

LIVESTOCK AND ANIMAL PRODUCTION IN ROMANIA - DYNAMICS AND STRUCTURAL CHANGES IN THE PERIOD 2007-2020

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Abstract

The paper analyzed the evolution animal sector regarding livestock and production in Romania in the period 2007-2020. Two sub-periods: P1- 2007-2013 and P2 2014-2020 were compared for assessing if the achievements in P2 were superior. The data from the National Institute of statistics regarding livestock and production by species were processed using fixed basis index, structural index, regression equations, coefficient of determination, multi annual mean per decade, absolute and relative differences between P2 and P1, in order to emphasize the trends and changes during the studied period. The results emphasized the following: the number of bovines, pigs and poultry decreased, while the number of sheep and goats and bee families increased both in P2 and P1. The total animal live weight at slaughter diminished due to the lower and lower live weight of bovines and pigs. However, the increased live weight at slaughter of sheep, goats and poultry had a positive impact. Milk and egg production declined and continued in P2, while wool and honey production increased. Despite that agricultural production value in animal sector increased by +20,420 trillion Lei in 2020 versus 2007, it was by 68.61% smaller than the agricultural production value achieved in the vegetal sector. In consequence, the contribution of animal sector to agricultural output was just 31.39% in the year 2020. The gaps in domestic production have to be covered by imports to meet consumers' requirements and this will deepen the deficit in agro-food trade balance. The reduction of CO₂ emissions in agriculture, where 50% come from animal sector, obliges farmers to set up strategies destined to promote animal products obtained from more environment friendly technologies.

Key words: animal sector, livestock, production, contribution to agricultural output value, structural change, Romania

INTRODUCTION

Foods of animal origin have a high importance in human diet and health due to their content in valuable nutrients like proteins, fats, minerals and vitamins.

A healthy life style means a balanced diet including all the nutrients and high value proteins. That is why milk and dairy products, meat of various sorts (beef, veal, pork, mutton and lamb, poultry) and fish should be present

in humans' daily diet next to vegetables and fruits [7, 9].

Foods with an animal origin have a specific texture, flavor and a higher palatability than the ones of vegetal origin. "Nutrient-dense foods of animal origin are used to prevent or treat the most global nutrition" [2].

The affirmations mentioned above reflects how important are farm animals and justify why animal sector should be developed in any country.

Romania is recognized as a country with a high potential for agriculture development both in the vegetal and animal sector.

Among the EU member states, Romania comes on the 1st position for its most numerous farms accounting for 2.88 million, but also it is on top position for the number of farms raising animals whose share in the total number of agricultural holdings is 61%, of which 25% animal farms and 36% mixed farms [10, 57, 61].

The small scale farms are especially subsistence and semi subsistence family farms which dominate animal growing and just a few are commercial companies mainly dealing with poultry and pig farming.

According to Eurostat, in 2020, in total animal output, the main contributors in Romania were: milk 25.3%, pigs 22.6%, eggs 15.7%, poultry 12.8% and cattle 8.5% [11].

Cattle, especially dairy cows and buffalos accounts for about 88 % in total milk production and together with sheep and goats assure the farmers' family consumption and also the raw milk needed by dairies [33, 34, 45].

Also, they are a source of meat (beef and veal) being consumed in Romania besides poultry and pork, but these sorts of meat and also exported in the Western countries [26, 39, 46].

Pigs are grown in Romania as pork is a traditional meat used in many preparations, but, despite that, during the last years, the people has become more oriented to poultry meat which is cheaper and healthier having less cholesterol [3, 40, 52].

Sheep and goats are raised for their milk, meat and wool and also because they are a symbol of pastoralism which offer jobs, income and food for the people in the rural areas mainly in the mountain regions [4, 5, 8, 29, 45].

Also, the live sheep are exported to the Arabian countries, and this brings foreign currency in the payment balance [6].

Poultry farming is the object of the business of the integrated commercial companies, but also in the small traditional family farms, their meat being produced faster than pork or beef and the price is more convenient for consumers. Eggs are a part of human diet and

that's why egg market is continuously diversifying and developing [16, 17, 18, 49].

