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RESEARCH ON THE TRENDS IN MILKING LIVESTOCK AND MILK PRODUCTION IN ROMANIA

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Abstract

The goal of the paper was to analyze the main trends in the milking livestock and milk production in Romania during the period 20072-012 and to establish the forecast for the 2013-2015 horizon, based on the empirical data provided by the National Institute of Statistics and Eurostat. The methods used in this study were: the fixed basis index, average change method, and comparison method. While the number of dairy cows declined by 30 %, accounting for 1,265 thou heads in 2012, the number of female sheep and goats increased by 45 % reaching 8,726 thou heads. The farm size is very small, 1-2 cows/farm for 59 % holdings, 3-9 cows/farm for 38 % holdings and over 10 cows for only 3 % farms and the extensive technology is the most practiced one. Milk production declined by 20 %, accounting for 44,172 thou hl in 2012, of which 86 % is produced by cows. Milk production value contributes by 32 % to agricultural production value. Cow milk yield is small, only 3,417 kg/cow in 2012 and in decline. Only about 22 % of milk is delivered to dairies and the remaining is consumed on farm and directly sold in the market because of the low milk farm gate price and milk quality. The producer's price is the lowest in the EU, accounting for Euro 29.84/100 milk kg. As a conclusion, to rehabilitate the sector of milk producing, the farmers' associative forms are required to join the capital and financial resources, to apply for EU funding to modernize the farms, to produce a higher production and assure a high profitability and competitiveness.

Key words**:** *milking livestock, milk production, Romania, trends*

INTRODUCTION

Romania has a long tradition in producing milk, due to its geographical position, with a large variety of relief, important surface of agricultural land, and also pastures and meadows for raising cattle, sheep and goats.

The entry into the EU was a real challenge for the milking livestock, spread in million of small farms of subsistence, lacked of modern technologies and financial resources, with low milk performance in more than 90 % animal holdings.

Just a few farms were able to keep pace with the EU requirements regarding milk production and quality which resulted in a low percentage of direct milk delivery to milk processors.

Romania was a modest milk producer during the last 25 years because of its huge number of small holdings, the decreasing number of milking farm animals mainly cows, the low number of dairy cows per farm, extensive technologies, low technical endowments, difficulties in assuring a corresponding feeding, high production cost, low producer's price, problems with milk quality, which pushed the dairy farming at the limit of the profitability producing dissatisfaction to the most of the Romanian farmers. [13]

Milk production is in a continuous decline, because of the decreasing number of dairy cattle, milk yield is still small about 3,400 kg/cow/year, milk delivery is affected by farm gate price and milk quality, so that the demand/offer is unbalanced and consumption is lower than in other EU countries. So, the imports of milk and dairy products were required to cover the population and industry needs.

However, some specialized farms recorded better performances supplying milk processors, despite that about 78 % of milk production is consumed on farm or directly in the market.

The areas with the highest contribution to Romania's milk production are the Central region and North East region, fresh dairy

products are mainly carried out in the Central and South Muntenia and Bucharest and Ilfov County and cheese production is especially achieved in the North-West, Central and North Eastern Romania. [8]

In this context, the paper aimed to analyze the evolution of the milking livestock, farm structures, milk yield, milk production, farm gate milk price, producers problems in order to identify the main trends arising after the accession into the EU in the period 2007-2012, and set up the forecast for the period 2013-2015.

MATERIALS AND METHODS

In order to carry out this analysis, the empirical data were collected from various official sources such as: National Institute of Statistics Data Base, National Institute of Statistics. EuroStat data base, journals, official communications. The period of reference was 2007-2012.

The main indicators taken into consideration to analyze the milk and dairy products market were the following ones: number of holdings producing milk, number of dairy cows, buffaloes, female sheep and goats, farm size, animal density/ha, milk production, milk production per inhabitant, milk yield, milk quality, and farm gate milk price.

The data were processed according to the fixed basis index method and comparison method and the results have been tabled and interpreted.

