such as: Spain (+385 thousand heads), Italy (+65 thousand heads) and Netherland (+36 thousand heads) [12, 19].

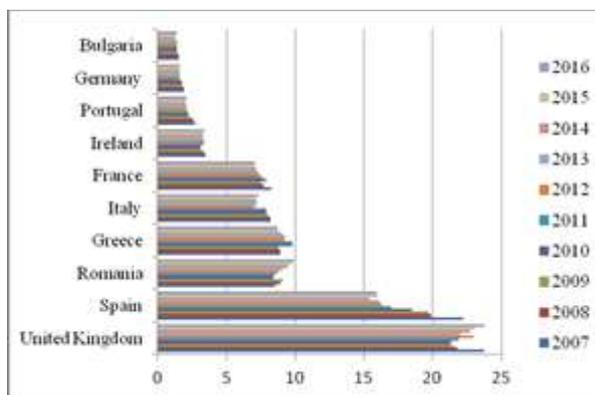


Fig.2. The dynamics of sheep livestock in Romania compared to the top EU breeding countries, 2007-2016 (Million heads)

Source: Own design based on the data from Eurostat Data base, 2017 [13]

**The density of sheep and goat livestock.**

Regarding the density of sheep and goats livestock, Romania comes on the 5th position in the EU, with 85.5 heads/100 ha, after Greece (332.9 heads), United Kingdom (140.4 heads), Spain (100 heads) and Netherlands (85.8 heads) (Fig.3.)

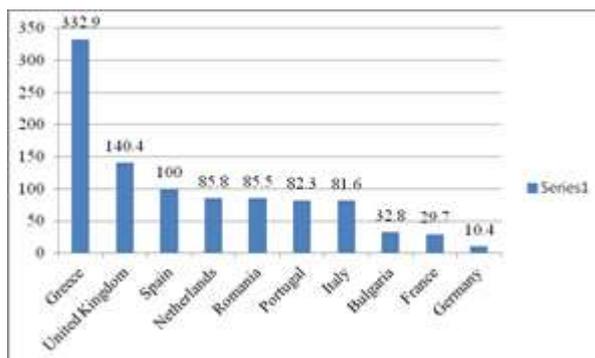


Fig.3. Sheep and goats density in Romania compared to the other top EU countries growing these species (heads/100 ha)

Source: Own design based on the National Institute of Statistics, Press Release no.124/May 15, 2017 [22]

The highest density of sheep accounting for more than 105 heads/100 ha was found in the Central region of Romania and the lowest one in Bucharest-Ilfov area (less than 25 heads/100 ha). The highest density of goats, more than 15

heads/100 ha, was found in the South region and the lowest density (3 heads/100 ha) in the West region [4].

**The evolution of sheep livestock in the territory by micro region.** The sheep livestock not uniformly distributed in the territory of Romania taking into account the soil and climate condition, the existence of pastures and meadows and of other feeding resources, and tradition.

In 2016, the highest number of sheep was concentrated in the Central part of Romania, 2,152 thousands heads, and the lowest number of sheep is raised in Bucharest-Ilfov area, only 31 thousand heads.

The importance of micro regions in sheep growing, in the decreasing order is: Central area, North West area, West region, South East, North East, South Muntenia, South West Oltenia and Bucharest-Ilfov.

In the Central area, the sheep number increased from 1,693 thousand heads in 2007 to 2,152 thousand heads in 2016. In the North West area, the sheep livestock grew up from 1,199 thousand heads in 2007 to 1,669 thousand heads in 2016. In the West region, the number of sheep increased from 1,137 thousand heads in 2007 to 1,515 thousand heads in 2016. In the South East area, it decreased from 1,491 thousand heads in 2007 to 1,485 thousand heads in 2016. In the North East region, it also declined from 1,432 thousand heads in 2007 to 1,403 thousand heads in 2016. In the South Muntenia, the sheep livestock increased from 823 thousand heads in 2007 to 934 thousand heads in 2016. In the South West Oltenia region, it increased from 671 thousand heads in 2007 to 686 thousand heads in 2016. Finally, in Bucharest-Ilfov area, the sheep number increased from 24 thousand heads in 2007 to 31 thousand heads in 2016.

In the analyzed period, in some regions, the sheep livestock increased: + 39.19 % in the North West, +33.24 % in the West region, +29.16 % in Bucharest-Ilfov area, +27.11 % in the Central region, +13.48 % in the South Muntenia, and + 2.23 % in the South West Oltenia, while in two regions, it declined by: - 0.41 % in the South East part, and - 2.03 % in the North East part of Romania (Fig.4).

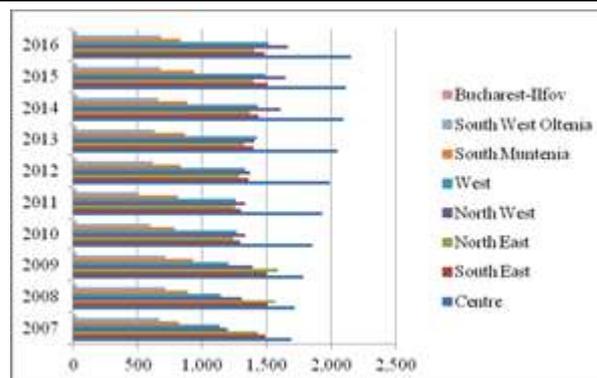


Fig.4. The dynamics of sheep livestock by micro region in Romania, 2007-2016 (Thousand heads)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

**The evolution of goats livestock in the territory by micro region.** The number of goats is relatively differently distributed in the territory compared to the sheep livestock. The situation of the micro regions in the decreasing order of their number of goats is the following one: South East, South West Oltenia, South Muntenia, North East, Centre, North West, West and Bucharest-Ilfov.

In South East region, the number of goats increased from 173.8 thousand heads in 2007 to 288.6 thousand heads in 2016. In South West Oltenia, the goats livestock grew up from 145.5 thousand heads in 2007 to 231.9 thousand heads in 2016. In South Muntenia area, the goats number increased from 125.7 thousand heads in 2007 to 209.3 thousand heads in 2016. In North East area, the number of goats increased from 96.3 thousand heads in 2007 to 173.5 thousand heads in 2016. In the Central region, the goats livestock grew up from 69.3 thousand heads in 2007 to 108.7 thousand heads in 2016. In North West region, the goats livestock increased from 59.3 thousand heads in 2007 to 84.4 thousand heads in 2016. In the West region, the number of goats accounted for 36.4 thousand heads in 2007 and 55 thousand heads in 2016, while in Bucharest-Ilfov it registered 6.9 thousand heads in 2007 and 9.5 thousand heads in 2016. In the analyzed period the number of goats registered an important growth rate in all the micro regions as follows: + 80.16 % in North East, +66.50 % in South Muntenia, + 66.05 % in South East, + 59.38 % in South Oltenia, + 56.85 % in the Central area, + 51.09 in the

West region, +43.32 % in North West, and + 37.68 % in Bucharest-Ilfov (Fig.5).

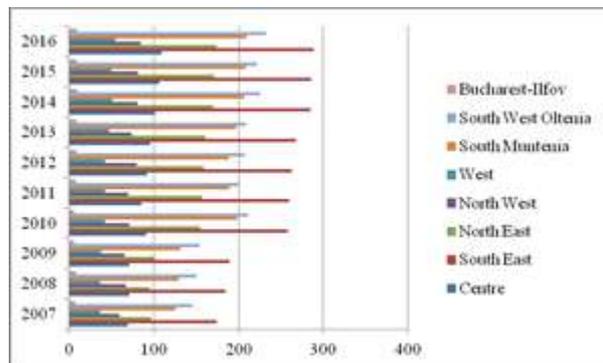


Fig.5. The dynamics of goats livestock by micro region in Romania, 2007-2016 (Thousand heads)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

**The dispersion of sheep livestock by micro region.** In 2007, the dispersion of sheep livestock in the territory was the following one, in the decreasing order of the regions: Central area ( 19.9 %), South East ( 17.6 %), North East (16.9 %), North West (14.1 %), West (13.4 %), South Muntenia (9.7 %), South Oltenia (7.9 %) and Bucharest-Ilfov (0.5 %).

Table 2. The dispersion of sheep and goats livestock by micro region in 2007 and 2016, Romania (%)

| Region             | Dispersion of sheep livestock (%) |      | Dispersion of goats livestock (%) |      |
|--------------------|-----------------------------------|------|-----------------------------------|------|
|                    | 2007                              | 2016 | 2007                              | 2016 |
| Centre             | 19.9                              | 21.8 | 9.7                               | 9.4  |
| South East         | 17.6                              | 15.0 | 24.4                              | 24.9 |
| North East         | 16.8                              | 14.2 | 13.5                              | 14.9 |
| North West         | 14.1                              | 16.9 | 8.3                               | 7.3  |
| West               | 13.4                              | 15.3 | 5.1                               | 4.7  |
| South Muntenia     | 9.7                               | 9.5  | 17.6                              | 18.0 |
| South West Oltenia | 7.9                               | 6.9  | 20.4                              | 20.0 |
| Bucharest-Ilfov    | 0.5                               | 0.4  | 1.0                               | 0.8  |

Source: Own calculations based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

In 2016, the dispersion of sheep number by region has changed as follows: Center region remained on the top position ( 21.8 %), North West region passed from the 4th position in 2007 to the 2nd position (16.9%), West region

passed from the 5th position in 2007 to the 3rd position (15.3 %), South East region passed from the 2nd position in 2007 to the 4th position (15%), North East passed from the 3rd position in 2007 to the 5th position (14.2 %), South Muntenia remained on the 6th position (9.5 %), South West Oltenia remained on the same 7th position ( 6.9 %), and Bucharest-Ilfov remained on the last position ( 0.4 %) (Table 2).

**The dispersion of goats livestock by micro region.** In 2007, the percentage distribution of goats livestock, in the decreasing order, was the following one: South East (24.4 %), South West Oltenia (20.4 %), South Muntenia (17.6 %), North East ( 13.5 %), Center (9.7 %), North West (8.3 %), West (5.1 %), and Bucharest-Ilfov (1 %).

In 2016, the hierarchy of the micro regions remained the same regarding their contribution to the goats structure in the territory as follows: South East (24.9 %), South West Oltenia ( 20 %), South Muntenia (18%), North East (14.9 %), Centre (9.4 %), North West (7.3 %), West (4.7 %), and Bucharest-Ilfov ( 0.8 %) (Table 2).

**The concentration of sheep livestock in the territory in terms of Herfindhal and Hirshman index and Gini-Struck index.** The values of Herfindhal -Hirschman index (HHI) varied between 0.15232 in the year 2007 to 0.15540 in the year 2016. The highest HHI value (0.15645) was recorded in the year 2012, while the lowest HHI value ( 0.15142) was recorded in the year 2009. The HHI values are situated between 0.15 and 0.25 (0.15 < HHI < 0.25), reflecting that in Romania it is a moderate concentration of sheep livestock in the regions.

The same situation was confirmed by the Gini-Struck index (GSI), whose values varied between 0.1766 in the year 2007 and 0.1864 in the year 2016. The highest GSI (0.1895) was found in the years 2012 and 2014, and the lowest value (0.1738) in the year 2009. Therefore, Romania has a moderate concentration of sheep livestock in the territory (Table 3).

Table 3. The evolution of sheep and goats livestock concentration in Romania's territory in terms of Herfindhal-Hirschman index and Gini-Struck index, 2007-2016

|                 | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   | 2014   | 2015   | 2016   |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Sheep livestock |        |        |        |        |        |        |        |        |        |        |
| HHI             | 0.1523 | 0.1517 | 0.1514 | 0.1554 | 0.1558 | 0.1564 | 0.1563 | 0.1564 | 0.1554 | 0.1559 |
| GSI             | 0.1766 | 0.1747 | 0.1738 | 0.1854 | 0.1878 | 0.1895 | 0.1894 | 0.1895 | 0.1864 | 0.1878 |
| Goats livestock |        |        |        |        |        |        |        |        |        |        |
| HHI             | 0.1693 | 0.1698 | 0.1716 | 0.1777 | 0.1778 | 1.1771 | 0.1751 | 0.1749 | 0.1744 | 0.1730 |
| GSI             | 0.2251 | 0.2263 | 0.2308 | 0.2454 | 0.2459 | 0.2440 | 0.2393 | 0.2387 | 0.2376 | 0.2343 |

Source: Own calculations based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

**The concentration of goats livestock in the territory in terms of Herfindhal and Hirshman index and Gini-Struck index.**

The values of Herfindhal -Hirschman index (HHI) varied between 0.1693 in the year 2007 to 0.1730 in the year 2016. The highest HHI value (0.1778) was recorded in the year 2011, while the lowest HHI value (0.1693) was recorded in the year 2007. The concentration of the goats livestock is a moderate one in Romania as confirmed by the HHI values ranging between 0.15 and 0.25 (0.15 < HHI < 0.25). However, the HHI index in case of goats livestock is a little higher compared to the one recorded by the sheep livestock.

In case of sheep livestock, in the analyzed period, the HHI increased by 2.33 %, and the GSI increased by 6.34 %.

The same situation was confirmed by the Gini-Struck index (GSI), whose values varied between 0.2251 in the year 2007 and 0.2243 in the year 2016. The highest GSI (0.2459) was found in the years 2011, and the lowest value (0.2251) in the year 2007. Therefore, Romania has a moderate concentration of goats livestock in the territory.

In the analyzed period, in case of goats livestock, the HHI values increased by 2.18 %, and the GSI values increased by 4.08 % (Table 3).

**The dynamics of sheep and goat milk production.** Sheep and goat milk production registered a large variation from a year to another depending on the sheep and goats milking livestock and the climate conditions with a deep influence on forage production.

In the year 2007, sheep and goat milk production accounted for 6,173 thousand hl, and in the year 2016 it reached 6,113 thousand

hl, meaning by 1 % less than in 2007. However, the top milk production, 6,520 thousand hl, was recorded in the year 2014, due to the increase of female milking livestock and a good year for forage production. The lowest milk production, 5,813 thousand hl, was registered in the year 2009 ( Fig.6).

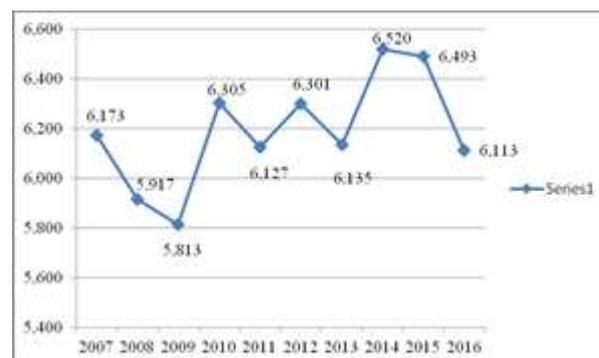


Fig.6.The dynamics of sheep and goats milk production in Romania, 2007-2016 (Thousand hl)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

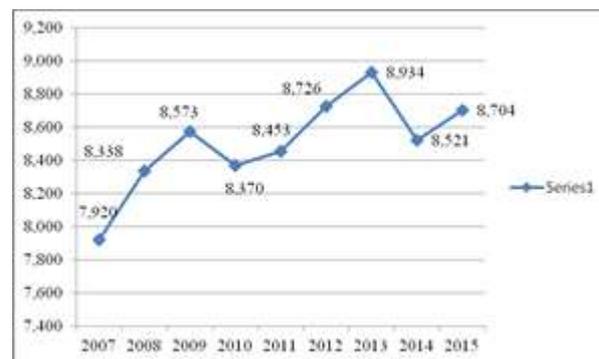


Fig.7.The dynamics of female sheep and goats milking livestock, 2007-2015 (Thousand heads)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

The evolution of sheep and milk production was determined by the dynamics of the female sheep and goats milking livestock. In 2007, it

accounted for 7,920 thousand heads, while in the year 2015, it reached 8,704 thousand heads, by 9.89 % higher than in 2007 ( Fig.7).

Sheep and goats collected milk production in the industrial units, increased much more, by 135.3 % in case of sheep milk, and by 295.97 % in case of goats milk.

The highest sheep milk production, accounting for 29,679 tonnes, was collected by industrial units in the year 2015, and the highest goats milk production, accounting for 16,829 tonnes, was also collected in the year 2015. This was a result of the increased number of sheep and goats and also due to the slight growth in average milk production in case of the both

species. The amount of collected milk was stimulated by the higher price offered by processors and by their interest in the diversification of milk products for the market (Table 4).

Taking into account the total sheep and goat milk production in terms of tonnes, the share of total sheep and goat milk production collected by the industrial units is very small, but with an ascending trend from 2.65 % in the year 2007 to 6.95 % in the year 2016. This reflects that most of sheep and goat milk production remains in the household for human consumption and for producing cottage cheese (Table 4).

Table 4. Sheep and goats milk production collected by the industrial units, Romania, 2007-2015 (tonnes)

|   | 2007    | 2008    | 2009    | 2010    | 2011    | 2012    | 2013    | 2014    | 2015    | 2015/2007 % |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------------|
| Sheep milk  | 12,608  | 13,634  | 13,729  | 16,406  | 14,345  | 15,759  | 18,122  | 27,280  | 29,679  | 235.3       |
| Goat milk   | 4,250   | 4,026   | 4,008   | 3,856   | 3,366   | 4,677   | 7,166   | 15,001  | 16,829  | 395.97      |
| Total collected milk                              | 16,850  | 17,660  | 17,737  | 20,262  | 17,711  | 20,436  | 25,288  | 42,281  | 46,508  | 276.01      |
| Sheep and goat milk production in tonnes          | 635,800 | 609,400 | 598,730 | 649,400 | 631,100 | 649,000 | 631,900 | 671,500 | 668,800 | 105.19      |
| Share in total sheep and goat milk production (%) | 2.65    | 2.89    | 2.96    | 3.12    | 2.80    | 3.14    | 4.00    | 6.30    | 6.95    | 262.26      |

Source: Own calculations based on the National Institute of Statistics Press Releases on Meat, milk and milk products in the industrial units, 2008-2016 [23]

**The dynamics of sheep and goat meat production.** Sheep and goat meat production increased by 65.45 % from 110 thousand tonnes in 2007 to 182 thousand tonnes in 2015. The increase in meat production was stimulated by the growth of sheep and goats livestock in the country, but also by the increased number of slaughtered sheep and goats, the increased total live weight at slaughter and the average live weight per animal (Fig.8)

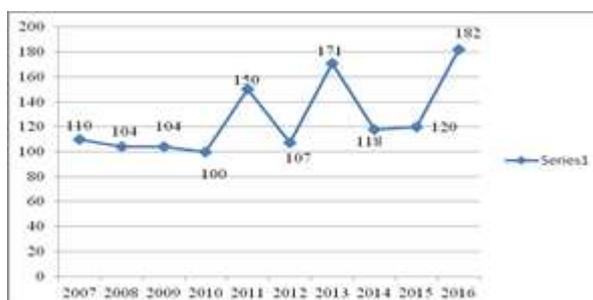


Fig.8. The dynamics of sheep and goats meat production in Romania, 2007-2016 (Thousand tonnes)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

The average live weight of sheep and goats at slaughter increased by 33.33 %, from 18 kg/head in 2007 to 24 kg/head in 2016 (Fig.9).

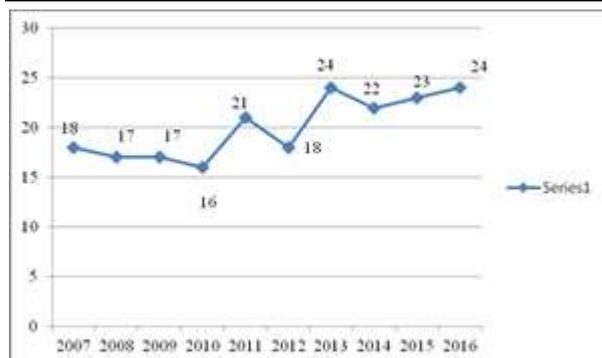


Fig.9. The dynamics of sheep and goats average live weight at slaughter in Romania, 2007-2016 (kg/head)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [21]

The sheep and goats meat production achieved in the industrial units has recorded a continuous ascending trend. First, because of a larger number of slaughtered sheep and goats. In the industrial processing units, in 2016 there

were slaughtered 726 thousands sheep and goats, by 360.9 % more than in the year 2007 (157.5 thousand heads).

Also, the total live weight at slaughter increased by 452.16 %, from 3,723 tonnes in 2007 to 20,557 tonnes in the year 2015.

This situation was positively influenced by the increased number of sheep and goats, by the increased average live weight at slaughter and by the higher request for sheep and goat meat for export.

The average live weight at slaughter accounted for 28.3 kg/head, being by 19.9 % higher than in 2007, when it accounted for 23.6 kg/head.

As a consequence, the sheep and goat total carcass weight increased 5 times from 1,849 tonnes in 2007 to 9,256 tonnes in 2015 (Table 5).

Table 5. Sheep and goats meat production in the industrial units, Romania, 2007-2015

|                                      | MU             | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014   | 2015   | 2015/2007 % |
|--------------------------------------|----------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------------|
| No. of slaughtered Sheep and goats   | Thousand heads | 157.5 | 198.2 | 120.2 | 376.8 | 357.6 | 190.3 | 259.4 | 379.3  | 726    | 460.9       |
| Sheep and goats total live weight    | Tonnes         | 3,723 | 4,397 | 2,683 | 9,348 | 9,248 | 5,176 | 7,119 | 10,650 | 20,557 | 552.1       |
| Average live weight at slaughter     | Kg/head        | 23.6  | 22.2  | 22.3  | 24.8  | 25.9  | 27.2  | 27.4  | 28.1   | 28.3   | 119.9       |
| Sheep and goats total carcass weight | Tonnes         | 1,849 | 2,138 | 1,349 | 4,432 | 4,142 | 2,414 | 3,206 | 4,833  | 9,566  | 500.5       |

Source: Own calculations based on the National Institute of Statistics Press Releases on Meat, milk and milk products in the industrial units, 2008-2016 [23]

Table 6. The share of sheep and goats slaughters in the most important micro regions in the total slaughters in the industrial units in Romania, 2007-2015 (%)

| 2007   | 2008  | 2009   | 2010   | 2011                                       | 2012  | 2013   | 2014                               | 2015  |
|--|---|--|--|--|---|--|------------------------------------|---|
| SE 43.7 %<br>SMuntenia<br>24.9 %<br>Center<br>14.9 % | SE 27.3 %,<br>SMuntenia<br>29.2 %,<br>West 16.7 % | SE 38.2 %<br>SMuntenia<br>22.4 %<br>Centre 9.5 % | West 40.1 %<br>SE over<br>20%<br>SMuntenia<br>14.2 % | West 40 %<br>SMuntenia<br>35.5 %<br>NW 9 % | West 37.5 %<br>SMuntenia<br>26.4 %<br>NW 10 % | WEST 51.4 %<br>SMuntenia<br>18.7 %<br>NW 9.6 % | West 50.1 %<br>SMuntenia<br>30.3 % | West 35.3 %<br>SMuntenia<br>28.4 %<br>SE 20.1 % |

Source: National Institute of Statistics Press Releases on Meat, milk and milk products in the industrial units, 2008-2016 [23]

This has determined a change in the structure of meat production.

In 2007, the situation was the following one: poultry meat 50.46 %, pork 38.72 %, bovine

meat 10.38 %, and sheep and goats meat 0.44 %. In 2015, the structure of meat production in the processing units has become the following one: poultry meat 49.38 %, pork 43.54 %, bovine meat 5.86 5 and sheep and goats meat 1.22 % [23].

In the analyzed period, the highest slaughters of sheep and goats were recorded in general in the regions with a high number of animals (Table 6).

**Romania's position in the EU-28 sheep and goat meat production.** Taking into account sheep meat production achieved in 2016, Romania is situated on the 10th position in the EU-28, after United Kingdom, Spain, France, Ireland, Greece, Italy, Germany, Netherlands, and Portugal.

The market share in the EU sheep and goat meat production is very small, just 1.1 %, compared to 40.6 % for the United Kingdom, 16.4 % in case of Spain, 11.6 % France, 8.5 % Ireland, 7.6 % Greece, 4.3 % Italy, 3 % Germany, 1.8 % Netherlands , and 1.4 % Portugal (Fig.10.).

However, having a high growth rate of sheep and goats livestock and also of sheep and goat meat production, Romania is considered an important meat producing country for the EU, where sheep meat production increased by + 2.5 % in 2015 compared to 2014. The increase of meat production in the EU is determined by the important growth of meat production in United Kingdom, Spain and Romania. In 2016 it increased by 2.1 % (+907 thousand tonnes)

compared to 2015. Goat meat production is relatively constant at about 45 thousand tonnes in 2015 and 2016 [12].

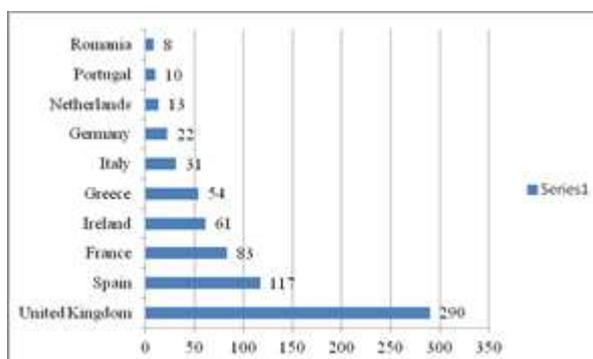


Fig.10. Romania's position among the top EU-28 sheep meat producing countries in 2016 (Thousand tonnes)  
Source: Own design based on Eurostat Statistics Explained, Meat production statistics, [15].

Considering the positions occupied for sheep and goat livestock, the lower position kept for meat production reflects that the potential in meat production is not enough exploited in Romania. And the fact that in the EU is a high demand for sheep and goat meat, it is an opportunity for Romania to increase the average weight at slaughter and carcass quality in order to increase sheep and goat meat production and facilitate its intra-EU exports.

**The statistical parameters of the main indicators characterizing sheep and goats sector.** The values of mean, standard deviation and coefficient of variation for the main indicators characterizing sheep and goats sector in Romania are presented in Table 7.

Table 7. The statistical parameters of the main indicators characterizing sheep and goats sector in Romania, 2007-2016

|   | MU              | Mean   | St. Dev. | Var. Coeff. (%) |
|---|-----------------|--------|----------|-----------------|
| Sheep livestock                                     | Thousand heads  | 9,172  | 994.14   | 10.83           |
| Goats livestock                                     | Thousand heads  | 1,174  | 436.99   | 37.22           |
| Sheep and goats livestock                           | Thousand heads  | 10,346 | 1,431.18 | 13.83           |
| Sheep and goats milk production                     | Thousand hl     | 6,143  | 424.20   | 6.90            |
| Female sheep and goats milking livestock            | Thousand heads  | 8,312  | 554.37   | 6.66            |
| Sheep and goats meat production (Live weight)       | Thousand tonnes | 146    | 50.91    | 34.86           |
| Average live weight of sheep and goats at slaughter | Kg/head         | 21     | 4.24     | 20.19           |

Source: Own calculations.

**Sheep and goat meat consumption.** In Romania, in 2013, mutton and goat meat consumption accounted for 2.4 kg capita (4.4% of the total meat consumption). At present, it is only 2.1 kg/capita, representing only 10 % of

the total meat consumption/inhabitant (60 kg/year), coming on the 4th position after pork, pork, and beef [20].

Sheep and goat meat is mainly consumed by the people living in the rural areas, in the

mountains, in the central part with a long tradition in shepherding, but also in the steppe and arid areas, and by the minority population of Turkish, Greek, Macedonian, Serbian, Bulgarian etc origin [16].

Compared to the EU sheep meat consumption representing only 2.5 % (1.9 kg/capita) of the total meat consumption, in Romania, the sheep meat consumption is a little higher by + 0.2 %). However, in the future, the demand/offer ratio will be not balanced as long as it is expecting as the sheep meat exports to continue the increasing trend and the import will continue its decline leading to a lower availability of sheep meat on the EU market.

As a result, in Romania, there is a surplus of sheep and goat live animals and also meat from these two species which could be exported.

This could be considered a niche for Romania which has to strengthen the sheep growing and slaughters and intensify its export on the EU market [10, 12, 27].

**The dynamics of sheep and goats meat export.** The sheep and goat meat export recorded a positive trend increasing by 52.42 %. Thus, the export increased from 20,546 tonnes in the year 2007 to 31,317 tonnes in the year 2015.

The import of sheep and goat meat has also increased but in a slight manner, only by 3.59 %, from 751 tonnes in 2007 to 778 tonnes in the year 2015.

As a result, the export/import ration is favorable for Romania, increasing by 47.16 %, from 27.35 in the year 2007 to 40.25 in the year 2015 (Table 8).

Table 8. The dynamics of the sheep and goat meat export, import and trade balance, Romania, 2007-2015

|                     | MU     | 2007    | 2009    | 2011    | 2013    | 2015    | 2015/2007 % |
|---------------------|--------|---------|---------|---------|---------|---------|-------------|
| Export              | Tonnes | 20,546  | 19,478  | 24,100  | 28,400  | 31,317  | 152.42      |
| Import              | Tonnes | 751     | 573     | 500     | 600     | 778     | 103.59      |
| Trade balance       | Tonnes | +19,795 | +18,905 | +23,600 | +27,800 | +30,539 | 154.27      |
| Export/Import ratio | -      | 27.35   | 33.99   | 48.20   | 47.33   | 40.25   | 147.16      |

Source: Own calculation based on the date provided by the National Institute of Statistics, Tempo online, 2016 [21].

Based on its sheep and goat meat export value, Romania is situated on the 5th position in the world among the top 12 countries exporting live sheep and goats, after Sudan, Somalia, Jordan and Australia [18].

Romanian producers are stimulated to better organize young ram fattening and deliver more animals in live weight for export and for slaughtering in meat processing industry to also increase export of high quality carcasses. The actual National Rural Development Programme 2014-2010 provides important measures for sheep and goat sector regarding national aids and coupled support which will result in an increased export of live sheep and goat and meat [16].

## CONCLUSIONS

The paper analyzed the dynamics of sheep and goat livestock, at national level and in the territory, animal density, milk and meat production, meat consumption, meat export,

import and trade balance and pointed out Romania's position in the EU in the sheep and goat livestock and meat production.

Sheep and goats livestock increased by 21.68 % in the analyzed period reaching 11,358 thousand heads in 2016, placing Romania on the 4th position in the EU after United Kingdom and Spain.

Romania comes on the 5th position for 85.5 sheep and goats per 100 ha, after Greece, United Kingdom, Spain and Netherlands.

The decreasing order of the micro regions where sheep are raised is: Central area, North West area, West region, South East, North East, South Muntenia, South West Oltenia and Bucharest-Ilfov. The important of regions in goats raising si the following one: South East, South West Oltenia, South Muntenia, North East, Centre, North West, West and Bucharest-Ilfov.

The Herfindhal-Hirschman and Gini-Struck indices confirmed that in Romania the

concentration of sheep and goats livestock in the territory is a moderate one.

Sheep and goat milk production accounted for 6,113 thousand hl in 2016, by 1 % less than in 2007. However, it varied in the analyzed period in close relationship with the female milking livestock, forage production, and reproduction activity.

The industrial units collect and process only a small amount of sheep and goat milk production, representing 6.95 % of the total milk production from these two species in the year 2016. Therefore, a lot of milk is used in the households for covering family and animal needs.

Sheep and goat meat production reached 182 thousand tonnes in 2015, reflecting a high growth rate (65 %) in the analyzed period. This performance was influenced by the increased number of slaughtered animals, and by the average live weight at slaughter.

Carcass quality does not comply to the EU standards as long as the share of young fattened males is still very low.

The most important regions where sheep and goat meat is produced are: South East, South Muntenia and West.

Romania comes on the 10th position in the EU-28 for sheep meat production after United Kingdom, Spain, France, Ireland, Greece, Italy, Germany, Netherlands, and Portugal.

Sheep and goat meat consumption is small in Romania, where pork is on the top position, followed by poultry meat.

The sheep meat balance sheet pointed out that export exceeds import, and Romania is a net exporting country of this sort of meat.

All these are arguments in favor of the development of sheep and goat meat production in Romania as long as it is a good tradition, and potential for increasing the livestock and carcass quality.

The development of sheep and goat milk and meat production needs the organization of sheep and goats raising in associations, where young sheep males to be fattened in order to assure the requirements of the domestic and external market. Also, the sheep and goats breeders must be focused on sheep and goats breeding, using making a corresponding

selection and using high breeding value animals for reproduction and production. Farm size must be increased to assure an efficient meat production in fattening units. Sheep and goat carcasses must be classified according to the EU standards in order to assure a high quality.

Taking into account that sheep and goat meat is a healthy food, it must be promoted among consumers to develop the domestic meat consumption and also to increase export of sheep and goat meat.

The national aids and coupled support received from the Romanian government and the EU are very important for sheep and goats breeders to help them to better develop meat and milk production in this animal sector.

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## TRENDS OF TOURIST ARRIVALS AND OVERNIGHT STAYS IN THE MARAMURES COUNTY, ROMANIA, 2007-2016 AND FORECAST FOR 2017-2021

Agatha POPESCU<sup>1</sup>, Daniela PLESOIANU<sup>2</sup>

<sup>1</sup>University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest Romania, Phone: +40213182564, Fax: +40213182888, Email: agatha\_popescu@yahoo.com

<sup>2</sup>Ovidius University, 1, University Avenue, Campus, Building B, Constanta, Romania, Email: plesoianudaniela@hotmail.com

**Corresponding author:** agatha\_popescu@yahoo.com

### **Abstract**

*The paper analyzed the trends in the tourism of the Maramures County, an important destination both for Romanian and foreign tourist due to its beautiful landscapes, cultural heritage and well preserved traditions. The empirical data were provided by the National Institute of Statistics for the period 2007-2016. The main statistical indicators used in this study were: number of units with reception function for tourists' accommodation, number of places, tourist arrivals, overnight stays and length of stay. They were statistically analyzed by: average, standard deviation, coefficient of variation, and trend line, and also by means of Spearman and Pearson correlation and regression models between number of places and tourist arrivals, and between number of places and overnight stays. Finally, the forecast for the number of tourist arrivals and overnight stays for the period 2017-2021 was set up using the adjusted series of data and the average growth rate. In the Maramures County, the tourism offer in terms of units with accommodation function for tourist reception increased by 47.05 % and the number of places by 77.46 %, accounting for 225 tourism units and 6,451 beds in the year 2016. The tourism demand, in terms of the tourist arrivals increased by 75 %, while the overnight stays raised by 48.24 %, accounting for 189,000 persons and, respectively, 339,000 overnights stays in the year 2016. The average length of stays declined by 15.7 % from 2.11 days in 2007 to 1.78 days in 2016. The Spearman correlation coefficient reflected that between the number of places and the overnight stays it is a weak positive relationship ( $r_s = 0.079$ ), but between the number of places and tourist arrivals it is a high and positive link ( $r_s = 0.776$ ). The Pearson correlation proved high positive values ( $r = 0.771$  and  $r = 0.893$ ) for this pair of indicators. In the year 2021, it is expected that the number of tourist arrivals to reach 225,000 and the number of overnight stays to account for 386,860 in the Maramures county, reflecting the tourists' interest to visit this part of Romania.*

**Key words:** tourism, offer, demand, forecast, Maramures County, Romania

### **INTRODUCTION**

Among the areas of high interest in Romania's tourism for the European visitors there are: Transylvania region with its medieval cities and ancient castles, Bucovina region with its painted monasteries and traditional artefacts, and Maramures region are with its rural tourism and cultural heritage [15].

A visit to Maramures area is "a real lesson of history, culture and geography without teacher for the tourist willing to know its moral and spiritual values" [11].

Many of the tourist attractions are included in the UNESCO World Heritage such as: the traditional houses, the wooden carved gates,

churches and monasteries, the grain mills, the rattle spindle, the seal engraver, the folk suits, dances and handicrafts, and traditional gastronomy. All these represent just a part of the attractions which characterize tourism in Maramures County [16].

The Maramures has a varied relief consisting of narrow peaks, wild valleys, glacial lakes, karst sources, limestone plateaus, forests rich in coniferous species and fauna, which determine the visitors to admire and remain wondered in front of the beautiful landscapes. The temperate-continental climate with cold summers and very cold winters allows good conditions for excursions along the year and give an

incentive for the fans of sport, hiking, alpinism. The Borsa mountain resort is well known for its good skiing slopes, and also other resorts like Izvoare, Cavnic, Mogoşa - Suior, Valea Vaserului, and Coştiui attract more and more tourists.

Tourism in Maramures has a huge potential to become a part of a programme of an integrated tourism process, grace to the harmonized activities offered by the local authorities, NGOs, local associations and the villages community [5].

A large range of tourism forms could be successfully practiced in Maramures area such as: cultural tourism, religious tourism, agri-tourism, mountain tourism, balneal tourism, ecotourism, medical tourism.

The accommodation facilities are mainly represented by rural guest houses and urban touristic boarding houses which accounts for about 60%, and respectively 19 % of the total number of units [4].

In Maramures rural tourism in guesthouses promotes the local hospitality as a "brand" and reflects the peasants' universe in terms of cultural traditions, and knowledge related to natural scenery [1].

However, in the Maramures area there are still unsolved problems related to tourism infrastructure, promotion of tourism offers, staff training, environment protection, deforestation, link between service quality and price, sanitation and waste collection, the lack of cooperation between local authorities, owners of guesthouses, tourism associations and NGOs within this sector, the deficient information offered to the travelers [3, 13].