The highest number of holdings are raising poultry, being followed by pig farms, bovine and sheep and goat farms.

Beekeeping is also a traditional job in the country mainly for its role as additional income source and for the special quality and nutritional value of honey and benefits of other bee products [27, 42,].

The special high quality of honey produced in Romania is a reason to produce more for export where the market requirements in the Western countries are higher [15, 23].

To produce more honey, means to extend the apiary size developing the number of bee families and strengthening their power. The higher the apiary size, the higher the honey production and beekeeping profitability [20].

In this context, the purpose of the paper was to evaluate the development of animal sector in Romania's agriculture by studying the dynamics of animal live stock and production in the period which passed from the country access into the EU, more exactly from 2007 till 2020. The interest is to notice the trends and quantify in what measure animal farming is developing from a period to another. For this reason, two periods of seven years were compared, P1- 2007-2013 and P2- 2014-2020, and the differences between P2 and P1 have been expressed in absolute and relative values. Finally, it was determined the contribution of animal sector to the agricultural production value as a performance indicator across the time series.

MATERIALS AND METHODS

For setting up this study, the data from National Institute of Statistics regarding the number of farm animals and animal production by species were collected for the interval 2007-2020.

The evolution of these indicators was illustrated in graphics and the trend line was explored based on the adequate regression equations according to the distribution of the variables along the time series. In the study there were utilized both polynomial regression of the 2nd degree, $Y = ax^2 + bx + c$ and linear

regression, $Y = bx + a$, suitable to each indicator.

R square was calculated simultaneously with the regression equations in order to show in what measure the variation of the variable taken into consideration depended on time.

Fixed basis index was calculated using its well known formula $I_{FB} = (X_n / X_1) \times 100$ and interpreted to show the growth or decline rate in the studied period.

Structural index, $S\%$, was utilized to reflect the share of the contribution of each animal species to animal production value.

The period was divided into two sub-periods of seven years, P1- 2007-2013 and P2 2014-2020 in order to assess in what measure P2 was superior to the achievements carried out in P1, based on the calculated absolute differences, P2-P1, and relative differences $[(P2-P1)/P1] \times 100$.

The results were mainly illustrated and also tabled, being accompanied by the corresponding comments.

Finally, the main ideas resulting from this research were presented within the conclusions.

RESULTS AND DISCUSSIONS

Dynamics of animal livestock in Romania in the period 2007-2020

-The number of bovines has continuously decreased from 2,818,983 heads, the maximum level, in the year 2007 to 1,875,169 heads in the year 2020, reflecting a reduction by 33.5% (Fig. 1).

The reproduction and milking livestock, dairy cows and buffaloes, has also declined from 1,596,199 heads in 2007 to 1,146,176 heads in 2020, meaning by -28.2%.

This situation in the bovine livestock is caused by multiple factors.

The low milk price was and still is a high risk factor for dairy farmers because they have high production costs and the price barely covers them [19].

The gross product value determined by marketed milk and milk price is sometimes not enough to cover the variable costs and assure a high gross margin and profit [21, 22, 30, 31].

Sometimes, milk quality does not meet the standards, and the processors reject milk collection or offer a lower price [58].

In the last years, the imports of powdered milk, preferred by processors instead of the collection of the local raw milk, have affected milk producers who were obliged to sell milk in Bulgaria [41, 44].

The low price per kg live weight at slaughter imposed by processors also is one of the causes why the fattened bovine live stock declined.

In addition, the severe droughts for a long period of time during the last decade led to a reduced forage production which was not enough to feed the whole number of animals in a farm and the farmers decide to diminish the farm size. Being a high demand of forage and low production, forage price has increased very much leading to higher production costs, in which forages have a share of more 70% [31, 33].

The lack of labor force in the farms is also a limiting factor which could cause the reduction of bovine live stock.

The decline in the number of cows and heifers representing the reproduction livestock was the result of a weak reproduction programme, the low percentage of the artificial insemination in the most of farms and the use of common practice of natural mating mainly in the small subsistence and semi-subsistence farms whose number is dominant. More than this, poor maintenance of the cows and calves and the taxes that the breeders have to pay for animal grazing the adult and young bovines increased expenses and diminish profit.