Also, the average change method was used to set up the forecast for the period 2013-2015, involving the adjustment of the chronological series, based on the formula: $Yt_i = y_{t0} - n\,\bar{\Delta}$, Yt_i = the adjusted value of the variable in the year i, y_{t0}= the real value of the variable in the year zero, n= 1,2,3,....i, $\bar{\Delta}$, was calculated with the formula $\bar{\Delta} = (\sum \Delta)/ (n-1)$, where Δ = annual change, $y_1 - y_0$; $y_2 - y_1$; .....$y_n - y_{n-1}$, where i=1,2,...n years of the chronological series. [7]

RESULTS AND DISCUSSIONS

Agricultural holdings raising cattle, sheep and goats. In 2010, there were 728,020 agricultural holdings dealing with cattle farming, by 31.82 % less than in 2007.

Taking into account that in the same year in the EU, there were 2.6 million holdings with cattle, this means that the share of the Romanian agricultural holdings was 28 %.

The descending trend in Romania followed, in general, the EU decreasing tendency regarding the number of cattle holdings, the highest decline being noticed in the Czech Republic (-45 %), Slovakia (-45 %), Slovenia (-43 %) and Estonia (-42 %) between 2007 and 2010. [10]

Taking into account the surface of the holdings in Romania, their structure was the following one: 24.28 % farms had less than 1 ha, 59.29 % holdings had 1-5 ha, 11.88 % farms had 5-10 ha, 3.91 % had 10-50 ha, 0.31 % had 50-100 ha and 0.33 % had over 100 ha.

The main trend regarding the agricultural holdings raising cattle is that the number of farms had a general decreasing trend, except the farms with over 50 cattle whose number is increasing, and a number of 608,512 farms (83.58%) had less than 5 ha. (Table 1)

Also, in 2010, Romania had 272,272 holdings with sheep and goats, by 30.25 % less than in 2007.

The holdings structure depending on their land was the following one: 25.83 % had 1-5 ha, 52.26 % had 1-5 ha, 14.02 % had 5-10 ha, 6.43 % had 10-50 ha, 0.78 % had 50-100 ha and 0.68 % had over 100 ha.

The main trends regarding the agricultural holdings raising sheep and goats were the following ones: the number of farms registered a continuous descending trend, except the smallest farms with less than 1 ha and the largest farms with over 50 ha whose number increased.(Table 1)

In the EU Dairy farms Report, 2013, based on FADN Data 2011, concerning the milk specialized farms, it is specified that Romania had 2 ha fodder area (farm size), compared to 29 ha in the EU-27, 51 ha in the EU-15, 788 ha in Slovakia (the largest farm size), 252 ha in Czech Rep., 102 ha in Denmark, 101 ha in United Kingdom, 92 ha in Hungary, 13 ha in Poland and 8 ha in Bulgaria. [3]

Table 1.Agricultural holdings raising cattle, sheep and goats, 2007 and 2010 (number)

Farm surface Ha	Cattle holdings			Sheep and goats holdings		
	2007	2010	2010/2007 (%)	2007	2010	2010/2007 (%)
Total	1,067,726	728,020	68.18	390,562	272,275	69.75
0-1	198,480	176,823	89.08	66,385	70,342	105.96
1-5	658,454	431,689	65.56	221,572	142,305	64.22
5-10	158,804	86,528	54.48	71,398	38,192	53.49
10-50	48,122	28,511	59.24	28,171	17,509	62.15
50-100	2,030	2,382	117.33	1,620	2,126	131.23
Over 100	1,836	2,087	113.67	1,413	1,801	127.45

Source: NIS, 2013, Romania's Statistical Yearbook. [11]Own calculations.

Cattle, sheep and goats stock. In the period 2007-2012, in Romania, the number of cattle decreased by 28.74 % from 2,819 thou heads in 2007 to 2,009 thou heads in 2012. Also, the number of dairy cows, buffalo and heifers declined by about 30 %. The share of dairy cows, buffalo and heifers in the cattle number registered a slight growth from 61.44 % in 2007 to 62.96 % in 2012.

The number of cattle stock and dairy cows is different distributed in the territory of Romania.