The tourism activity in Maramures area is supported by private investors (73 %), public-private partnership (13 %), localities (13 %). The integrated tourism could be a sustainable form of tourism development in the area, creating new jobs in production, processing, agriculture, and trade, in this way assuring a harmonized balance between the opportunities offered by agriculture and forestry, and accommodation facilities, services (catering, guided tours, exhibitions of animals and tools), traditional peasant products (handicrafts, beverages, gastronomy, folk music, suits and

dances), conservation of landscapes and preservation of cultural values [6, 8].

To cover tourists' requirements, it is needed to join all the efforts and natural, human and technical resources. Technical endowment in tourism, in terms of accommodation units, food facilities, transportation, treatment and leisure opportunities is the one of the key factors contributing to the development of tourism [7].

Tourism development can take into account the preservation of the cultural heritage, promotion of tourist attractions, investments, diversification of activities, service and staff quality [9].

In this context, the goal of the paper was to analyze the dynamics of tourism offer, in terms of number of units with reception function for tourists' accommodation, and number of places, and tourism demand in terms of tourist arrivals, overnight stays and length of stay in the period 2007-2016. The trend line as well as the statistical parameters: mean, standard deviation, coefficient of variation, and also Spearman rank correlation, Pearson correlation coefficient and linear regression models between number of places and tourist arrivals, and between number of places and overnight stays were established to characterize tourism in the Maramures County and finally to forecast the number of tourist arrivals and overnight stays for the period 2017-2021.

## MATERIALS AND METHODS

### The study area.

The Maramures County is situated in the North part of Romania at the border with Ukraine, and having as neighbors the Cluj, Bistrita-Nasaud, Salaj, Suceava, and Satu Mare counties. The Maramureş county represents 2.6% in Romania's surface and 2.4 % in its population. It has 6,304 square km surface and on July 1st, 2016, the population of the county counted over 524,871 inhabitants, of which 41 % living in the rural areas. The main relief forms are: the mountains (43 %) represented by branches from the Eastern Carpathians and the Maramures Mountains, and also hilly and

plateau areas (30%) and valleys with terraces (27%) [10].

Its moderate temperate continental climate is characterized by with cold summers and extremely cold winters. Its territory is rich in various minerals, and is also crossed by various rivers among which the Tisa, Viseu, Iza, and Somes rivers are the most important, and also the 14 glacial lakes are significant for fishery and leisure, and also the salted lakes such as Ocna Sugatag and Costui are successful used as treatment places.



Photo 1. A typical landscape from the Maramures County.

The cultural heritage of the Maramures County includes: over 100 wood churches and also monasteries, most of them belonging to the UNESCO patrimony, and also the well known Merry Cemetery in Sapanta.



Photo 2. The Barsana Monastery, The Maramures County.

There are many interesting museums such as: Museum of History in Baia Mare, Museum of History and archeology Maramures, Museum of Mineralogy in Baia Mare, Museum of

Ethnography and Folklore, and cultural institutions such as: Historical center in Bara Mare, the Cathedral St. Stephan and the Tower, the Elisabeth House, the Chioaru fortified medieval fortress.

Also, due to the 13 natural reservations and 38 protected areas, the National Park of the Rodna Mountains, the 17 nature monuments, the Natural Park of the Maramures Mountains, the Maramures county is situated on the 2nd position in Romania [12, 18].

A large variety of tourism forms could be practiced in Maramures County such as: cultural, mountain, treatment, medical, religious and gastronomic tourism, trekking, mountaineering, climbing, paragliding, cycling, motorcycling and off-roading, skiing, and business tourism [18].

**Data collection.** In order to carry out this paper, the empirical data have been collected from the National Institute of Statistics, Tempo online Data base for the period 2007-2016.

**The main specific indicators taken into account** have been the following ones: number of units with reception function for tourists' accommodation, number of places, tourist arrivals, overnight stays and length of stay.

**The applied methodology** consisted of:

*Index Method*, in terms of *Index with fixed basis* with the formula  $I_{FB} = (X_n / X_1) * 100$ , where:  $X$  = the variable taken into consideration,  $n = 1, 2, 3, \dots, i$ , the years of the chronological series. The term of reference was the year 2007=100, and *Index with variable basis* with the formula  $I_{VB} = (X_n / X_{n-1}) * 100$ .

*The statistical parameters*: mean, standard deviation, and variation coefficient were determined using the Excel facilities.

*The mean*,  $\bar{y}$  was determined according to the formula:  $\bar{y} = \frac{\sum y_n}{n}$ .

*The standard deviation* was calculated as  $\delta = \sqrt{\frac{\sum (y_t - \bar{y})^2}{n}}$

*The coefficient of variation* was determined according to the formula:  $V\% = \frac{\delta}{\bar{y}} * 100$ .

*The average change*,  $\bar{\Delta}$ , based on the formula:  $\bar{\Delta} = (X_n - X_1) / (n - 1)$ .

The average index,  $\bar{I}$ , based on the formula:  $\bar{I} = \frac{n-1 \sqrt{X_n}}{\sqrt{X_1}}$

The average growth rate,  $\bar{R}=100 (\bar{I}-1)$

The Spearman rank coefficient of correlation,  $r_s$ , was calculated using the formula:

$$r_s = 1 - \frac{6 \sum d^2}{n(n^2-1)}$$

The Pearson correlation coefficient was determined using the formula:

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

The results for the correlation coefficients were interpreted according to [2].

The linear regression model was  $Y = a + bX$ , where: Y is the dependent variable, X is the vector of the independent variable, "a" is the constant and "b" is the regression coefficient. The values of thea and b were calculated solving the linear system of equations by means of the Least Square Method.

The Forecast Method was based on the adjustment of the indicators tourist arrivals and overnight stays in the period 2007-2016 using the absolute change  $\Delta_t/t-1$ , and the formula for  $Y_t = y_1 + (t-1) \bar{\Delta}$ .

The results were graphically illustrated and tabled, and correspondingly interpreted.

## RESULTS AND DISCUSSIONS

**The number of units with reception function for tourist accommodation** in the Maramures County increased by 47.05 % in the analyzed period from 153 units in the year 2007 to 225

units in 2016. The share of the accommodation units in the Maramures County in the total accommodation units for tourists' reception in Romania declined from 3.25 % in 2007 to 3.23 % in 2016 with the maximum 3.78 % in the year 2008 and the minimum value 2.74 % in 2014 ( Fig.1.).

The indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of units for tourists' accommodation in the Maramures County are presented in Table 1.

The  $I_{FB}$  values reflected that compared to 2007, as term of reference, in all the other years taken into consideration, it was registered a higher number of units. The  $I_{VB}$  showed that from a year to another there were recorded differences, either growths or declines.

The years with reduced number of units were 2011 (-10 %), 2012 (-0.6 %) and 2014 (-6.7%) compared to the level of the previous years.

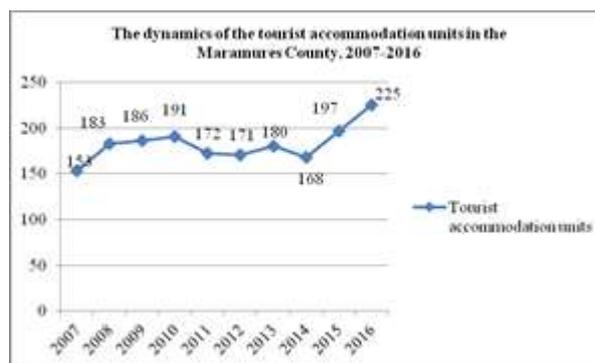


Fig.1.The dynamics of tourist accommodation units in the Maramures County in the period 2007-2016

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

Table 1. The evolution of the indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of units for tourists' accommodation in the Maramures County, 2007-2016 (%)

|          | 2007 | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
|----------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| $I_{FB}$ | 100  | 119.6 | 121.5 | 124.8 | 112.4 | 111.7 | 117.6 | 109.8 | 128.7 | 147.0 |
| $I_{VB}$ | 100  | 119.6 | 101.6 | 102.6 | 90.0  | 99.4  | 105.2 | 93.3  | 117.2 | 114.2 |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

**The number of places (beds) in tourist accommodation units** in the Maramures County increased by 77.46 % from 3,635 places in 2007 to 6,451 places in 2016. Compared to the dynamics of the tourists units, the evolution of the number of beds was much higher. Also, the growth rate of the number of places, 77.46 % was higher compared to the

growth rate of the number of places in Romania which accounted for just 15.92 % in the analyzed period.

The increased dynamics of the number of places in tourist accommodation units reflects the concerns of the "actors" involved in the development of tourism offer to better satisfy tourist's demand.

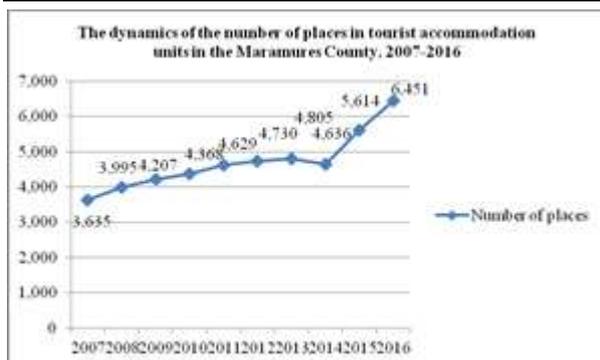


Fig.2. The dynamics of the number of places in the tourist accommodation units in the Maramures County in the period 2007-2016

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

As a consequence, the share of the number of places in the Maramures County in the number

of places in Romania's tourism increased from 1.28 % in 2007 to 1.96 % in 2016, meaning by 53.12 % growth rate (Fig.2.).

The indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of places in the units for tourists' accommodation in the Maramures County are presented in Table 2.

The  $I_{FB}$  values reflected a continuous increase with small inflexions in different years, but an ascending general trend is obvious.

The  $I_{VB}$  values reflected a decline of the number of places from 2011 to 2014, in this last year the number of places recording the highest decrease compared to the previous year (-3.6 %), but starting from 2015, it began a recover.

Table 2. The evolution of the indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of places in the units for tourists' accommodation in the Maramures County, 2007-2016 (%)

|          | 2007 | 2008 | 2009 | 2010 | 2011  | 2012 | 2013  | 2014  | 2015  | 2016  |
|----------|------|------|------|------|-------|------|-------|-------|-------|-------|
| $I_{FB}$ | 100  | 94.2 | 89.0 | 87.7 | 88.1  | 81.5 | 83.7  | 89.9  | 123.2 | 148.2 |
| $I_{VB}$ | 100  | 94.2 | 94.4 | 98.5 | 100.5 | 92.5 | 102.6 | 107.3 | 137.0 | 120.2 |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

**The tourist arrivals (Romanians and foreigners)** increased by 75 % from 108 thousand arrivals in 2007 to 189 tourist arrivals in 2016.

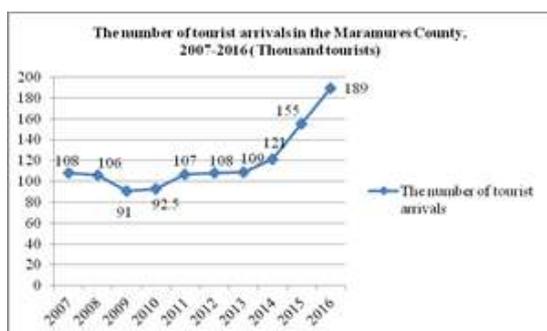


Fig.3. The dynamics of the number of tourist arrivals in the Maramures County in the period 2007-2016

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

The growth rate of 75 % was higher than the increase rate 57.82 % at the country level, proving the interest of many tourists to visit the Maramures region.

As a result, the share of the number of tourist arrivals in the Maramures County in the total number of tourist arrivals in Romania increased by 11.68 % from 1.54 % in 2007 to 1.72 % in 2016 ( Fig.3).

The indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of tourist arrivals in the Maramures County are presented in Table 3

Table 3. The evolution of the indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of tourist arrivals in the Maramures County, 2007-2016 (%)

|          | 2007 | 2008 | 2009 | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
|----------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| $I_{FB}$ | 100  | 98.1 | 84.2 | 85.6  | 99.0  | 100.0 | 100.9 | 112.0 | 143.5 | 175.0 |
| $I_{VB}$ | 100  | 98.1 | 85.8 | 101.6 | 115.6 | 100.9 | 100.9 | 111.0 | 128.0 | 121.9 |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

The  $I_{FB}$  values reflected a decline of the number of tourist arrivals in the period 2008-2011 compared to the level of 2007, and then,

starting from 2012 it was noticed a recover with the highest level in 2016.

The indices with variable basis,  $I_{VB}$ , reflected the highest decline in 2009, but then a continuous increase from a year to another.

The number of overnight stays in the Maramures County increased by 48.24 % from 228 thousands in 2007 to 338 thousands in 2016. The share of the number of overnight stays of the Maramures County in the number of overnight stays in Romania's tourism increased by 37.50 % from 1.04 % in 2007 to 1.43 % in 2016 ( Fig.4).

The indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of overnight stays in the Maramures County are presented in Table 4.

The  $I_{FB}$  values reflected a decline of the number of overnight stays after the year 2007, which has continued till the year 2015, when it restarted to increase over the level of 2007.

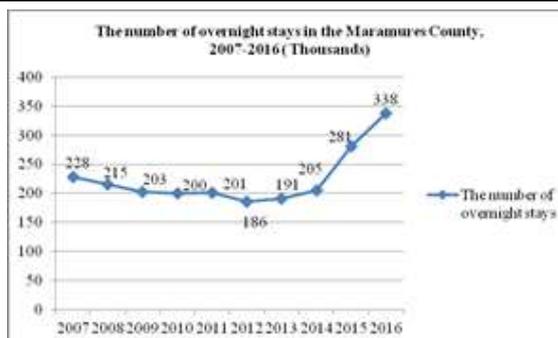


Fig.4. The dynamics of the number of overnight stays in the Maramures County in the period 2007-2016

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

The indices with variable basis,  $I_{VB}$ , reflected much better the changes from a year to another, the most critical period being 2008-2010, and then the year 2012. After this year, it started a continuous growth of the number of overnight stays

Table 4. The evolution of the indices with fixed basis ( $I_{FB}$ ) and the indices with variable basis ( $I_{VB}$ ) for the number of overnight stays in the Maramures County, 2007-2016 (%)

|          | 2007 | 2008 | 2009 | 2010 | 2011  | 2012 | 2013  | 2014  | 2015  | 2016  |
|----------|------|------|------|------|-------|------|-------|-------|-------|-------|
| $I_{FB}$ | 100  | 94.2 | 89.0 | 87.7 | 88.1  | 81.5 | 83.7  | 89.9  | 123.2 | 148.2 |
| $I_{VB}$ | 100  | 94.2 | 94.4 | 98.5 | 100.5 | 92.5 | 102.6 | 107.3 | 137.0 | 120.2 |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

The average length of stay of the tourists in the Maramures County registered a decline by 15.7 % from 2.11 days in 2007 to 1.78 days in 2016.

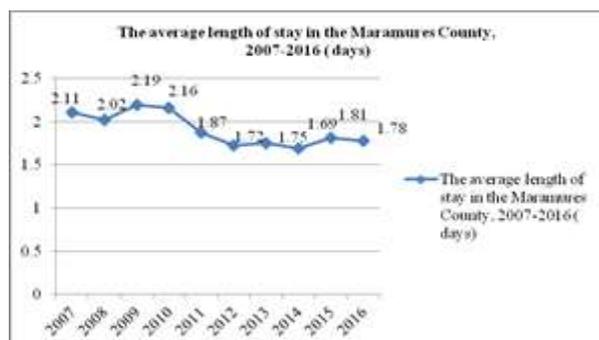


Fig.5. The dynamics of the average length of stay in the Maramures County in the period 2007-2016 ( days)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

The decrease of 17.7 % was lower than the decline of -27.8 % at the country level of this indicator. First of all, this reflects the general trend in tourism at present, the desire of most of tourists to spend less days in the same destination and to make more trips along the

year, and secondly this reflects that in the Maramures area the tourists prefer to spend more time to enjoy looking at the beautiful landscapes, knowing the local traditions and visiting the cultural places.

As a result, the share of the average length of stay in the Maramures County in the average length of stay in Romania increased from 0.71 % in 2007 to 0.83 % in 2016 ( Fig.5).

Table 5. The mean, standard deviation and variation coefficient for the studied indicators

| Indicator                               | Mean   | Standard Deviation | Coefficient of variation (%) |
|---|--------|--------------------|------------------------------|
| Number of tourist accommodation units   | 182.6  | 19.52              | 10.69                        |
| Number of places                        | 4,707  | 810.10             | 17.21                        |
| Number of tourist arrivals ( thousands) | 118.65 | 30.44              | 25.65                        |
| Number of overnight stays (thousands)   | 224.8  | 48.04              | 21.37                        |
| The length of stay (days)               | 1.91   | 0.19               | 9.94                         |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

**The main statistical parameters of the studied indicators:** mean, standard deviation and coefficient of variation are presented in Table 5.

The values of the coefficients of variation varied from an indicator to another. In case of the number of tourist accommodation units and the length of stay, the values of the variation coefficients were about 10 % reflecting that the values of these indicators are homogenous. In case of the number of places, the variation coefficient ranged between 10 % and 20 % reflecting that the data are relatively homogenous. In case of the overnight stays and tourists arrivals, the values of the variation

coefficients varied between 20 % and 30 % reflecting that the data are relatively heterogeneous.

**The Spearman rank coefficient of correlation.**

*The Spearman rank coefficient of correlation between the number of places (X) and the number of overnight stays is presented in Table 6.*

The value of the Spearman rank coefficient of correlation pointed out a very weak but positive relationship,  $r_s = 0.079$ , between the number of places and the number of overnight stays.

Table 6. The Spearman rank coefficient of correlation between the number of places (X) and the number of overnight stays (Y)

| Year             | X<br>Number of places | Y<br>Number of overnight stays<br>(Thousands) | $r_x$ | $r_y$ | D  | $d^2$ |
|------------------|-----------------------|---|-------|-------|----|-------|
| 2007             | 3,635                 | 228   | 1     | 8     | -7 | 49    |
| 2008             | 3,995                 | 215   | 2     | 7     | -5 | 25    |
| 2009             | 4,207                 | 203   | 3     | 5     | -2 | 4     |
| 2010             | 4,368                 | 200   | 4     | 3     | 1  | 1     |
| 2011             | 4,629                 | 201   | 5     | 4     | 1  | 1     |
| 2012             | 4,730                 | 186   | 7     | 1     | 6  | 36    |
| 2013             | 4,805                 | 191   | 8     | 2     | 6  | 36    |
| 2014             | 4,636                 | 205   | 6     | 6     | 0  | 0     |
| 2015             | 5,614                 | 281   | 9     | 9     | 0  | 0     |
| 2016             | 6,451                 | 338   | 10    | 10    | 0  | 0     |
| $\sum d^2 = 152$ |                       |   |       |       |    |       |
| $r_s = 0.079$    |                       |   |       |       |    |       |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

*The Spearman rank coefficient of correlation between the number of places (X) and the number of tourist arrivals is presented in Table 7.*

In this case, the Spearman rank coefficient of correlation pointed out a strong and positive relationship,  $r_s = 0.776$ , between the number of places and the number of tourist arrivals.

**The linear regression model and Pearson correlation coefficient.**

*The linear regression model and Pearson correlation coefficient for the number of*

overnight stays depending on the number of places is presented in Fig.6. The regression model shows that for an increase by 1 unit of the number of places, the number of overnight stays will increase by 0.0458.

The Pearson correlation coefficient,  $r_{xy} = 0.771$  reflects that between the two variables it is a strong and positive relationship.

Also, the coefficient of determination  $R^2 = 0.5954$  showed that the variation of the overnight stays is influenced 59.54 % by the variation of the number of places.

Table 7. The Spearman rank coefficient of correlation between the number of places (X) and the number of tourist arrivals (Y)

| Year            | X<br>Number of<br>places | Y<br>Number of<br>tourist arrivals<br>(Thousands) | $r_x$ | $r_y$ | D  | $d^2$ |
|-----------------|--------------------------|---|-------|-------|----|-------|
| 2007            | 3,635                    | 108   | 1     | 5     | -4 | 16    |
| 2008            | 3,995                    | 106   | 2     | 3     | -1 | 1     |
| 2009            | 4,207                    | 91  | 3     | 1     | 2  | 4     |
| 2010            | 4,368                    | 92.5  | 4     | 2     | 2  | 4     |
| 2011            | 4,629                    | 107   | 5     | 4     | 1  | 1     |
| 2012            | 4,730                    | 108   | 7     | 5     | 2  | 4     |
| 2013            | 4,805                    | 109   | 8     | 6     | 2  | 4     |
| 2014            | 4,636                    | 121   | 6     | 7     | -1 | 1     |
| 2015            | 5,614                    | 155   | 9     | 8     | 1  | 1     |
| 2016            | 6,451                    | 189   | 10    | 9     | 1  | 1     |
| $\sum d^2 = 37$ |                          |   |       |       |    |       |
| $r_s = 0.776$   |                          |   |       |       |    |       |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]



Fig.6. The linear regression model and Pearson correlation coefficient for the number of overnight stays depending on the number of places in the Maramures County in the period 2007-2016 (days)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

**The linear regression model and Pearson correlation coefficient** for the number of tourist arrivals depending on the number of places is presented in Fig.7.

The regression model shows that for an increase by 1 unit of the number of places, the number of tourist arrivals will increase by 0.0336.

The Pearson correlation coefficient,  $r_{xy} = 0.893$  reflects that between the two variables it is a strong and positive relationship.

Also, the coefficient of determination  $R^2 = 0.7985$  showed that the variation of the tourist arrivals is influenced 79.85 % by the variation of the number of places.

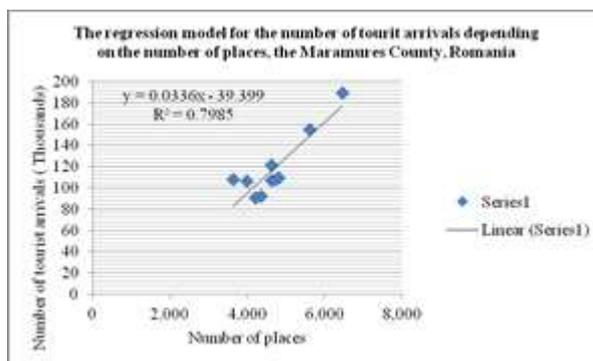


Fig.7. The linear regression model and Pearson correlation coefficient for the number of tourist arrivals depending on the number of places in the Maramures County in the period 2007-2016 (days)

Source: Own design based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

**The forecast of the number of overnight stays in the Maramures County for the period 2017-2021.**

First of all, it was needed to proceed to the adjustment of the average growth for the number of overnight stays for the period 2007-2016, as presented in Table 8.

The average growth in the whole period was  $\bar{\Delta}_n = (X_n - X_1) / (n - 1) = 12.22$  thousands.

The forecast for the number of overnight stays is presented in Table 9. As one could see, in the year 2021 it is expected as the number of overnight stays to account for 386.86 thousands.

Table 8. The adjustment of the average growth for the number of overnight stays for the period 2007-2016

| Year | yt<br>Number of<br>overnight stays | $\Delta_t/t-2$ | t-1 | $Y_t = y_1 + (t-1) \bar{\Delta}$ | $(y_t - Y_t)^2$ |
|------|------------------------------------|----------------|-----|----------------------------------|-----------------|
| 2007 | 228                                | -              | 0   | 228                              | -               |
| 2008 | 215                                | -13            | 1   | 240.22                           | 636.04          |
| 2009 | 203                                | -12            | 2   | 252.44                           | 2,444.31        |
| 2010 | 200                                | -3             | 3   | 264.66                           | 4,180.91        |
| 2011 | 201                                | +1             | 4   | 276.88                           | 5,757.77        |
| 2012 | 186                                | -15            | 5   | 289.10                           | 10,629.61       |
| 2013 | 191                                | 5              | 6   | 301.32                           | 12,170.50       |
| 2014 | 205                                | 14             | 7   | 313.54                           | 11,780.93       |
| 2015 | 281                                | 76             | 8   | 325.76                           | 2,003.45        |
| 2016 | 338                                | 57             | 9   | 337.98                           | -               |
|      |                                    |                |     | Total                            | 49,603.52       |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

Table 9. The forecast for the number of overnight stays in the Maramures County for the period 2017-2021 (Thousands)

| Year | t-1 | $Y_t = y_1 + (t-1) \bar{\Delta}$ |
|------|-----|----------------------------------|
| 2017 | 10  | 337.98                           |
| 2018 | 11  | 350.02                           |
| 2019 | 12  | 352.42                           |
| 2020 | 13  | 374.64                           |
| 2021 | 14  | 386.86                           |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

**The forecast of the number of tourist arrivals in the Maramures County for the period 2017-2021.**

First of all, it was needed to proceed to the adjustment of the average growth for the number of tourist arrivals for the period 2007-2016, as presented in Table 10.

The average growth for the number of tourist arrivals in the whole period was:

$$\bar{\Delta}_t = (X_n - X_1) / (n - 1) = 9 \text{ thousands.}$$

Table 10. The adjustment of the average growth for the number of tourist arrivals for the period 2007-2016

| Year | yt<br>Number of<br>tourist arrivals | $\Delta_t/t-2$ | t-1 | $Y_t = y_1 + (t-1) \bar{\Delta}$ | $(y_t - Y_t)^2$ |
|------|-------------------------------------|----------------|-----|----------------------------------|-----------------|
| 2007 | 108                                 | -              | 0   | 108                              | -               |
| 2008 | 106                                 | -2             | 1   | 117                              | 121             |
| 2009 | 91                                  | -15            | 2   | 126                              | 1,225           |
| 2010 | 92.5                                | 1.5            | 3   | 135                              | 1,806.25        |
| 2011 | 107                                 | 14.5           | 4   | 144                              | 1,369           |
| 2012 | 108                                 | 1              | 5   | 153                              | 2,025           |
| 2013 | 109                                 | 1              | 6   | 162                              | 2,809           |
| 2014 | 121                                 | 12             | 7   | 171                              | 2,500           |
| 2015 | 155                                 | 34             | 8   | 180                              | 625             |
| 2016 | 189                                 | 34             | 9   | 189                              | -               |
|      |                                     |                |     | Total                            | 12,480.25       |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

Table 11. The forecast for the number of tourist arrivals in the Maramures County for the period 2017-2021 (Thousands)

| Year | t-1 | $Y_t = y_1 + (t-1) \bar{\Delta}$ |
|------|-----|----------------------------------|
| 2017 | 10  | 189                              |
| 2018 | 11  | 198                              |
| 2019 | 12  | 207                              |
| 2020 | 13  | 216                              |
| 2021 | 14  | 225                              |

Source: Own calculation based on the National Institute of Statistics, Tempo-online Data base, 2017 [14]

The forecast for the number of tourist arrivals stays is presented in Table 11. As one could see, in the year 2021 it is expected as the number of tourist arrivals to account for 386.86 thousands.

## CONCLUSIONS

The Maramures County is one of the most attractive area of Romania grace to its beautiful landscapes, various cultural heritage, treasure of traditions and well known hospitality of the people.

A more intensive tourist inflow was noticed during the last decade in terms of tourist arrivals and overnight stays. In 2016, tourist arrivals accounted for 189 thousands, being by 75 % higher than in 2007. At the same time, the number of overnight stays reached 338 thousands in 2016, being by 46.24 % higher than in 2007.

The tourism offer has been continuously improved so that the number of units with function for tourists' accommodation has increased by 47.05 % reaching 225 units in the year 2016. At the same time, the number of places (beds) also increased by 77.46 % accounting for 3,635 places in 2016.

However, a decline was noticed in the length of stay, which accounted for only 1.78 days in 2016 instead of 2.11 days in 2007.

The Pearson correlation coefficient registered a high and positive value reflecting a strong link between the number of places and the number of tourist arrivals ( $r = 0.893$ ) and between the number of places and the number of overnight stays ( $r = 0.771$ ).

The coefficient of determination showed that the variation of the number of places have a deep influence on the variation number of tourist arrivals (79.85 %) and overnight stays (59.54 %), confirming the validity of the two regression models:  $y = 0.0458x + 9.3878$  between the number of places and the number of overnight stays, and  $y = 0.0336x - 39.399$  between the number of places and the number of tourist arrivals.

Taking into consideration that, in the analyzed period, the average growth of the overnight stays 12.22 thousands and for the number of

tourist arrivals 9 thousands, it was forecasted that in the year 2021, the Maramures county will register 386.86 thousand overnight stays and 225 thousand tourist arrivals, meaning an average length stay of 1.72 days.

The increased visitors' demand to visit the Maramures area oblige a revision of the strategy of tourism development joining the efforts of all the "actors" which must be involved: local communities, investors, local authorities, local population, NGOs and associations.

The main aspects where their attention must be focused are: infrastructure, modernization of accommodation units to meet the European standards, staff training, environment protection and a better promotion of the tourism offers.

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## TRENDS AND CORRELATIONS IN ROMANIA'S AGRO-FOOD FOREIGN TRADE IN THE PERIOD 2007-2016

Agatha POPESCU

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti Boulevard, District 1, 011464, Bucharest Romania, Phone: +40213182564, Fax: +40213182888, Email: agatha\_popescu@yahoo.com

*Corresponding author:* agatha\_popescu@yahoo.com

### *Abstract*

*The purpose of the paper was to analyze the trends and correlations in Romania's agro-food trade in the period 2007-2016 based on the data supplied by the National Institute of Statistics. The statistical parameters of mean, standard deviation, coefficient of variation, growth rate, trend line, regression model, Pearson correlation coefficient have been used in this study. The export value of agro-food products reached Euro 6.06 billion, while the import value of agro-food products accounted for Euro 6.78 billion in the year 2016. Despite that both export and import value increased, Romania is still a net exporting country. The year 2013 and 2014 registered a positive trade balance. The economic efficiency in Romania's agro-food foreign trade has increased. This was proved by the growth of the share of the agro-food products export in Romania's export value, and by the share of export value in the GDP carried out in agriculture as well as in terms of export/import coverage rate. Romanian producers must continue to pay a special attention to the factors stimulating the growth of the agricultural production and improve the quality of agro-food products in order to cover better the requirements of the domestic and also of the international market, leading to a positive trade balance.*

*Key words:* agro-food products, correlations, international trade, trends, Romania

### INTRODUCTION

The globalization process has an important impact of the economies and foreign trade whose development has become a very dynamic one.

The liberalization trade has been favored by the EU enlargement and the creation of the unique market [8].

Romania's entry into the EU had a positive impact of the development of agricultural production and Romania's trade with agro-food products.

The exports and imports have been intensified. Grains, fruit, and vegetables have become the top export items, while food and beverages and the vegetal products are the top items in the country imports [6, 13].

However, the economic crisis had a deep impact on the structure of Romania's foreign trade [5].

Romania's agro-food trade has a positive evolution of the export and import, but the trade balance is still a negative one [3].

But after a short period of diminishing the gap between export and import of agro-food products, in the years 2013 and 2014, when the trade balance has positive values, in 2015 and 2016, the imports registered historical records [11].

The same increasing trend was mentioned in case of Romania's export and import on the international market and mainly of the EU market [1].

However, the processed products represent about 46 % of Romania's exports and about 63 % of the imports reflecting a low-competitive structure of the agro-food trade [4].

Besides the benefic effect of the common market, some negative aspects have been noticed in Romania's agro-food trade as follows: the lack of competitiveness of the Romanian products in the increased external competition, the reduction of the production performance affected by the climate factors which involved a growth of the imported processed products which affected the local producers, the reduced revenues from exports and increased expenditures for imports [12].

In this context, the present paper had the goal to analyze the trends in Romania's foreign trade with agro-food products the period 2007-2016. In this respect, the dynamics of export, import and trade balance value, the share of export and import value of agro-food products in Romania's export and import value, the ratio between the export value and import value of agro-food products, the share of export value in the agricultural production value, the dynamics of the export, import and trade value by each group of agro-food products have been studied. Also, the regression model of export value depending on the agricultural production value and of GDP created in agriculture have been established to identify the intensity and direction of the relationship between these indicators reflecting the economic efficiency of Romania's agro-food international trade.

## MATERIALS AND METHODS

The paper is based on the empirical data supplied by the National Institute of Statistics, Tempo online Data base for the period 2007-2016.

The main indicators analyzed in this study were the following ones: the dynamics of GDP achieved in agriculture, forestry and fishing, the dynamics of the agricultural production value, the value of export with agro-food products and its share in Romania's export value, the value of import with agro-food products and its share in Romania's import value, the weight of agro-food products export in GDP carried out in agriculture and in the value of agricultural production value, the regression model of export value depending of GDP created in agriculture and also, the regression model of export value depending of the value of agricultural production, the ratio between the value of export and the value of import, the dynamics of the export value, import value and trade balance by each group of agro-food products classified according to the Combined Nomenclature, the share of each group of agro-food products in total agro-food export value, and respectively in the total agro-food import value, the value of export, import and trade balance for cereals as a special

category of products in Romania's agro-food international trade.

The analysis was based on various well known modern methods such as:

-*The statistical parameters* of mean, standard deviation and coefficient of variation which were calculated according to the well known methods.

-*The fixed index method*, used to assess the growth or decline of the variables from each year compared to the 2007 level considered as term of reference, according to the formula:  $I_{FB} = (X_n/X_0) * 100$ .

-*The linear regression model*,  $Y = bx + a$ , where Y is the dependent variable and X is the independent variable was used to analyze the relationship of determination between export value and GDP achieved in agriculture and the value of agricultural production.

-*The Pearson correlation coefficient* and the *determination coefficient* were utilized to evaluate the direction and intensity of the relationship between these indicators.

The results were tabled and graphically illustrated and then correspondingly interpreted.

## RESULTS AND DISCUSSIONS

**The evolution of GDP achieved in agriculture, forestry and fishing.** The economic development of Romania has been influenced by agriculture, forestry and fishery as one of the most important branch in the economy, besides industry, trade, buildings, IT sectors etc.

The GDP created in agriculture increased by 5.81 % in the analyzed period from Euro 7.05 billion in 2007 to Euro 7.46 billion in the year 2016 (Fig.1.).

Despite this positive dynamics, the share of GDP achieved in agriculture declined in Romania's GDP from 5.7 % in the year 2007 to 4.4 % in the year 2016.

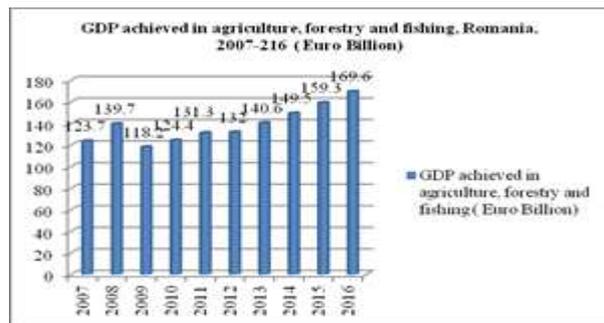


Fig.1. The dynamics of GDP carried out in agriculture, forestry and fishing, Romania, 2007-2016 (Euro billion) Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The agricultural production value** registered an ascending trend, increasing by 9.64 % from Euro 14.31 billion in 2007 to Euro 15.69 billion in 2016 (Fig.2.). This is a positive aspect which could sustain the supply for export of agro-food products. Important growths were recorded both in the vegetal production and also in the animal production.

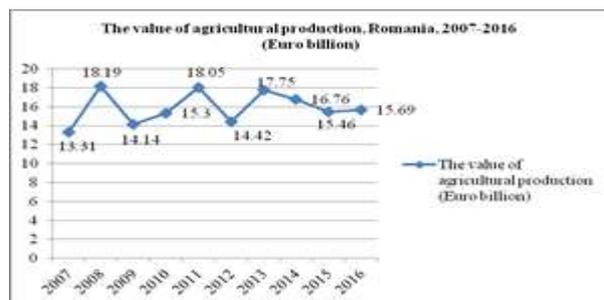


Fig.2. The dynamics of the agricultural production value, Romania, 2007-2016 (Euro billion) Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The agro-food foreign trade of Romania** registered a positive evolution regarding both export and import values.

*The export value* of agro-food products increased by 440.90 % from Euro 1.1. billion in 2007 to Euro 6.06 billion in 2016.

At the same time, *the import value* of agro-food products increased by 103.31 % from Euro 3.33 billion in 2007 to Euro 6.78 billion in 2016.

As a result, *the trade balance* of agro-food products was a negative one, - Euro 2.2 billion in 2007 and - Euro 0.71 billion in 2016.

Therefore, in 2016, the deficit was by 67.67 % lower than in 2007, which reflects a slight

improvement of the economic efficiency of the agro-food foreign trade of Romania (Fig.3).

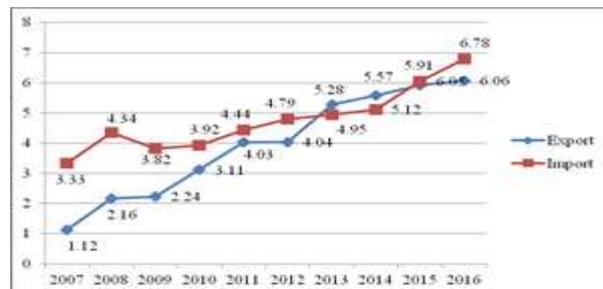


Fig.3. The dynamics of the value of export and import of agro-food products, Romania, 2007-2016 (Euro billion) Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

However, in the evolution of the export and the import value in the analyzed period, the years 2013 and 2014 recorded a positive trade balance, as export value exceeded the import value, reflecting the improvement in Romania's agro-food foreign trade in the last 20 years. Therefore, the country in this two years became again a net exporter of agro-food products.