The state aids in terms of subsidies are allotted only to individual enterprises and family farms, authorized physical persons who keep a producer certificate for animal breeders and juridical persons dealing with animal farming. These aids are sometimes not enough to help the farmers.

Farmers have not enough financial support to sustain investments for modernization of the cows sheds and improve technical endowment [24].

-Pig livestock registered a similar downward trend in the studied interval from 6,564,907 heads to 3,784,504 heads in 2020 (Fig. 1).

The decline in the pig livestock was caused by the low offer of piglets on the domestic market and the high price for their acquisition, the increased price for fodder, electricity and water, the lack of labor force, the low price at farm gate offered by processors per kg live weight for pigs destined to be delivered to the slaughter houses, the competition of the imported pork at lower prices affecting the local pig breeders.

In addition the African Swine Fever had deeply affected the swine livestock which favored the imports of pork to cover the requirements of the internal market. The extent of swine fever could not be stopped by the weak measures taken against the wild boars accused by pig breeders as being the main vector of the virus. Also, the lack of security and hygiene norms in the small individual households have favored the spread of this disease [60].

The unbalance ratio between the internal pork offer and demand has led to the increase in pork price and encouraged the invasion of the imported meat.

-Sheep and goats livestock had a completely different evolution, being characterized by an upward tendency. If in 2007, Romania had 8,469,195 sheep and 865,070 goats, in the year 2020, their number reached 10,281,473 sheep and 1,611,785 goats, being by 24.95% and, respectively, by 86.3% more numerous (Fig. 1).

The increase of the number of sheep and goats was stimulated by the incentives offered to the breeders to sustain this sector in order to maintain a stable income for agriculturists and preserve the cultural heritage in Romania regarding the specificity of pastoralism and of high quality products from these species, which give their contribution to food security and safety, and also to the preservation of the environment quality, the beauty of landscapes and biodiversity [8, 45].

The state aids for sheep and goats breeders imposed to fulfill the criteria regarding the

minimum number of 50 female sheep/25 female goats which are older than one year, but not to exceed 8 years for females and 6 years for rams, the livestock to be registered in the National Registry of Agricultural Holdings, the flock to be retained for 100 days since the date of the payment request. The request of the aid is for minimum 150 and maximum 500 heads of female or rams and the animals to be registered in the genealogic Registry [65].

The raising of these species has an important economic, social and environment impact in the rural areas and also in the mountain areas and isolated regions. Sheep and goats growing offers jobs and is an income source which could diminish the migration of the youth to the cities and maintain a decent living standard to the inhabitants living in the rural areas.

-The number of bee families registered an ascending trend from 982,368 in 2007 to 1,879,611 in 2020, meaning a surplus of 91.33% (Fig. 1).

The development of beekeeping is stimulated by the request of more high quality honey and other bee products like polen, propolis, wax, royal jelly, venon etc. even though in the domestic market the demand is slowly increasing and reached about 0.8-0.9 kg per inhabitant and year, but the demand in the Western European countries for Romanian honey is higher and higher [59].

For this reason, the national bee genetic fund of *Apis mellifera* *Carpatica* has to be preserved, the number of hives and bee families have to be increased and the melliferous resources to be better valorized. In addition, bee families contribute to the maintenance of biodiversity, beekeeping is a pleasant outdoors job and an additional income source.

The higher the number of bee families per apiary, the higher the economic efficiency in beekeeping [28].