Table 2. Cattle, sheep and goats stock, 2007-2012 (Thousand heads)

	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Cattle, of which:	2,819	2,684	2,512	2,001	1,989	2,009	71.26
-Dairy cows, buffalo and heifers	1,732	1,639	1,569	1,299	1,266	1,265	70.03
Share(%)	61.44	61.06	62.46	64.91	63.65	62.96	-
Sheep, of which:	8,469	8,882	9,141	8,417	8,533	8,834	104.30
-Ewes and ewe lambs	7,207	7,597	7,818	7,338	7,441	7,695	106.77
Share (%)	85.09	85.53	85.52	87.18	87.20	87.10	-
Goats, of which:	865	898	917	1,241	1,236	1,266	146.35
-Female goats	713	741	755	1,032	1,012	1,031	144.60
Share(%)	82.42	82.51	82.33	83.15	81.87	81.43	-

Source: NIS, 2013, Romania's Statistical Yearbook. [11]Own calculations.

The region with the highest number of dairy cows is the North-East Romania with about 23 % in total cattle stock and about 22.6 % in total number of dairy cows. On the next positions are coming, in the decreasing order, the North West region, the South Region and the Western region. [1]

In 2011, the EU had over 86 million cattle, a smaller figure compared to the previous years. This means that in 2011, about 2.31 % of the EU cattle stock was in Romania. The decreasing trend regarding cattle number was noticed in some EU countries, the highest decline being noticed in Romania (-32 %) and Slovakia (-25 %) in the period 2007-2011. But, important growths were recorded in other EU countries such as: Greece (+12 %), Portugal (+8 %), Cyprus (+7 %) and the Netherlands (+2 %).[10]

The number of sheep increased by 4.30 % from 8,469 thou heads in 2007 to 8,834 thou heads in 2012. A similar ascending trend was registered by ewes and ewe lambs whose number increased by 6.77 %. The number of goats recorded the highest growth, + 46.35 %, from 865 thou heads in 2007 to 1,266 thou heads in 2012, of which female goats about 81.43 %.[12]

Therefore, while the number of dairy cows, buffalo and heifers is decreasing, the number of sheep and goats is increasing mainly due to the importance of goat milk for human consumption. [12]

Farm size. Taking into account the number of holdings with cattle, sheep and goats and the number of dairy cows, buffalo and heifers and also of ewes and ewe lambs and female goats, it is easy to notice that the holding size is very

small in term of average number of animals per farm.

The average farm size in dairy farming is 1-2 heads in about 59 % of holdings, 38 % have 3-9 heads and only about 3 % have more than 10 cows. Romania comes on the last position in the EU from this point of view, compared to the EU average farm size.

In the EU Dairy farms Report, 2013, based on FADN Data 2011, regarding milk specialized farms, it is mentioned that Romania had 4 LU (Livestock unit)/farm, compared to the EU-27 average farm size of 29 LU, EU-15 with 54 LU, or various EU countries such as: Slovakia 217 LU, Denmark 142 LU, Czech Rep 138 LU, United Kingdom 119 LU, Hungary 76 LU, Poland 16 LU, Austria 16 LU, Bulgaria 13 LU. [3, 5]

Animal density per surface unit. The number of animals per surface unit is very small in Romania: 14.8 cattle/ha in 2012 by 31 % less than in 2007, 9.3 dairy cows, buffalo and heifers/ha in 2012 compared to 13.2 heads/ha in 2007, that is by 29.55 % less. Therefore, the density of cattle has continuously decreased taking into account the descending trend of cattle stock.

Table 3.Cattle, sheep and goats per hectare (heads/ha)

	2007	2008	2009	2010	2011	2012	2012/2007 (%)
Cattle, of which:	21.4	20.4	19.1	14.6	14.7	14.8	69.15
-Dairy cows, buffalo and heifers	13.2	12.4	11.9	9.5	9.3	9.3	70.45
Sheep and goats, of which:	70.9	74.3	76.4	70.5	72.2	74.6	105.21
Ewes, ewe lambs and female goats	60.1	63.3	65.1	61.1	62.4	64.5	107.32

Source: NIS, 2013, Romania's Statistical Yearbook. [11]Own calculations.