But, in 2015 and 2016, the import value restarted to exceed again the export value and the agro-food trade balance became a negative one with a tendency to grow ( Fig.4).

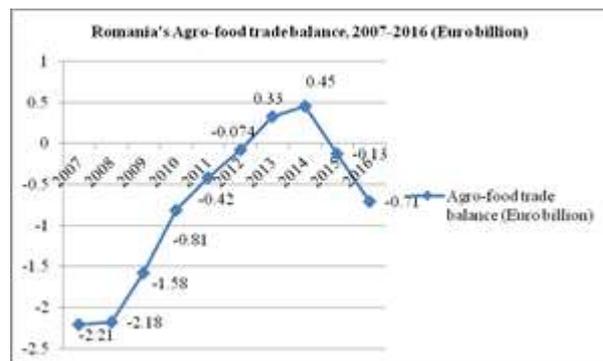


Fig.4. The dynamics of Romania's agro-food foreign trade balance, 2007-2016 (Euro billion) Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The share of agro-food export in Romania's export value** increased from 3.7 % in 2007 to 10.5 % in 2016, meaning that agro-food products are required in the international market, mainly in the EU-28 market whose weight in Romania's export of agro-food products is about 76 % (Table 1).

Table 1. The share of agro-food export value in Romania's export value (%)

|                               | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Agro-food export Euro billion | 1.12  | 2.16  | 2.24  | 3.11  | 4.03  | 4.04  | 5.28  | 5.57  | 5.91  | 6.06  |
| Romania's export Euro billion | 29.54 | 33.72 | 29.08 | 37.36 | 45.27 | 45.06 | 49.56 | 52.45 | 54.59 | 57.38 |
| Share of agro-food export (%) | 3.7   | 6.4   | 7.7   | 8.3   | 8.9   | 9.0   | 10.6  | 10.6  | 10.8  | 10.5  |

Source: Own calculations based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The share of the agro-food import value in Romania's import value** increased from 6.49 % in the year 2007 to 9.95 % in 2016 and the imports are coming mainly from the EU-28

countries in the highest proportion, around 80 % (Table 2).

Table 2. The share of agro-food import value in Romania's import value (%)

|                               | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Agro-food import Euro billion | 3.33  | 4.34  | 3.82  | 3.92  | 4.44  | 4.79  | 4.95  | 5.12  | 6.05  | 6.70  |
| Romania's import Euro billion | 51.32 | 57.24 | 38.95 | 46.90 | 54.94 | 54.07 | 55.26 | 58.50 | 62.96 | 67.34 |
| Share of agro-food import (%) | 6.49  | 7.58  | 9.80  | 8.35  | 8.08  | 8.85  | 8.95  | 8.75  | 9.61  | 9.95  |

Source: Own calculations based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The share of agro-food export in GDP achieved in agriculture** increased from 15.91 % in 2007 to 81.23 % in 2016. This was due to the fast growth of export value compared to the lowest growth in the agriculture GDP (Fig.5).

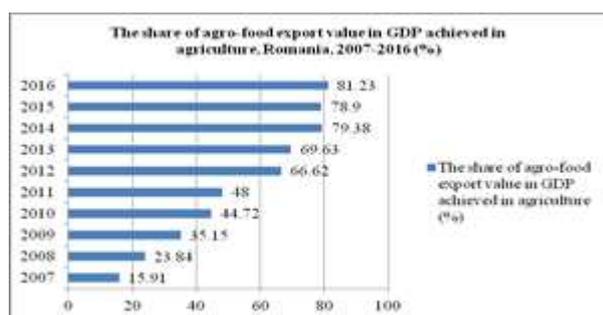


Fig.5. The share of the agro-food export value in GDP from agriculture, Romania, 2007-2016 (%)

Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The share of agro-food export value in the value of agricultural production** increased from 7.83 % in 2007 to 38.62 % in 2016.

This was due to the higher requirements of Romanian agro-food products for export, and due to the faster growth of export compared to the increase of GDP coming from agriculture. By means of its increasing values, this indicator reflects the growth of the economic efficiency of Romania's agro-food foreign trade (Fig.6).

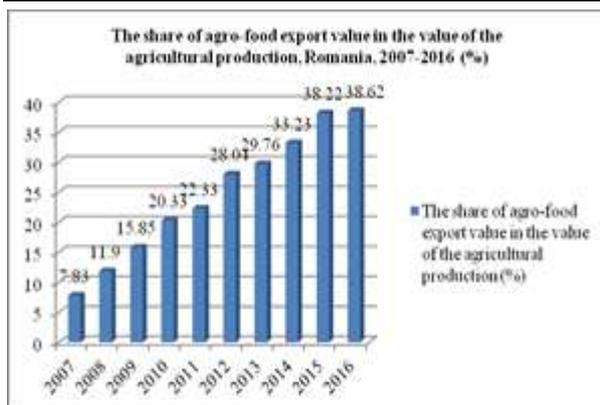


Fig.6. The share of the agro-food export value in the value of agricultural production, Romania, 2007-2016 (%)

Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

**The regression model reflecting the agro-food export value (Y) depending on the value of GDP created in agriculture** was  $Y = 0.0866 X - 8.07$ . It reflects that an increase by Euro 1 billion of GDP in agriculture will determine an increase by Euro 0.0866 billion in the agro-food export value.

Also, the determination coefficient shows that 66.69 % of the variation of the exports value with agro-food products is determined by the variation of the GDP created in agriculture.

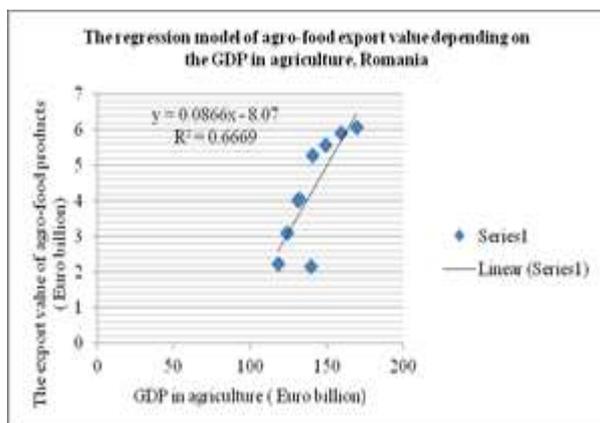


Fig.7. The regression model between the agro-food export value and GDP in agriculture, Romania, 2007-2016

Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

The coefficient of correlation,  $r = 0.816$  reflects that between the agro-food export value and the GDP coming from agriculture is a strong and positive relationship. Therefore, the

availability of the estimated regression model is confirmed (Fig.7).

The regression model estimated for the agro-food export value depending on the GDP coming from agriculture is presented in Table 3.

**The regression model reflecting the agro-food export value (Y) depending on the value of agricultural production** was  $Y = 0.3505 X - 1.6234$ . It reflects that an increase by Euro 1 billion of the value of agricultural production will determine an increase by Euro 0.3505 billion in the agro-food export value.

Also, the determination coefficient shows that only a small percentage, more exactly, 11.87 % of the variation of the exports value with agro-food products is determined by the variation of the agricultural production value.

The coefficient of correlation,  $r = 0.344$  reflects that between the agro-food export value and the value of agricultural production is a weak but positive relationship. Therefore, the availability of the estimated regression model is confirmed, but the variation of the agro-food export value is determined by other factors, not only by the value of agricultural production value (Fig.8).

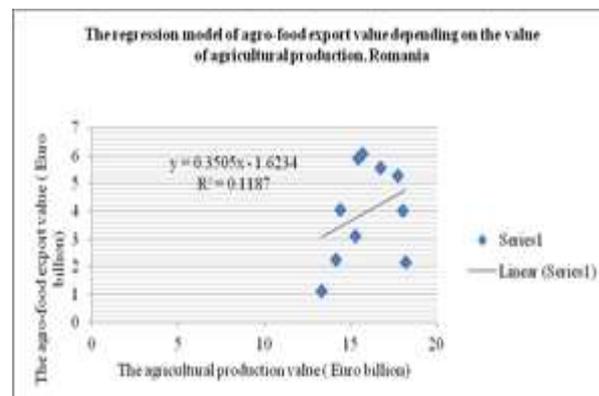


Fig.8. The regression model between the agro-food export value and the value of agricultural production, Romania, 2007-2016

Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

The regression model estimated for the agro-food export value depending on the value of agricultural production is presented in Table.

Table 3. The estimated regression model for the agro-food export value depending on the GDP created in agriculture, Romania, 2007-2016

| Regression statistics |                     |                       |               |                |                       |                  |
|-----------------------|---------------------|-----------------------|---------------|----------------|-----------------------|------------------|
| Multiple R            | 0.8166              |                       |               |                |                       |                  |
| R Square              | 0.6669              |                       |               |                |                       |                  |
| Adjusted R Square     | 0.6252              |                       |               |                |                       |                  |
| Standard Error        | 1.0709              |                       |               |                |                       |                  |
| Observations          |                     |                       |               |                |                       |                  |
| ANOVA                 |                     |                       |               |                |                       |                  |
|                       | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |                  |
| Regression            | 1                   | 18.3692               | 18.3692       | 16.0169        | 0.0039                |                  |
| Residual              | 8                   | 9.1749                | 1.1468        |                |                       |                  |
| Total                 | 9                   | 27.5441               |               |                |                       |                  |
|                       | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i>      | <i>Upper 95%</i> |
| Intercept             | -8.0700             | 3.0229                | -2.6695       | 0.0283         | -15.041               | -1.0990          |
| X Variable 1          | 0.0865              | 0.0216                | 4.0021        | 0.0039         | 0.0366                | 1.1364           |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [9]

Table 4. The estimated regression model for the agro-food export value depending on the value of agricultural production, Romania, 2007-2016

| Regression statistics |                     |                       |               |                |                       |                  |
|-----------------------|---------------------|-----------------------|---------------|----------------|-----------------------|------------------|
| Multiple R            | 0.3445              |                       |               |                |                       |                  |
| R Square              | 0.1187              |                       |               |                |                       |                  |
| Adjusted R Square     | 0.0085              |                       |               |                |                       |                  |
| Standard Error        | 1.7418              |                       |               |                |                       |                  |
| Observations          |                     |                       |               |                |                       |                  |
| ANOVA                 |                     |                       |               |                |                       |                  |
|                       | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |                  |
| Regression            | 1                   | 3.2705                | 3.2705        | 1.0778         | 0.3295                |                  |
| Residual              | 8                   | 24.2736               | 3.0342        |                |                       |                  |
| Total                 | 9                   | 27.5441               |               |                |                       |                  |
|                       | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> | <i>Lower 95%</i>      | <i>Upper 95%</i> |
| Intercept             | -1.6234             | 5.3983                | -0.3007       | 0.7712         | -14.0721              | 10.8252          |
| X Variable 1          | 0.3505              | 0.3375                | 1.0382        | 0.3295         | -0.428                | 1.1290           |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [9]

**The ratio between export value and import value of agro-food products** varied between 0.83 in the year 2007 and 0.89 in 2016, with two exceptions in 2013 and 2014 when this ratio was 1.06 and, respectively, 1.08 in favor of export.

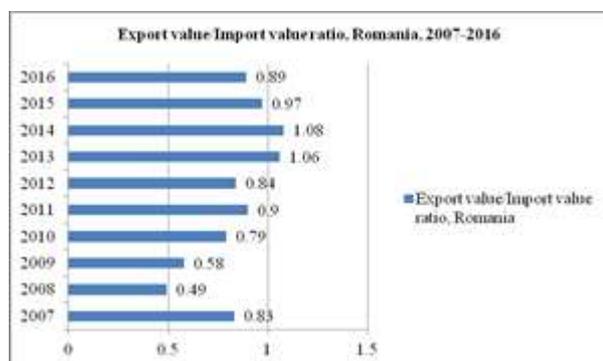


Fig.9. The evolution of the ratio between the export value and import value of agro-food products, Romania, 2007-2016

Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

In general, the ratio had an increasing trend in the period 2008-2011, but then it was followed by a lower value, 0.84 in 2012, when due to the drought in the country the imports were higher than exports of agro-food products. In the years 2015 and 2016, again it has appeared a decline of this ratio to 0.97 and, respectively 0.89 (Fig.9).

Other authors affirmed that in the year 2014, besides of the trade with Dacia and Ford cars, the agro-food foreign trade of Romania had the highest coverage rate (export/import ratio) [10].

**The statistical parameters for the main indicators** used in this study characterizing Romania's agro-food foreign trade in the period 2007-2016 are presented in Table 5. The values of the coefficient of variation are in general below 10 % in case of the value of agricultural production, reflecting that the values are uniformly distributed around the mean. In case of GDP coming from agriculture the value of this coefficient is a little over 10 %

reflecting a slight variation of the values. The coefficient values ranging between 10 and 20 % in case of the import value of agro-food products and export value/Import value ratio show that it is a moderate variation of the variables around the average. But in case of the

export value of agro-food products and the value of agro-food foreign trade balance, the coefficient of variation has recorded values higher than 40 % and also ranging between 30-40 % reflecting a very large variation of the data.

Table 5. The statistical parameters of the main indicators characterizing Romania's agro-food foreign trade in the period 2007-2016

|  | MU           | Mean   | Standard deviation | Coefficient of variation (%) |
|--|--------------|--------|--------------------|------------------------------|
| GDP from agriculture                         | Euro billion | 138.83 | 16.49              | 11.87                        |
| The value of agricultural production         | Euro billion | 15.90  | 1.71               | 10.75                        |
| The export value of agro-food products       | Euro billion | 3.95   | 1.74               | 44.05                        |
| The import value of agro-food products       | Euro billion | 4.75   | 1.04               | 21.89                        |
| The value of agro-food foreign trade balance | Euro billion | -0.73  | 0.96               | 31.50                        |
| Export value/Import value ratio              | -            | 0.84   | 0.18               | 21.42                        |

Source: Own calculations.

### The evolution of the agro-food export value by categories of products according to the Combined Nomenclature.

The export value of the Live animals and products of animal origin was 3.22 times higher in 2016, accounting for Euro 0.81 billion, compared to 2007. Romania imports especially pigs, cattle and poultry, and exports mainly live cattle [14].

The export value of the Vegetal products was 7.58 times higher in 2016, accounting for Euro 3.33 billion in comparison with the level of 2007.

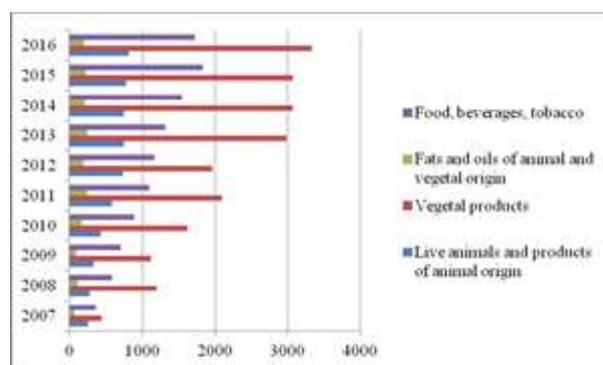


Fig.10. The evolution of the export value by group of agro-food products according to the Combined Nomenclature, Romania, 2007-2016 (Euro billion)

Source: Own design based on National Institute of Statistics, Tempo Online Data base, 2017 [9].

The export value of the Fats and oils of vegetal and animal origin was 2.85 times higher in 2016, representing Euro 0.19 billion compared to 2007.

The export value of the Food, beverages and tobacco was 4.76 times higher than in 2007, accounting for Euro 1.71 billion in 2016 (Fig.10).

**The share of various groups of agro-food products in the export value of agro-food products.** Despite that the descending order in the hierarchy of agro-food products groups remained the same: Group II Vegetal Products, Group IV Food, beverages and tobacco, Group I Live animals and products of animal origin, and Group III Fats and oils of vegetal and animal origin, the share of each group in the value of export with agro-food products has changed.

While the share of the vegetal products export value increased from 39.21 % in 2007 to 54.99 % in 2016, the share of all the other groups of products declined as follows: Group IV from 32.28 % in 2007 to 28.68 % in 2016; Group I from 22.45 % in 2007 to 13.14 % in 2016; Group III from 6.06 % in 2007 to 3.19 % in 2016 (Table 6).

Fats and oils are important items of Romania's agro-food trade. In order to stimulate the exports of oleaginous seeds and oils, the producers have received subsidies. In this way, the production growth had a positive impact both on the exported amounts and export value as increase of soybean [7].

Table 6. The share of agro-food groups of products in the value of export of agro-food products and, respectively in the value of import of agro-food products, Romania, 2007-2016 (%)

| Group of agro-food products based on the Combined Nomenclature | Export value of the agro-food products groups |                          | Import value of the agro-food products groups |                         |
|--|---|--------------------------|---|-------------------------|
|  | 2007 = Euro 1.1 billion                       | 2016= Euro 6,069 billion | 2007 = Euro 3.33 billion                      | 2016= Euro 6,78 billion |
| I- Live animals and products of animal origin                  | 22.45   | 13.14                    | 26.05   | 21.22                   |
| II- Vegetal products   | 39.21   | 54.99                    | 31.05   | 34.31                   |
| III- Fats and Oils of vegetal and animal origin                | 6.06  | 3.19                     | 4.31  | 2.78                    |
| IV-Food, beverages, tobacco                                    | 32.28   | 28.68                    | 38.59   | 41.69                   |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [9]

**The share of various groups of agro-food products in the import value of agro-food products.** The decreasing order in the hierarchy has not changed and remained the same as follows: Group IV Food, beverages and tobacco, Group II Vegetal Products, Group I Live animals and products of animal origin, and Group III Fats and oils of vegetal and animal origin.

But, the share of each group of agro-food products has changed as follows: Group IV Food, beverages and tobacco increased its share from 38.59 % in 2007 to 41.69 % in 2016; Group II Vegetal Products increased its share from 31.05 % in 2007 to 34.31 % in 2016; in case of Group I Live animals and

products of animal origin, the share in the import value of agro-food products declined from 26.05 % in 2007 to 21.22 % in 2016; the share of Group III Fats and oils of vegetal and animal origin also declined from 4.31 % in 2007 to 2.78 % in 2016 ( Table 6).

Therefore, in 2016, Romania exported more vegetal products and less food, beverages and tobacco, mainly as raw materials, and it imported more food, beverages and tobacco and also vegetal products, mainly processed products, including high value added favoring the trade of the supplying countries.

**The balance of Romania's agro-food foreign trade by category of products** is presented in Table 7.

Table 7. The agro-food foreign trade balance of Romania, 2007-2016 ( Euro million)

|   | 2007   | 2008   | 2009   | 2010 | 2011 | 2012 | 2013   | 2014     | 2015     | 2016     |
|---|--------|--------|--------|------|------|------|--------|----------|----------|----------|
| Balance of agro-food trade                      | -2,217 | -2,181 | -1,580 | -813 | -423 | -746 | +334   | +452.7   | -135.9   | -719.8   |
| I- Live animals and products of animal origin   | -518   | -913   | -790   | -550 | -381 | -304 | -369   | -479.9   | -472.3   | -626.8   |
| II- Vegetal products                            | -597   | -61    | +122   | +484 | +773 | +554 | +1,530 | +1,554.1 | +1,007.3 | +1,008.1 |
| III- Fats and Oils of vegetal and animal origin | -76    | -121   | -72    | -53  | -3   | -56  | +35    | +48.5    | +39.6    | +4.7     |
| IV-Food, beverages, tobacco                     | -926   | -1,086 | -840   | -694 | -812 | -940 | -862   | -670     | -740.6   | -1,105.8 |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [9]

The trade balance by category reflects the following aspects:

-Group I had a negative balance in all the analyzed years, meaning that Romania imported more live animals and products of animal origin than it exported.

-Group II had a negative balance in 2007 and 2008, but then it recorded positive values in the period 2009-2016, reflecting that Romania exported more vegetal products than it imported.

-Group III had a negative trade balance between 2007 and 2012 and from 2013 till 2016, it became a positive one, reflecting that Romania exported more fats than it imported.

-Group IV registered a negative trade balance in the whole analyzed period, reflecting that Romania is a net importing country of Food, beverages and tobacco.

**The value of export, import and trade balance for cereals.** Cereals occupy a special

place in Romania's agro-food export value, being an important producer of cereal grains. But also, Romania imported small amounts of cereals when it was needed to cover the internal market needs.

The export value of cereals was 13.89 times higher in 2016, accounting for Euro 2.09 billion compared to 2007 (Euro 0.15 billion).

The import value of cereals was 2.18 times higher in 2016, accounting for Euro 0.59 billion compared to 2007 (Euro 0.27 billion).

As a result, the trade balance was a negative one only in 2007 and then it registered only positive values along of a relatively continuous increasing trend.

In 2016, the trade balance of cereals accounted for Euro 1.5 billion. However, the highest value of cereals export was recorded in 2014 and accounted for Euro 1.69 billion (Table 8).

Table 8. The value of export, import and trade balance for cereals, Romania, 2007-2016 ( Euro million)

|               | 2007 | 2008 | 2009 | 2010 | 2011  | 2012  | 2013  | 2014  | 2015    | 2016    |
|---------------|------|------|------|------|-------|-------|-------|-------|---------|---------|
| Export        | 151  | 638  | 631  | 893  | 1,095 | 1,336 | 1,981 | 1,988 | 2,003.5 | 2,097.1 |
| Import        | 271  | 308  | 250  | 248  | 333   | 373   | 327   | 256   | 539.3   | 592     |
| Trade balance | -120 | 330  | 381  | 645  | 762   | 963   | 1,654 | 1,692 | 1,464.2 | 1,505.1 |

Source: Own computation based on National Institute of Statistics, Tempo on line Data Base, 2017, [9]

As a result, the share of cereals in the export value of agro-food trade increased from 13.43 % in 2007 to 34.56 % in 2016.

The share of cereals in the import value of agro-food trade increased from 8.10 % in 2007 to 8.72 % in 2016, the maximum weight being 8.90 % recorded in the year 2015.

Grains of cereals are among the most important items in Romania's export and even from the period 2002-2011 both their exported quantity and export value had recorded growths. Wheat, maize and barley are successfully exported and the export has constantly covered their imports [2].

## CONCLUSIONS

The development of agro-food foreign trade of Romania is deeply conditioned by the volume and structure of the agricultural production, the quality of agro-food products, the

demand/offer ratio on the internal and external market.

The growth of the agricultural production, both in the vegetal and animal sector, has influenced the export of agro-food products.

In the period 2007-2016, the export value of the agro-food products increased 5.4 times, while the import value raised 2.03 times.

In 2016, the export of agro-food products accounted for Euro 6.06 billion while the import value for Euro 6.78 billion, leading to a negative trade balance of - Euro 0.71 billion.

In the years 2013 and 2014, the trade balance of agro-food products had a positive value, reflecting that Romania has a good potential to become a net exporting country.

The export value of agro-food products has recorded an increasing share in Romania's export value, from 29.5 % in 2007 to 57.38 % in 2016. At the same time, the import value of agro-food products registered a slight growth

in Romania's import value from 6.4 % in 2007 to 9.95 % in 2016.

Also, the export of agro-food products has registered a continuous growth in the GDP produced in agriculture from 15.9 % in 2007 to 81.2 % in 2016.

In 2016, 38.6 % of the agricultural production value was represented by the export value of agro-food products.

The regression models estimated in this study pointed out that it is a strong relationship between the export value of agro-food products and the GDP created in agriculture, as long as the coefficient of correlation was  $r = 0.816$  and R squared showed that 66.69 % of the variation of the export value is due to the variation of the agricultural GDP.

Between the export value of agro-food products and the agricultural production value it is a weak correlation,  $r = 0.344$  and R squared reflected that only 11.87 % of the variation of the export value is determined by the variation of this factors. The remaining variation of 88.13 % is due to other factors.

As a result of the export and import dynamics, export/import ratio varied from 0.49 in the year 2008 to 1.06 in 2013 and 1.08 in the year 2014, the last figures reflecting the highest economic efficiency in Romania's agro-food trade. But, in the years 2015 and 2016, this ratio became lower than 1, reflecting that Romania is again a net importing country.

The export value of agro-food products was positively influenced by all the four groups of agro-food products included in the Combined Nomenclature.

The vegetal products contributed by 54.9 %, while Food, beverages and tobacco by 28.68 % to the export value of agro-food trade.

In the import value of agro-food products, the main share belongs to Food, beverages and tobacco, (41.69%), vegetal products (34.31 %) and live animals and products of animal origin ( 21.22 %).

The general negative value of the agro-food trade balance was mainly influenced by the negative values recorded by Food, beverages and tobacco, and by Live animals and products of animal origin.

The positive influence on the trade balance came from Vegetal products which had a positive balance and continuously increasing since 2009 till 2016, and from Fats and oils whose balance was positive in the last five years of the analysis.

Being an important cereal producer, Romania exports cereals. In 2016, the export value of cereals recorded Euro 2.09 billion, being 13.89 times higher than in 2007. In the same, year, Romania imported cereals whose value accounted for Euro 0.59 billion, almost double compared to the 2007 level.

The cereals contributed by 34.5 % to the export value of agro-food products.

As a final conclusion, Romania is still a net importing country of agro-food products, despite that it has a good potential to become a net exporter. But in the analyzed period, it was noticed an increase of the economic efficiency of the agro-food foreign trade in terms of the share of the export value with agro-food products in the GDP achieved in agriculture, export value in the value of agricultural production, and export/import ratio.

Romanian producers must intensify their efforts to produce more and increase the quality of the agro-food products to be more competitive on the external market. In this way, the agro-food trade balance could become positive and Romania a net exporting country.

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## LIMITATION IN CONDUCTING RESEARCH FOR FODDER SPECIES BREEDING

Camelia SAND SAVA, Maria-Mihaela ANTOFIE

"Lucian Blaga" University of Sibiu, Faculty of Agricultural Sciences, Food Engineering and Environment Protection, 7-9 Dr. Ioan Ratiu, 550012, Sibiu, Sibiu county Romania  
E-mails: camelia.sand@yahoo.com, mihaela.antofie@ulbsibiu.ro

### Abstract

Currently it is considered that food security is highly depending on the sustainable use of arable land that may be dramatically affected by drought and/or precipitations in the next 20 years. The Romanian agricultural economy is based on animal bred, crops cultivation as well as commodity trade. Fodder plants become more important when drought and acidification become limiting factors negatively impacting our own ability to bred livestock. A complex research project was implemented starting with 2007 when six fodder species (i.e. *Festuca arundinacea*, *Festuca pratensis*, *Phleum pratense*, *Dactylis glomerata*, *Lolium perenne* and *Trifolium repens*) have been tested with the scope of producing new genotypes that may develop adaptation mechanisms towards drought and acidification. Thus, the scope of this article is to emphasize the main limitations that have been encountered during project implementation. A SWOT analysis was applied for evaluating final results. Major limitations are imposed by techniques, skills and studied plant species as well as by the need of data corroboration at the international level.

**Key words:** drought stress, breeding limitations, *Festuca arundinacea*, *Festuca pratensis*, *Phleum pratense*, *Dactylis glomerata*, *Lolium perenne* and *Trifolium repens*.

### INTRODUCTION

Breeding crop species is a long-time process with a history that starts with human civilization [22]. In the end of the 19<sup>th</sup> century [31] maize starts as a subject of breeding in the so-called corn belt [6]. It can be considered that maize is among the first species as a subject for scientific breeding. However, maize is known in Romania mostly after the 18<sup>th</sup> century. Before, wheat was the major crop in Romania [28]. Thus, it was proved that wheat has a long history of over 5000 years of cultivation in the actual borders of Romania and in the inner arch of Carpathians that is relevant for the current strategies development for the country [16]. Different studies emphasized the relevance of fodder plants for animal bred as well as for nature conservation in Sibiu county including climate change negative impact of drought or precipitations [26, 27]. However, the breeding of species originating from pastures become more relevant today when considering the effects of droughts as well as the increase of soil salinity on long term [12]. Romania is passing a warming period with dramatic effects on productivity especially in agriculture due to drought conditions for long term [3]. Animal

bred will be the most affected among all agricultural sectors. Pastures and grasslands are among major food sources in Romanian agriculture and assessing the genetic diversity as well as variability of fodder species will be supportive.

The scope of this paper is to discuss some barriers encountered during the implementation of a long process of selecting and testing different fodder species that are relevant and common for all pastures in South-East Transylvania.

In 2007 it was run for a period of five years the project entitled "The identification based on biotechnological methods of new genotypes of fodder species that are resistant to drought and soil acidity". The philosophy of the process was to test based on an integrated approach from laboratory to the field, six fodder species (e.g.: *Festuca arundinacea*, *Festuca pratensis*, *Phleum pratense*, *Dactylis glomerata*, *Lolium perenne* and *Trifolium repens*), in order to access their genetic variability, to prove its existence, to isolate relevant clones and to test their resistance against drought and acid conditions.

## MATERIALS AND METHODS

**Plant material.** Certified seeds of six fodder species and varieties have been used for all experiments during 2007-2012, such as follows: *Festuca pratensis* Huds. 'Pradel', *Festuca arundinacea* Schreb. 'Kora', *Lolium perenne* L. 'Mara', *Dactylis glomerata* L. 'Intensiv', *Phleum pratense* L. 'Barpenta' and *Trifolium repens* L. 'Barblanca'. The following bred lines have been used for *Dactylis glomerata* L. (i.e. Intensiv 14R01, 83R01, 84R01 și 10R01), *Festuca pratensis* Huds. (Pradel, 19R00, 23R00, 99L2 și 77Ro7), *Phleum pratense* L. (i.e. Barpenta 34R00, 10010, 10385, 14R00 and 1Bv00), *Lolium perenne* L. (i.e. diploid: LPD and tetraploids: Mara 2002, 20020, 20062 and 2003) and *Lolium perenne* L. (i.e. tetraploids: 31A99, 40026, 40019, 30A99 and 40021).

**Methodology** Barriers will be discussed in a SWOT analysis based on published results for the six fodder plants that have been selected for *in vitro* micro propagation, testing against acidification and hydric stress and for selecting clones that are most resistant against acid or drought conditions [20, 21, 23, 24].

Some of the limits for field tests that followed the laboratory and acclimation tests will be discussed further. All field tests have been performed in pastures located in the limits of Braşov and Sibiu counties belonging to the following villages: Ucea (45°47'12"N 24°40'32"E), Dealul Luncii, Viştea (45°47'54"N 24°43'21"E), Ucea –Carmolimp, Bruuiu, Ucea- Buciumi, Ucea-Vigerox.

## RESULTS AND DISCUSSIONS

*First stage of research: Laboratory and acclimation phases.* During the laboratory phase 6 fodder plant species have been accessed all of them being in the gene bank of our institution. Based on former experience these species have been tested for their *in vitro* cultivation, setting appropriate *in vitro* micro propagation technology for each of the species [4, 13, 20, 21]. Acclimation was realized in greenhouse conditions by limiting the impact of viruses on obtained plants. The process was

realized in distinct stages: the cultivation of *in vitro* plantlets on perlite that for 10 days were acclimated from 90% humidity up to 60% as it was possible to be supplied in the greenhouse conditions. The pot second phase followed when each specimen was transferred in a single pot supplied with soil mixture rich in nutrients. In this case the humidity was set up to 30% for the greenhouse conditions to be prepared for field testing in the elite field. In this case, a major attention was oriented for handling each specimen, the presence and or persistence of pathogenic fungus or bacteria. Of major importance is the intensity of the light, especially during the first two weeks that must be between 10,000 and 6,000 lx minimum. During the pot phase the natural light will be enough but during the cloudy days, if they are longer than 10 days and ensure only 500 lx, it is relevant for two hours a day to supplement the needs for light up to 10,000 lx. The light intensity is essential for supporting the adaptation strategy of the plants towards new conditions as it was previously discussed [11, 17]. Watering will be done at the temperature of the greenhouse (25°C ±5°C) to avoid thermic shocks also in accordance with other author results [9].

The major limitations identified belong to the species, to the technique of *in vitro* culture and to the laboratory skills. Not all the species may develop fast or well into *in vitro* conditions and therefore it is a major gap to be covered for the future in this respect when distinct species are to be compared for the same culture medium cultivation. High skills for biotechnology laboratory are needed as appropriate handling of *in vitro* cultures impacts on infections. Moreover, *in vitro* plantlets' needs for passing on new culture medium request fine observations that need to support *in vitro* conditions. Testing the hormone balance is based on previous researches conducted in the laboratory.

*First stage of research: Elite field testing.*

Specimens belonging to each of the species have been planted in the elite field testing starting with 2008. In this case the common agricultural practices have been applied starting with land working, fertilizers and soil

amendments. All collected data have been used to support the control of the whole future experimentations. In parallel have been analysed the results of other research teams such as that of Peter-Schmid and collaborators [19] or from China run by Zhang and collaborators [10]. The selected cultivars proved to be valuable also for other laboratories all over the world.

Major limitations are due to climatic conditions (i.e. climatic conditions temperature, humidity, wind spread, precipitations, biotic factors). It is almost impossible to repeat the experiment under the same conditions from one year to another and therefore, in case of drought to consider only those clones or specimens that are developed under a clear measurable stress factor. Based on this experience it can be considered that marginal specimens in the tested field may not be considered if the shadow provided by rye grass from the buffering zone is impacting the rise of air humidity more compared to the rest of the tested plot areas.

*Second stage of research: Laboratory and acclimation phases.*

The second part of research is mainly based on the previous results. It is meant to test the genetic variability against drought and acidity. *In vitro* drought stress is not possible to be induced due to the height humidity in the air of each jar. However, adding a chemical agent to induce water stress such as PEG (polyethylene glycol) in different forms (i.e. PEG 6000) it is possible to stress from osmotic point of view the *in vitro* plantlets [2, 4, 15]. All six cultivars have been tested for hydric stress [2]. As a conclusion we registered that *in vitro* systems are valuable tools in our attempts to select resistant genotypes to drought conditions. The action of PEG6000 over *in vitro* plantlets is acting also as memory at the specimen level for improving the performance of selected plants towards drought conditions expressed under acclimation. These results are grounding the previously results obtained for selecting the best clones responding to hydric stress induced by the PEG 6000. The target for a 6 months period was 600 plantlets of each of the tested varieties and breed lines. Based on today

conclusion we consider that it is a feasible target. *In vitro* culture media are variants of Murashige-Skook 1962 culture medium [14] and technical parameters are comparable to those published by Gamborg and Philips [7]. The best results have been obtained for *F. pratensis* with a success of 84,60% viability of tested inocula. The rest of the genotypes and species recorded values up to 50%. In the end of the entire project it can be considered that even the chosen process is for *long term*, the results are reliable and therefore it can be recommended for future testing. In case of *D. glomerata* L. the success is obtained up to 91.50%. The second stage of *in vitro* testing was only for pH variations and decreasing the pH down to 4.5 or increasing up to 8. In case of *D. glomerata* the survival rate decreased down to 44% for a pH of 4.5 and 32% for a pH of 8. The best hormone balance was auxin / cytokinin at 1mg/l and among all six species only *D. glomerata* proved the best adaptation capacity towards hydric stress and induced acidity (fig. 1).

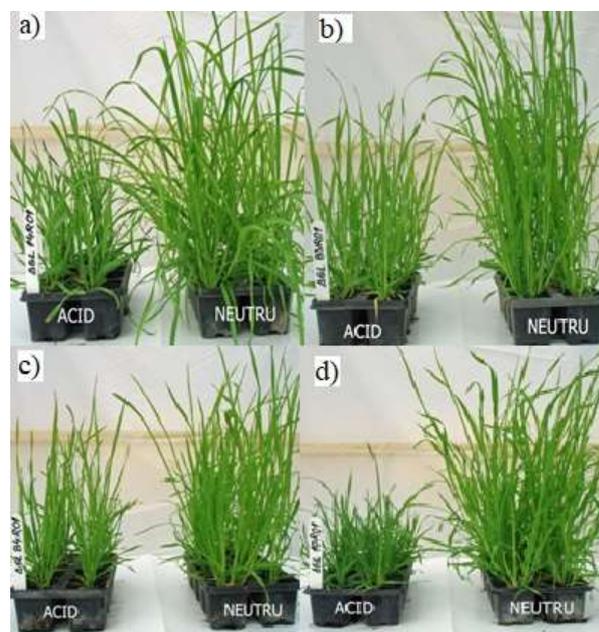


Fig. 1. *Dactylis glomerata* testing against acidity at 30 days after acclimation (a. DGL 14R01, b. DGL 83R01, c. DGL 84R01 and d. DGL 10R01)

Source: Original.

A major new limitation of the second phase may be due to the culture medium composition itself. It is possible that working more for the culture medium composition, in a unique way

for each of the species to reach different results for the future. However, it can be considered that our results need to be related to the same culture medium formula and explicitly mentioned for the results. Considering all results related to acclimation it is obvious that the best clones are those passing easily acclimation which impose to all plants drought stress conditions as well as random disposition for all variants (fig. 2). In this regard, using the PEG stressed clones it is possible to improve the selection method for producing the most appropriate genetic varieties from this point of view. However, this is not connected yet to any of quantitative genetic traits followed by agronomist in breeding the species.



Fig. 2 Random disposition of experimental tested variants for *Lolium perenne*

Source: Original.

A new major limitation may be due to the molecular mechanisms that undergoes the adaptation of each of the specimens during acclimation. However, considering the bulk of specimens belonging to one line, compared to the average value may be important only for the subjected species.