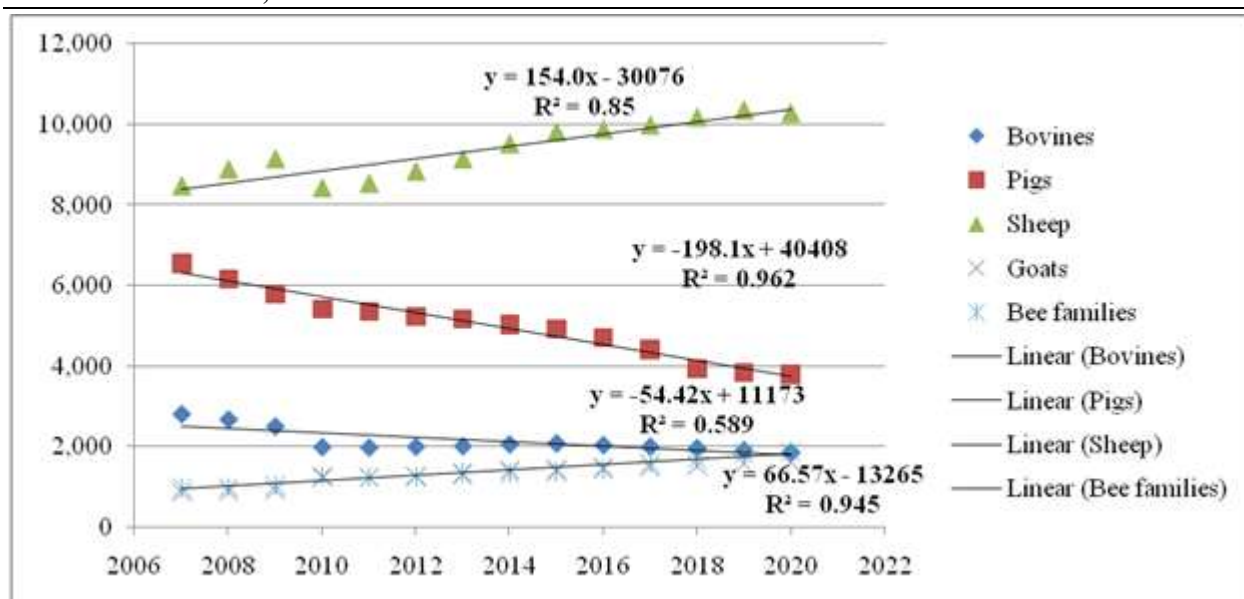


Fig. 1. Dynamics of bovine, pig, sheep, goats livestock and bee families in Romania, 2007-2020 (thousands)
Source: Own calculation and design based on the data from NIS, 2023[14].

-Poultry livestock declined from 82,035,594 heads in 2007 to 71,183,431 heads in 2020, accounting for 13.33% less (Fig. 2).

The number of adult egg layers decreased by 19.94%, from 45,207,992 heads in 2007 to 36,648,478 heads in 2020.

Such a loss resulted in a lower egg production both for consumption and reproduction in these 14 years. This also influenced the share of adult layers in poultry livestock and also egg production from 55.10% in 2007 to 51.48% in 2020.

Despite that of the high increase in poultry meat consumption due to its high quality and nutritive value (protein richness, low content of cholesterol), the poultry livestock declined, but in a smaller proportion than in case of bovine and pig live stock.

The high input prices for one day chickens, concentrated fodder, electricity and water, have also contributed to the decline in poultry livestock.

In addition, the high costs to align the raising of the laying hens, according to the EU direction to improve the birds welfare have discouraged a part of the poultry breeders.

However, all the EU countries, including Romania, have aligned the dimension of the raising cages for laying hen to the EU new standard (enlarged cages) for assuring birds welfare. In Romania, on the eggs produced in the comfortable cages in batteries in the

industrialized commercial poultry companies, it is mentioned the alphanumeric code "3".

In 2018, the number of laying hens grown in enlarged cages in batteries accounted for 4,790 thousand heads, representing 14.7% of the total number of laying hens in Romania of 32,552 thousand heads.

In addition, from the total poultry live stock raised in industrial farms, 36.1% birds are raised at the ground in sheds, 3% in sheds and outdoors and 1% in an organic system [1].

The more visible appearance of the imported eggs, especially from Poland, which are sold in the domestic market at lower prices compared to the high price which needs to cover the production cost obtained in poultry farming in Romania, has also affected the reduction of the number of laying birds.

Organic farming is an alternative to classical growing systems and environmentally friendly solution in Romania and is destined to be extended in the animal sector too for providing healthier foods and assure food safety to the population.