But, concerning sheep and goat stock per ha, the density increased reaching 74.6 heads/ha in 2012, by +5.21 more than in 2007 and 64.5 ewes, ewe lambs and female goats in 2012, meaning +7.32 compared to 2007. Therefore, the increased livestock for these species had a positive impact on animal density.

However, Romania has the lowest animal density per surface unit compared to other EU countries.

Milk production recorded a descending trend from 54,991 thou hl in 2007 to 44,172 thou hl, that is minus 19.68 % in the analyzed period.

Table 4. The share of Milk production produced by dairy cows and buffaloes in total milk production, 2007-2012 (Thousand hl)

	2007	2008	2009	2010	2011	2012
Share of Milk production produced by dairy cows and buffaloes in total milk production (%)	88.77	99.54	88.66	85.92	86.64	85.73

Source: Own calculations based on NIS, 2013, Romania's Statistical Yearbook. [11]

This was a consequence of the decline of the milking livestock, mainly dairy cows, which have the largest contribution to milk production. The share of milk coming from dairy cows and buffalo to the whole milk production in the country declined from 88.77 % in 2007 to 85.73 % in 2012. (Table 4).

Milk production produced by dairy cows and buffalo accounted for 37,878 thou hl in 2012, by 23.43 % less than in 2007.

Taking into consideration the milk production achieved by Romania in the year 2011, and the total amount of milk produced in the EU of 156 Million tons, one can notice that Romania's contribution to the EU milk production was about 4.23 %. In Romania about 86 % of milk is produced by cows, while in the EU cows contribution accounts for about 97.8 %.

In Romania, due to the livestock structure, tradition and geographical conditions, about 14 % milk is produced by sheep and goats. Based on milk coming from these species, Romania is situated on the 5 th position in the EU, after Greece, Spain, France and Italy. All

these 5 countries produces 92 % of the EU ewe milk. [10]

In 2011, Romania's milk production value accounted for Euro million 1,252.8, contributing by 7.32 % to the value of agricultural production (Euro million 17,103.3) and 2.35 % of the EU milk production value (Euro million 53,215). In the EU, milk represented 14 % of the agricultural production value.