#### Second stage of research: Elite field testing.

Selected clones, during *in vitro* experimentation and acclimation testing have been transferred into the field testing. The target was to obtain 80 individuals per variant. Also, it was an achievable target. For *D. glomerata* have been use 15 plants of four biotypes, for *P. pratense* have been obtained 20 plants of 5 genotypes, for *F. pratensis* have been obtained 15 plants of 5 genotypes and for *L. perenne* 15 plants of 5 diploid genotypes and 5 tetraploid genotypes. Have been made observations regarding the fading index. For laboratory analysis dry content was relevant especially when considering animal

bred. Also, protein and cellulose contents were important in this regard. Major limitations are due especially to climatic conditions, the harvesting momentum and the skills of the involved team. Field testing was also complex and therefore only considering the dry mass as well as the fresh weight mass production proved to be the subject of a height variability interspecific as well as intraspecific.



Fig. 3. Isolated poly-cross of *Phleum pratense* in the field testing.

Source: Original.

In all cases acidification induced the decreased in fresh weight for all cultivars (i.e. a minimum for *P. pratense* of 3,59% and a maximum of 14,03% for *L. perenne*. In case of dry matter, it was recorded a minimum of 4,72% for *P. pratense* and a maximum of 16,38% for *L. perenne*. These results showed the height genetic variability of the species as well as limitations in others such as *Phelum sp.* Those limitations are responsible for the ratio between species in pastures and may further support the idea to access wild genotypes originating from stressing conditions related to drought and acidification [8]. Related to *D. glomerata* only two breeding lines have been considered as valuable for further experiments (i.e. DGL 83 R01 și DGL 84R01). Also, *L. perenne* diploid lines are less tolerant to acidity compared to *F. pratensis* and tetraploid lines of the same species *L. perenne* in line with current results [18, 25]. In our experiments it was the case for the following lines: *F. pratensis* FPR 77Ro7 and *L. perenne* tetraploid LPT 40019 and LPT 30A99. Among *P. pratense* lines remarkable results have been obtained in order for PHL 10385, PHL 14 R00 and PHL 1Bv00 supported also by other researchers' results [29].

The project ended in 2012 and these results appear to be reliable according to other results published in other laboratories, supporting the viability of the whole research process.

Among these fodder species *D. glomerata* line DGL 14R01 proved to maintain also highest productivity on an acid environmental conditions.

We also consider that these values can be supported by the previous *in vitro* treatments of all these lines as today is almost all the time considered the drought memory of the plants [30]. Thus, accessing the same signalling pathways creates the minimum required pools of specific compounds that may support the expression of adaptation to stress conditions [1].

Harvesting started in the elite testing field after removing path vegetation as well as the protection area meant to prevent cross-pollination represented by a field of *Secale cereale*. Each of the repetition (20 repetitions per variants) have been separately harvested 1 kg/variant for evaluating the fresh weight, the dry matter and subsequently the total protein and carbohydrates.

All free samples after first weight have been sent to the State Laboratory for Sanitary Veterinary of the County Brasov to perform the rest of analysis to remove any suspicious related to analysis conditions.

We need to underline that by the time of harvesting only *L. perenne* was entered in seed production phase as all other species were in early phase of seed production.

However, the protein content range between 12,30 % and 18,19 % for drought conditions because the diversity of the species was mainly represented by *L. perenne*, *F. pratensis* and *F. arundinacea*. The small ratio was added by *T. repens*, *D. glomerata* and *P. pretense*.

However, after the second mow the ratio of *T. repens* increased and showed dominance towards the others and explaining the increased level of total proteins.

## CONCLUSIONS

As major lessons of implementing such a long-time breeding process, with positive results, we can mention the following:

(a) we need to know, understand and acknowledge all laboratory and field limitations imposed by techniques, our own developed skills as well as by the species it selves;

(b) it is always relevant to refer our results to other results published in peer-review articles and in peer-review journals by different research teams working on the same topics to make sure the consistency of our results with the goal of breeding and;

(c) it is a great need to follow long-term breeding processes as they may contribute to the diversity of the species we need for ensuring food security for the future.

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## THE ECOTOURISM IN DOBRUDGEA'S RURAL AREA - REALITIES AND PERSPECTIVES

Elena SIMA

Institute of Agricultural Economics, INCE, Romanian Academy, 13, Calea 13 Septembrie, District 5, Bucharest, Phone/Fax:021/3182411, E-mail: elena.sima2008@yahoo.com

*Corresponding author:* elena.sima2008@yahoo.com

### *Abstract*

*The paper aimed to present some aspects of the development stage of ecotourism activities within and around the natural protected areas in Dobrugea – a historical province from Romania's South-East extremity, as well as a set of proposals to orient the efforts of putting into value these destinations through ecotourism activities, in agreement with the requirements of the national legislation and the international conventions to which Romania adhered. The whole volume of information presented in this paper was obtained by bibliographic documentation and field visits. The analysis of data suggested that the development of ecotourism areas should be based on empowering local communities by education, social entrepreneurship and cultural preservation programs.*

**Key words:** ecotourism, natural potential, rural area, development strategy, Dobrugea

### INTRODUCTION

The tourism sector is a privileged field of application of the sustainable development principles. When managed properly, this industry can result in a positive impact on the economic, environmental and social field. Ecotourism, a form of sustainable tourism, is a particularly promising niche. Global demand for this type of experience is growing remarkably and is expected to continue to increase over the coming years. [15, 17]

Ecotourism is a well-exploited segment at tourism industry level and has a particular resonance among tourists, especially among those who have a special consideration for the environment and want the best possible protection and conservation of it. However, this term and its variations (eco-vacation, ecotour, eco-adventure, eco-cruise, etc.) were often introduced in tourism offers only as simple words, tricks to attract a wide range of tourists, or to enter and to benefit from the special natural and cultural areas. [1]

The fast growing transportation industry, the free flow of information over the internet and different media, and the decreasing communication costs are all factors supporting the new emerging ecotourism. [5]

The tourism activities developed under the aegis of ecotourism offer to tourism industry, tourists, authorities and local people the possibility to cooperate for the organization and development of responsible journeys into the natural areas unaltered by the anthropic activity, in order to admire the ecological richness, to study, to understand and enjoy both nature and cultural diversity, in a manner that will take into account the impact upon the environment, in the idea of maintaining the viability in the respective area on an indefinite period of time. [10]

At the same time, the development of ecotourism activities in the protected areas implies a series of socio-economic benefits such as:

- Generates job creation at local level (directly in the tourism sector or in related sectors).
- Stimulates the local economy by developing services (hotels, restaurants, souvenir industry, craft products and guiding services).
- Generates economic exchanges with the exterior of the protected areas.
- Determines diversification of local economy, particularly in the rural area where people are working in the farming sector only during one season in a year.
- Stimulates mainly the rural economy by the creation or increase of demand for agricultural

products needed to ensure tourism services and by capital insertion.

- Intensifies the development of infrastructure, which also brings benefits to the local population.
- Once developed the tourism in a protected area, the local/regional/national authorities can be stimulated to contribute to the development of peripheral regions by capital insertion.
- Encourages the increase of agricultural productivity on restricted land areas (intensive agriculture) to maintain a larger area under natural vegetation.
- Can contribute to the improvement of the intercultural relations in a region. Tourists often want to know the traditions and customs specific to an ethnographic region, and the guest community is thus stimulated to revive the folk traditions.
- In the conditions of normal development, tourism can lead to self-financing the development mechanisms that the park authorities can benefit by as instrument for the preservation of natural areas.
- Creates leisure facilities that can be also used by local communities over the year.
- Supports the preservation activities, by persuading the governments and large public on the importance of natural areas. [7]

Romania has a lot of attractions, making it one of the most attractive ecotourism destinations in Europe. The authenticity and the uniqueness of those attractions create a story that is looking forward to be revealed to all tourists visiting Romania. [5]

Among the zones where ecotourism programs are developed, we can also mention Dobrugea, a historical province from Romania's South-East extremity, with an area divided into two counties from the administrative point of view: Tulcea and Constanța, consisting of three geographical relief units: delta, plateau and seashore. [13]

In this context, the present paper had the purpose to analyze some aspects of the development stage of the ecotourism activities within and around the natural protected areas in Dobrugea, as well as a set of proposals to orient the efforts of putting into value these destinations through ecotourism, in line with

the requirements of the national legislation and the international conventions to which Romania adhered.

## MATERIALS AND METHODS

The research methods are of inventory-type analysis of resources in the Dobrugean ecotourism. The analysis is based on data and information taken from documentation and field visits.

Dobrugea's ecotourism patrimony is evaluated according to the normative acts, which regulate the management of tourism resources.

Taking into account the floristic and faunistic importance of the Dobrugean zone, some of the sites of the European Ecological Network Nature 2000 include more protected areas which has a great natural value and can generate revenues from ecotourism and other associated activities. The protected natural area is defined as "the terrestrial, aquatic and/or underground area, in which there are wild plant and animal species, bio-geographic elements and formations, or of other nature, with special ecological, scientific or cultural value, which has a special protection and preservation regime, established according to the legal provisions". [8]

In order ensure the special protection and preservation measures of the natural heritage, a differentiated protection, preservation and utilization regime has been established, according to the following categories of natural protected areas (Table 1).

Table 1. Categories of natural protected areas

| Categories                                 | Characteristics  |
|--|--|
| of national interest                       | scientific reserves, national parks, natural monuments, natural reserves, natural parks;               |
| of international interest                  | natural sites of the world natural heritage, wetlands of international importance, biosphere reserves; |
| of community interest or Natura 2000 sites | Sites of Community Interest (SCI), Special Protection Areas (SPA);                                     |
| of county interest or local interest       | settled only on the public/private area of the administrative-territorial units (if the case)          |

Source: <http://www.anpm.ro/> [8]

The sustainable tourism inside and outside the protected areas imposes:

- the close cooperation with the authorities of the protected areas;
- the tourist operators and guides who work in the protected areas must have high ecologic knowledge;
- practical and financial contributions of tourist operators for the preservation of the protected areas;
- rules for the promotion and marketing of holidays based on the protected areas;
- guidelines for the local communities involvement;
- standards for the design and operation of sustainable and business tourism. [2]

## RESULTS AND DISCUSSIONS

Situated in the South-East of Romania, Dobrudgea has a surface of 15,570 km<sup>2</sup>. It is a well geographically individualised territory, limited by the Danube and the Black Sea. From the administrative point of view, This area is divided between two counties: Constanta and Tulcea, included in the South-East development region of Romania. It has 17 urban settlements (4 municipalities and 13 towns), 104 communes and 322 villages with a population of 884,406 inhabitants on January 1, 2016. [9]

Dobrudgea is an extremely important zone from the bio-geographic point of view, which determined the concentration of a number of flora and fauna species of conservation interest and also the interference of the floristic species from the Central European, Mediterranean and Asian areas.

The territory of the Tulcea and Constanta, from north to south and from east to west, is characterized by an important number of natural and semi-natural habitats with a vast diversity:

- water habitats (fresh water habitats, salt water habitats, marine and coast habitats),
- terrestrial habitats (forests habitats, steppe pastures and bushes, silvo-steppe habitats, moors and peatery habitats) and
- underground habitats (cave habitats). [13]

In Dobrudgea the main areas with ecotourism potential are: the Danube Delta and Razim-Sinoe lagoon complex, the Măcin Mountains National Park, the Romanian Black Sea Coast and the Northern Dobrudgean Plateau (Table 2).

Table 2. Characteristics of the main protected areas located in Dobrudgea

| Name  | Characteristics   |
|---|---|
| Danube Delta and the lagoon complex Razim-Sinoe | With a great diversity of aquatic and terrestrial ecosystems, which has a triple international status at present: Biosphere Reserve, Ramsar site (wetland of international importance) and World Natural and Cultural Heritage Site where real opportunities exist for ecotourism activity. |
| Măcin Mountains National Park                   | Located in the north-western part of the county Tulcea, with maximum altitude 467 m (the mountain peak Greci-Țuțuiatul), which is fascinating by its unique geo-morphology and biogeography.  |
| Romanian Black Sea Coast                        | With its specific ecotourism potential represented by the Sites of Community Interest, such as: sea dunes from Agigea and sea zones from Tuzla, Costinesti, Vama Veche.   |
| Northern Dobrudgean Plateau                     | With ecotourism potential, yet totally un-explored (large forests and a rich hunting fund).   |

Source: own processing [12, 19, 21, 22]

At present, on the lists of sites from Natura 2000 referring to Dobrudgea, there are 64 sites, out of which 31 Special Protection Areas (SPA) and 33 Sites of Community Interest (SCI) (Table 3).

Table 3. Number of Romanian sites Natura 2000, in the year 2016

|           | SPA | SCI |
|-----------|-----|-----|
| Constanta | 22  | 24  |
| Tulcea    | 9   | 8   |
| Dobrudgea | 31  | 32  |
| Romania   | 148 | 384 |

Source: <http://www.anpm.ro/> [8]

The Natura 2000 sites are suitable for ecotourism and agro-tourism development based on tradition and organic products, which may lead to a brand. Tourism and specifically eco-friendly tourism industries (eco-tourism, agro-tourism, etc.) are encouraging development activities in the regional and national Natura 2000 sites as a sustainable opportunity for people and nature. Following the example of other countries, the local community can create multiple niches to give the possibility for the

local people to participate in the development of tourism promoting mechanisms. Together, these can promote their traditions and the local natural resources at national and international level. [16]

In Romania, the ecotourism programs have a relatively recent history. The first ecotourism packages emerged around the year 2000, when a series of national or natural parks started to develop projects that also had ecotourism components. [6]

The ecotourism activities can include:

- types of adventure activities (for example rafting, canoeing, on horse tourism on pre-established routes, tour skiing, bicycle trips on established routes, etc.);
- guided trips / organized journeys;
- tours for nature observation (flora, fauna);
- experimentation trips for nature preservation activities;
- trips to local communities (visits to cultural objectives, visiting traditional farms, viewing traditional cultural manifestations, traditional food products consumption, acquisition of non-food traditional products etc.).

Therefore, tourist and agro-tourist pensions play a more and more important role in Romania's tourism and their services look to be more attractive in comparison to other sorts of accommodation units due to a good correlation between the provided services and prices. [11] Ecotourism in Dobrugea is still a narrow segment of the tourism market, confronted with many problems such as:

- weak cooperation at local level,
- modest promotion at national and international level,
- existence of a limited offer, weakly diversified,
- weak development of the infrastructure specific for ecotourism at the level of protected areas,
- labour force migration,
- low training level of those employed in this field etc. [14]

The tourist accommodation structures represent the most important component of the specific technical-material basis, as it responds to one of the tourists' fundamental needs, which is rest and bedding. The lack of such

organized spaces can be harmful for the environment.

The protected areas do not have a sufficient number of housing units (for example the Macinului Mountains National Park); however, in most cases, this is compensated by the housing units from the vicinity of protected areas. The Romanian National Forest Administration "Romsilva" considers that there are no problems related to the reception capacity for the visitors in the parks under its administration and that there are enough places for the controlled increase of their number without endangering the environment. [3]

The visiting centers and information points play a special role within the tourism infrastructure of the protected areas in Dobrugea. These have an important role in promoting the management objectives of the protected natural areas, in order to get the large public aware of the importance of measures for natural species/habitats preservation in the context of the sustainable management of natural resources. In general, at present, the protected areas in Dobrugea are poorly equipped from this point of view.

Within the process of tourist valorization of the protected areas, a special role is played by the specific access infrastructure (roads, paths, pre-established trails). The access inside the parks, depending on the land area configuration, is by various means, including: walking, private vehicles, boats, small ships and bicycles.

The category of "ecotourist" can also include a person who, during the sojourn in a tourist resort buys an ecotourism program for one day within a national park nearby, even if the activities developed in nature occupy only a small part of his sojourn. Yet, there are activities that cannot be considered ecotourism activities, namely those activities that although are developed in nature, they have an obvious negative impact upon the natural or socio-cultural environment (for example the off-road activities).

The conducted studies showed that those interested in a real experience in ecotourism generally demand more than the average classical tourists. As a result, ecotourism is

mainly destined to the tourists with a medium or high income level, with a culture oriented towards the knowledge of nature, who tend to practice a healthy way of living; these tourists need an increasingly better quality of the environment in which they choose to spend their holidays: fresh air, unpolluted waters and places, nice landscapes, etc.

Tourists also started to appreciate more and more the sojourns in places in which the natural resources are protected in an institutionalized manner, yet this is an adjacent point of interest and does not constitute a concern for the majority of tourists.

At present, as long as there is no taxation system for tourists at the park entrance, there is no evidence of the number of visitors, this being only estimated. According to the data of the National Institute for Research and Development in Tourism, Bucharest, until now, in the Dobrugean protected areas, there were systematic actions for monitoring and registration of visitors only in the Danube Delta Biosphere Reserve and in the National Park Macinului Mountains. [3]

In the year 2008, in the Danube Delta Biosphere Reserve (Tulcea municipality included), 96090 tourists were accommodated, out of which 82% were Romanian tourists and 18% foreign tourists (fig. 1); in the year 2012, in the same area 88021 tourists were accommodated, out of which 64% were Romanian tourists and 36% foreign tourists. [9]

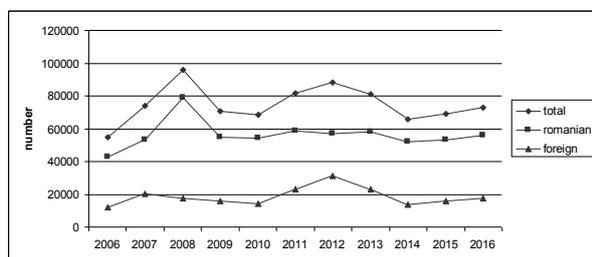


Fig.1. Number of tourist arrivals in the Danube Delta Biosphere Reserve, 2006-2016

Source: NIS, Tempo-online, 2017 [9]

In the National Park Macinului Mountains, about 10,000 visitors are mainly Romanians from the zones near the Park (the local communities or the municipalities of Brăila, Galați, Tulcea, Constanța), with an average

duration of stay of one day (and a minimum economic impact upon the local communities); the main visitor groups are local people in the localities near the park (for a picnic), bird-watchers, rovers in small groups (2-10 persons), organized groups of 20-40 persons who ask for a guide from the park administration, cycling tourists, climbers, families with caravans and personal cars. [3]

Although the estimated number of visitors in natural and national parks is high enough, we must have in view that only a small part of them have the ecotourism practice as motivation.

There are a multitude of actors involved in ecotourism development in Romania. Some of them play a more important role than others, but each of them brings a special contribution in the development of ecotourism.

The key actors involved in the development of ecotourism can be classified as follows:

- governmental institutions,
- local public administrations,
- administrations of the protected areas,
- members of the private tourism sector,
- non-governmental organizations,
- local communities,
- financiers,
- university environment,
- tourists.

In this respect, the organizations/institutions in charge (mainly environmental ones) can express their point of view on this matter, but for this purpose a special focus on verification and control is needed. In Romania, the main responsible institutions are the Ministry of Regional Development and Tourism and the Ministry of Environment and Forests (with the National Agency for Environmental Protection and the National Institute for Research and Development in Environmental Protection).

The ideal situation would be when the two Ministries would build bridges for cooperation with other ministries (Ministry of Agriculture and Rural Development, Ministry of Education, Youth and Sports, Ministry of Economy, Trade and Business Environment, Ministry of Finance) to create plans and strategies for the development and control of ecotourism impacts on the natural environment

and on how it is perceived/practiced by the society. [1]

At the moment, in Romania the NGOs with environmental profile can play a very important contribution, and by close collaboration at ministerial level, and with a particular focus on education and the local community, the "ecotourism principle" can become a reality. [3]

According to the data of the Romanian Ecotourism Association (REA) [18] and the National Institute for Research and Development in Tourism, Bucharest, [4] the economic impact produced by the ecotourism programs developed by the tourism operators – REA members is obviously on the rise. But what is remarkable is the fact that the impact at local level is much above the classical tourism average. In the case of REA members, around 80-90% of the receipts from tourism are used for the development of the area in which the ecotourism activities take place, mainly in the countryside.

The development of ecotourism activities in the local communities and within the protected areas implies the following socio-economic advantages:

- It creates jobs at local level (directly in the tourism sector or in the related sectors);
- It stimulates the local economy through the development of infrastructure and tourism services (accommodation services, food, transport, leisure facilities, craft products and guidance services, souvenirs);
- It stimulates rural economy through the creation or increase of demand for agricultural products necessary to ensure the tourism services;
- It gives momentum to infrastructure development, which also benefits the local population;
- It stimulates the development of the peripheral regions by capital insertion;
- It stimulates the improvement of the intercultural relationships specific to an ethnographic region, and the host community is thus stimulated to revigorate the folk traditions;
- In the conditions of a normal development, tourism can lead to self-financing of the

development mechanisms that could benefit the administrators of the protected areas as an instrument for their preservation;

- It supports the preservation activities, by convincing the Government and the public of the importance of the natural areas. [4]

The management plan of a protected area is the official document for establishing the objectives of it and the management measures for the efficient and responsible managing of the respective zones. This synthesizes the existing information at the date of plan making, establishes the major fields and the management objectives, as well as an action plan over a certain time horizon, generally for five years. [8]

The management plan lies at the basis of the protected area activity and represents a reference document for the planning of all the short and medium term activities in relation to it for all land owners/administrators and for all wishing to initiate and develop activities on their territory.

The main management objectives of the plan are grouped into the following themes:

- Bio-diversity preservation;
- Land utilization and utilization of natural resources;
- Preservation and promotion of cultural heritage;
- Tourism and leisure management;
- Education and awareness;
- Park management;
- Other activities specific to each park.

Another extremely useful instrument in tourism management of the protected areas is the management plan of the visitors. This directs the proper type of visitor to the proper zone in the park or its vicinity, creating the best opportunities for the fulfilment of the experience imagined by the visitor, to spend the leisure time in nature, producing a minimum negative impact upon nature and local communities and creating the best opportunities for local ecological business development in the tourism sphere. [7]

When we speak about the financing sources of the ecotourism activity, we must have in view both the financing capacity of the entities administrating the protected areas and the

possible financing sources of the other involved stakeholders. In the last years, about 85% of the financial funds at the disposal of the parks came from state sources, but not from the state budget, 12% from different projects and only 3% from own incomes (from access tariffs, sponsorships, guided trips, housing etc.). [8]

At present and for the next period, there are many financing alternatives available for the administrations of the protected areas. Among these, we can mention those of local authorities inside or near the protected areas, of the economic operators involved in the ecotourism activity and of the NGOs development activities in ecotourism or environment protection. We can also mention here the structural funds, one of the instruments by which the solidarity and cohesion policy of the EU is implemented.

The main operational programs with financing possibilities in the ecotourism activities are the following [14]:

-The Sectoral Operational Programme for Environment, Priority Axis 4 “Implementation of adequate management systems for nature protection”, co-financed from the European Regional Development Fund (ERDF);

- The Regional Operational Programme ROP – Axis 5 Sustainable development and promotion of tourism, co-financed from the European Regional Development Fund (ERDF);

-The National Rural Development Programme – financed/co-financed from the European Agricultural Fund for Rural Development (EAFRD).

-The Sectoral Operational Programme for Human Resources Development will be co-financed through the European Social Fund (ESF) and will have in view the human resources formation and development.

- The Sectoral Operational Programme Increase of Economic Competitiveness – co-financed from the European Regional Development Fund (ERDF);

- INTERREG IVC Programme, co-financed through European Regional Development Fund (ERDF). This program will benefit the public authorities and the public equivalent

bodies, as partners in the common projects with the other participant states.

Among the investments, there are projects regarding biodiversity preservation, protected natural areas administration, education and public awareness of environmental protection. Once acknowledged the importance of this sector for the protection and preservation of the natural and cultural heritage, for the economic and social development of the local communities in the natural rural areas and for the increase of tourist experience, all efforts should be made for the efficient valorization of the rich heritage of our country.

## CONCLUSIONS

Dobrudgea is traditionally known as a destination for sea and spa tourism. But Dobrudgea represents an important zone from the bio-geographic point of view, with valuable ecosystems in scientific reserves, natural reserves, national parks, and the economic impact produced by the ecotourism programs has obviously increased.

The ecotourism is an important instrument for preserving nature, educating visitors and supporting sustainable development projects.

Due to our field research, we were able to identify, at least, two distinct Dobrudgean areas where are real opportunities for ecotourism activity: the Danube Delta and the Măcin Mountains.

At present, the Danube Delta with the lagoon complex Razim-Sinoe are included in the *Danube Delta Biosphere Reserve*, which has a triple international status: Biosphere Reserve, RAMSAR site (wetland of international importance) and World Natural and Cultural Heritage Site.

The territory of the Măcin Mountains are included in the *Macin Mountains National Park*, which is accessible to a wide range of tourists, interested in hiking, landscapes, flora, local fauna, studies and documentations.

A multitude of factors are involved in ecotourism development in Dobrudgea. Some of them play a more important role than the others, but each brings its special contribution to ecotourism development.

In the present economic conditions, the great majority of tourists (even the wealthy ones), are concerned about the price of tourism services. Tourists began to pay great attention to their expenditures, the prices of tourism services being the main variable in the consumers' choices.

In most protected areas in Dobrugea, networks of tourist routes were created, most of them being certified or on the way to be certified. Most routes are for camping, but cycling routes or water routes were also established (in the parks located on wetland areas).

In the Danube Delta Biosphere Reserve, with an old tradition in tourism, different other variants of access inside it emerged over time, i.e. transport by boats and by ships of various sizes.

However, it is estimated that the internal accessibility in the natural and national parks is low (routes in bad conditions) and this should be improved (not in quantitative terms, but rather in quality), taking into account the preservation needs, the needs for local development and the quality of tourism experience.

The inevitable path that the large tourism companies will follow is the opportunity for innovative start-ups to successfully launch their new products, grow the ecotourism market and leapfrog their established rivals.

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## STUDY ON THE PORK MARKET WORLDWIDE

Elena SOARE, Irina-Adriana CHIURCIU

University of Agricultural Sciences and Veterinary Medicine Bucharest, 59 Marasti, District 1, 011464, Bucharest, Romania, Phone: +40213182564, Fax:+40213182888, Mobile:+40744 6474 10, Emails: soare.elenausamv@gmail.com; irina.chiurciu@yahoo.ro

**Corresponding author:** soare.elenausamv@gmail.com

### **Abstract**

*The present study analyzes the evolution of the pork market worldwide in the 2010-2016 period. For the analysis of the pork market in the world, several specific indicators were interpreted. Among the indicators analyzed in this study, the most significant are: number of pigs worldwide, global pork production, the total consumption of pork in the world, average prices for living pigs at the Chicago Board of Trade, imports and exports of pork etc. In the analysis of the main indicators it is showed that they varied from one year to another due to the decisions taken by the main actors which are present on the international pork market. In this study, there have been made clarifications on the evolution of the pork consumption worldwide for the period 2018-2026. This aspect is very important for both producers and consumers of pork that are found on the globe. The main statistical data that led to the current study were taken from national statistical sites as well as from different specialized materials.*

**Key words:** pork, prices, imports and exports, total consumption of pork, swine flocks worldwide

### **INTRODUCTION**

From the food point of view, meat is a significant source of nutrients and energy indispensable to modern humans. Meat is a very important food for the world's population due to: balanced chemical composition in trophies; culinary potential and superior digestibility. The chemical composition of the meat differs depending on the species [12, 13, 16].

The chemical composition for the category "Meat Porcine for Meat" g/100 is the following: water 51.5 g; proteins 41.3 g; lipids 33.3 g and mineral salts 0.9 g. The energy value for this category of meat is 357 kcal/100 g. The energy value for pork is generally high compared to other types of meat. For example, rabbit meat has an energy value of 138 kcal/100 g [3].

In animal productions, meat represents the main production in terms of both value and protein, compared to milk production. Worldwide, meat has a significant share in trade relations between world states. In the contemporary world, scientific nutrition gives meat and meat preparations an essential role in the ration's daily structure [1, 2, 11].

Consequently, meat consumption is a basic indicator of the standard of living as presented in the statistics made by sociologists and economists [7].

According to the studies, the pigs are a category of animals that provide a significant amount of meat for human consumption. Currently, swine meat provides over 30% of the world-wide meat consumption [8].

Regarding the nutritional characteristics of pork meat, it is necessary to specify that these depend on several factors, of which the most representative ones are: the breed; the feeding mode; the age; the sex; the health condition and the slaughtering conditions etc [14, 15, 17]. Pork is characterized by high fat content on the one hand, and on the other hand it is an important source of protein, iron and zinc [18].

### **MATERIALS AND METHODS**

In order to carry out this study, a series of statistical data regarding the intentional pig meat market was taken and analyzed. The most representative indicators of this market are: swine flocks worldwide; total production of pork; per capita consumption of pork; average prices at the Chicago Board of Trade; imports and exports of pork. The statistical data that led

to the research were taken from international profile sites as well as from various specialty materials.

## RESULTS AND DISCUSSIONS

Worldwide swine flocks during 2010-2016 recorded fluctuations from one year to the next (Figure 1). The largest flock was registered in 2013 (802,200 thousand heads). On the opposite side, the smallest flock was recorded in 2016 (785,241 thousand heads).

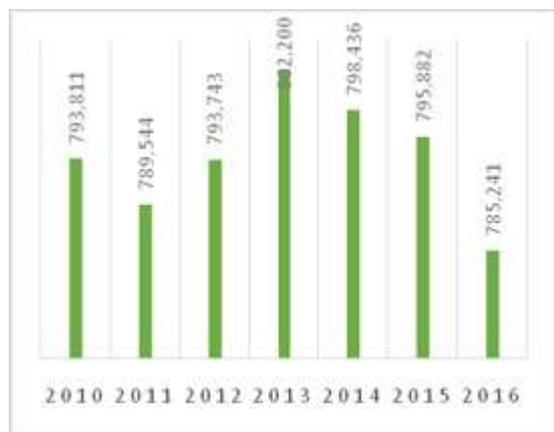


Fig.1 Swine flocks worldwide, 2010-2016 (Thousands Heads)

Source: [5, 6]

From the statistical data on swine flocks in the world, it can be noticed that in 2016, the results decreased by 1.1% compared to 2011. According to the official data published for the year 2017, there is a forecast of 769,053 thousand swine heads and for January-October 2018, an effective of 755,242 thousand heads of pigs. From the predicted data, it can easily be noticed that swine effectives will go on a declining trend.

The production of pork oscillated during the analyzed period (figure 2). The largest pork production was recorded in 2014 (110,652 thousand tons equivalent casing), and the lowest production was registered in 2010 (103,032 thousand tons equivalent casing). In 2016, pork production grew by 6.7% compared to 2010.

According to official statistics the main pork producer worldwide is China. It accounts about 50% of the world's world production of pork.

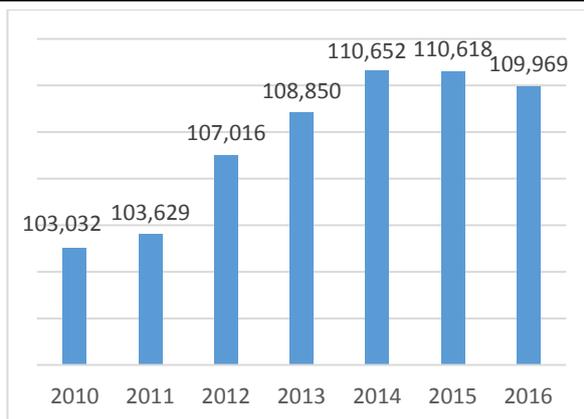


Fig. 2. Pork production worldwide in 2010-2016 (Thousands of tons equivalent casing)

Source:[5,6]

The increase in pork production recorded in China was mainly due to an increase in the domestic demand for pork.

A significant aspect worth highlighting is that in China the pork sector is stimulated by government subsidies. Worldwide, among the top pork producers, the second is the European Union, and the third is the USA [25].

For the year 2017, a production of pigs of 111,034 thousand tons equivalent casing was provided, and for January-October 2018, a production of 113,070 thousand tons equivalent casing. From the predicted data for pork in 2017, the production is expected to increase by 0.96% compared to 2016.

Globally, meat consumption is generally influenced by a number of factors, such as: food consumption patterns; the standard of living; meat production and animal husbandry conditions; consumer prices etc.

It is necessary to mention that, compared to other categories of goods, meat production is carried out at relatively high costs. The increase in meat consumption in some countries is mainly due to the increase in population incomes and urbanization.

As urbanization intensifies, a number of consumers have changed their eating habits, including a higher amount of animal protein [9].

The total consumption of pork in the world during the analyzed period recorded variations from one year to the next (Figure 3). In 2010, the world's lowest total pork consumption was 102,898 thousand tons equivalent casing. The highest pork consumption was recorded in

2015 (110,148 thousand tons equivalent casing). In 2016, total pork consumption worldwide increased by 6.5% compared to 2010.

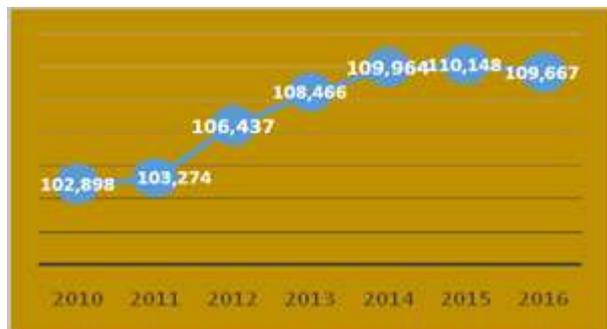


Fig. 3. Total consumption of pork in the world during the period 2010-2016 (Thousands of tons equivalent casing)

Source: [5,6]

It is important to note that the high consumption of pork is recorded in China. On the following positions in the pork consumers top are: European Union; US; Russia; Brazil; Japan; Vietnam, Mexico and Korea [25].

In terms of total pork consumption worldwide for the period 2018-2026, it is estimated that it will be on a positive trend. The lowest quantity consumed will be 118,653.3 thousand tons (2018), and the highest will be 127,520.7 thousand tons (2026) (Figure 4).



Fig.4. Forecasts of total pork consumption worldwide in the period 2018-2026 (Thousand tons)

Source:[9]

Regarding pork consumption per capita in the world, it varied slightly over the analyzed period (Table 1).

Table 1. World consumption of pork per capita in 2010-2016 (kilograms / inhabitant)

| Specification | 2010  | 2012  | 2014  | 2016  |
|---------------|-------|-------|-------|-------|
| Pig meat      | 15.82 | 15.74 | 16.12 | 15.74 |

Source:[10]

According to official statistics, in 2016, the highest meat consumption per capita in the world was recorded for pork (39.8% of the total meat consumed per capita) [19].

According to statistical data published by the OECD, in 2016 the largest regions and countries consuming pork were: European Union (32.3 kg/capita); China (30.8 kg/capita); Vietnam (28.9 kg/capita); Korea (28.3 kg/capita); OECD-Total (23.3 kg/capita); United States (22.8 kg/capita); Paraguay (20.9 kg/capita); Australia (20.5 kg/capita); Russia (20.0 kg/capita) etc.

According to the same source, at the opposite end, with the lowest consumption of meat, we find: South Africa (3.4 kg/capita); Peru (3.3 kg/capita); Haiti (3.2 kg/capita); Indonesia (2.3 kg/capita); Israel (1.6 kg/capita); Zambia (1.5 kg/capita); Sub-Saharan Africa (1.1 kg/capita); Nigeria (1.1 kg/capita); Ghana (0.8 kg/capita); Saudi Arabia (0.2 kg/capita), Tanzania (0.2kg/capita); India (0.2 kg/capita); Egypt (0.2 kg/capita); Turkey (0.1 kg/capita); Algeria (0.1 kg/capita).

According to official estimations, between 2018 and 2026, world pork consumption per capita will not exceed 16.0 kg (Table 2) [9].

Table 2. Forecasts of pork consumption per capita globally in the period 2018-2026 (kilograms / inhabitant)

| Specification | 2018  | 2020  | 2022  | 2024  | 2026  |
|---------------|-------|-------|-------|-------|-------|
| Pig meat      | 15.66 | 15.69 | 15.62 | 15.62 | 15.56 |

Source: [10]

A determining factor in the pig meat market is the average price for live pigs. In the paper are presented the average prices for live pigs at the Chicago Board of Trade in the period 2010-2014. These varied over the analyzed period from one year to the next. The highest price was \$ 2,335.00/ton (2014), and the lowest price

was \$ 1,667.80/ton (2010) (Fig. 5). From the data presented, it can be noticed that in 2014, the average price for live pigs increased by 40.00% compared to 2010.

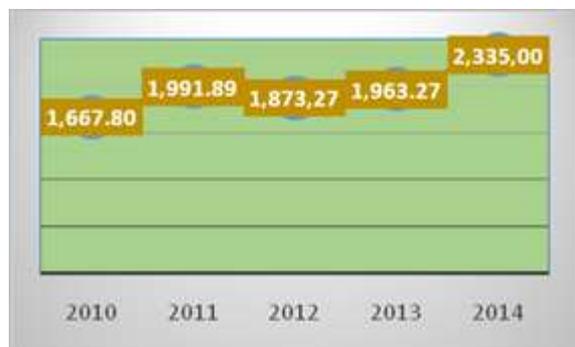


Fig. 5. Average prices for live pigs at the Chicago Board of Trade, 2010-2014 (\$ / ton)  
Source: [20, 21, 22, 23, 24, 25]

The international pig meat market in 2010-2016 was dominated by a variation in both quantitative imports and quantitative exports. Imports of pork ranged between 5,901-7,973 thousand tons in equivalent casing (figure 6). In 2016, quantitative imports of pork increased by 35.1% compared to 2010.