In 2018, only 2.7% of Romania's agricultural area was covered by organic farming. In the animal sector, in that year, there were raised "138,678 animals, of which 77,175 poultry (55.7%), 42,047 sheep and goats (30.3%) and 19,400 cattle (14.0%). Also, 190,000 bee families were kept in organic beekeeping" [63].

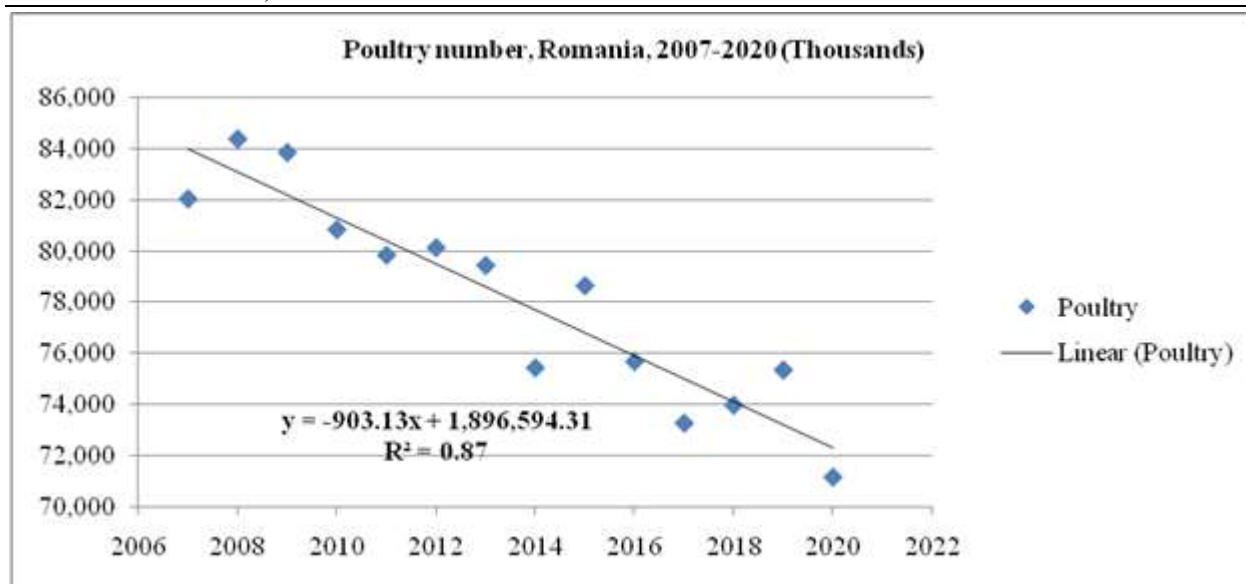


Fig. 2. Dynamics of poultry number in Romania, 2007-2020 (thousands)
 Source: Own calculation and design based on the data from NIS, 2023 [14].

In the year 2020, the period of the Covid-19 had a negative impact on the bovine, swine and poultry sectors where the acquisition price was diminished, the transport of the animals to the direct delivery or processing in the market was prohibited or limited by various restrictions which led to the decline of the number of animals and to the disturbance of the supply chains. This aspects resulted in losses for animal breeders, due to the interdiction of labor mobility, the impossibility of deliveries to processors, and the stopping of retail deliveries to HoReCa, aspect which produced an economic disturbance in animal farming.

The comparative situation regarding the animal livestock in the P1, that is 2007-2013 and P2 2014-2020, since Romania integrated its agriculture into the EU, is presented in Table 1, which reflects the following aspects:

-In the period 2014-2020, it was registered an average bovine livestock per decade accounting for 1,999,682 heads, being by 12.78% smaller than in the previous decade 2007-2013. Also, the average number of dairy cows and buffaloes decreased by 11.40% in P2 versus P1.

-The multiannual average of pig number in P2 was 4,375,196 by 22.94% smaller than the multiannual mean in P1.

-Compared to P1, 2007-2013, in the Interval P2, 2014-2020, the multiannual average of sheep number was 10,000,235 heads, being by 13.98% higher.