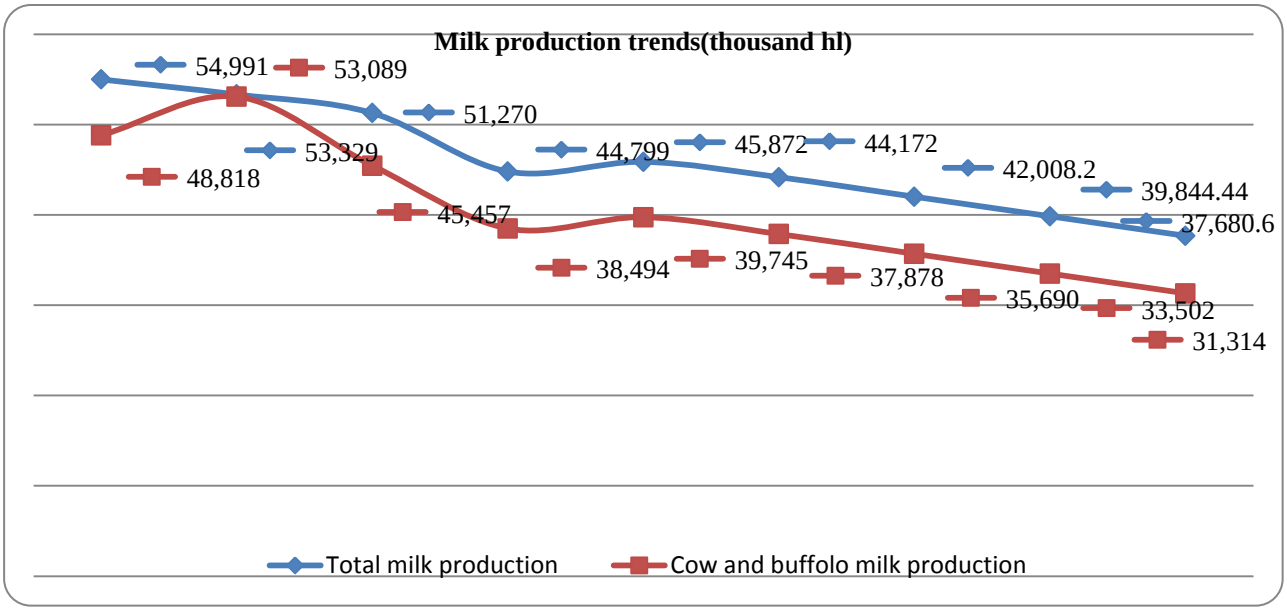

Fig.1.Evolution of the Total milk production and Cow and buffalo milk production during the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Romania's Statistical Yearbook. [11]

Regarding milk quota, the Romanian farmers have not been able to fulfill it in the period 2007-2012 and the EU decision to remove the dairy quota starting from the year 2015 will deeply affect the Romanian milk market which is expected to be invaded by many foreign dairy products coming from the EU countries which are exceeding their quota currently. [15]

Based on the evolution of milk production during the period 2007-2012, the forecast for the 2013-2015 horizon is illustrated in Fig.1. In the year 2015, it is expected as total milk production to account for 37,680.6 thousand hl, of which 31,314 thousand hl, that is 83.10 % to be supplied by dairy cows and buffaloes. (Fig.1.)

Milk production per farm. In 2011, a dairy farm produced 14 tons milk, compared to 203 tons in the EU-27, 396 tons in the EU-15, 1,242 tons in Slovakia (the highest production in the EU), 1,193 tons in Denmark, 942 tons in Czech Rep., 885 tons in United Kingdom, 654 tons in the Netherlands, 544 tons in Hungary, 86 tons in Poland and 40 tons in Bulgaria, as just a few examples. Therefore, Romania had the lowest milk production per farm among the EU countries. [3]

Cow milk yield. As cows give the highest contribution to milk production, this article is mainly focused on cow milk. Cow Milk yield is in general small in Romania, taking into account the breeds' production and fodder production, the small sized farms where growing technologies are more extensive than intensive. In 2012, Romania registered 3,417 kg milk/cow by 4.13 % less than in 2007 (3,564 kg/cow). (Fig.2.)

In 2011, Romania produced 3,524 kg/cow, twice less than the EU-15 average accounting for 7,337 kg/cow or compared to 6,905 kg/cow produced in the EU-27. In other European countries the average milk production is much higher: 8,711 kg/cow in Finland, 8,546 kg/cow in Sweden, 8,421 kg in Denmark, 8,019 kg in the Netherlands, 6,814 kg in Czech Rep., 7,199 kg in Hungary, 5,732 kg in Slovakia, 5,319 kg in Poland, 3,140 kg in Bulgaria. [3] Therefore, in the EU, there are countries with the highest performance in terms of milk yield like Finland, Denmark, Sweden, Spain, and also countries in the

opposite side, with the lowest yield: Romania, Greece and Bulgaria. [5]