Fig. 6. Dynamics of quantitative imports of pork in the world during 2010-2016 (Thousand tons in equivalent casing)  
Source: [5, 6]

In the world, in 2016, imports of fresh, chilled or frozen pig meat were dominated by: Japan (4,166,179 \$); China (3,190,419 \$); Italy (1,982,137 \$); Germany (1,592,068 \$); United States of America (1,330,068 \$); Poland (1,314,978 \$); Mexico (1,312,295 \$); Republic of Korea (1,268,026 \$); United Kingdom (1,050,654 \$) and Hong Kong, China (876,197 \$) [4].

Quantitative pig meat exports fluctuated between 6,032-8,320 thousand tons in the equivalent casing (Fig. 7). It is noticed that, in 2016, the quantitative exports of pork rose by 37.9% compared to 2010.

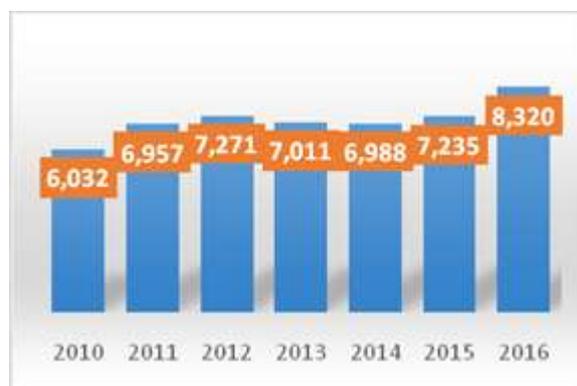


Fig.7. Dynamics of quantitative exports of pork in the world during the period 2010-2016 (Thousand tons in the equivalent casing)  
Source: [5,6]

In terms of exports of fresh, chilled or frozen pork meat in the world in 2016, they were dominated by: Germany (4,349,885 \$); United States of America (\$ 4,224,777); Spain (3,550,205 \$); Denmark (2,628,643 \$); Canada (2,387,446 \$); Netherlands (2,018,068 \$); Brazil (1,349,499 \$); Belgium (1,318,556 \$); France (878,573 \$) and Poland (836,970 \$) [4].

## CONCLUSIONS

Following the analysis of the world pork market, we found the following:

- the swine flocks have fluctuated from one year to the next;
- the largest number of pigs was 802,200 thousand heads (2013);
- pork production depended, on the one hand, on the flocks for meat and on the other hand on the weight of the pigs in the slaughterhouse;
- the most significant pork production was achieved in 2014 (110,652 thousand tons equivalent casing);
- in 2015, the highest consumption of pork (110.148 thousand tons equivalent casing) was registered;
- in 2016, according to official statistical data, the largest pork consumers per inhabitant, with over 20 kilograms per inhabitant, were: European Union (32.3 kg/capita); China (30.8

kg/capita); Vietnam (28.9 kg/capita); Korea (28.3 kg/capita) United States (22.8 kg/capita); Paraguay (20.9 kg/capita) and Australia (20.5 kg/capita);

-the average of 2014 live pig prices recorded at the Chicago Stock Exchange was \$ 2,335.00 / ton, marking an increase of 11.89% over the average of 2013;

-during 2010-2016 there were registered fluctuations of imports and exports of pork, both in terms of quantity and value;

-quantitative pork meat imports increased by 35.1% in 2016 compared to 2010;

-in 2016, the most significant value imports of pork were recorded by Japan (4,166,179 \$);

-the largest quantitative exports of pork were 8,320 thousand tons in the equivalent casing (2016);

-in 2016, highest exports of fresh, chilled or frozen pork were recorded by Germany (4,349,885 \$)

-forecasts for the period 2018-2026, in terms of fundamental market factors (production, trade and consumption) reveal that changes will be recorded from one year to the next.

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## THE CONTROL OF THE DEFOLIATOR *LYMANTRA MONACHA* L. POPULATIONS (LEPIDOPTERA: LYMANTRIIDAE) BY MAKING USE OF PHEROMONE TRAPS IN THE FOREST RANGE MIERCUREA SIBIULUI (ROMANIA) IN THE PERIOD 2011-2015

Cristina STANCĂ-MOISE<sup>1</sup>, Tom BRERETON<sup>2</sup>, Robert BLAJ<sup>1</sup>

<sup>1</sup>“Lucian Blaga” University of Sibiu, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, Sibiu, Romania, Phone: 0040269234111, Fax: 0040269234111, E-mails: cristinamoise1@yahoo.com, robert\_blaj@yahoo.com

<sup>2</sup>Butterfly Conservation, Manor Yard, East Lulworth, Wareham, Dorset, BH20 5QP, UK

**Corresponding author:** cristinamoise1@yahoo.com

### Abstract

*The studies which were effected by different authors enabled to be published some articles which include scientific results related to the most important defoliator of coniferae - the nun moth Lymantria monacha L., 1758. In this work the researches had an applicative character, with the view to using the results in drawing up a plan for monitoring and control the populations of Lymantria monacha L., 1758, by making use of pheromone bait traps. At the same time, the researches had in view to get new scientific information in order to improve the methods of controlling the pest, existent at the moment and of tracing the focuses of this pest, prejudicial to the forest domain of Sibiu county (Romania). The studies enabled also to be tracked the dynamics of the population of Lymantria monacha L., 1758 and to notice that the male moths can be attracted by using pheromone bait to open areas, 200-250 m distance from the border of the forest. The studies were effected in the spruce and fir arboretum which cover 70 percent of the forest, aged between 50 and 125 years. The researches effected in the last 5 years (2011-2015) aimed at the monitoring of this month, the dynamics of its population, the efficiency of capturing the male moths and the way of installing the pheromone traps in the domain of the state Forest Range Miercurea Sibiului and the private Forest Range Tilișca, totalizing 14,932.37 hectares forest.*

**Key words:** *Lymantria monacha* L., 1758, monitoring, pheromone, trap

### INTRODUCTION

*Lymantria monacha* L., 1758 is a major pest of coniferous trees in Europe and Asia. For example, in Poland from 1978-1984 3.7 million ha of coniferous woodland was infested. In parts of Europe [15,26], the frequency of occurrence of outbreaks has increased in recent decades. Monitoring and control of populations are vital activities including across Romania where woodland covers 29% of the land surface and forestry is an important economic activity. Direct control with insecticides is an effective method of control over large areas, whilst pheromone trapping can be used as a means of disrupting mating [6]. Conventional monitoring methods

include winter egg counts, larval counts, larval frass estimates, pupal counts, counts of adults resting on tree trunks and defoliation assessments [1-5,7,14,25]. However, these methods are labour-intensive and not good at detecting population increases over short time scales. Pheromone-based monitoring is an alternative method of detecting population change in pest moth species over short time frames, though research on the technique is at a relatively early stage and more is required. This study contributes to this knowledge gap, looking at effectiveness and applicability of various types of pheromone trap (panels, funnels, tetraptraps) baited with Atralymon, a synthetic pheromone specific to this defoliator. Specific objectives of the study related to

monitoring and control of *Lymantria monacha* populations using Atralymon pheromone traps included: the efficiency of traps used, position of traps (placed on the tree trunks), the dynamics of the captures, the variation in the number of populations and evolution trend of the defoliator populations in four production units.

## MATERIALS AND METHODS

A total of 85 Atralymon pheromonal traps (Fig. 2) were installed in the Forest Range Miercurea Sibiului (Sibiu, Romania) over the period 2011-2015 on plastic panels with glue for capturing the males of *Lymantria monacha* L., 1758. Among them, 81 panels with Atralymon pheromone traps were dissipated in the state Forest Range Miercurea Sibiului and four panels with traps in the private Forest Range of Tilișca village, Sibiu County.

Pheromone traps were placed in all woodlands with spruce and fir trees [13], and in mixed spruce-fir-beech forests, where spruce and the fir trees represented more than 30 %, of tree composition. The traps were placed before the emergence of adults, with the flight period varying according to the altitude and the latitude of the monitored forests [16,18,23,24]. To representatively sample forest areas (Fig.1), a grid (1:20.000 scale, as used in local forest planning) was placed over wooded areas, with traps set at evenly-spaced intervals in each grid cell and with each trap having an independent capturing surface of 200ha of forest.

These panel type traps (Fig. 3), manufactured by the Chemistry Institute “Raluca Ripan” in Cluj-Napoca were tested. Each of the 85 traps was an experimental variant, with a view to establishing the optimal position on the tree trunk of the panels with glue and Atralymon.

The largest number of moths *Lymantria monacha* were captured in 2012 in the lookout point UP III Bistra, u 162B (50 insect copies); the composition of the arboretum was 10 Mo, the altitude 1200 m, the NorthEast exposure, arboretum age 95 years, the defoliator being still in the latent period.

According to this distribution, the panels were numbered from the trap no. 1 to 81,

downstream located, on the line of highest slope and going on clockwise in the three plantations of the Miercurea Sibiului Forest [24] Range and the traps 82 to 85 in the Tilișca Forest Range.



Fig.1. Region Map (orig.)

The data obtained between 2011-2015, related to the captures in the panel type pheromone traps utilized in the two forest ranges mentioned above, have allowed to establish the duration and the flight dynamics of the moths (males) and to ascertain differing proportions of captured moths.

In the three areas in Miercurea Sibiului Range Forest and in the area in Tilișca Range Forest, analysis was undertaken on correlations between the number of moths captured annually in traps and climatic factors. The climate data of the last five years was obtained from Sibiu Meteorological Station [17,19-22], located within the studied area.

In the cases with significant ties we established also the respective regressions.



Fig. 2. Pheromone traps installed in stand (orig.)

conditions both on the pheromone attraction and on the level of the insect populations.



Fig. 3. Atralymon pheromone traps (orig.)

## RESULTS AND DISCUSSIONS

The captures obtained in traps used in the area of Miercurea Sibiului and Tilisca Forest Ranges helped to be established the dynamics of the *Lymantria monacha* populations; they took place in the arboreta: III Bistra, IV Cibán, V Fode and UBI Tilişca where 70% of tree composition consists of spruce and fir trees, their age ranging between 50-125 years.

The number of moths captured varied annually, most likely due to variations in annual weather and the dynamics of the defoliator population, especially in the studied area of spruce and fir trees, in the Forest Range of Miercurea Sibiului. In 2012 it was recorded the highest number of insect copies captured: 2,567, followed by 2013 with 2,157 insect copies, then 2011 with a total of 1,989 males captured. In 2015 it was recorded the capture of 1,179 insect copies; the fewest captures were in 2014, when it was recorded 781 male insects captured (see Table 1).

Results of the captures in different types of traps are presented in Fig.4.

Regarding the average captures made on in different repetitions, it was ascertained that there are differences between them, this fact proving the influence of the stationary

Table 1. The disposition in the forest of the traps placed on the tree trunks in the four production units and monitoring the captures of *Lymantria monacha* L., 1758, during 2015

| UP             | Surface (ha) | Tree composition | Age of the trees (years) | Average number of moths captured in a pheromone trap / Tree number/ha) | Traps installed/ captures number    |
|----------------|--------------|------------------|--------------------------|--|-------------------------------------|
| III BISTRA     | 4.300        | 8Mo2Fa           | 50-110                   | 21.86 moths/993 trees  | 29 traps/634 moths                  |
| IV CIBAN       | 2.400        | 10 Mo            | 50-120                   | 13.46 moths/1150 trees   | 29 traps /391 moths                 |
| V FODE         | 2.000        | 10 Mo            | 85-125                   | 5.87 moths/582 trees   | 23 traps/135 moths                  |
| U.B.I. TILIŞCA | 800          | 10 Mo            | 50-120                   | 4.75 moths/367 trees   | 4 traps/19 moths                    |
| <b>TOTAL</b>   | <b>9.500</b> |                  |                          | <b>13.87 moths/773 trees</b>   | <b>85 traps/1179 moths captured</b> |

The number of moths captured in the downstream panels (traps 59 and 81) was larger than the number captured in the panels located upstream (traps 1 and 29), respectively 634 compared with 135.

This situation can be explained by interpreting the ecology of the moth and the direction of air currents when adults are active. Previous research [8-12] has shown that the adult activity mainly takes place between 22.00-04.00, with the peak 23.00-01.00.

These flight intervals vary, depending on local weather conditions and microclimate factors.

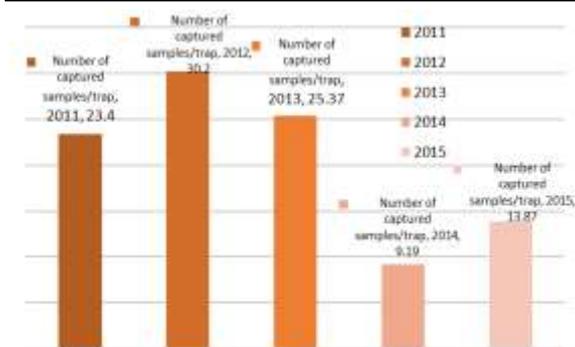


Fig. 4. Number of insect copies captured in a trap

The movements of air masses in the slopes, respectively in experimental areas, are governed, in the absence of strong winds, by the mountain breeze. This breeze causes descending air currents on the slopes and along the valleys. By combining the two components of the direction of the air movements, it is obtained a result which goes over the slope from upstream to downstream, intersecting obliquely the contour lines.

Under these circumstances Atralymon, which is a volatile product, is carried downstream by the mountain breeze and is received by *Lymantria monacha* L. 1758 males. The flight of the male moths will follow the direction of the mountain breeze, but to the opposite direction, to the source which is spreading the substance attractive for them. In their nocturnal flight, the moths will meet mainly the panels 59-81.

The discrepancies between the captures from the traps located downstream and those located upstream recorded values of 9.19 % in 2014, 13.87 % in 2015 and values ranging between 23.40-30.20% in the period 2011-2013 (Fig.4).

#### Duration and dynamics of the flight

*Lymantria monacha* was on the wing from July-September, but the beginning and the end of the flight varied, depending on year and trap location. The flight dynamics in the four production units: III Bistra, IV Cibana, V Fode and UBI Tilișca studied during the years 2011-2015. The occurrence of two broods of *Lymantria monacha* is indicated only by data from the III Bistra area, where a higher discontinuity in all years of study is remarked. However, until the genetic data, which must prove the existence of two or more populations of *Lymantria monacha* L., 1758 in the area, are

not obtained, this assumption cannot be scientifically sustained.

Over the five-year study period, most captures were made from mid-July to the end of August. A later peak with lower abundance was noted in 2012, presumably due to unseasonably wet and cool weather.

## CONCLUSIONS

During the activity of mounting the pheromone traps panels in the Forest Range Miercurea Sibiului, which were utilized to detect and capture the pest, it was ascertained, over the years, that the traps are more effective if mounted on the downstream side of the tree trunk, as in this position the captures are 20-35% higher than on the upstream side of the same trunk.

The flight of the moths in the four investigated areas: III Bistra, IV Cibana, V Fode and UBI Tilișca started during the second and third decade of July, earlier or later, subject to the local conditions of standing and arboretum.

The flight activity took place mostly until the first decade of August, when over 75% of all males was captured. From this point of view and considering the yearly captures, the development of the flights in 2012 was similar to 2013, respectively 2015 and 2014, when it registered a postponement of the captures towards the autumn.

Moth density (number of male/trap) was significantly influenced by the changes in maximum temperature in May each year, by the precipitations recorded during the flight period and by the annual aridity. The level of the captures is positively correlated with maximum temperature and negatively with the precipitations and the index of aridity.

Density measures for 2011-2015, indicate the moth was at latent levels, with no evidence of an imminent outbreak.

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## STUDIES CONCERNING THE SITUATION OF WINE PRODUCERS IN SWITZERLAND

Petrică ȘTEFAN<sup>1</sup>, Stefan MANN<sup>2</sup>, Gina FINTINERU<sup>1</sup>

<sup>1</sup>University of Agricultural Sciences and Veterinary Medicine, 59 Marasti, District 1, 11464, Bucharest, Romania, Phone:+40213182564, Fax:+40213182888, Mobile:+40743644744, Emails: stefanmarian2004@yahoo.com, gina2007ro@yahoo.com

<sup>2</sup>Agroscope, INH Institut, Tänikon, CH-8356 Ettenhausen, Switzerland, Email: stefan.mann@agroscope.admin.ch

**Corresponding author:** stefanmarian2004@yahoo.com

### *Abstract*

*In this paper we seek to analyze the level of wine production and rural tourism in Switzerland. The various factors in wine production and their functions represented the different segments, their links and the global values and identified the added value for each segment of the value chain. 443 respondents were selected using the multi-stage sampling technique and interviewed using structured questionnaires, informal interviews and observation techniques to obtain primary results. This resulted using the functionality and analysis. The work concluded that Switzerland, although having a small agricultural area, the surface cultivated with vines is relatively significant (over 15,000 hectares). Also, production of more than 1 million hectoliters per year is destined for self-consumption, the exports representing only about 1% of total production.*

**Key words:** financial situation, resources, Switzerland, vineyards, wine producers

### INTRODUCTION

Switzerland is an important grapes and wines producer even if it does not have a very large vineyard area comparing with other countries (about 15,000 hectares of vineyards, especially in the South and West of the Federation, mainly in the cantons of Geneva, Neuchâtel, Ticino, Wallis and Waadt) and the average area per producer is less than 4 hectares [9].

Switzerland produces about 1 million hectoliters of wine annually, of which about 479,000 hl of red wine and 522,000 hl of white wine. Almost all of their wine production being destined for domestic consumption. Less than 2% of wine production is exported, especially in the surrounding countries (Germany being on the first place in this ranking). Swiss wines enjoy an exceptional heritage, with over 60 local varieties (old varieties and modern crosses). Many known varieties - Chasselas, Savagnin - have their genetic origin on the current territory of Switzerland, and others more obscure (Armigne, Arvigne, Bondola, Cornalin) are found only in a canton or valley. In this sense, knowledge of varieties is

important. At the same time, there are many known varieties that give very good results - Pinot Noir, Gamay and Merlot from tomatoes, and Chardonnay, Pinot Gris and Chenin Blanc from the white. Pinot Noir owns the largest planted area, followed by Chasselas, Gamay, Chardonnay and Merlot. Generally northwest is of white wines, and the center and Southern of red wines.

We also wanted to find out if the wine producers practice rural tourism and if so, to what level this activity influences the financial situation of the holding [1].

The climate is heavily influenced by the prevailing currents from westerly directions mainly deliver a mild, humid sea breeze to Switzerland. In summer, it has a cooling, in winter a warming effect, and most areas enjoy an adequate amount of precipitation throughout the year. The Alps are acting as a prominent climatic barrier between Northern and Southern Switzerland. In the Southern part of Switzerland, which is influenced mainly by the Mediterranean Sea, winters are considerably milder than in the Northern part. Aside from their dominant effect as a climatic

barrier between the North and South, the complex mountain range of the Alps additionally creates several different climatic regions [6],[7],[10].

The climate of Switzerland is characterised by a number of special features – ranging from snowfall during spring, a cold snap in June to fog and heat as summer in autumn [10].

Even though 40% of Switzerland's surface area is mountainous, there are six vineyards that group a variety of soils and microclimates: Valais - with over one third of total production, Vaud, German cantons, Geneva, Ticino, and the three-lakes region (Neuchatel).

The great lakes, the sunny valleys, the warm winds, the terraces with Southern exposure, all create favourable conditions for the optimal development of vineyards. On the shores of Lake Lemman there is even a Mediterranean microclimate [1], [7].

Historically, on the current territory of Switzerland, there is continuous wine from the time of the Romans, who founded here the province of Raetia, and many modern localities are drawn directly from the ancient Roman settlements. Even since the early Middle Ages, there have been commemorations of vines, between monasteries.

There are several areas where there are documented over 1,000 years of uninterrupted cultivation - the Lavaux estates, for example, is UNESCO heritage. Even today, many manufacturers have been doing this for several generations, and there are wine growers' associations more than 100 years old [9].

In this context, the purpose of the paper aimed to analyze the level of wine production and rural tourism in Switzerland. The various factors in wine production and their functions represented the different segments, their links and the global values and identified the added value for each segment of the value chain.

## MATERIALS AND METHODS

A thousand questionnaire were sent to the Swiss wine producers to which 443 responded. For the following reasons: retirement, changing the field of activity or other reasons we did not get more answers.

The 443 vineyard locations analysed in this study totalize 1,650 ha (11%) from a total area of approximately 15,000 ha of Swiss vineyard. On the surface of 20 of the 26 cantons of Switzerland, the people surveyed carry out their production. In the six remaining cantons, the vine is less present or missing.

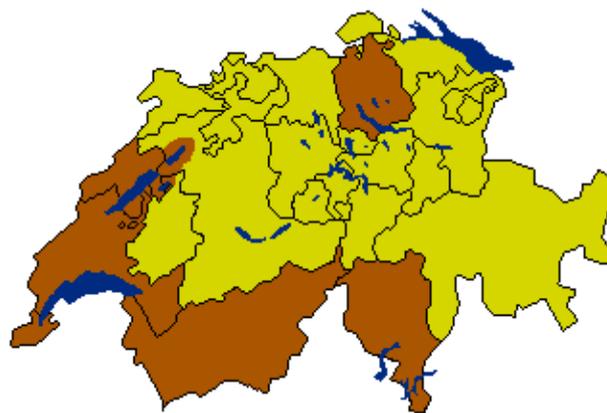


Fig. 1. The main wine regions of Switzerland (in brown color) [9]

To a certain number of people, it represents either the entire population or a sample drawn from this population [5].

The purpose of the survey of consumer attitudes toward organic products is that of making estimates, based on the results from the processing of obtained data and using the principles of the probability theory, the appropriate parameters of the total population, elements that are included in the name of the *statistic survey*.

The questionnaire has been chosen as tool for gathering the information necessary for the research, for the purpose of reaching the goals and performing the study, as well as for economic reasons.

Using the survey shows that the representativeness of a sample primarily depends on the proper choice of methods and selection types.

Among the most important methods used in this purpose are: opinion polls, SWOT surveys, surveys on the quality of products and services, surveys on product sales and information, etc. [10].

## RESULTS AND DISCUSSIONS

The questionnaire highlighted aspects related to:

(a) *County or counties* where production takes place – Most part of the wine producers interviewed operate on the surface of a single county. The main counties as the number of respondents being Waadt and Wallis;

(b) *Year of birth* of the person interviewed – the average age of the Swiss winemakers is almost 54 years – average of born year being 1963.63;

(c) *Gender* - 89% of men and 11% of women;

(d) *Last graduated school* - the calculated average tells us that most of them have, at least, graduated the high school;

(e) *Full-time or part-time activity* - 58% of the respondents have the full wine production concern, for 42% of them is only a part-time activity;

(f) *Selling price of grapes* (if they sell grapes) - about 63% of producers sell grapes and the average price/1 kilo is about 3.52 CHF;

(g) *Wine price* is divided into 4 categories:

- a. under 15 CHF / 0.75 l
- b. between 15 and 20 CHF / 0.75 l
- c. between 20 and 30 CHF / 0.75 l
- d. over 30 CHF / 0.75 l

(h) *The mode of exploitation*: conventional, with ecological services required, biologic-organic or transition [3].

(i) *Agricultural surface*: arable land, grassland, vine, other perennial crops

(j) *Turnover (%)*: *The financial situation of the agricultural holding*: very good, good, fair, poor, very poor

(k) *Wine marketing (%)*: direct or through specialized distributors

(l) *Tourist facilities* (where applicable): pump room, restaurant, winery, accommodation, playground, events in which they participate, others to mention

(m) *The manufacturer's attitude* towards the following statements:

- ✓ productivity per unit area,
- ✓ the contribution of tourist activities to the direct sale of wine,
- ✓ the existing portfolio,

support from local authorities and from the state, the location of the farm in a scenic area [9].

For this last situation the scoring was performed from 1 to 7, as follows:

- ✓ Total disagreement - 1 point,
- ✓ Disagreement - 2 points,
- ✓ Rather disagree - 3 points.
- ✓ Undecided - 4 points,
- ✓ Rather agree - 5 points,
- ✓ Agree - 6 points,
- ✓ Totally agree - 7 points [4].

The most important answers to the applied questionnaire are related to:

### 1. The price of wine

The results obtained are represented in Table 1 and Figure 2 where you can see the following: more than 52% of the wine marketed by the producers is sold at a price of less than 15 CHF / 0.75 l and only 2.88% is sold over 30 CHF, but prices are significantly higher relative to other countries.

Table 1. The price of wine for 0.75 l in Switzerland

|                                |         |
|--------------------------------|---------|
| under 15 CHF / 0.75 l          | 52.64 % |
| between 15 and 20 CHF / 0.75 l | 31.59 % |
| between 20 and 30 CHF / 0.75 l | 12.89 % |
| over 30 CHF / 0.75 l           | 2.88 %  |

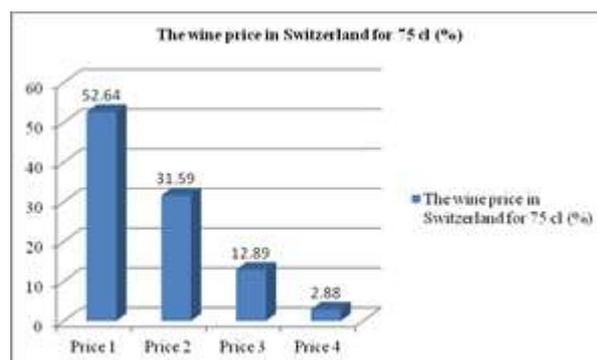


Fig.2. The price of wine in Switzerland for 0.75 l

Note:

Price 1= below 15 CHF; Price 2= between 15&20 CHF

Price 3=between 20&30 CHF; Price 4= over 30 CHF.

Source: Own calculations

**2. The agricultural area** - as it is distributed by the vine growers.

The obtained results with the area of land cultivated by wine producers are as follows (as shown in Fig. 3):

-Over 8 ha is the average of the arable land exploited by each producer;

- Approximately 4.8 ha is the average of the areas occupied by the grass;
- The vineyard culture with an average of 3.78 ha / producer;
- Almost 1 ha for each is the average for other perennial plants.

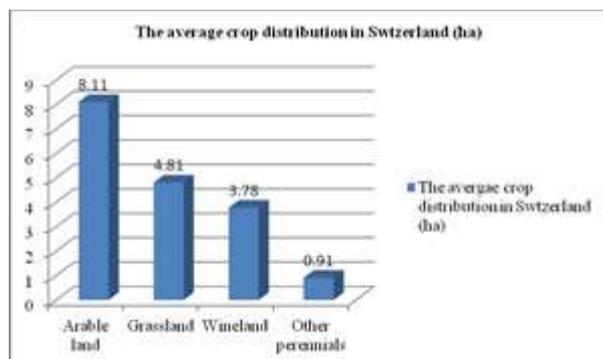


Fig.3. The average crop distribution in Switzerland (ha)

**3. The financial resources** of producers are highlighted in Figure 4. We find the following percentage situation:

- Nearly 64% of the average revenue comes from the sale of grapes or wine;
- 26.8% come from agriculture, except for viticulture;
- 1.38% of tourism;
- 8% of revenues are financial sources from other activities outside the agricultural holding.

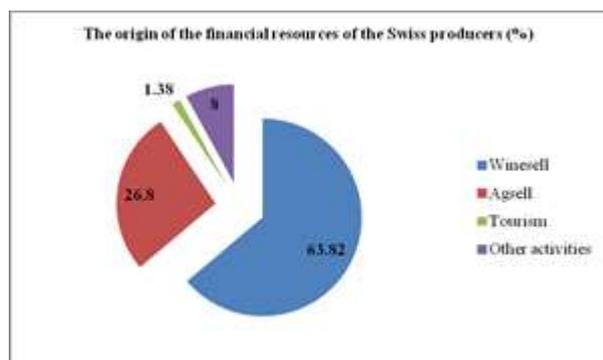


Fig.4. The origin of the financial resources of the Swiss producers(%)

Source: Own design.

**4. Tourist facilities** offered by wine producers (Fig. 5). Although, in terms of the overall income average, tourism activities in wine farms are not very high (less than 1.4%) but they are on the upward path, most of the producers wanting to combine these two branches.

Thus, in terms of facilities, we received the following answers:

- 5 % have pump room;
- 2.5% of respondents can provide food services;
- 6.3% have wineries (they can also organize wine tastings at their own farm);
- 3.2% can offer accommodation;
- Approximately 1.1% provide a playground for children;
- Over 28% participate in different events: fairs, exhibitions, tastings, etc.;
- 8% also offer other services worth mentioning.

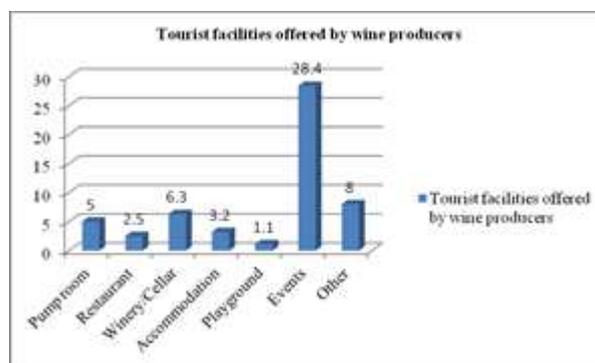


Fig.5. Tourist facilities offered by wine producers

Source: Own calculation and design.

**5. The attitude of Swiss wine producers** is presented in Fig.6.

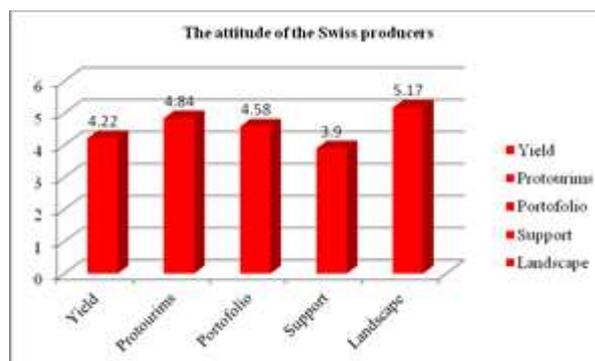


Fig.6. The attitude of the Swiss producers

Source: Own determination.

The Fig.6. shows the following aspects:

- Productivity per unit area – 4.22 points is the average out of 7 [5];
- The contribution of tourism activities to the direct sale of wine – 4.84;
- The existing portfolio (5 points) - broadly they have loyal customers – 4.58;

- Support from the local authorities and the state (3.9 points) - the state and / or the local authorities does not help too much;
- The location of the farm in the scenic area (5.17) - the attitude, from this point of view, is favorable, the producers being pleased with the landscape of their area.

## CONCLUSIONS

Vine culture and Swiss wine production are a great surprise to our study but a challenge at the same time. Tight data is the result of a busy but pleasant job.

In this small country as a surface, with a reduced agricultural area and with a smaller vine area, wine production is still high even if it covers more household use.

The tourist activities in the vineyards do not bring too much financial contribution but they are in continuous process of development from this point of view.

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## ASSESSMENT OF SOCIAL COHESION INDICATORS AND RURAL POVERTY REDUCTION IN NIGERIA

Zainab Aina USMAN<sup>1</sup>, Kehinde Oluseyi OLAGUNJU<sup>2</sup>

<sup>1</sup>Achieving Health Nigeria Initiative, Plot 1070, Coscharis Plaza, Garki, Area 3 Abuja, Nigeria, Phone/Fax: +234 8023610888; E-mail: zainabus23@gmail.com

<sup>2</sup>Institute of Economics and Management, Universita Carlo Cattaneo, Via Corso Matteotti 22, Castellanza, Italy, Phone/Fax: +39 3644755327; Email: kolagunju@liuc.it

**Corresponding author:** zainabus23@gmail.com

### **Abstract**

*Social cohesion (SC) is not much of a debatable topic in the developing countries, and like poverty is a multidimensional concept. Evidence from research shows fairly poor basis for testing the multidimensionality and measurement of SC in Nigeria. We test for the multidimensionality of social cohesion(SC) in rural areas using possible indicators that could contribute to the welfare of the rural populace. Data were drawn from the Nigeria General Household Survey 2012/2013 derived from the World Bank Living Standard Survey Measurement. Using exploratory factor analysis and Pearson correlation techniques to measure and test the multidimensionality of SC and its relation to rural welfare respectively, the results showed that about 46.5% and 36.6% have a perception that social trust and violence level is better in Nigeria, however only 36% have access to rural communal resource. Policy focus should be targeted towards development of the rural social sector by redefining funding, institutional structures and functions.*

**Key words:** multidimensionality, rural welfare, social cohesion

### **INTRODUCTION**

Social cohesion (SC) include social capital, absence of conflict and social exclusion [5], it becomes difficult for the implementation and effective utilization of any welfare or development project in a weaker cohesive society and as well poses a great risk to increasing poverty in the society. Nigeria, as a multicultural society, automatically possesses various societal attributes along its ethnic, religious and cultural lines. Having surmounted her civil wars and varying ethnical and religious crisis is however faced with terror attack. Of concern is looming destruction of its staple foods base (the rural areas) and displacement of its agricultural labour and potential ones. At present, the number of internally displaced persons is over 2 million [15] which is about 8 percent of the country's population. A multiplier effect is increasing poverty incidences and severity especially among rural households. This explicitly confirms the relationship between the degree of the absence of cohesion and rural poverty.

Over the years there has been trend towards the bipolarization of the income class, in other words, a disappearing middle class, and a higher income inequality this can be explained from the increasing income inequality report between 1991 and 2000 from 48% to 60% [3]. However a further measurement by the World Bank in 2010 recorded an income inequality of 43.0%, though lower, but at a perceived level. Inequality in varying dimensions (income, gender, health etc) is quite important and contributes to a weaker social cohesion.

In theory, community cohesion is dependent on the nature of the socioeconomic or inequality gap between its citizens [13]. It therefore means that rural households' income, knowledge status and participatory abilities determines the type of societal build-up. It also suggests that degree of social cohesion determines the welfare package available to a community. This argument however needs extensive empirical proof on the impact of social cohesion on socioeconomic characteristics of a society. In the studies of

social cohesion, a usual strong affirmation is made about social exclusion and inequality since the absence of cohesion is the usually the basis of research, it becomes prominent that a society with large ethnic minorities has the possibilities of being imbalance and poses threats of social conflicts. On this note, for a large rural society like Nigeria, the agricultural sector which has continued to play its role as a source of food and income to its rural populace has lost several of its resources (human and natural resources) to social conflicts. It is cogent to note that several efforts have been made towards the improvement of rural livelihood, but poor efforts have been channeled to improving the rural society. This is evident in poor resource utilization, application and build-up of poorly knowledgeable rural society and poor or non-existing rural networks, inequality towards access to resources amongst others. These can be attributed to the poor concern to social protection packages.

#### **Problem Statement**

The Nigeria economy has over the years sustained its growth, and in 2014 rated the largest economy in Africa after the rebase of its GDP from 1990 to 2000 at current prices [2]. However, this does not reflect in the country's welfare indices. Otherwise, persisting high poverty incidences is quite common with the Northern region of Nigeria, compared to the Southern region. Most of these northern states ranked above the National average of Multidimensional Poverty Index (MPI), incidences and intensity of 0.303, 53.3% and 56.8% respectively [12]. In addition, this region is experiencing persisting territorial resource crisis, terrorist attack among other social vices. Of noticeable is the increasing number of street children (*Almajiris*) suggesting inadequate provision for child welfare and poor implementation of social and welfare policies for the country's economic development. It also expresses the reasons for the offshoot of disadvantaged groups in the Northern and Southern region of the country. The southern region however with lesser poverty incidences is not devoid of crisis and records of ethnical and resource use crisis and

societal vices such as increasing robbery, violent attack and kidnapping. Constant resource conflicts example is the Niger Delta, and the Plateau farmers, fishermen and *fulani* herdsmen are at dilemma of crisis over agricultural lands and rendering local economy defective. A cumulative effect of this is increasing poverty incidences especially in the rural areas. The rural areas in Nigeria are mostly poverty-hit (41.6%) and usually gets the higher share of poverty indicators compared to the urban area (13.2%) according to the global multidimensional poverty index of 2015, this is also above the national average of 30.3% [4]. Rural poverty has however been on the increase, it stoops higher above its urban counterpart in every type of poverty measure, one can refer to the Nigeria Bureau of Statistics poverty profile in 2010; on absolute poverty 66.1% and 52.0% for rural and urban respectively, relative poverty measurement of 73.2% and 61.8%, dollar per day measurement of 66.3% and 52.4% and food poverty measurement of 48.3% and 26.7% respectively [14]. A recent multidimensional poverty analysis OPHI 2015 shows a record of 70% and 59.5% of poverty incidence and intensity respectively compared to 28.1% and 47% for urban populace. A most significant problem is corruption, leadership inefficiency and poor budgetary allocation to the social sector of the economy. This is evident in the poor budgetary allocation to the social budget sector. A higher percentage of meagre allocation to the social sector goes to social insurance (pension, unemployment benefits) while little goes to social assistance targeted solely to the large rural populace. In a report by [6], Nigeria allocates 0.6% of the Gross domestic product to social protection which is less than the ILO averaged 3.9% for West Africa. Moreso, the significant of infrastructure in promoting livelihood is worthy of note due to its importance in the build-up of human capital. Physical infrastructures in the rural areas such as good roads are lacking, as reported by IFAD, a chunk of 80 percent of the Nigerian populace living in the rural areas, have limited social services and infrastructures. Infrastructure in this case promotes and

facilitates a convenient and socially ordered environment. Apart from income poverty and deprivations, several issues ensue from a weak cohesive society and cuts across several aspects from disorderliness, conflicts, inequality, exclusion, terrorism consequently leading to destruction of infrastructures and poor socioeconomic status., a persisting continual vicious poverty cycle. Inequality speaks volume from income to education, with a gini coefficient of 48.83, inequality in education and life expectancy ranks 45.24 and 34.49% respectively.