-At the same time, the average number of goats in P2 accounted for 1,512,815 heads, meaning by 36.88% higher than in the previous P1 period.

-The average poultry livestock accounted for 74,800,061 heads in P2, which means a reduction by 8.3% compared to the number of poultry in P1.

Also, the laying birds registered a multiannual average of 40,151,041 heads in P2, meaning a decrease by 10.41 % compared to the previous period.

-In case of the number of bee families, the multiannual average accounted for 1,599,404 in P2 compared to P1 (Table 1).

Dynamics of animal production in Romania in the period 2007-2020

(a) Dynamics of animal live weight at slaughter for consumption

-The total live weight of the animals destined to slaughter registered a decline from 1,502,791 tons in the year 2007 to 1,462,047 tons in the year 2020, meaning a reduction by 2.78% (Fig. 3).

Table 1. The multiannual average of animal livestock in the period P2-2014-2020 versus P1- 2007-2013

	MU	Multiannual average in P1-2007-2013	Multiannual average in P2-2014-2020	Absolute differences P2-P1	Percentage difference [(P2-P1)/ P1]x 100 (%)
Bovines	Heads	2,290,925	1,999,682	-291,243	-12.72
Dairy cows and buffaloes	Heads	1,320,399	1,169,953	-150,446	-14.40
Pigs	Heads	5,676,937	4,375,196	-1,301,741	-22.94
Sheep	Heads	8,773,234	10,000,235	+1,227,001	+13.98
Goats	Heads	1,105,179	1,512,815	+407,636	+36.88
Poultry	Heads	81,501,947	74,802,061	-6,699,886	-8.3
Adult laying birds	Heads	44,813,285	40,151,041	-4,662,244	-10.41
Bee families	Number	1,167,242	1,599,404	+432,162	+37.02

Source: Own calculation based on the data from NIS, 2023 [14].

This situation was determined by the changes in the number of live animals destined to slaughter for consumption and of their average weight at slaughter.

-The live weight of bovines destined to slaughter for consumption decreased by 48.59% (Fig. 3).

This situation was caused by the decline in the bovine livestock, especially regarding the number of fattened young steers and also of their weight at delivery to the slaughter houses. The low average price offered by processors per kg live weight at slaughter has determined a part the breeders to diminish the number of animals destined to fattening or to quip as production cost could not be covered by the offered price at the farm gate [13].

This had a negative consequence on farmers income and also on beef and veal production and marketed meat in comparison with consumption requirements.

-The live weight of the slaughtered pigs also went down by 21.70%, mainly as a result of the decline in pig livestock, the causes being presented in the previous paragraph (Fig. 3).

Romania is one of the most important pork producing country in the EU and a period of time was also an exporting country [37].

In the period of swine fever, the pig livestock was deeply affected, hundreds of thousands of pigs had to be killed even in the industrial complexes [53, 54].

- The live weight of sheep and goats increased by 9.86%, due to the growth of the number of animals of these species slaughtered to cover

the growth of the domestic demand and in a smaller proportion for export (Fig. 3).

However, Romania is an important producer of sheep and goat meat in the EU [62].

The meat from these species is consumed by a part of the population in Romania, especially by sheep and goats breeders, but also by other people aware of its special quality: red meat but with a low cholesterol, a special taste, smell and texture, and traditional delicious dishes [5, 29, 45].

-The live weight of the slaughtered poultry registered a substantial growth accounting for +59.56% in the analyzed 20 years (Fig. 3).

The increased live weight at slaughter depended on the number of birds especially fattened for this purpose, that is broilers chickens coming from specialized hybrids with high daily gain performance and with a high live weight in maximum 33 days of fattening. Also, the adult poultry, at the end of the exploitation period either for reproduction or egg production, were slaughtered and meat parts were commercialized.

Farmers are satisfied with this business which could bring them profit in a short period of time.

Consumers are more and more oriented to poultry meat due to its high value protein, less cholesterol compared to pork, accessible acquisition price and large variety of tasty and flavored preparations [17].

The contribution of the species to the total live weight of the slaughtered animals for consumption is comparatively shown in the year 2020 versus 2007 in Figure 4.