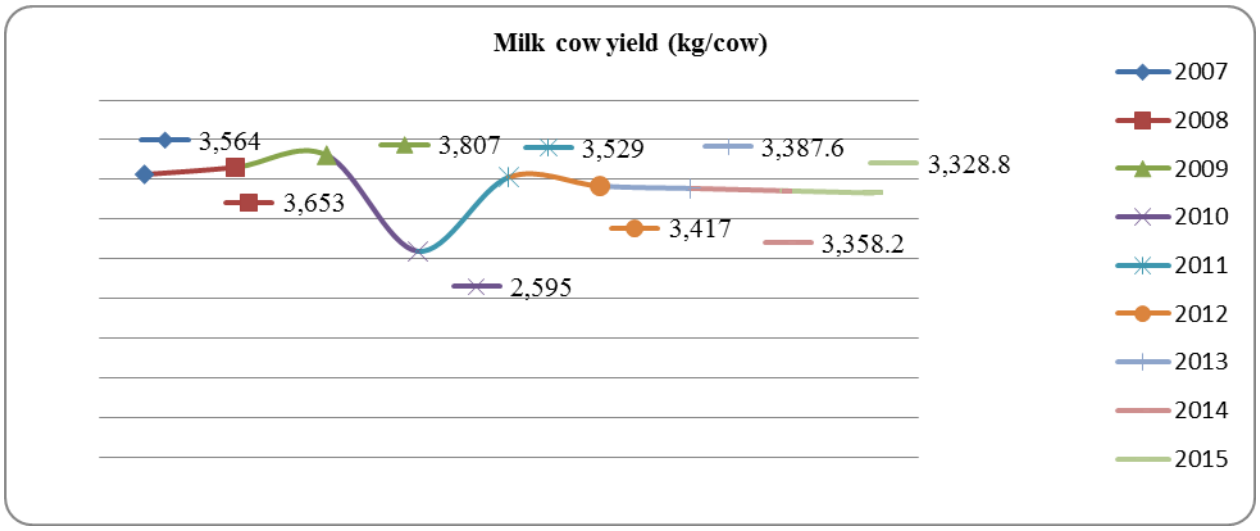

Fig.2.Evolution of cow milk yield in the period 2007-2012 and the forecast for the 2013-2015 horizon in Romania. Own design based on MARD Report 2014, [8]

Milk production per inhabitant. Taking into consideration the evolution of Romania's milk production and population, the milk production per inhabitant in the period 2007-2012 declined from 292.3 kg/capita in 2007 to 240.5 kg/capita in 2012, that is by 17.73 % less.(Fig.3.)

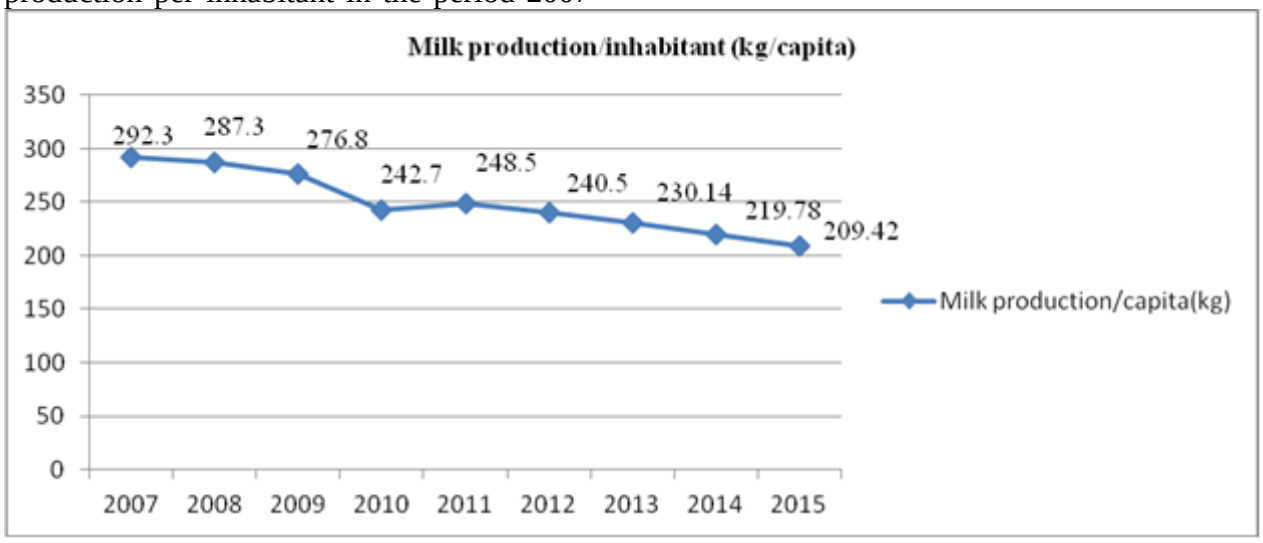

Fig.3.Evolution of milk production per inhabitant in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Romania's Statistical Yearbook. [11]