### **Justification of the study**

The rural populace forms the majority of the Nigeria populace and thus contributes to the 70% labour force of the agricultural sector which including other non-oil sectors have continued to contribute to the growth of the economy with real GDP growth rate of 5.4%, 8.3% and 7.8% compared to 3.4%, -2.3% and 5.3% of the oil sector in 2011, 2012 and 2013 respectively [2]. At the same time the country's real GDP growth, at its rebased from 1990-2000 using current price projected Nigeria as the largest economy in Africa. Despite this record, it is evident that the country's stances on poverty over the years have not successfully included and equally targeted the rural poor. A constant deprivation of Nigeria of its needed development is persisting social conflicts, unemployment, poor educational status and health status, infrastructures among others. All these contributes to a weaker and poverty stricken society. Poverty is multidimensional and thus should be solved using a multidimensional approach, research have shown that poverty is highly linked with inequality [8], which is a component of absence of social cohesion. Evidently, severities of poverty in Nigeria are found in regions with high records of social conflicts, and poor socioeconomic populace. An example is the increased poverty incidences in the Northern region of the country compared to the Southern region of the country, most states in this region have poverty incidences above national average (46%) and has over the years, experience persisting conflicts as a result. An example of a weak or absence of social

cohesion known as social erosion [7]. Significantly, the rural areas' holds the ace in the production of the cool climate crops (due to presence of plateau), vegetables (due to presence of *fadama* lands), grains, staples and commodity crops (sesame, cocoa, rubber, etc) and contributes immensely to the agricultural sector. Despite the agriculturally rich nature of the rural areas, it is socioeconomically poor. The rural areas is more agriculturally driven, and this sector constitutes 70% of the labour force whom are largely poor [2]. Also, as much as Nigeria is a large rural country due to the concentration of her populace in the rural areas (60.1%) and the continual significance of rural society to the urban society, it becomes more important to study the social status and possible indicators of social cohesion attributes to assess the need for a shift in the social development focus for a multidimensional framework that promotes social cohesion, expand rural networks and reduce poverty. The study of social cohesion becomes prominent in the stance of Nigeria in order to incorporate the poor and excluded minorities into a socially developed network; however, it would require the need for identified indicators that best explains the concept of social cohesion in Nigeria. Moreso, with the present decline in oil prices which is the main source of income to the country, increasing support has been noticed from the non-oil sectors which includes the rural agricultural sector, and for the fact that agriculture has once driven the affairs of the country's economy; the rural populace needs to be incorporated sustainably for social, economic and environmental balance.

A focus on social cohesion in Nigeria have not appropriately linked it to societal welfare, complex referral have been from ethnic and religious point of view with no significance detail of possible component of social cohesion . Most times, social conflicts are used as basis for absence of social cohesion in multiethnic Nigeria; however, the concept of social cohesion encompasses this. Researches such as [9], constitute the basis for measuring social capital (a component of social cohesion) and its impact on poverty. Other approaches have

included the relating social inequality with poverty and measurements in varying dimensions [1; 10; 11]. However, a wide gap of research still exists in the social sector of the country. Emphasis has not been made on the need to constitute the set of indicators representative of social cohesion in a multiethnic society like Nigeria, of which on this basis, effective and efficient policies can be formulated.

From this, it can be said that social cohesion which incorporates social capital, social equality, social trust, societal identity and social solidarity amongst others has not been defined to enable measurement. In other words, the intertwine of these components can be depicted as the outcome of the group prowess to utilize its social capital might not be complete without a fairly equal participation advocated for, and adequate protection of public goods would be amiss without social order and civic identity. As regarded by [4], social cohesion can be described in varying dimensions, either in the inequality dimensions/social exclusion or in the social capital dimension.. However both dimensions are important for poverty reduction and rural economic development especially in a multicultural society like Nigeria with diverse ethnic and culture and gender disparities belief and notably is the resource diversities among the geographical areas of the country. This study refers to the multidimensional definition of poverty and stands to state that the problems of failure of several rural development policies is more as a result of weak investment in the social protection to create a well-defined civic society. On one hand, poverty and societal conflicts are however highly related, although argument has ensued that a peaceful society does not necessarily means presence of social cohesion, this depicts the complexity of social cohesion. This study tends to construct the link between the indicators of social cohesion and rural welfare, by first testing for its multidimensionality and creating a link with income poverty.

On this basis, our aims in this paper are:

-to profile the level of social cohesion indicators;

-to test for the multidimensionality of social cohesion as a concept;  
-to determine the correlation between social cohesion on poverty.

## MATERIALS AND METHODS

**The Study Area** is Nigeria. Nigeria is a large multicultural society. It is located in West Africa on latitude and longitude 8<sup>0</sup>N 10<sup>0</sup>E respectively with Abuja as its Federal Capital Territory. It occupies a land area of 923,768 square kilometers with a population of more than 170 million. It is bordered to the North by Niger republic to the East and West by Republic of Cameroun and Republic of Benin respectively, and to the south by the Atlantic Ocean. There are six geopolitical zone which includes North-West, North-East, North-Central, South West, South-East and South South-South. Across these geopolitical zones are diverse vegetation which includes the Sahel Savannah, Sudan Savannah, Guinea savannah, Rain forest and the Mangrove. Her diversity extends to its populace in ethnic, cultural and religious activities. The country has about 250 ethnic groups, with three common influential group, Hausa, Yoruba and Igbo, others include Ijaw, Fulanis, Kanuris, Ibibios and Tivs (Nigeria fact sheet, 2012). The rural and urban populace constitutes 54% and 46% respectively according to 2016 estimates (WDI, 2017) [16].

### Data Collection

This study uses secondary data derived from Nigeria General Household Survey from the World Bank Living Standard Measurement Survey that was carried out between 2012 and 2013 (Wave 2), it was released in 2015. The data is agricultural based which means it collectively captures the rural and urban households. For this study, stratified method was used to differentiate rural from urban. For the purpose of this study which tries to test for the multidimensionality of social cohesion, its measurement and impact on poverty reduction, data were retrieved on proxies for social cohesion components such as social trust, social order, social capital, inequality and sense of belonging, they include perception on

trust level, perception on violence level, presence of village development group, presence of women group, presence of communal resources and access to communal resource. Due to limited data, 273 responses were used for the analysis.

### Variables Definition

The variables used in this study include the following: presence of communal resource, presence of women group, presence of village development group, access to communal resources, perception on trust level and perception on violence level. These proxies constitute components of SC which include sense of belonging, social capital, social trust and social order. The variables are defined below:

*Presence and access of communal resources (arable land):* In this study, presence of communal resources is used as a proxy for sense of belonging and the communal resource used is arable land, arable land because, land is a very important resource for the rural community. The presence of rich arable lands poses a risk for control and priorities of access. Access to communal resource (arable land) in this study is however seen as differentiated access apart from gender.

*Presence of women group:* This significantly represents societal allowance for women participation in activities that contributes to their livelihoods. Rate of women group in Nigeria to an extent is dependent on cultural, ethnic and religious belief.

*Perception on trust level and Perception of violence level:* Social trust have been used as a proxy for measurement of social cohesion. It also forms a component of social capital as defined by Putnam.

Social trust is seen as a lubricant for societal cohesion, and in this study, it is portrayed as a value perceived in the society to foster rural networking activities and could as well improve rural livelihoods.

Violence contributes to a non-civic society; disrupt livelihood activities and a major contributing factor to poverty increase. Societal perception of violence can predict the likelihood of presence of economic and developmental activities.

### Analytical Methods

We employ descriptive statistics such as frequency, percentages, mean and standard deviation to profile the level of indicators of social cohesion in rural Nigeria. Lorenz curve was used to describe the income disparities among rural households.

Following this, we test for the multidimensionality concept of social cohesion in rural areas of Nigeria using Exploratory Factor Analysis (EFA).

To determine if social cohesion can be explained using more than one dimension, exploratory factor analysis was used to treat social cohesion as a latent variable to see if social cohesion could be treated using one latent concept in accordance to Reeskens *et al* (2000) [13].

The mathematical expression as cited in Yong and Pierce (2013) denoted as:

$$X_j = a_{j1} F_1 + a_{j2} F_2 + \dots + a_{jm} F_m + e_i \dots \dots (1)$$

Where

$X_j$  = denotes number of variables represented in the latent factors

$a_{j1} \dots \dots a_{jm}$  ( $j = 1, 2, \dots \dots p$ ) depicts that  $a_{j1}$  is the factor loading of  $j$ th variable on the 1<sup>st</sup> factor

$F_1, F_2, \dots \dots F_m$ ,  $m$  denotes the number of underlying factors

Finally, to analyse the relationship between social cohesion indicators and rural welfare we use the Pearson correlation technique.

The correlation coefficient estimates, the degree of relationship between variables, calculated using the formula denoted below:

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2 \sum_{i=1}^n (Y_i - \bar{Y})^2}} \dots \dots \dots (2)$$

where:  $\bar{X}$  and  $\bar{Y}$  are the sample means of social cohesion and income values;

$\bar{X}$  = sample means of SC variables (perception of violence, perception on trust level, presence of communal resource, village development group, access to communal resource and women group;

$\bar{Y}$  = sample means of log of per capita expenditure (income).

## RESULTS AND DISCUSSIONS

### Social cohesion indicators/measures of income disparities

Descriptive statistics analysis of the social cohesion indicators/measures of income disparities in Table 1 details the perception of rural dwellers in Nigeria on trust and

violence. The results show that 46.5% and 36.6% believes that the perception on trust and violence level respectively among rural population is better. However, a considerable proportion of 30.8% and 36.6% believes that trust level and violence level are still the same respectively.

Table 1. Social trust and Social Order: Perception on Trust and Violence level

| Demography                   | Much Better       | Better              | About the same     | Worse             | Much Worse        | *NA                | Total              |
|------------------------------|-------------------|---------------------|--------------------|-------------------|-------------------|--------------------|--------------------|
| Perception of Trust level    | F = 25<br>P = 9.2 | F = 125<br>P = 46.5 | F = 84<br>P = 30.8 | F = 25<br>P = 9.2 | F = 8<br>P = 2.9  | F = 4<br>P = 1.5   | T = 273<br>T = 100 |
| Perception of violence level | F = 21<br>P = 7.7 | F = 100<br>P = 36.6 | F = 67<br>P = 24.5 | F = 26<br>P = 9.5 | F = 15<br>P = 5.5 | F = 44<br>P = 16.1 | T = 273<br>T = 100 |

F means Frequency and P means percentage \*NA – Not Applicable  
 Source: Authors' data analysis 2017.

A measure of social capital and sense of belonging is profiled in Table 2 proxied by presence of village development committee, presence of communal resources (arable land) and access to communal resource (arable land). Results reveal that 76.9%, 39.2% and 37.0% of rural communities have village development committee, presence of communal resources and access to communal resources respectively.

This implies that the level of social networking platforms/organizations among rural dwellers is high but not correlated with perceived trust level among them.

Table 2. Social capital and Sense of belonging

|   | Frequency | Percentage |
|---|-----------|------------|
| Presence of village development committee   | Yes = 210 | 76.9       |
|   | No = 63   | 23.1       |
| Presence of communal resources(arable land) | Yes = 107 | 39.2       |
|   | No = 166  | 60.8       |
| Access to communal resource (arable land)   | Yes = 101 | 37.0       |
|   | No = 172  | 63.0       |

Source: Authors' data analysis 2017.

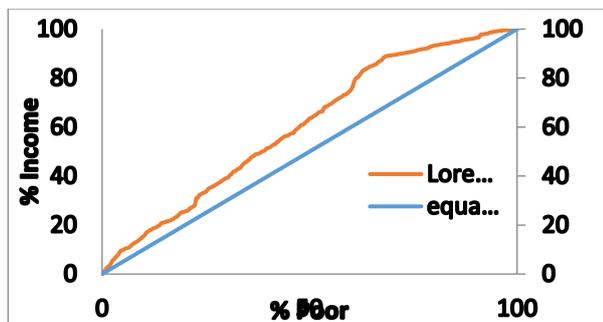


Fig. 1. Income description based on disparities (Lorenz curve)

Source: Authors' data analysis 2017

The Lorenz Curve in Figure 1 reveals the presence of income inequality among rural households and a tendency of disparities of income. There is sharp increase in the curve at 80%, which implies that the income disparity is prominent among large proportion of rural poor. This could be as a result of impact of varying income sources, access to rural infrastructural and some other differing socio-economic characteristics, most especially household size.

### To test for the multidimensionality concept of social cohesion using exploratory factor analysis

Table 3 shows the correlation matrix between variables and validity of p-value greater than 0.05. Using the Pearson correlation matrix, women group, access to communal resource and village development committee are negatively correlated, while a strong positive correlation exists between access to communal resource and presence of communal resource. However, the determinant 0.073 which is greater than the 0.001 rule of thumb and the Kaiser Meyer measure of sampling adequacy is 0.515 which is slightly above the 0.5 stipulated requirement. In addition, the Barlett test significant value below 0.05 ( $p < 0.05$ ) shows the sample's appropriateness for further analysis.

Table 4 explains the variation of the unobserved variable explained by the observed variable. From the extracted and rotated sums

of square loadings, 73.7% of the total variation is explained.

Table 5 reveals the extraction of three components with two variables loadings on each. In the communalities, all other variables

satisfied the 0.5 rule of thumb except one. Table 5 also shows that two variables each are loaded component one and two with high (ish) positive, including one factor in component three.

Table 3. Correlation Matrix

|   |            |          |           |           |            |            |
|---|------------|----------|-----------|-----------|------------|------------|
|   | VILLADEVCO | WOMENGRP | PRECOMRES | ACCCOMRES | LEVOFTRUST | VIOLENTPER |
| VILLADEVCO  |            |          |           |           |            |            |
| WOMENGRP  | -0.043     |          |           |           |            |            |
| PRECOMRES   | 0.012      | -0.020   |           |           |            |            |
| ACCCOMRES   | -0.012     | -0.026   | 0.894     |           |            |            |
| LEVOFTRUST  | 0.114      | -0.010   | -0.003    | 0.003     |            |            |
| VIOLENTPER  | 0.135      | -0.004   | -0.083    | -0.060    | 0.377      |            |
| <i>Significant (1 tailed)</i>   |            |          |           |           |            |            |
| VILLADEVCO  |            |          |           |           |            |            |
| WOMENGRP  | 0.238      |          |           |           |            |            |
| PRECOMRES   | 0.420      | 0.373    |           |           |            |            |
| ACCCOMRES   | 0.419      | 0.334    | .000      |           |            |            |
| LEVOFTRUST  | 0.031      | 0.436    | .482      | .478      |            |            |
| VIOLENTPER  | 0.013      | 0.474    | .087      | .161      | .000       |            |
| <i>Determinant: 0.073 &gt; 0.0001</i>   |            |          |           |           |            |            |
| <i>Kaiser-Meyer-Olkin Measure of Sampling Adequacy: 0.50038</i>                       |            |          |           |           |            |            |
| <i>Barlett's Test of Sphericity Approx. Chi-Square : 695.582 df : 15; Sig : 0.000</i> |            |          |           |           |            |            |

Table 4. Total variance explained

| Component | Initial Eigen values |        |        | Extraction Sums of Squared Loadings |        |        | Rotation Sums of Squared Loadings |        |        |
|-----------|----------------------|--------|--------|-------------------------------------|--------|--------|-----------------------------------|--------|--------|
|           | Total                | % var  | %cum   | Total                               | % var  | %cum   | Total                             | % var  | %cum   |
| 1         | 1.968                | 32.805 | 32.805 | 1.968                               | 32.805 | 32.805 | 1.958                             | 32.639 | 32.639 |
| 2         | 1.440                | 24.006 | 56.811 | 1.440                               | 24.006 | 56.811 | 1.434                             | 23.894 | 56.533 |
| 3         | 1.013                | 16.878 | 73.689 | 1.013                               | 16.878 | 73.689 | 1.029                             | 17.156 | 73.689 |
| 4         | 0.916                | 15.262 | 88.950 |                                     |        |        |                                   |        |        |
| 5         | 0.618                | 10.303 | 99.253 |                                     |        |        |                                   |        |        |
| 6         | 0.045                | 0.747  | 100.00 |                                     |        |        |                                   |        |        |

Source: Author's data analysis 2017

Table 5. Rotated Component Matrix

|  | Component |      |       |
|--|-----------|------|-------|
|  | 1         | 2    | 3     |
| PREOFCOMMRES   | .988      |      |       |
| ACCESSTOCOMRE  | .980      |      |       |
| VIOPERCEPT   |           | .803 |       |
| LEVOFTRUST   |           | .799 |       |
| WOMENGRP   |           |      | .919  |
| VILLADEVCOM  |           |      | -.430 |
| Extraction Method: Principal Component Analysis.<br>a. 3 components extracted. |           |      |       |

Source: Author's data analysis 2017

From this, one can detect that the two factors loadings are highly related to sense of belonging, they are presence of resources and access to resources, the second components constitute factors relating to social order and social trust which include level of violence and

perception of level of trust, while the third components constitute variable of social equality is presence of women group. One can conclude that social cohesion cannot be explained by a concept and thus is a multidimensional term.

**To determine the correlation between rural social cohesion and poverty**

Table 6 reveals that there is a weak and negative significant correlation between indicators of social cohesion and rural income. This could be as a result of low data indicators of social cohesion and proxies of poverty. This

further explains the multidimensionality concept of social cohesion and poverty.

Table 6. Correlation coefficient analysis

|               | Income   | Significant (2-tailed) |
|---------------|----------|------------------------|
| PREOFCOMMRES  | -0.122*  | 0.045                  |
| ACCESSTOCOMRE | -0.119   | 0.051                  |
| VIOPERCEPT    | -0.073   | 0.230                  |
| LEVOFTRUST    | 0.013    | 0.832                  |
| WOMENGRP      | -0.173** | 0.005                  |
| VILLADEVCOM   | 0.044    | 0.474                  |

\*\* correlation is significant at 1% \*correlation is significant at 5  
Source: Author's analysis 2017

## CONCLUSIONS

The multidimensionality concept of rural social cohesion is tested in this study; it explicitly depicts the many facet of social cohesion from the variables used in this study. This study is more like a preliminary to determining many significant facets of social cohesion, and thus raises the need for comprehensive social data in Nigeria. Due to the data limitation, this study has only been able to use little out of many facets of social cohesion, but has significantly point out the huge errors in the social aspect of the country. Furthermore, an attempt to measure correlation between income and social cohesion indicators shows that there is a likelihood of relationship. Conclusively, there is a need for policy targeted towards improving social cohesion to enhance rural welfare. This would be easier if concurrently policy is targeted towards differentiating the roles of development in agriculture and rural areas; hence a defined rural development ministry explicitly understands better the importance of rural social cohesion to rural welfare.

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## DEVELOPMENT PARADIGM OF THE INNOVATIVE TECHNOLOGY TRANSFER IN THE AGRO-INDUSTRIAL COMPLEX OF RUSSIA

Mikhail Yakovlevich VESELOVSKY<sup>1</sup>, Vladimir Gavrilovich SAVENKO<sup>2</sup>,  
Andrey Nikolaevich OSIPOV<sup>3</sup>, Khatimat Nabieva GASANOVA<sup>3</sup>,  
Dmitry Sergeyevich NATAROV<sup>3</sup>

<sup>1</sup>Technological University, 141070, Russia, Moscow Region, Korolyev, Gagarin St., 42; Phone: +7 (495) 516-99-29, email: mveselovsky@bk.ru

<sup>2</sup>Russian University of Cooperation, 141014, Russia, Moscow Region, Mytishchi, V. Voloshina St., 12/30; Phone: +7 (495) 640-57-11, email: savenko\_vg@list.ru

<sup>3</sup>Federal State Budgetary Scientific Institution "Federal Research Center of Agrarian Economy and Social Development of Rural Areas – All Russian Research Institute of Agricultural Economics", 123007, Russia, Moscow, Khoroshevskoe Hwy., 35, Bldg. 2, Phone: +7 (495) 195-60-16, emails: andrey.n.osipov@mail.ru, khatimat.gasanova@mail.ru, natarov\_d\_s@mail.ru

**Corresponding author:** mveselovsky@bk.ru

### Abstract

*The article emphasizes the significance and defines basic stages of agricultural advisory services formation in Russia, its actual status and current activities of its subjects, as well as development prospects. Based on the study of current development status of the contemporary services, main indicators of its activity and the demand for advisory services, the authors conclude that the country has established the basis of the agricultural advisory system, and formed the body of professional advisors, ready to provide quality advisory services that are largely becoming of demand. Special attention is paid to the innovative component of the agricultural advisory services functioning, consisting in informing about the scientific and technological achievements of Russian and foreign scientific organizations, advanced production practices, providing assistance in the modernization of production, increasing the level of knowledge of agricultural producers, as well as analyzing demand for advisory services. Based on the analysis of advisory group activities, forms and types of the most demanded services, the authors identify the main innovation and advisory directions in consulting activities. Moreover, it is noted that innovative direction should serve the basis of the industry modernization and be an object of state agrarian policy. Conceptualizing the activity priorities, the authors predict two directions of further development of the Russian system of agricultural advisory services. These are involvement of public institutions providing the state innovation policy, and more complete use of private commercial consulting structures providing assistance to rural entrepreneurs in the development of innovations and in other areas of their activities.*

**Key words:** innovations, modernization, agricultural consulting, advisor, advisory service.

### INTRODUCTION

The purpose of this article is analyzing the status of the agricultural advisory services in Russia and the development of a paradigm of its development in the future. The relevance of the study is due to the increasing role of the institution of agricultural advising in information and consulting support of modernization and innovative transformation of the agricultural sector of the Russian economy.

Changing economic conditions in the relatively new market economy has contributed to

emergence of dualistic organizational model of rural entrepreneurship: the formation of large agricultural enterprises, as well as the development of farming and small businesses that in turn requires the revision and amendment of the development concept of agricultural advising service system.

### MATERIALS AND METHODS

Conducted study was based on generalization of theoretical and methodological approaches to the organization of the agricultural advisory

services system, outlined in the works of Russian and foreign researchers.

To formalize and generalize the research results, the authors used the methods of comparative and abstract-logical analysis, as well as inductive-deductive and statistical analyses. In particular, for the analysis and evaluation of information and advisory system the authors used monitoring of advisory services provision to agricultural producers and rural population in the Russian Federation, conducted annually by the Federal Center of Agricultural Consulting.

## RESULTS AND DISCUSSIONS

One of the most important activity elements of any company, including agro-industrial enterprise, is the ability being continuously improved, keeping competitiveness, and being able to implement the necessary innovative changes. These factors are often decisive for enterprise's existence in today's market.

Successful development of contemporary business in a competitive environment is impossible without implementation of innovative activities, that is, without the implementation of new or upgraded products and technologies. The main tool of conducting a competitive struggle currently becomes the ability to develop and implement innovations rather than the possession of capital resources and material assets.

The successes achieved in recent years in agriculture, expressed in a record for Russia harvests of grain crops, partly confirm this viewpoint. At that, one of the success factors consists in technical updating of the grain industry. The old tillage and sowing machinery are replaced by modern agricultural vehicles, able to ensure the uniformity of crops, and create optimal conditions for plants germination and growth. Modern multipurpose machines, in contrast to the old unproductive ones, allow timely harvesting with minimal losses.

When discussing modernization issues, it is quite common to bring a charge against science as if it insufficiently supplies industry with scientific and technical developments.

However, it's not really fair because the innovation market offers quite a lot of efficient developments either domestic, or borrowed, or imported, which under certain conditions could have provided the domestic agro-industrial complex with the most advanced technologies, modern efficient and resource-saving equipment and machinery, high-yielding varieties and hybrids of field crops, high-producing animal breeds, as well as agricultural chemicals. Therefore, the problem is not in the availability of innovative products, but in their promotion, in the lack of conditions for large-scale modernization of the agricultural industry and effective mechanisms of implementation. Out of the total number of scientific and technical developments that are completed, accepted and recommended for implementation into production, up to 40-50% remain unclaimed. At that, technological innovations are used by less than 10% of agro-industrial enterprises. Not more than 12% of rural producers use intense resource-saving technologies [16].

The contemporary policy of innovative development of agriculture should be aimed at modernization of production with maximum use of:

- domestic scientific and technical developments;
- foreign innovative products;
- strategies for implementing innovative products of foreign production.

The institution of agricultural advising should ensure the innovative development of agriculture.

The need for universal training of peasants in the land management techniques appeared in Russia in the XVIIIth century with the abolition of serfdom when peasants, becoming self-employed, have experienced the lack of knowledge in the most essential issues of agriculture.

The first Institute of Agriculturists (advisors, in the current concept) was founded in 1765, when an agricultural society was established to help peasants. The revival of the domestic advisory services refers to the beginning of 90-ies of the last century, when the first attempts were made to reform the domestic agricultural

sector. In 1993, according to the instructions of the Russian Ministry of Agriculture, Central Research Institute of Innovative Problems and Marketing in Agribusiness has developed the "Pilot project for the establishment of the Russian advisory services for agricultural producers of all forms of ownership". A significant step in the development of the domestic advisory services was the "Agricultural Reform Implementation *Support* Project (ARIS)". Information and advisory services, created in the framework of the project in 26 regions of the country, contributed to the acceleration of scientific and technical progress in industry, implementation of agrarian and land reforms, and the adaptation of producers to new economic conditions. A successful example of centers created at that time and still working is a consulting center "Samara-ARIS" in the Samara Region.

Thus, the development of national agricultural advisory services in Russia has more than 150-year history and 24-year period of its development in contemporary conditions.

During this period a variety of global and domestic models of organizational forms applicable for advisory services were explored and tested, a methodology for agricultural advising was proven, and the forms, methods, and mechanisms of consulting activities were developed.

The development (since 1993) of contemporary services has passed a number of stages:

*Scientific research stage.* During this stage we have studied historical experience of social agronomy and the today's international experience. We made attempts to use foreign advisory services models trying to adapt them to Russian conditions. But the specifics of agricultural production in Russia, namely multi structurality of the domestic agricultural sector, the diversity of climatic conditions, large volumes and territorial scattering, poor technical support and financial-economic state of the industry, do not allow using even the most successful model of agricultural advisory support developed abroad.

In the world, there are long-established schemes of technology development activities, where the operation of information and advisory services is the main factor contributing to the achievement of scientific progress. In different countries these services have their own peculiarities and specifics, though consideration of two systems seems to be the most suitable for Russia, namely American and European approaches, with quite significant differences, both in terms of structure, operational methods and principles.

The American system of knowledge transfer with a very longtime history starting since 1862 (it was created in the same years, as in Russia), is built on the principles of knowledge dissemination and training of farmers. Simultaneously with the diffusion of innovation, the staff provides feedback of farmers with research institutions. Farmers inform scientists about the effectiveness of scientific advices and identify the range of production problems to define research areas [4; 18; 19]. The American model of information and advisory services fully justifies the term "Extension service", meaning a special kind of targeted training of farmers, aimed at solving specific production tasks.

A number of Western European countries have a slightly different system of transferring scientific developments into production [1; 4; 5; 7; 13; 14; 15; 17; 18; 19; 20]. Along with the training and innovation functions this model is focused mainly on practical assistance. The Danish Agricultural Advisory Service (DAAS) may serve as an example of successful advisory services, which is focusing its efforts on direct assistance to agricultural producers in decision-making and practical farming. Working methods of the Danish advisers have a more pronounced and individual character. The advisor continually maintains a close relationship with a farmer, knows his farm thoroughly, as well as educational and professional level of workers, the economic situation and opportunities, and even the psychology of the farmer. He gives recommendations, supervises production, provides help, and in fact takes care of the farmer.

Experience of the DAAS is of particular interest in matters of innovation, such as shaping research plans and implementing them, up to a wide assimilation of the scientific research achievements. All applications for research and development are formed by the farmers through the advisory services [4; 18; 19].

What we can borrow from the Western experience? In the context of size, mentality, and statehood, Russia largely comes close to the American experience. However, there are some essential differences.

- American approach requires state (budgetary) money, which is constantly in short supply;
- Ministry of Agriculture and especially regional and district authorities, after many years of involvement in command-style administration, were not ready to refuse from such style of management, and considered the agricultural consulting institution as being identical to Ministry of Agriculture. The Ministry has not used the opportunities of the supplementary vocational education system and agricultural universities functioning in almost every region, which could become the basis for the state consulting system.

In connection with the farming development and the arrival to the villages of merchants, incompetent in agricultural technologies, as well as decrease in the number of rural specialists, technology advices are becoming increasingly demanded. In this respect it would be possible to use a European (Danish) experience, where the advisor practically "takes care" of farmer. But this is hindered by differences in mentality of the Russian farmer comparing to the western farmer. The latter, as a rule, is sufficiently trained and confident in his abilities, while Russian farmer is not yet ready to hire an advisor (for 75 years, rural producers have received knowledge for free, and now many of them remain confident that someone should come and help them for free). Thus, Russia is not able to fully copy someone else's experience. Nevertheless, it is quite possible and reasonable using world experience in the development of agricultural advisory services in Russia.

*Stage of finding own place in the actual system of agriculture management and scientific support (2003 - 2015).* Having no possibility to manage and influence the new economic conditions, but still having the opportunity of receiving state support of the industry, the management bodies of the agro-industrial complex resisted in every way the new technologies of influence on the rural commodity producer (resource capabilities made it possible making believe of controllability over a long time). The need of creating advisory structures was denied almost everywhere. Neither management personnel, who were losing their powers, nor scientific community, which did not try to understand the real situation, did not perceive a few existing advisory centers as serious institutional system.

Unfortunately, up to the present day, the Russian Ministry of Agriculture could not develop clear vision of prospects in development of the system providing dissemination of new knowledge in practice. As a negative example we can note the loss of the ability to create a clearly structured state system for information and advisory support of the agricultural complex with the use of the supplementary vocational education. Nowadays, among more than 90 supplementary vocational education institutions, previously located in all regions of the Russian Federation, factually there remained slightly more than 20. The attempt to involve agricultural universities in advising activities is not quite good due to different tasks of the institutions providing agricultural advisory services and higher education institutions.

At the same time, real conditions (the structures, which newly came into the agricultural business, farmers and private farms of citizens deprived of support) required technological, legal, economic and other advisory support, and thus advisory centers were created initially in a single, and then in most regions.

It was probably the most difficult stage in the system's development. Now, in many regions, there are as a rule, new top managers at

different levels (especially those who came from other industry sectors). Time to time, they are trying to curtail, redirect, replace, and introduce new functions, often unusual for agricultural advisory services, and set other tasks, in other words, try to complicate the development process.

*The third stage of development has come now.* Information and advisory structures are operating with varying degrees of intensity in most regions, while in 63 regions they operate at regional and district level (regional level is represented by 28 governmental, 6 commercial, 8 non-profit organizations, and 21 educational institutions).

In five regions (the Kostroma Region, the Ryazan Region, the Amur Region, the Zabaikalye Territory, and the Jewish Autonomous Oblast) advisory services to agricultural producers and rural population are assigned to the agribusiness management bodies [2; 11].

Due to heterogeneity of conditions, different perceptions of needs, and the lack of clearly governing legal acts, regional and district centers are established in the frameworks of various organizational-legal forms. In addition, a significant niche in advisory services is occupied by various dealer structures involving in the market promotion of innovative goods of foreign companies and domestic enterprises.

In general, about 4 thousand specialists are involved in advisory services, whereas more

than 2 thousand of advisors are working on a regular (professional) basis in advisory centers. Agricultural advisory services of all organizational-legal forms, as well as educational institutions, rendered more than 500 thousand advisory services to agricultural producers and rural population in 2016.

Information and advisory centers and advisory units of educational institutions have organized over 800 demo events including 334 "Field Days" (13 at the interregional level, 80 at the regional level, and 240 at the district level) and 474 exhibitions (67 at the interregional level, 187 at the regional level, and 220 at the district level). At that, 378 demonstration sites were organized (22 interregional, 104 regional, 93 district, and 159 – based on contracts with agricultural organizations). More than other three thousand events were conducted, including meetings, seminars, conferences, gatherings of citizens, etc.

The most in demand (Fig. 1) are technological advisory services in the field of crop farming (84.4 thousand services) and animal farming (84.0 thousand services), as well as advisory services on economy and lending matters (to 66.4 and 23.3 thousand, respectively) as well as accounting issues (58.7 thousand services). Advices on issues of state support (42 thousand services), legal coverage and software support (30.5 and 27 thousand, respectively) are of great demand.

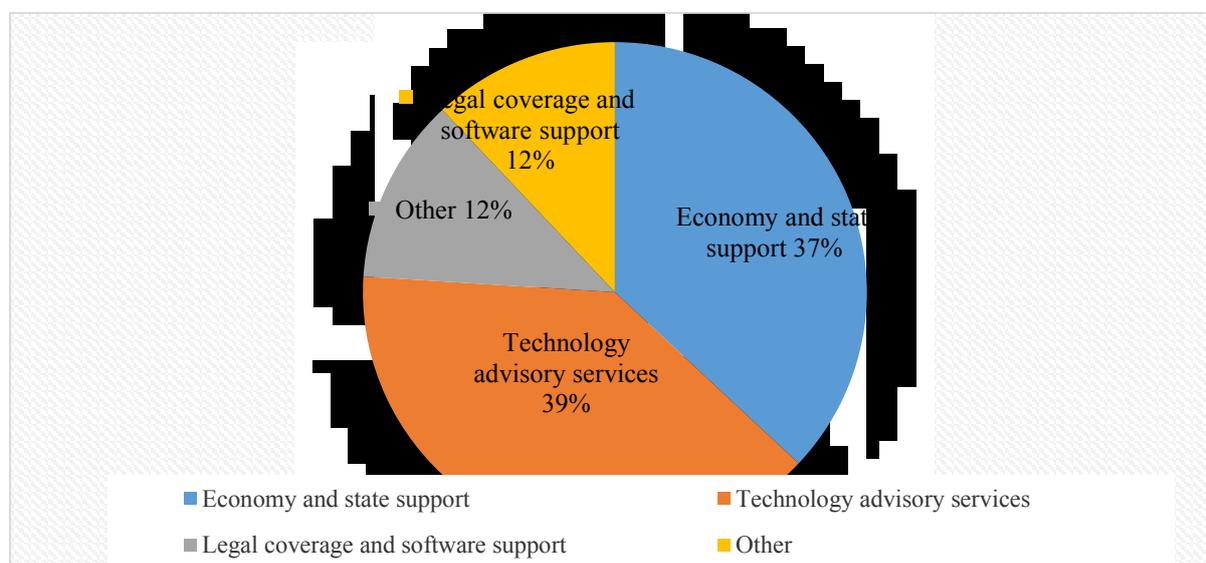


Fig. 1. Structure of agricultural advisory services rendered in 2016

Source: The Federal Center for Agricultural Consulting

Among the recipients of advisory services (Fig. 2), peasant (farmer) economies (45%) are in the first place, similarly as in 2015, followed by agricultural enterprises specialists (23%),

and private subsidiary farming (20%). Further, as demand decreases, the management bodies of agribusiness (7%), processing enterprises (3%), and cooperatives (2%).

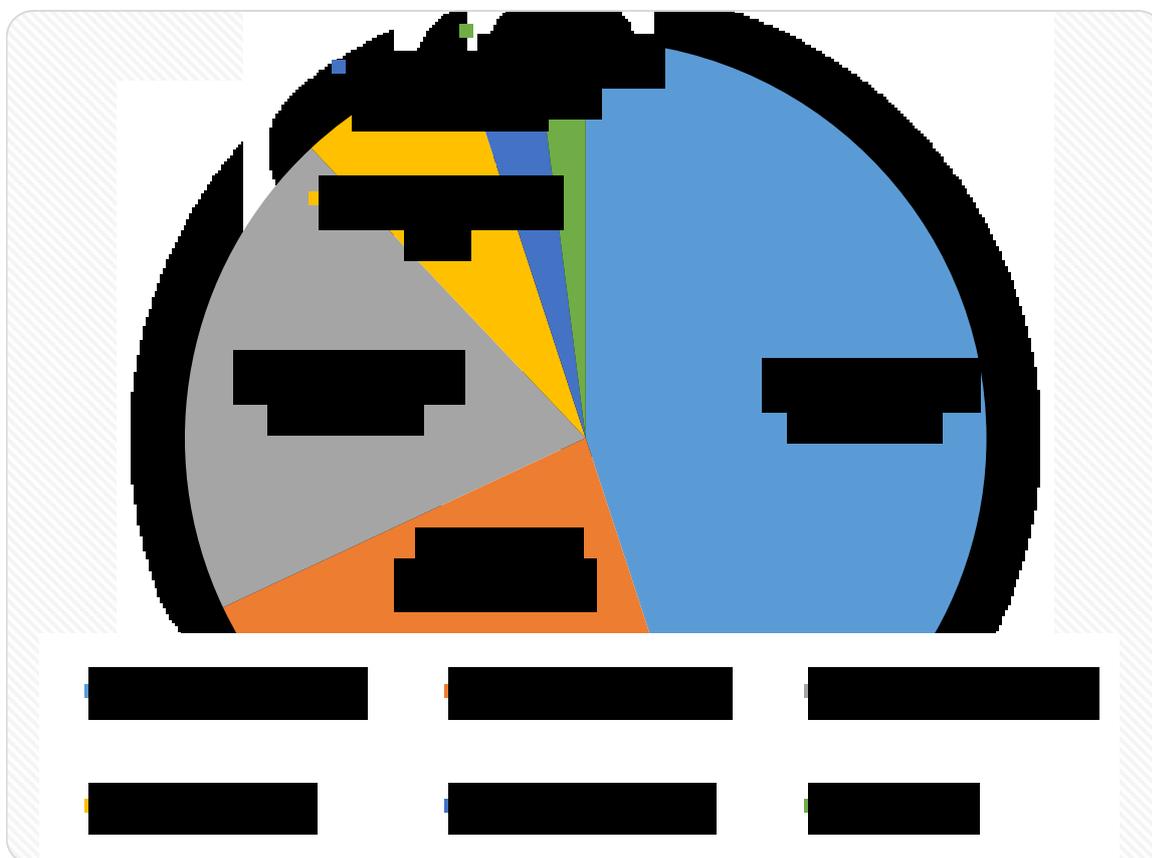


Fig. 2. Distribution of agricultural advisory services in 2016 by user groups  
 Source: The Federal Center for Agricultural Consulting

Monitoring of advisory activities in recent years shows the stability in the structure of the advisory services demand. The portfolio of orders for advisory services remains virtually unchanged and includes the production technology, issues concerning economy, government support and credit, accounting, legal support, as well as other services (social development of village, alternative employment in rural population, rural tourism, and environment).