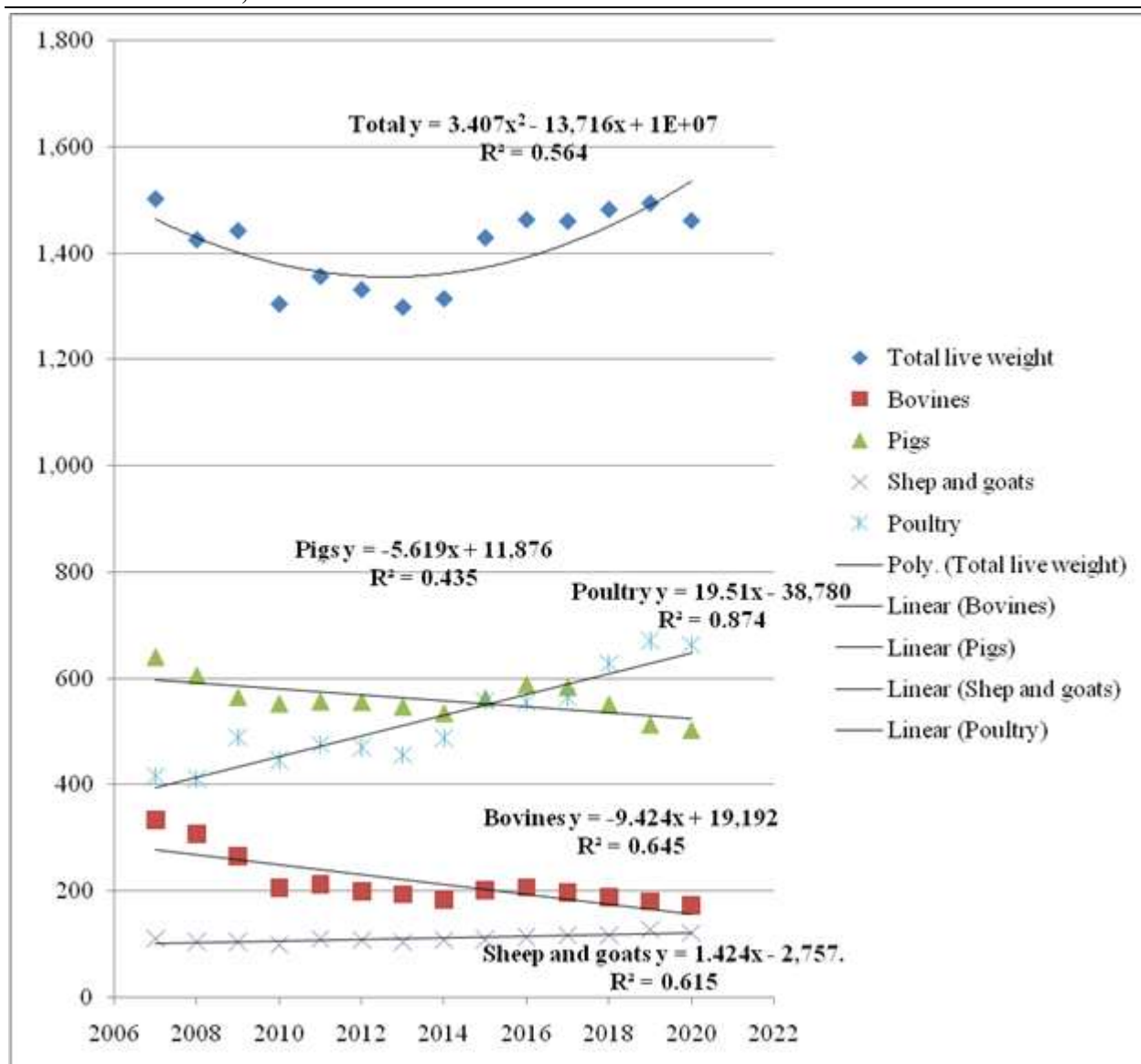


Fig. 3. Dynamics of the live weight of animals destined to slaughter for consumption by species, Romania, 2007-2020

Source: Own calculation and design based on the data from NIS, 2023 [14].