Milk quality is very important for processing and for human consumption of healthy milk and dairy products. At delivery, milk quality is checked regarding its fat and protein percentage, acidity, density, and the number of total pathogenic germs and the number of somatic cells. The EU established specific standards regarding milk quality, which should be respected by all the member states according to the requirements of Commission Directive 89/362/EEC (1) and Council Directive 92/46/EEC. [2,6,14]

In Romania, the amount of delivered milk from dairy farms is recalculated at the standard fat %,that is 3.5 % , from this calculus being advantaged the farmers whose dairy cows produce a milk with a fat % higher than 3.5 %, while the ones delivering a milk with less than 3.5 % fat are deeply disadvantaged. The thresholds for the number

of pathogenic germs is maximum 100,000 per ml milk and for the number of somatic cells is maximum 400,000/ml milked milk. These standards reflect the hygiene conditions where milk was produced and milked, the degree of disinfection of the milking machine and other milk equipments between two milkings and also how milk was treated. [16]

In Romania, there are still problems from this point of view, due to the fact that many of the small farmers are practicing manual milking, have no milk tanks to store milk at a corresponding temperature. However, milk quality is checked and only the corresponding milk is collected by dairies and milk collecting centers.

Starting from January 1st 2014, milk producers are not allowed to deliver milk which do not compile with the EU milk quality standards. [9]

Farm gate milk price. Producer's price, that is the one he receives at delivery based on standard milk amount, has slightly increased from Lei 0.75/kg in the year 2007 to Lei 1.11/kg in 2012, meaning + 48 % in case of cow milk and from Lei 1.20/kg in 2007 to Lei 1.87/kg in 2012, reflecting +55 % gain in case of sheep milk. In 2012, a kilogram of sheep milk was by 68.47 % higher than a kilogram of cow milk. (Fig.4.).

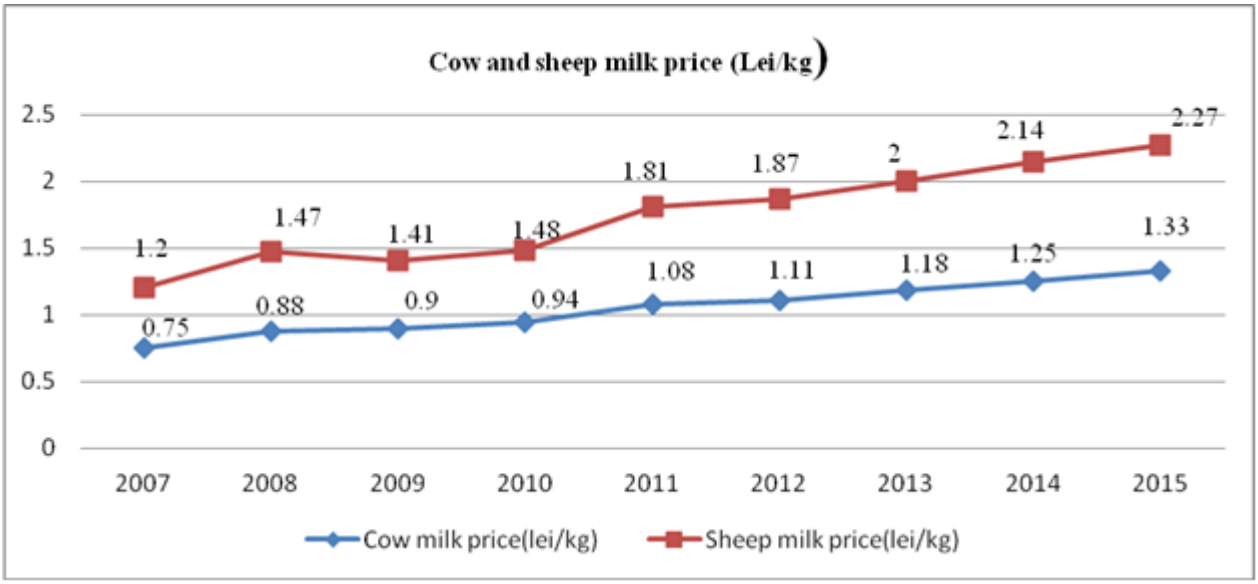

Fig.4.Evolution of cow and sheep milk price in the period 2007-2012 and the forecast for the 2013-2015 horizon. Own design based on NIS, 2013, Romania's Statistical Yearbook. [11]