Development analysis of the existing advisory groups, forms and types of advisory services allows defining two main directions: *innovative* path in relation to the ongoing need to modernize production, and *advisory* path in the form of supporting large producers, farmers and their associations as well as rural

population - on technological, organizational and other issues.

(1)The first innovative path is significantly associated with the competitiveness of the industry in general, and should be an area of state agricultural policy (The fundamentals of the Russian Federation policy in the field of science and technology development for the period up to 2010 and beyond). In the state structures, the main form of innovation advancement in manufacturing is information, exhibition, demonstration and educational activities [6; 9]. This direction should be implemented by a state and regional information and advisory centers.

(2)Information policy includes organization of information networks, exhibitions, "Field Days" and conferences, which should be scheduled (and funded) by the Federal

Ministry and regional agribusiness authorities. Their organization is entrusted to subordinate agencies and major regional advisory centers. Their working methods are similar to those of the American "Extension Service" method. Successful examples of such activities can be called advisory services rendered by the Yaroslavl and Samara regions, Bashkortostan, Chuvashia and other regions, working on the instructions of regional administrations of agro-industrial complex. Advisory services towards implementing the state agrarian innovation policy are increasingly offered also by institutions of supplementary vocational education [8].

The state should determine the vectors of its interests. And it is not only technical and technological modernization. For example, it is absolutely clear that the development of farming is constrained by the problem of distribution. Currently, retail chains have almost occupied the market for agricultural products, and they will not work with disparate farms. And the reason is quite understandable – the majority of farmers are not able to perform fair requirements of trade networks (standardization, packaging, and regularity of supplies). The most effective solution is cooperation. Consequently, the objective of the state structures is ensuring the development of cooperatives including their advisory support. The state should encourage this direction as socially significant, as well as provide financing of advisory services at the initial stage.

First and foremost, this concerns the state advisory services, which of course need to be developed. But the state cannot embrace all agricultural producers. As known, an entrepreneur is a person, who organizes his business at his own risk. Therefore, the state is not obliged to provide various services including free advisory services. In this regard, agricultural advises should be carried out on a paid basis.

Now that the system of agricultural advisory services has entered a period of demand by rural producers, it can cover at least part of its expenses through payments of own services.

Currently, the agricultural sector is represented by two types of economic management. We can talk about the gradual formation of a dualistic structure of trade agricultural sector in Russia. On the one hand, there are large and often giant structures, integrated horizontally and vertically (holdings), while on the other hand there are relatively small farms [3; 12].

Representatives of the first the most developing sector are large farms, called agricultural holdings, which provide a full production cycle, combining enterprise associations, and operating based on the principle "from field to shop board".

According to the Institute of Agrarian Market Studies, in Russia, on the area of 18 million hectares (15.3% of the total arable land) there are over 100 largest agricultural enterprises operating on arable land of 100 thousand hectares, and another about 200 farms with arable land of more than 30-50 thousand hectares.

In Russia, the total number of peasant (farmer) households amounts to 170 thousand. These farms labor 19.7 million hectares of arable land (16.3%).

In addition to these two opposing forms of agricultural business organization, in the country agriculture is managed with varying degrees of effectiveness by establishments of other legal forms, transformed from the former state farms and collective farms. Among them the dominated place is occupied by the companies (or partnership) with limited liability as well as agricultural production cooperatives.

Agricultural holdings bring real benefits to the economy, supplying products, creating jobs, paying taxes to the state treasury. Thanks to them, some regions turned from food importers to exporters. They employ the most effective latest domestic and foreign technologies and equipment, multilevel automated management system, and are the main recipients of finance. The state provides holdings tax incentives, cheap loans, and access to infrastructure [3].

Large agricultural enterprises use services of advisory agencies, as a rule, in the context of the choice of contemporary high technologies, searching inventions, business planning, and

supporting of investment projects. The specialists of the agricultural holdings often visit and participate in exhibitions and demos, actively attend seminars and conferences organized with the involvement of advisory centers. All these contribute to innovative development of the enterprises.

The creation of farming aims at forming a diversified rural economy, recreating the institution of private ownership of land, and replacing on this basis administrative methods of economic management by new approaches based on market principles, creating conditions for entrepreneurship and competition in the countryside. Among the peasant and farmer households there are a lot of highly-profitable farms, but for the most part these are still weak, technically poorly equipped farms that have a lot of problems. The main problems are the following.

1. One of the main problems, which is common to farming and agriculture in general, is high prices for fuel, agricultural machinery, fertilizers, and means of protection, which are incommensurable with prices for agricultural products, and thus greatly complicate the highly profitable agricultural production;
2. High loan interest rates (up to 12%, and in some cases up to 20% per annum). Small soft loans at a rate of up to 5% cannot meet the existing needs and are difficult to get;
3. Today, property rights to land are an acute problem for farmers. Farmers and agricultural enterprises of the country still suffer from corruption and raids.
4. Most acute problem concerns products sale and relationships with the trade. Large retailers expand to the regions and currently are trading with monopolies. Such monopolies are extremely dangerous for the medium-sized agricultural enterprises and farm economies in general. Distributive networks have almost occupied the agricultural product market not willing to work with disparate farms.

Farmers, as well as medium-sized and small agricultural enterprises are the main category of users of advisory centers. In addition to above mentioned innovation related services, the owners and specialists of small and medium-sized agricultural enterprises employ

services of consulting lawyers, accountants, agronomists and veterinary professionals. They need help in products' sales, establishment of cooperatives, preparation of reporting documents [10; 11]. As a rule, they are not involved in large projects, though willing to pay for nonrecurrent consulting services.

Activities of commercial structures, established by the consultants having experience and credibility with rural entrepreneurs in a particular region confirm the possibility of self-financing of part of advisory services.

For example, advisory center "Helper" in Kalmykia was organized by the former head of the national agricultural advising service. At the same time, together with this center, there is enough work for state advisory center. Commercial services of the Smolensk, Irkutsk, Vladimir, and Leningrad regions are vivid examples of such collaboration. This became possible because the country has already formed a relatively large body of professional advisors, who are willing and able to provide quality advisory services, for which the customer is willing to pay.

Currently, the agro-industrial complex of Russia and its integral part - agriculture, being in the course of transformation, are increasingly becoming a high-tech innovative industry. At present the main goal is to further increase yields and productivity of agriculture, turning it into the largest exporter of agricultural products. The solution of these problems must be directly linked to the strengthening of advisory support to producers of all forms of ownership, including large holdings and small farms. For this purpose it is necessary to extend a network of advisory services, creating them on the basis of higher agricultural educational institutions and institutions of supplementary vocational education. It is impossible not to recognize that the development of existing agricultural advisory services is largely constrained due to lack of a law about "Agricultural advising," which would have defined legal, economic, and organizational basis for the development of the agricultural advisory system in order to

create conditions contributing to increase of agricultural production efficiency, improvement of the living standard of the rural population, and ensuring sustainable development of rural regions through the implementation and adaptation of the achievements of scientific and technological progress, innovative developments, and advanced production practices. The adoption of such a law would have facilitated the development of agricultural advisory services in Russia that is the most important tool in implementing of the state agrarian policy. The challenge of training professional advisors at the universities is in the same context.

## CONCLUSIONS

In consequence of the present study we revealed the availability of supply and demand for agricultural advisory services. Thus, we can assume that there are two main paths for the advisory system development.

– The state agencies providing the main function of innovation support including that conducted through the organization of the information process, exhibitions and demos, as well as education. This category should also include the municipal centers for agricultural consultancy, the challenge of which is the execution of municipal tasks and the implementation of municipal projects (all that, which not long ago was the responsibility of the district agricultural departments).

– Private agencies with the advisory functions, which would provide assistance in the development of innovation and render various advisory services, such as technology consulting, business planning, documentation, accounting and legal support, etc. (all that, which cannot be paid from the state budget).

The first state direction in development of agricultural advisory system should include also supplementary vocational education institutions subordinated to the Ministry of Agriculture of the Russian Federation [8]. But in this case the paradigm of their activities (education, science, business) needs to be changed. At that, in our view, we could benefit from using the experience of the American

system, where exactly universities are agents of state policy. Now it is exactly the period, which is characterized by restructuring of the national scientific system, reorganization of agricultural research institutes, and release of scientific personnel.

Unfortunately the Russian agrarian universities and supplementary vocational education institutions, possessing technological capabilities and human recourses, virtually are very little involved in advisory support of the industry. This is absurd. Communication experience and monitoring of ongoing activities have confirmed that at present neither Ministry, nor university rectors have serious intentions in addressing this acute problem.

Based on the current situation, it is necessary, in our opinion, implementing the following suggestions:

1. All existing supplementary vocational education institutions should officially be given the status of federal information and advisory centers. They should be given the responsibility to implement the state innovation policy and organize proper retraining of personnel. They should provide agricultural producers with information about the innovative possibilities of modernization of regional agriculture (databases, information assurance, exhibitions, seminars, "Field Days", and training).

2. Agricultural universities need to radically change the approaches to advisory services. The state agricultural universities situated in the regions can become powerful educational-scientific and advisory centers for development of regional agro-industrial complex. Responsible executives of the Ministry and universities should reconsider the relationship of educational institutions to advisory support of agricultural business. These activities should occupy an equivalent position with the educational process and scientific activity, and should be taken into account as academic load of lecturers.

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## IDENTIFICATION OF THE MAIN VOLATILE COMPOUNDS RESPONSIBLE FOR THE AROMA OF *SAUVIGNON BLANC* WINES

Valerica Luminita VISAN<sup>1</sup>, Radiana-Maria TAMBA-BEREHOIU<sup>1</sup>,  
Ciprian Nicolae POPA<sup>2</sup>, Silvana Mihaela DANAILA-GUIDEA<sup>1</sup>

<sup>1</sup>University of Agriculture and Veterinary Medicine Bucharest, Faculty of Biotechnologies, 59, Mărăști Blvd, Zip code 011464, Bucharest, Romania, Phone: +40721135314, Emails: l\_visan@yahoo.com, radianatamba@yahoo.com, silvana.danaila@yahoo.com;

<sup>2</sup>Farinsan SA, Gradistea Village, Giurgiu County, Romania, Email: cipnpopa@yahoo.com

**Corresponding author:** cipnpopa@yahoo.com

### Abstract

*Our research aimed at identifying the main volatile compounds, including the volatile thiols, from 2 Sauvignon Blanc wines, obtained in Dragasani vineyard, 2014 harvest. Wines were obtained using 2 yeast strains of Saccharomyces cerevisiae, one commercial used in wine industry and the second being obtained by screening, in Dragasani vineyard. By GC/MS technique were identified and determined quantitatively three compounds of the mercaptans group, having an important contribution in the Sauvignon aroma, namely: 4-mercapto-4-methylpentan-2-one, 3-mercaptohexan-1-ol and 3-mercaptohexyl acetate. The results showed the positive influence of the yeast strain Saccharomyces cerevisiae selected from Dragasani area, over concentration in volatile thiols and consequently, on the flavor of Sauvignon wine, obtained by fermentation with this strain.*

**Key words:** GC/MS method, 4-mercapto-4-methylpentan-2-one, Sauvignon flavor

### INTRODUCTION

Aromatic features are essential factors of the wines quality. Aroma and wines typology are due to a large number of volatile compounds that make up their aromatic expression [42]. The wines flavour is the result of three aromas categories, namely: varietal aromas, fermentation aromas and aging aromas (the bouquet of wines). Therefore, the flavor of wines depends on a multitude of factors. The study of these factors influence on the aromatic composition of grapes and wines, and therefore on the quality of wines, is complex and refers not only to the influence of each factor, but also to the interaction between them [16].

*Varietal aromas*, or aromatic potential of grapes, result from the complex interaction between: the vine variety and the rootstock used [16], "*terroir*" (climatic factors like microclimate, temperature, light, water reserve, and soil factors like soil nature) and cultural techniques applied to wines [13].

The initial aromatic potential of the grapes changes later in the course of alcoholic

fermentation, as well as during the wines aging [22].

Thus, the *fermentation flavor* is due to the different physico-chemical and enzymatic processes, determined by yeast activity. During alcoholic fermentation, the *Saccharomyces cerevisiae* yeasts, the species most commonly used in winemaking, act on terpenic compounds, by hydrolyzing the glycosides and reducing the free terpene alcohols, leading to new flavor compounds. Fermentation flavors depend on the oenological methods and techniques applied in the bioprocess of wine obtaining. Fermentation monitoring and the strain of yeast used in the fermentation process are of great importance [42].

Subsequently, during wine maturation and aging, other compounds with an important role in the aroma, occur in a reducing environment. These compounds form *the aging aroma* (the tertiary aroma or the bouquet of wines) are depending on maturation and aging conditions. More than 1000 volatile compounds have been identified in wines, but only a relatively small percentage of 10-15% occurs in their flavor [43]. Although a small number of wine

varieties belong to the group of aromatic wines (*Muscat*, *Tămâioasă*, *Traminer*), the grapes of all varieties contain volatile substances, from various chemical classes, that determine the variety specificity. These substances are mainly acids, alcohols, esters and aldehydes. In wine, volatile aromatic compounds result from the complex association of the substances named above, with phenols, proteins, ethyl alcohol, glycerol, polyglucides, organic acids etc [23]. Aromatic varieties have a higher content of flavors, especially terpenes.

Varietal aromas (biosynthetic compounds in grapes) are represented by two groups of compounds [23]: flavor precursors, which are non-volatile and non-aromatic compounds: fatty acids, glycosides, phenolic acids [8] and free flavors. Free flavors are represented in grapes by 3 classes of compounds:

- terpenic compounds and norisoprenoids, with floral and tropical fruits aroma (in aromatic varieties, namely *Muscat*);
- methoxypyrazines, with herbal vegetal flavors, in *Sauvignon* and *Cabernet Sauvignon* varieties [1, 9].
- rotundone (especially in the *Syrah* variety).

The *Sauvignon Blanc* is considered a half aromatic variety [21], the aromatic flavor being determined mainly by thiols (mercaptans). Thiols are found in grapes like flavor precursors, bound to an amino acid (cysteine, glutathione), in odorless form and during alcoholic fermentation are converted into aromatic thiols [18]. The potential odor occurs only in wine, during alcoholic fermentation, when flavor precursors are degraded by the yeast, under the action of enzymes in aromatic thiols [13, 35].

The main volatile thiols identified in wine are:

- 3-mercaptohexanol (3MH), with a sensory perception threshold of 60 ng/L, with citrus, grapefruit and exotic fruits aroma [5];
- 3-mercaptohexyl acetate (A3MH), with a sensory threshold of 4 ng/L, which prints a cranberry and tropical fruit aroma [37];
- 4-mercapto-4-methylpentan-2-one (4MMP), with a perceptual threshold of 0.8 ng/L, whose flavor reminiscent of cranberries;
- 4 – mercapto – 4 – methylpentan – 2 - ol (4MMP).

In addition to these compounds, free aromas are found, such as monoterpenes, pyrazines, etc. According to some authors [14, 15, 19] the main volatile compounds involved in the *Sauvignon* flavor are mercaptans (especially 4-mercapto-4-methylpentan-2-one), other authors considering that methoxypyrazines are the decisive compounds in the variety flavor. After Tominaga (1998) thiol 3-mercaptohexanol and its derivative, 3-mercaptohexyl acetate is the "key" of the specific flavor of *Sauvignon Blanc* wine [40]. *Sauvignon* varietal aroma composition depends on several factors [28]. Thus, studies conducted on the *Sauvignon Blanc* cultivated in South Africa [31], showed the influence of area microclimate, temperature and light mainly, on the content of grapes in monoterpenes, C13 - norisoprenoids and pyrazines. The concentration in monoterpenes increases parallel to the accumulation of sugars. An optimal temperature and a better illumination of the grapes are leading to the growth of terpenes concentration [27]. Contrary, in the case of methoxypyrazines, strong light and high temperature have a negative influence on the concentration in these compounds, leading even to their degradation [30, 32]. Thus, the aroma profile of *Sauvignon* will depend on climatic conditions and the microclimate of the area, concerning the variable content of monoterpenes and methoxipirazines respectively [29].

In terms of thiols, microclimate conditions influence the content in various volatile thiols, grapes having an aromatic profile dominated either by tropical fruits and flowers (due to 3 – mercaptohexan – 1 - ol) or green pepper, asparagus, due to 4 – mercapto – 4 – methylpentan – 1 - ol [16].

Cultural techniques applied to vine also have a great influence on the aromatic potential of the *Sauvignon* variety. Some authors point out that under the conditions of a high temperature climate, the exposure of grapes to light (by defoliating the calves around the grapes) is contraindicated, because a temperature above 35°C at their level, disturbs the metabolism of flavor compounds. They recommend that

*Sauvignon* plantations have to be placed in cooler microclimates, or with a higher water regime, through irrigation of vineyard culture [10]. A cool-night microclimate is appropriate for preserving the aromatic potential of grapes. A water stress during vegetation on the *Sauvignon* variety is always correlated with a very low accumulation of cysteine precursors, namely precursors of volatile thiols [10]. A proper hydrological regime leads to a fresh, fruit flavor wine production.

The concentration of wines in volatile thiols is also influenced by the assimilable nitrogen content of the must, content that depends on soil fertility. Thus, in the case of a non-fertilized crop (nitrogen deficiency), the concentration of the main must thiols (4-mercapto-4-methylpentan-2-one, 4-mercapto-4-methylpentan-2-ol and 3-mercaptohexanol) is much lower [26].

Lacroux (2008) showed the importance of the grape must content in nitrogen and especially its nature (ammonium or amino acids), on yeasts and therefore thiols production [26]. Also, thiols are highly oxidative compounds in an environment without SO<sub>2</sub> protection, especially in a quinone rich must [24].

Thus, for wines where these compounds play an important role in flavor, such as *Sauvignon* wine, hyperoxygenation of must before antioxidant treatment is contraindicated [6].

In the course of alcoholic fermentation, besides sulfur compounds (mercaptans), numerous volatile compounds form, through secondary metabolism of yeasts, numerous volatile compounds, namely the class of fermentative aromas, also called secondary flavors. Fermentative aromas are classified into four groups: the group of higher alcohols, the fatty acid group, the ester and acetylene group, and the group of sulfur compounds [9].

The formation and concentration of volatile compounds in wine is influenced by numerous factors linked to the fermentation process: temperature, pH, composition of the grape must and especially, the yeast strains that make the alcoholic fermentation [2, 17, 25, 33].

The influence of yeasts on the flavor of wine has been studied by numerous researchers, especially concerning the production of sulfur

compounds (volatile thiols). Conversion into volatile thiols (sulfur compounds) made during alcoholic fermentation is dependent on yeasts first, in the sense that different yeasts strains produce more thiols than others [4]. On the other hand, the composition of must in flavor precursors, as well as fermentation parameters, influence the production of wines thiols [20]. The production of higher alcohols during alcoholic fermentation also varies depending on yeasts strains, especially on the yeast capacity of using amino acids in the synthesis of higher alcohols [42].

Esters are particularly important for the aroma of young wines, where they participate with their fruity (red fruits, bananas, pineapple etc.) and floral odors. The formation of ethyl esters is positively influenced by a reduced fermentation rate, due to a low temperature and low wax turbidity, as well as a strict anaerobiosis. Acetate biosynthesis is influenced by both yeast strain used and the content in higher alcohols [23].

## MATERIALS AND METHODS

*Analyzed wines.* Two wines obtained from the *Sauvignon Blanc* grapes variety in Drăgășani vineyard, 2014 harvest, were analyzed. The wines analyzed were obtained by controlled alcoholic fermentation, with 2 yeast strains of the species *Saccharomyces cerevisiae*: a commercial strain produced by Sodinal, France (*Sauvignon S*<sub>1</sub>) and *Saccharomyces cerevisiae* strain obtained by screening from the Drăgășani vineyard (*Sauvignon S*<sub>2</sub>). The conditions for obtaining the wines were similar: 229 g/L sugar concentration of the must; similar fermentation parameters (temperature, pH etc).

*Sauvignon* wines were analyzed in terms of physico-chemical parameters: alcoholic strength (vol% alcohol), residual sugar content (g/L), total acidity (g/L sulfuric acid), total dry extract (g/L), volatile acidity (g/L acetic acid) and glycerol (g/L). All analyses were performed according to standard methods [39]: ebulliometer method for alcoholic strength; titrimetric method for total acidity; distillation method Saunier-Cazenave for volatile acidity;

Tabarié method for total dry extract and volumetric method for glycerol.

#### *Specific Extraction of Volatile Compounds.*

200 mL of wine, placed in a conical flask, were successively extracted (3x20 min) at 0°C with 3x25 mL of freshly distilled dichloromethane and then centrifuged for 15 min. at 3000 rot/min. The three organic extracts were pooled, dried with anhydrous sodium sulfate and concentrated to 5 mL in a Danish concentrator (45°C), then to 1 mL under a stream of nitrogen [3, 12].

*Specific Extraction of Volatile Thiols.* A volume of 500 mL of wine containing 4-methoxy-2-methyl-2-mercaptobutane, as an internal standard, was brought to pH 7.0 with sodium hydroxide solution and was extracted successively twice, with 100 mL dichloromethane, with magnetic stirring for 5 min; the organic phases were centrifuged for 5 min., at 3000 rot/min, to break the emulsion and were separated in a funnel; the obtained organic phase was then extracted successively twice, with 20 mL p-hydroxymercurbenzoate solution, for 5 min.

The two aqueous phases, from the extractions, were pooled and brought to pH 7.0 by addition of a 5% hydrochloric acid solution; the obtained solution was loaded into a strongly basic anion exchange column; the volatile thiols were released from the complex thiol-p-hydroxymercurbenzoate, fixed on the column, by percolating for 40 min with a cysteine solution adjusted to pH 7.0. The organic phases were collected, dried on anhydrous sodium sulfate and concentrated under nitrogen flow [40].

*GC/MS.* Determination of volatile aromatic compounds in wine was performed using a Hewlett Packard 5890 gas chromatograph series II coupled to a mass spectrometer Hewlett Packard 5972 series II.

*Quantitative analysis of volatile compounds identified in Sauvignon wines by GC/MS.* 1 $\mu$ L from each extract was injected into an HP 5-MS capillary column with dimensions: 30 m x

0.25 mm x 0.25 mm (film thickness). Column temperature: 30°C for 10 min., followed by temperature gradient 10° min<sup>-1</sup> up to 80° C, then gradient of 25°C/min. up to 250°C where stationed 10 minutes. Detector and injector temperatures are: 280° C and 250° C resp. Carrier gas is He, flow-0.5 ml min<sup>-1</sup>. MSD conditions are: temperature 180° C ion source, ionization energy 70 eV, mass limit of 20-400 amu, electronic multiplier voltage 1700V, scan rate 1.60 s<sup>-1</sup>. Injection mode: split, opening after 60 sec. and the split flow 20 mL min<sup>-1</sup>. Quantitative determination and identification of volatile compounds based on the comparison of retention indices (RI), mass spectra and the estate of odors. Identification is based on the standard MS library Wiley [7, 38]. *Quantitative analysis of volatile thiols identified in Sauvignon wines by GC/MS* [40, 41]. 2  $\mu$ L from extract was injected into an HP 5-MS capillary column. The three volatile thiols were detected: 4-mercapto-4-methylpentan-2-one, 3-mercaptohexan-1-ol and 3-mercaptohexyl acetate.

## RESULTS AND DISCUSSIONS

*Chemical and sensorial analyses of wines.* The two *Sauvignon Blanc* wines from the Romanian wine region Drăgășani, harvest 2014: *Sauvignon S<sub>1</sub>* and *Sauvignon S<sub>2</sub>* were analyzed chemical and sensorial.

Results are presented in Table 1.

The *Sauvignon Blanc* variety is grown in Romania in 41 vineyards, but in the Drăgășani vineyard it seems that it finds the best conditions, the wine produced here being special [11]. In sensorial analysis, the two *Sauvignon* were characterized as dry wines, with a bright yellow color with light green reflections, medium-sized, well-structured. Both wines showed a gentle acidity, perfectly balanced with alcohol.

In terms of flavor, the general impression shows that the *Sauvignon 1* sample had a more intense flavor, elder, jasmine and melon.

Table 1. The main physical-chemical parameters of wines

| Wine sample                    | Alcoholic strength (vol% alcohol) | Residual sugar content (g/L sugar) | Total acidity (g/L sulfuric acid) | Glycerol (g/L) | Total dry extract (g/L) | Volatile acidity (g/L acetic acid) |
|--------------------------------|-----------------------------------|------------------------------------|-----------------------------------|----------------|-------------------------|------------------------------------|
| <i>Sauvignon S<sub>1</sub></i> | 13.35                             | 1.8                                | 5.8                               | 8.9            | 22                      | 0.35                               |
| <i>Sauvignon S<sub>2</sub></i> | 13.18                             | 3.8                                | 5.45                              | 9.4            | 21                      | 0.56                               |

The *Sauvignon 2* sample was characterized at tasting, with a delicate but expressive, complex flavor; the taste was fruity, fresh, with exotic fruit aromas, vine flowers and acacia flowers. In addition, the *Sauvignon 2* sample featured typical mineral notes, and the wine was finally characterized with more variety and region typology.

The alcoholic strength of the two wines varied very little in favor of the *Sauvignon 1* sample, due to the fact that the commercial yeast strain showed a very good ability to metabolize the sugars. The sample fermented with the local yeast strain showed a residual sugar content of 3.8 g/L.

From the point of view of total acidity, although its value is slightly different, both wines showed a pleasant acidity, in balance with the alcoholic strength.

Regarding glycerol, a compound that is positively involved in the quality of wines, the local strain led to a higher concentration of glycerol, although the sample obtained with the commercial yeast strain showed a higher alcoholic concentration.

Volatile acidity, a very important parameter in the quality and health of wines, showed normal values for both samples. However, it was noted that the local strain led to higher production of volatile acids (0.56 g/L acetic acid).

*GC/MS wines analysis. Identification of volatile compounds.*

Fermentation flavors are very important for the typical wines, which are responsible for their wineiness and their specific character. Fermentative aromas are classified into four groups: the group of higher alcohols, the fatty acid group, the ester and acetylene group, and the sulfur compound group [4].

In the analyzed wines, volatile compounds from the group of esters, higher alcohols, lactones and terpenes, as well as from the

group of sulfur compounds (thiols or mercaptans) were identified.

*Esters* are especially important for the aroma of young wines, to which they participate with their fruity and floral odors. Their contribution is however, much more complex, because it involves the aromatic potential of the variety, which is in a complex relationship with other factors (ex. yeast strain).

During alcoholic fermentation, ethyl esters and acetals of higher alcohols are formed. Among the ethyl esters, especially ethyl butanoate, ethyl hexanoate, ethyl octanoate and ethyl decanoate, are involved in the aroma of young wines, imparting odors of flowers, apples, strawberries, pineapples, etc. [34]. Of the branched esters, an important role in the aroma of the wines seems to have ethyl 2-methylpropanoate and ethyl 2- and 3-methylbutanoate

When analyzing the two samples of wine, it was observed that the local strain led to the production of a larger quantity of ethyl esters (Fig. 1).

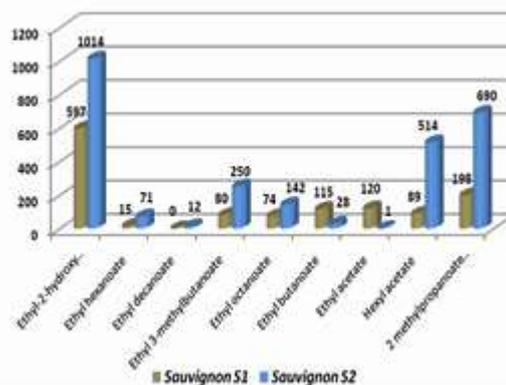


Fig. 1. The main esters of a *Sauvignon* wines (mg/L)

*Superior Alcohols.* With the exception of 2-phenylethanol containing floral, rose flavors, the aroma of the other higher alcohols is less favorable to the aroma of wines [36].

Many authors believe that a content of less than 300 mg /L of higher alcohols has a positive effect on wine aroma; the presence of higher alcohols above the level of 1 g/L leads to olfactory defects of wine.

From Fig. 2 it can be seen that the sample obtained by fermentation with local yeast had a very low content of superior alcohols, in the form of traces, except 2-methyl-1-propanol (alcoholic, malt, vinified).

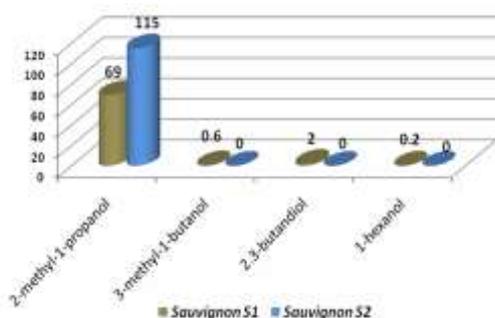


Fig.2. Concentration of aliphatic alcohols in *Sauvignon* wines (mg/L)

**Terpenes.** Monoterpenols are specific to aromatic varieties present in the grapes of *Muscat*, *Tamãioasă*, etc., but also in the aroma of wines from other varieties. In *Sauvignon*, in both samples, only linalone (monoterpenol which imparts aroma of rosewood, coriander) was identified (Fig. 3).

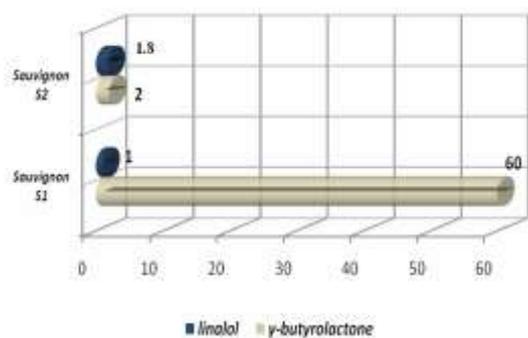


Fig.3. Concentration of terpenes and lactones in *Sauvignon* wines (mg/L)

**GC/MS wines analysis. Identification of volatile thiols.**

Volatile thiols, aromatic compounds that impress citrus aromas, exotic fruits, cranberries etc., have been identified in wines of the

variety like *Colombard*, *Merlot*, *Cabernet*, *Grenache*, *Cinsaut*, *Malbec* etc.

After Tominaga (1998) 3-mercapto-hexanol thiol and its derivative, 3-mercaptohexyl acetate is the “key” to the specific flavor of *Sauvignon Blanc* wine [40]. The conversion of precursors into thiols is dependent on yeast, first of all, in the sense that different strains of yeasts produce more thiols than others.

In the analyzed wines 3 volatile thiols were identified: 3-mercaptohexanol (3MH); 3-mercaptohexyl acetate (3MHA) and 4-mercapto-4-methylpentan-2-one (4MMP).

GC/MS analysis showed that the local strain led to the production of a larger amount of 3-mercaptohexanol and 3-mercaptohexyl acetate (Fig. 4 and Fig. 5).

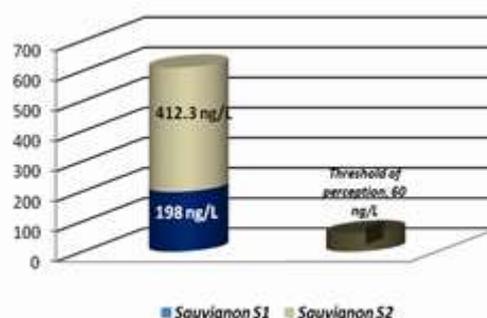


Fig.4. The concentration in 3-mercaptohexan-1-ol from the *Sauvignon* wines

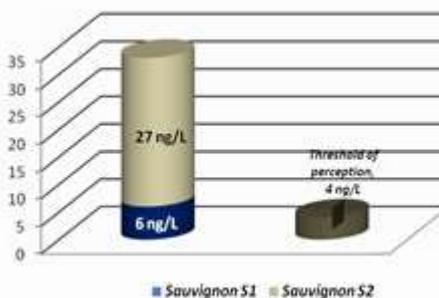


Fig.5. The concentration in 3-mercaptohexyl acetate from the *Sauvignon* wines

Some authors state that the specific flavor of *Sauvignon* wine is given by the 4-mercapto-4-methylpentan-2-one thiol found in some French wines, in concentrations up to 50ng/L. A higher concentration of 4-mercapto – 4 – methylpentan – 2 - one was identified in *Sauvignon 2*, a wine produced by fermentation with the commercial strain (Fig. 6).

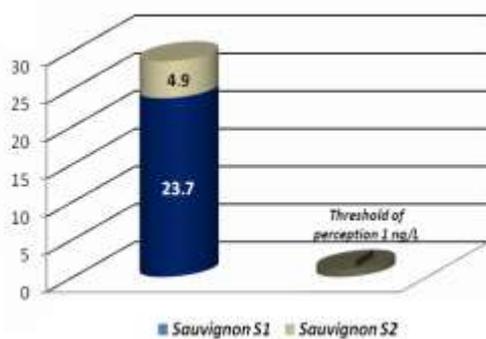


Fig. 6. The concentration in 4-mercapto-4-methylpentan-2-one from the *Sauvignon* wines

## CONCLUSIONS

In sensorial analysis, the two *Sauvignon* were characterized as dry wines, with a bright yellow color with light green reflections, medium-sized, well-structured.

Both wines showed a gentle acidity, perfectly balanced with alcohol.

*Sauvignon 1* sample had a more intense flavor, elder, jasmine and melon. The *Sauvignon 2* sample was characterized, at tasting, with a delicate but expressive, complex flavor; the taste is fruity, fresh, with exotic fruit aromas, vine flowers and acacia flowers. The *Sauvignon 2* sample featured typical mineral notes, and the wine was finally characterized with more variety and region typology.

The alcoholic strength of the two wines varied very little in favor of the *Sauvignon 1* sample, due to the fact that the commercial yeast strain showed a very good ability to metabolize the sugars. The sample fermented with the local yeast strain showed a residual sugar content of 3.8 g/L.

The local strain led to a higher concentration of glycerol, although the sample obtained with the commercial yeast strain showed a higher alcoholic concentration.

Volatile acidity showed normal values for both samples. The local strain led to higher production of volatile acids (0.56 g/L acetic acid).

In the analyzed wines, volatile compounds from the group of esters, higher alcohols, lactones and terpenes, as well as from the group of sulfur compounds (thiols or mercaptans) were identified.

The local strain led to the production of a larger quantity of ethyl esters. The sample obtained by fermentation with local yeast had a very low content of superior alcohols, in the form of traces, except 2-methyl-1-propanol.

In *Sauvignon*, in both samples, only linalone (monoterpenol which imparts aroma of rosewood, coriander, etc.) was identified.

In the analyzed wines, 3 volatile thiols were identified: 3-mercaptohexanol (3MH); 3-mercaptohexyl acetate (3MHA) and 4-mercapto-4-methylpentan-2-one (4MMP).

GC/MS analysis showed that the local strain led to the production of a larger amount of 3-mercaptohexanol and 3-mercaptohexyl acetate.

A higher concentration of 4-mercapto-4-methylpentan-2-one was identified in *Sauvignon 2*, a wine produced by fermentation with the commercial strain.

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## STUDY ON MURCIANA-GRANADINA GOATS PHENOTYPE. REMARKS ON PRODUCTIVE PERFORMANCES IN AGRI VALAHIA FARM FROM CONTEȘTI, DÂMBOVIȚA COUNTY, ROMANIA

Iulian VLAD<sup>1</sup>, Marius MAFTEI<sup>1</sup>, Elena POGURSCHI<sup>1</sup>, Mirela CĂRĂTUȘ STANCIU<sup>2</sup>

<sup>1</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Animal Sciences, 59 Mărăști Boulevard, District 1, Bucharest, 011464, vladiul@yahoo.com

<sup>2</sup>"Lucian Blaga" University of Sibiu, Faculty of Agricultural Sciences, Food Industry and Environmental Protection, 5-7 Ion Ratiu Street, 550003, Sibiu, Romania, Phone: +40269211338, Mobile:+40744472790, Email: mirela\_stanciu2008@yahoo.com,

**Corresponding author:** vladiul@yahoo.com

### Abstract

*Exploitation of specialized goats in Romania is a growing concern among breeders. The explanation can be attributed to the initial intervention on the milk quota and more recently due to the new agricultural policies. Thus, performing animals that are exploited for milk production such as Murcia Granadina breed are imported. This breed is distinguished mainly by the quality of milk, but also by the performance achieved in the environment. The study shows how to adapt the Spanish breed to the type of semi-intensive farm in southern Romania. Specific body measurements were performed, basic indices, prolificacy, and production performances were determined. This was followed up the process of youth growth as well as the quantitative and qualitative performance of milk obtained at Agrivalahia - Conțești farm, Dâmbovița County. The study was carried out within the framework of the CAPRIPLUS project, which aims to achieve qualitative performance for a higher milk. The main body size results show: live weight 45.58±0.73 kg, as an average, withers height 67.02±0.33 cm, the height at the crupper 65.25±0.36 cm, oblique body length 67.25±0.82 cm, head length 22.51±0.12 cm, head width 13.19±0.19 cm, chest width 17.05±0.31 cm, croup width 17.55±0.17 cm, thoracal perimeter 76.89±0.84 cm and cannon bone perimeter 7.84±0.15 cm. These dimensions correspond to a population with a typical dolicomorphic conformation. There are also typical hypo-eumetric dimensions (developed skeleton, high profile, straight upper line, fine head). These data are also confirmed by basic body indices which was determinate. Milk production is only 440.4 ± 0.18 liters for a period of 185 days of average lactation. Daily average milk production is 2.4 liters. However, milk quality gives a much better breed advantage for its average fat of 5.16% and about 2.95% for protein. This type of milk is suitable for the preparation of a certain type of cheese and specialties.*

**Key words:** goat, milk production, quality, body dimensions

### INTRODUCTION

The world goat sheep continues to grow on certain continents such as Asia, Africa, Latin America, main in those areas where goats are considered as "indispensable" species.

In the same areas, the products supplied by its goats are vital to poor families, the goat being the most abundant animal in the countryside. Its biologic features such as adaptability to food, maintenance, or mode of exploitation, as well as its attachment to man, make this species indispensable in people's lives.

The global goat effective has grown over the past 15 years, from 883 million head in 2005 to 1,006 million head in 2014[3].

The main producer remains Asia, which holds over 50% of the world herd. China held 196 million heads in 2005 and 188 million in 2014. In 2014, India held its second position with 133 million heads. On the African continent, in 2005 there were approx. 280 million heads, and in 2014 there were 364 million heads. Over this period on the American continent there were 38 million heads and 36 million heads respectively.

World production of goat as well as cow's milk has declined since 2014. There were major differences between supply and demand due to European policies linked to certain embargoes to the east, China's import reductions as an important global player.

Today, we are witnessing major European dairy demands due to a fall in the number of cows and other lactogens breeds, including goats. [3],[8].

World production of goat milk was 14931 (thousand tones) in 2005 and 17957 (thousands tones) in 2014, of which Asia holds 8270 (thousands of tones) and 10654 (thousands of tones) respectively. Of this, India has almost half, Africa is down by 3520 (thousands of tons) in 2005 to 4185 thousand tons in 2014. The EU 27 had 2590 thousand liters in 2005 and 2526 thousand tones in 2014, declining by approx. -2.47%. [13],[14]

Goat milk contains fatty acids whose level is greatly influenced by the ingestion or diet of animals. [2],[10].

The need to improve the quality of goat milk is a current way of seeing food quality in human consumption. It also addresses the risks to which the metabolism of the animal is exposed in certain disorders. Cardiac disorders are among the most common pathological conditions [15],[17].

Taking into account the concern about the human diet and the need to constantly seek new outlets for the products, special attention is paid to the quality of the raw milk [2][4, 16].

To improve the fatty acid content of milk, we used oilseeds in the goat diet, which have specific characteristics [2],[4],[11].

Romanian farmers are especially concerned about finding new outlets and improving the quality of raw milk.

The present study is part of the analysis of the biological material covered by the CAPRIPLUS project.

The main objective of the project is to obtain a higher quality milk in terms of fatty acid content [1],[2],[14].

## MATERIALS AND METHODS

The biological material subjected to the analyzes was represented by goats from the Murciana-Granadina imported from Spain and breed on the farm in Agri-farm Coțești, Dâmbovița County. The first determinations focused on the prolificacy, the weight of the females, the growth increases and lactation

control, respectively the chemical composition of the milk, determined with the help of the milks scanner and the month variation [17].

Subsequently, body measurements were performed with the help of specific instrumentation and body indexes were determined [11],[12].

For the determination of the quantitative milk production, milking machines were used with debitmetry.

## RESULTS AND DISCUSSIONS

The EU with only 18 million in 2005 and 17 million in 2014 is steadily declining [3].

The European goat herds is presented as follows: Greece is ranked with 4157 (thousands of heads), followed by Spain with 3010 thousand heads and Romania with 1518 (thousands of heads). Our country owns almost 12% of the EU 27 goat herd.[3],[5] (Fig. 1 ).

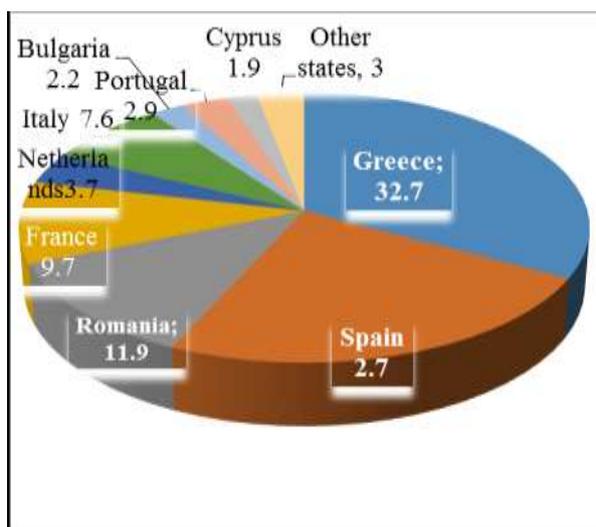


Fig. 1 The herds of goats in the EU 27 - % total heads  
Source: Own design based on the statistic data from Eurostat, 2016 [7, 8].

In Romania there is a tendency to specialize for milk performance. Use of pure breed selection in native breeds based on the conformation of the udder and its suitability for mechanical milking (Fig.2. and 3).

The tendency of autochthonous livestock over the last years analyzed for goat flocks, generally shows a continuous evolution.

The total goat population in Romania registered a decline between 2013 and 2014, followed by an annual increase of approx.

0.5%. The number registered in 2017 (at the end of August) is approx. 3% higher than at the end of 2016 [9] (Fig. 3).

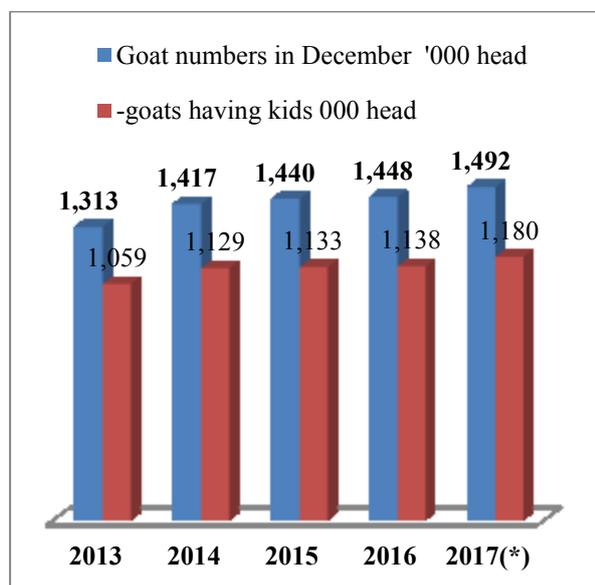


Fig. 2. The herds of goats in the Romania (thousand heads)

\* 2017 = statistical forecast for the last five months

Source: Own design based on the statistic data from MADR, 2017[6]

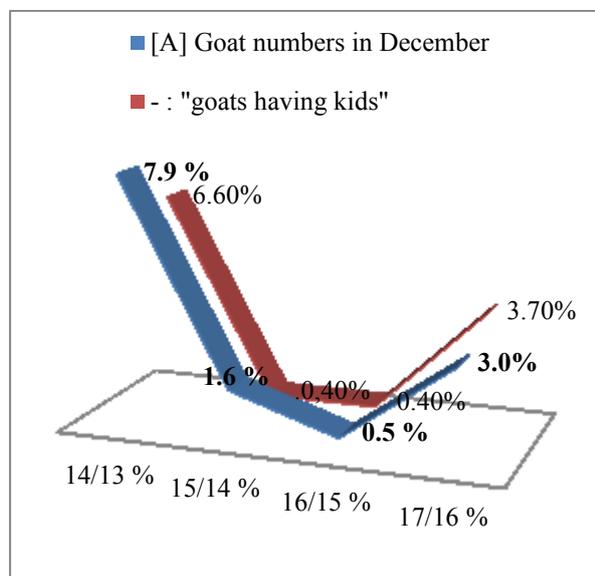


Fig. 3. The annual growth rate of goat flocks in Romania (2014-2017\*)

Source: \* 2017 statistical forecast for the last five months. -own design based on the statistic data from MADR, 2017, [6].

The upward trend in goat herd in Romania is due to farmers' guidance for the exploitation of goats for milk. Farmers have received national subsidies to support livestock breeding. These

subsidies, both for sheep and goat farming, help the economy of small breeders [14],[17].

#### Somatometric measurement

Body measurements carried out on goats in the Murciana breed were performed in order to fit the phenotypically population of goats. The obtained values allowed the determination of corporal indices to confirm the orientation of the population for a particular production.[17] Thus, the following values were obtained by body measurements: the average weight of the goats is  $45.58 \pm 0.73$  with a CV of 12.09%; the width is  $67.02 \pm 0.33$ cm with a 3.69% CV; the height at the crotch is  $65.25 \pm 0.36$  cm; the height at the butt point is  $54.64 \pm 0.44$  cm; the substernal vacuum is  $35.35 \pm 0.22$  cm; the oblique length of the trunk is  $67.25 \pm 0.82$  cm; head length is  $22.51 \pm 0.12$  cm; the head width is  $13.19 \pm 0.19$  cm; the width at the hip is  $17.55 \pm 0.17$  cm; the width at the co-femoral joints is  $18.98 \pm 0.19$  cm; the width at the butt point is  $15.19 \pm 0.34$  cm; the width of the chest is  $17.05 \pm 0.31$  cm; the biaxial width is  $25.53 \pm 0.29$  cm; the perimeter of the chest is  $76.89 \pm 0.84$  cm; the perimeter of the whistle is  $7.84 \pm 0.15$  cm. Measurements of the udder were also performed in females, demonstrating generally a relatively small volume, about 25% smaller than the indigenous races. The udder is very well trapped, with much secretory tissue and good nipple orientation, with no supernumerary and hairless nipples with good kneeling for milking.

Sexual dimorphism is mainly represented by the shape and size of the horns. Male's conformation are 118% higher than in females.

#### Milk production

In the analyzed population, milk production at first lactation reaches an average of 188 liters / head in 140 days of lactation. The quality of milk, reflected by the fat and protein content, is clearly superior to the local breeds. Thus, the protein level of milk reaches 3.05% and that of fat 5.2%. Average production in the following lactations is evolutionary. Thus, good production, ie.  $440.4 \pm 0.18$  liters (with high variability in the population, CV = 15%), was recorded during the 185 days of lactation (compared to the 550 l breed average in 240 days of lactation).

*Chemical milk composition*

The fat content of milk was 5.16%, very close to the breed standard, while the protein content of the milk was only 2.95% compared to 3.6% of the breed standard. We believe this is due to the lack of protein intake in ration. (Fig. 4 and 5).

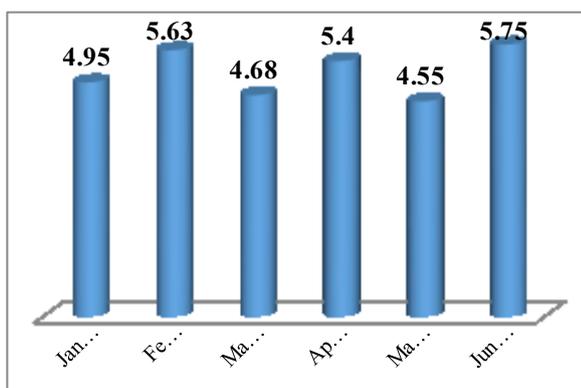


Fig. 4. Variations on the monthly average of milk fat (%)  
Source: Own design based on own determination, 2017

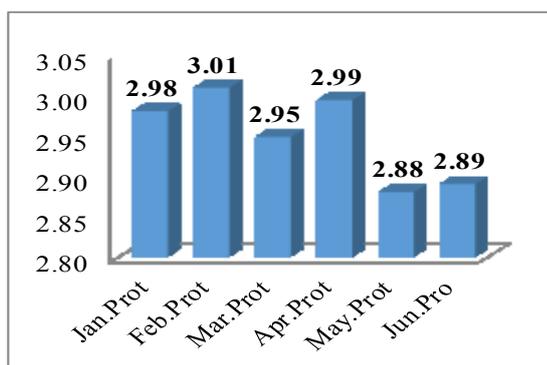


Fig. 5. Variations on the monthly average of milk protein (%)  
Source: Own design based on own determination, 2017

The protein may be considered to be the most important element according to which the selection of goats is primarily aimed at protein intake and casein alpha s-1 especially in specialized goats.

*Growth of young*

Analyzing the stages of the growth process at young goats, different growth rates are observed. These are due to physiological phenomena strictly conditioned by dairy consumption in the first period.

All Spanish technologies provide for a minimum breastfeeding period of approx. 45 days, but also a slower shift to fodder feed.

Farm data reveals that the first step is due to a good increase, with a visible start in the first two months of 114g, respectively 133g /head/day. The daily average gain decreases after weaning at 98g /head/day and remains at this level over the next 4 months. In the last 3-4 months of growth, the average daily increase to 144g /head/day. (Fig. 6).

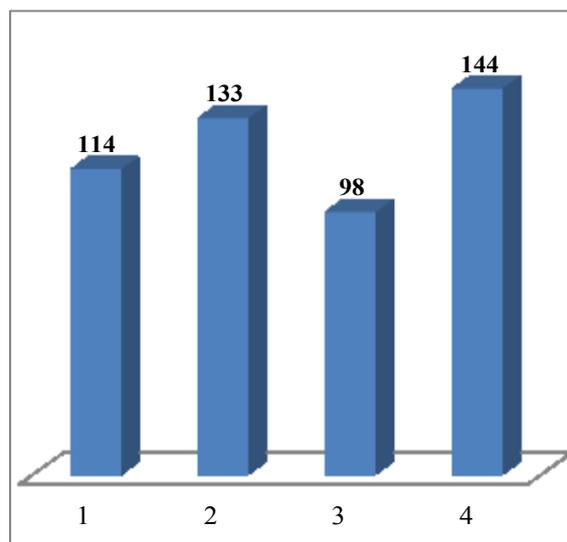


Fig. 6. Evolution of daily average gain in youth up to 9 months, (g/day).  
Source: Own design based on own experiment, 2017

Young female can enter to reproduction at 10-12 months, provided by a very good preparation, based on a protein intake of approx. 15% higher than adults females.

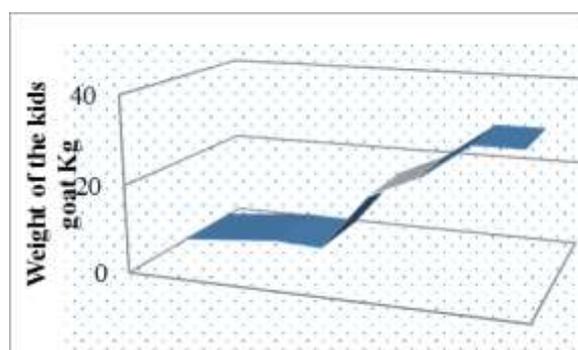


Fig. 7 Stage of growth rates  
Source: Own design based on own determination, 2017

*Females prolificacy*

Analysis of the prolificacy of females in the Murciana population highlights the hyper prolific character of females, the value of this indicator being 168%, compared to the average prolificacy of the breed of 190%.

## CONCLUSIONS

The first conclusions regarding the performances of this breed may be those related to the quality of milk and the yield of cheese maker. Equally, there is a good plasticity of the breed in the context of semi-intensive exploitation.

Typical conformation of Murciana goats' is the dolicomorphic with hipo and eumetric dimensions. Although they have a slightly smaller body size (19.8%) than specialized breeds for milk production, they produce average yields of 440 l /lactation. The milk contains 5.16% fat and 2.95% proteins.

The productive potential of the population can be improved only in the intensive or semi-intensive type of exploitation, with keeping the modern technological requirements.

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## CULTURAL TOURISM AND THE TRANSBOUNDARY COOPERATION

Rozalin YANEV

„Prof. Dr. Assen Zlatarov“ University, Burgas, Department of Marketing and Tourism, 1, “Prof. Yakimov” Boulevard, 8010 Burgas, Bulgaria, E-mail: rozko@abv.bg

*Corresponding author:* rozko@abv.bg

### *Abstract*

*The article provides a brief overview of the opportunities provided by the joint development of cultural tourism in the Balkan Peninsula region. It is proposed to develop some routes as a product of cross-border cooperation. Attention is directed to the Thracian-Illyrian cultural heritage. The Thracian-Illyrian tribes have participated in the genesis of all Balkan nations. Their heritage provides an opportunity to create a single regional Balkan emitting and receiving market for cultural tourism. Specific routes will be mentioned on the residences of the Odrysians and Satrae, Dacians and Getae, Paeonians and Dardani, who through cross-border cooperation projects could become attractive tourist products.*

*Key words:* cultural tourism, Thracian-Illyrian heritage, routes, residences

### INTRODUCTION

Alternative types of tourism are created by the wishes of communities who have realized their responsibility for the environment, who would not want to replace the stress in their everyday life with the stress of mass tourism and can afford it [4]. This does not mean that all other participants in mass tourism are not aware of these needs, and perhaps simply cannot afford another type of tourism. The very word „alternative“ means literally „one after another“, i.e. choice between two or more options. On the one hand, as is the case with Bulgaria, there are mainly the mass sea recreative and mountain ski tourism, and on the other most other species. They are alternative mainly because they are not massive. Otherwise, most of them have been developed long before the so-called „mass“ types of tourism. Moreover, according to the tourist resources of a country, some types of tourism declared alternative in some countries, others are mass - culturally, culturally, culturally, etc., which have no less harmful influences than the classic mass tourism types. Tourism resources are territorially limited, which enables individual countries to specialize in the development of different types of tourism [5]. Alternative types of tourism, even if they are not the main purpose of the trip, contribute to

the extension of the tourist season and diversification of leisure time in mass tourism. The promotion of alternative tourism types is boosted by the drop in the revenues from mass tourism and, above all, its profitability. The most active in the promotion of alternative types of tourism are those that do not have the necessary resources to develop typical mass tourism such as Great Britain, Germany, the Netherlands and others. It is hardly necessary for the developing mass tourism countries to shrink it at the expense of the alternative, but rather to make it „softer“ to approach the characteristics to the alternative.

Undoubtedly, the diversification of leisure time can be successful with the development of alternative types of tourism. The great benefit of developing them to extend the season, employment, average stays, revenue, etc. is well known.

The problem is that if we want to be successful, these species must develop strategically, in a complex way, not in a piece, to have a finished look that satisfies tourists and brings advantages over competition. Unfortunately, countries with the necessary tourism resources do not always have the means to develop the different types of tourism at a competitive level.

One of the promising types of tourism that has become very popular in recent times is **cultural tourism**.

Unfortunately, the economic results of the development of this type of tourism in Bulgaria are far too insignificant for now. Revealing some of the causes of this condition is not enough in itself. It is necessary to identify some steps that would help to channel the efforts for the development of cultural tourism.

The very concepts of culture and cultural tourism are so diverse and involve so many varieties that many researchers have some reason to say that this type of tourism has a much larger market share than it counts.

## MATERIALS AND METHODS

The purpose of this research is not the definition, nature, specificities and importance of cultural tourism. In our tourist literature they are well described by researchers such as T.Parusheva, Br. Koprinarov, St. Marinov, M. Neshkov and others [3, 4, 5, 6].

We will only look at some peculiarities that make it difficult to solve the problem of attracting enough participants and distract the efforts for the successful development of this kind of tourism.

The methods used for the current article are analysis and synthesis of specialized literature on the topic and presentation of the critical opinion on the actual situation of cultural tourism and the transboundary cooperation.



Fig.1.The main problems the development of cultural tourism is facing in the Balkans' area  
 Source: Own design.

Based on the analysis, the author expressed his own opinions on what it could be made to develop cultural tourism in the Balkans' area.

## RESULTS AND DISCUSSIONS

Let's start with the definition of the very notion of culture. Perhaps nobody knows how many definitions this term has. According to UNESCO's definition, „Culture is a multiplicity of distinctive spiritual, material, intellectual and emotional traits of a society or a social group, it encompasses not only art and literature, but also the way of life, cohabitation, value systems, traditions and beliefs.“ Or, formulated briefly, culture is a set of all material and spiritual achievements created by a society that are realized and used by it. From the definition we see how multi-layered is the concept, how much various human activities and relationships affect. Koprinarov points out the relation of culture to the different aspects of human everyday life - „Human environment; social heritage and traditions; Lifestyle; behaviour; rules of social life; international relations; values and norms; symbols and meanings; perceptions; similarities and differences between people“ [3].

A number of others could be added to them, but they also indicate what an incredible variety of relationships are intertwined in the notion of culture and how many different aspects should be considered when an action plan is exhausted. All these relations arise on the part of the material and intangible elements of the „higher culture“ - historical landmarks, works of art, painting, music, architecture, museums, etc., and on the other - language, education, clothing, religion and ritual, crafts, folklore, etc.

The diversity of the concept of culture also provokes diversity in the definitions of cultural tourism. One of them, Drayer, defines him as: „Cultural tourism is all trips whose motives are based on cultural activities, all the activities the tourist feels like“[3].

This and almost all other definitions of culture and cultural tourism are so comprehensive that they practically include all kinds of tourism as far as they are the achievements of society and it is impossible to say that one type of tourism is cultural and another non-cultural. We only distinguish between motivational, cognitive, educational, religious, festival, etc. types of

cultural tourism - for specialists and mass tourism. That is why it would be good to decide exactly what is meant by saying that Bulgaria will develop cultural tourism and what exactly the subspecies will develop predominantly in order not to dilute the efforts. Bulgaria is a relatively poor country and does not have the necessary financial and human resources to develop at the same time all the subcategories of cultural tourism at a competitive level. In such a small territory as our country are so invaluable natural and anthropogenic tourism resources that many people have reason to ask themselves why with such resources and such huge for our scale, modern bed base our revenues from international tourism are only about 6.2 billion BGN per year?

The reasons are numerous, but as far as cultural tourism is concerned, we will mention, as a start, the extremely strong competition in this area of our neighbouring countries. It is often pointed out that Greece, Italy, Bulgaria and Turkey are the richest countries of ancient artefacts in Europe. But to what extent is this known to the general public? That Bulgaria is a country with ancient culture, one of the cradles of European, and why not of the world civilizations? Just the Greeks have the unbelievable luck of being heirs of the culture of ancient Greece and the Eastern Roman Empire. The Hellenic culture is spread by Alexander the Macedonian and the Diadochi in the satrapies of the East. The glorious examples of Hellenic art have become the model of imitation of Roman artists, sculptors, architects, poets, and so on. And Roman legions have spread these patterns throughout the world. Later, during the Renaissance, in the Southern European art, the Hellenic and the Roman models were revived and became the subject of the admiration and imitation of the then-creators, thanks to the patrons such as Cosimo and Lorenzo di Medici, and the Byzantine philosophers and cultural figures who saved the Venetian galleys after the capture of Constantinople by Mehmed Fatih II. During the Enlightenment through the so-called Grand Tours, this worldview and these works became available to young aristocrats and bourgeoisers from Northern Europe and

the United Kingdom. This generalization of Hellenic and Roman art has in fact played the role of free advertising and propaganda for centuries. If this were to be done for good, we would need inexhaustible means to match the results of this „advertisement“. Despite this huge advantage, it could be offset, to a certain extent, by properly selecting the emitting and receiving markets and choosing a win-win strategy for the development of cultural tourism.

Still, in which direction to concentrate our efforts if we want to become a visible factor in the international tourism market of cultural tourism and to realize significant revenues corresponding to our rich cultural and historical heritage. There is currently a campaign for project preparation and application for European funds for cultural tourism projects. There would be nothing wrong with the enrichment of our cultural and historical heritage, if it was not the danger of dissipating the efforts and the means and degenerating away - in every village an ancient fortress or a church, if possible metropolitan. Like any - a village with a stadium as a world championship, despite the lack of population.

At the moment, talking about the development of cultural tourism in our country, we mean mainly the development of recipes and receptive local markets. Creating prerequisites for development of an integrated tourism and integrated tourist product is also favourable for the sustainable development [1]. Its combination also with rural tourism, leads to the creation of unique tourism service that satisfies the new needs – divergence, adventure, nearness to town, nature, humanism, delicious dishes, relatively low cost [2]. But before we start creating and shaping the product, we have to answer a number of questions: Who and what are the expected guests? What are the possible emitting markets and what are the interests of potential tourists from sending countries? Where will the tourists come from, how will they learn about the monuments of culture in Bulgaria, scattered around villages and mountains that they do not suspect that they exist or have the opportunity to reach them? What will be relied on by

different visitors - on organized or non-organized trips, with group or individual transport, how and where will the shelter and the food be? Who and how will organize and perform their reception and service, etc.?

Perhaps the most important questions we first need to answer are the subdued cultural tourism with the most attractive power and chances of conquering market segments, and which are these segments. Probably the greatest chances we would have if we use our unique immovable cultural and historical heritage as a basis for the development of cultural tourism - formations, mounds, necropolises, religious buildings, etc. But at what age should we set, at what time, in order to be competitive, attract the attention of potential tourists? We have already pointed out that we could hardly fight countries like Greece and Italy in the field of ancient Hellenic and Roman cultures. Not that we do not have wonderful examples of these epochs, but when one wants to see the Pope, he goes to Rome. There is another problem in our Balkan region. In the last 11-12 centuries the borders of the Balkan countries have been remade hundreds of times. Still there are disputes about which historical monuments from which people are created and whose culture they belong to. Perhaps the historical heritage with comparatively the least controversial monuments is the Thracian-Illyrian, since at that time modern states did not exist.

Apart from the fact that the Thracian-Illyrian tribes participate in the ethnogenesis of all Balkan peoples, focusing on their cultural heritage gives us the unique chance to create a **common Balkan cultural and historical product and a Balkan receptive and emitting market as a manifestation of cross-border cooperation**. Indeed, there are also unclear, undisclosed and controversial issues, but we believe that with the combined efforts of all Balkan countries this common product would more easily find its place on the international tourism market. The main problem is that Balkan history and culture have always stayed away from the attention of the broad masses in Europe and the world and are not known despite their great universal and

historical significance. Considerable means will be needed to shape and promote the product. Perhaps initially we are likely to face Greece's reluctance to impose a new regional product on cultural tourism, as it is an established destination for a brand-name cultural tour. But we hope everyone would benefit from offering a new exciting travel product.

Logically, the question arises - with what and how should it begin? Some of our historians and archaeologists call on tour operators to co-finance excavations. Unfortunately, firstly, Bulgarian tour operators do not have the necessary financial capabilities and secondly, they are commissioners and distributors and expect to be offered a ready-made product. Clearly, in order to create such a product, the coordinated efforts of archaeologists, historians, ethnographers, tour operators, hoteliers, restaurateurs, interested NGOs, government bodies, etc. are needed.

As a **starting point for cross-border cooperation**, we think that it is necessary to identify routes that would be of mutual interest to the Balkan countries and methodically start with the creation of the specific products. For this purpose, we offer the following example routes that would enter the Balkan product of cultural tourism - „Following the Traces of the Ancient Thracians“:

### 1. Residences of Odrysian Kings and Thracian Cult Complexes



Fig.2. The route including the residences of Odrysian Kings and Thracian Cult Complexes

Source: <https://www.google.bg/maps/>

- **Tekirdağ**, Turkey (Rodosto), which is home to the Byzantine residences - probably from the times of Teres; Heraion Teichos (the fortress of Hera) - capital during the time of Cersobleptes, son of Cotys, conquered by Philip II of

Macedon; The holy mountain of Heraion Oros (Tekirdağ), called by the Thracians Ganeada - the Great Goddess Mother from which many residences and tombs are scattered [7].

- **Doriskos**, near Enos / Enez (near the Turkish-Greek border), a Thracian fortress occupied during the times of the Odrysian kings Teres and his son Sparatocos after the Persians withdrew; the second Odrysian capital in this region. At 20 km north of Enos there is the ancient Ipsel (Kipsella), where Kerseblept begins to coin the coins, and against the mouth of Maritsa, Samothraki island is the sanctuary where the Thracian kings were dedicated to the Samothrakian mysteries, as well as Philip II, who intervened there and so to speak in a „church marriage“ with his wife Olympiada. The route could include other Thracian residences in the area of Alexandroupoulos.

- **Tatul** (Momchilgrad Municipality), an ancient cult complex, existed and used for thousands of years from the Neolithic Age (VII - VI millennium BC) to the Middle Ages. Perperek - 15 km. northeast of Kardzhali, an ancient sanctuary from the Chalcolithic period (before 8000 B.C.), a Thracian temple complex of the Satrae tribe, a fortress and a town where later West-Romans, Goths, East-Romans and Bulgarians lived. Destroyed in 1362 [7].

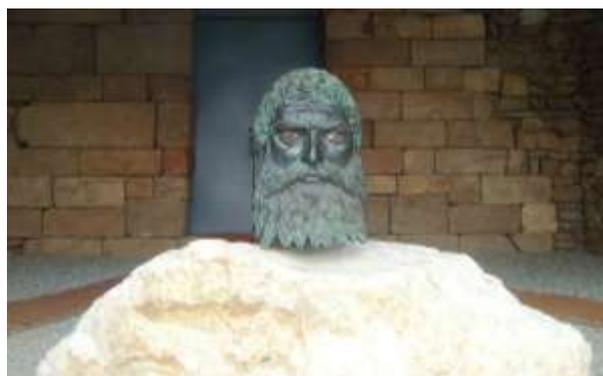


Fig.3. Burial mask of Seuthos the III found near Golyama Kosmatka

Source: <http://trakia-tours.com/king-seuthes-iii-gallery-174.html>

- **The valley of the Thracian kings - Seuthopolis**, at the bottom of the Koprinka dam near Kazanlak, the capital of the Odrysian kingdom of 320 BC, founded by Seuthes III. Unfortunately, this only well-studied Thracian city can be exposed to visitors only if the

project of arch. J. Tilev for his visualization. To this complex belongs the Thracian tomb in Kazanlak, the cult buildings in the mounds near the town of Shipka - the Golyama Kosmatka, Ostrusha, Shushmanets, Grifoni, Helvetia, the Great Arsenal and others [10]. There's an additional activity for people, interested in visiting the sanctuary near Starosel and the fortress-residence on Kozi Gramadi Peak.

- **Kabile** (10 km from Yambol) - an ancient Thracian town from IV century BC (created around 2000 BC), a crossing of the Ainos (Enez) roads - through Hemus (Stara Planina) and Via Diagonalis - from Byzantium (Istanbul) through Serdica (Sofia) to Naissos (Niš). Residence of Odrysian kings Sparatocos and Scostodos. In the 4th century AD is the episcopal centre of Thrace. Destroyed by the Avars in 583.

**2. Getae and Dacians** (likely to have been parts of the same North-Thracian people, as the Getae lived on both sides of the Lower Danube, in Bulgaria and Romania, and the Dacians in the mountains westwards till the river Tisza).



Fig.4. The route including the key attractions regarding Getae and Dacians

Source: <https://www.google.bg/maps/>

-**Historical-archaeological reserve „Sboryanovo“**, 10 km from Ispirih, to the village of Sveshtari. It includes the remains of the Thracian town of Helis (dedicated to Helios the God of the Sun), which existed from the end of the 4th century BC. until 250 BC. - Residence of the Getae king Dromichaetes, the victor of diadochus Lysimachus. Perhaps earlier in the early Iron Age of this place was Dausdava - „The Wolf City“. Daos - a wolf, an attribute of Helios, from which the ethnonym of the Dakoi - Dacians probably originates.

The Sveshtari Thracian-Hellenistic tomb, where burial of Dromichaetes was found, is declared by UNESCO as an object of world cultural and historical heritage, as well as the Muslim sanctuary Demir Baba Teke, revered by the Alevi.

- An additional activity, if preferred, to the Danube delta and a visit to the town of **Tulcea**, where the ancient Thracian (Getae) town of Aegyssus, founded in the Bronze Age - II millennium BC was located.

-**Argedava**, in Popești, Mihăilești, in the district of Giurgiu, Romania - the supposed capital of **Burebista**, king of the Dacians and Getae, ruled between 82 and 44 BC. His vast country covers the area from the Carpathian territories in Slovakia to the Stara Planina and from the Middle Danube to the Black Sea, till Apolonia (Sozopol).



Fig.5. Sarmizegetusa Regia, the old capital of Decebal, the King of Dacia

Source:

[https://ro.wikipedia.org/wiki/Sarmizegetusa\\_Regia](https://ro.wikipedia.org/wiki/Sarmizegetusa_Regia) [11]

- The **Mountains of Orăștie**, near the village of Gradishte, dist. Hunedoara. There are six Dacian fortresses - **Sarmizegetusa**, the capital of the last Dacian king - **Decebal "The Brave"** (86-106 AD), Costești-Blidaru, Piatra Roșie, Costești-Cetățuie, Căpâlna and Bănița. The six fortresses, built in the style of murus dacicus that formed the defensive system of Decebal against the Romans, are included in the UNESCO World Cultural Heritage [9].

### 3. Paeonians and Dardani

-**Skupi**, an archaeological reserve on the territory of the city of Skopje, originally founded by the Dardani and was their temporary capital. After his capture by the Romans and receiving the status of municipia (106 AD), the governor of the province of Dardania resided there.

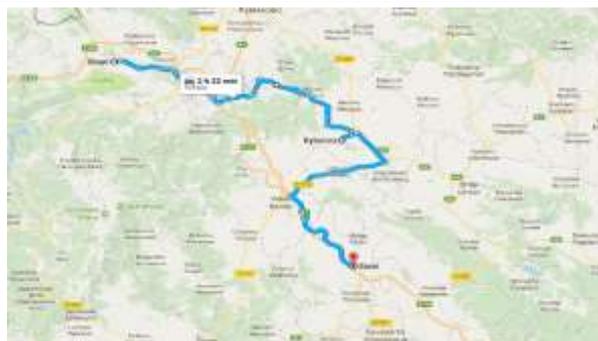


Fig.6. The route including the key attractions regarding Paeonians and Dardani

Source: <https://www.google.bg/maps/>

-**Bylazora**, near village of Knezhje, municipality Sveti Nikole in Republic of Macedonia – a presumable capital of the Paeonians. Captured in 217 A.D. by the armies of Philip V Macedonian. The Paeonians inhabited by the territory between the Scombrus Mountain (present day Vitosha) to the north and the ancient Kingdom of Macedon to the south and between the rivers Struma and Vardar [8]. The tribal group of the Paeonians is part of the Thracian-Illyrian society. They are probably a mixture of Pelasgian, Illyrian and Thracian tribes with colonists returning from Asia Minor - Phrygians, Misians, Carians.



Fig.7. Archaeological site of Bylazora

Source:

<https://www.google.ro/search?q=Archaeological+site+of+Bylazora> [12]

- **Stobi**, Gradsko Municipality, at the mouth of the river Vardar and Cherna in the Republic of Macedonia – an ancient paeonian city, conquered in 168 B.C. by the Romans. Since 325 B.C. is the seat of bishop. It is the largest archaeological complex in the Republic of Macedonia.

## CONCLUSIONS

At a later stage, other routes could be added to these routes. But there is a danger of local patriotism getting so many suggestions that ultimately no solutions can be reached. In order to offer these routes we were guided by the point of view of a tourism specialist. To achieve this, however, it is necessary to form teams of narrow specialists in the relevant fields to turn them into ready-made tourist products.

Perhaps the greatest difficulty that has to be overcome on the way of offering and promoting this product on the tourist market is to promote the history and culture of the Thracian-Illyrian tribes and to make it known to potential tourists. That's why the usual means of advertising and propaganda will not be enough. Perhaps the best effect for the promotion of this culture would be the creation and popularization of science-fiction, feature films and video games for everyday life, culture, gods and heroes (Dionysus, Zamolkses, Rezos, Orpheus, Spartak, Decebal, etc.). The task requires enormous resources, but there is no better way to promote it. Unfortunately, the few films of this age related to the Thracian peoples - the "Dacians" and the "Trajan's Column" - are only remembered by a small part of the older population of the former socialist camp. In the only film of a newer years in which the main heroes are Thracians – "Hercules", directed by Brett Ratner, in 2014, they represent the Thracians as Greek tribes, and the mythical hero Rezos - a candidate for the king of the nonexistent then-Greece. In the film "The Golden Fleece", Orpheus's role is played by an African American, and may cause the wrong idea that the Thracians were African tribes. These paradoxes show how important it is to clarify to the general public what the Thracians are if we want to make a success in promoting this product of cultural tourism.

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