Romania recorded in the year 2011 a milk price of Euro 323 per ton, lower than Euro 357 per ton in the EU-15 and Euro 349 per ton in the EU-27. In comparison with other European countries, farm gate milk price in Romania is the lowest one: Euro 460/ton in Italy (the highest milk price), Euro 411 in Finland, Euro 394 in the Netherlands, Euro 371 in Denmark, Euro 335 in Czech Rep., Euro 334/ton Slovakia. However, milk price in Romania was higher than in other EU countries such as: United Kingdom Euro 315 per ton, Bulgaria Euro 311, Hungary Euro 309, Poland Euro 286. [3]

In 2014, the average farm gate milk price in the EU-28 was Euro 34.32 per 100 kg. Romania registered Euro 29.84 per 100 kg, by 7.62 % less than in 2011, reflecting a decreasing trend. A similar situation was noticed in other EU countries such as: Italy Euro 36.77/100 kg (-20 %), Denmark Euro 36 (- 2.97 %), the Netherlands Euro 34.50 (-12.44 %), while in other countries the price increased like in Finland Euro 42.33 per 100 kg (+2.99 %), United Kingdom Euro 35.63 (+13.11 %), and Bulgaria Euro 32.58 (+4.75 %).[4]

The reduced milk price places Romania on the last position in the EU, the main causes being: the growth of farm input cost, mainly of feeding cost, the lack of cooperatives or other associative organization forms to assure farm

inputs at a lower cost and sell milk at a higher price, milk quality, which sometimes does not compile with the EU standards, and as a consequence, the low milk price offered by dairies to farmers, the demand/offer ratio in Romania, the restrains and embargo imposed by Russia, and the dynamics of milk production and marketed milk in Slovakia, Poland and Hungary. [5]

However, a few cooperatives have been already founded and their results proved a higher efficiency, but their impact on milk producing sector is not yet so significant.

For this reason, farmers are dissatisfied of the low milk price, which stagnated for several years and of the lost of their business and some of them have been oriented to beef cattle growing as meet production is a niche for the Romanian producers as long as the demand is higher than the offer currently. [15]

Milk delivery. A low number of farms delivered milk directly to milk processors, it is about 1,464 specialized farms accounting for only 1.30 % of the total number of dairy holdings. The marketed milk directly sold to the milk processing industry represented only 22 %, meaning that the remaining of 78 % was consumed by the family members, calves, and other animals.

Some milk processors had the idea to provide mill tanks and installed 1,613 milk collecting centers where farmers to bring their milk.

Despite this, many farmers could not deliver milk to the processing industry.

As a result, milk processors' need of raw milk is only partially covered by the domestic suppliers, a reason to make milk import to assure the processing capacity and profitability.

CONCLUSIONS

Romania is facing a continuous decline regarding milking animal stock, number of farms, milk yield, and milk production.

The small farm size, the low technical endowment, the lack of financial resources led to a low milk performance, a low productivity and competitiveness in this sector.

In addition, milk quality requirements imposed by the Romania's entry into the EU have limited the number of farmers able to supply milk processing industry.

As a result, the amount of delivered milk was diminished with a negative impact on the raw milk offer and milk processors were obliged to import milk from various EU countries to cover the processing capacity.

This analysis pointed out that some measures are imposed to rehabilitate this sector of activity. First, farmers' associative forms could restore the milk producing sector to increase profitability and milk quality. Also, important investments are required to modernize or develop modern dairy farms which are the major suppliers of raw milk.

Unfortunately, after the quota abolition in 2015, it is expected as import of raw milk and dairy products to be encouraged, so that The Romanian milk producers to be more affected than they are at present.

Milk quality is a challenge to overpass the increasing competition in the milk and dairy products market.

However, sheep and mainly goat milk and products could be a niche for Romania' s export in the future.

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