From the data, we may easily notice that important changes happened in 2020 compared to 2007 which reflect that the share of bovines declined by 10.18 percentage points, the share of pigs decreased by 8.37 pp, while the share of sheep and goats increased by 1.1 pp and the share of poultry also increased but by 17.37 pp.

Therefore, in the year 2020, the poultry passed on the 1st position with a share of 45.10% compared to pigs which passed on the 2nd one. In this year, the share was higher by 17.37 percentage points than in 2007.

This is explained by the higher and higher preference of the Romanians for a healthier

diet where poultry meat to be the source of high quality protein, less cholesterol, multiple uses for preparing various meals and all these at a lower selling price compared to pork.

On the 2nd position are pigs having a share of 34.36% in the total live weight of the slaughtered animals for consumption.

Their share is smaller by 8.37 percentage points than in the year 2007. This position is still fine as long as pork is a traditional meat sort in Romania, still preferred by many consumers.

Bovines came on the 3rd position with a share of 12.02 % in 2020, which is by 10.18 pp smaller than in 2007.

The decline is explained by the fact the beef and veal are more expensive than the other sorts of meat and also the consumers preference is more oriented to poultry meat and pork.

Finally, the share of sheep and goats in the total live weight at slaughter for consumption

is on the last position and accounted for 8.53% in 2020 being by 1.19 pp higher than in the year 2007.

The slight increase is determined by a slight growth in mutton, lamb and goat meat consumption (Fig. 4).

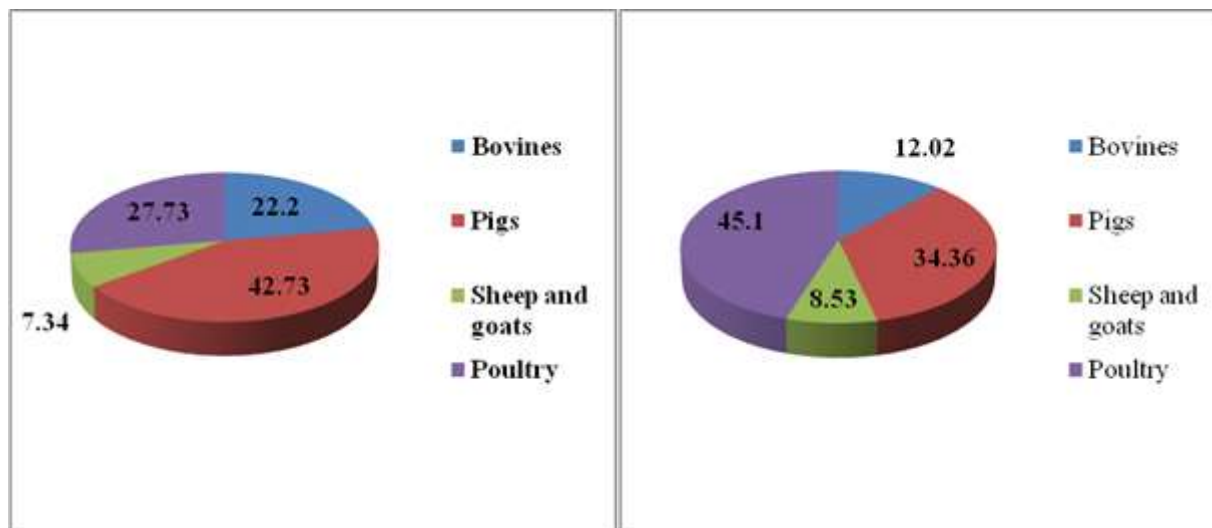


Fig. 4. Contribution of the species to the total live weight of the animals slaughtered for consumption in 2007 (left) and 2020 (right), %

Source: Own calculation and design based on the data from NIS, 2023 [14].

(b) Dynamics of milk production

Milk production decreased from 54,875 thousand hl in 2007 to 46,357 thousand hl in 2020, meaning a reduction by 15.53%.

This was due to the decline in the milking livestock represented especially by cows and also, in a lower measure by buffaloes. But, sheep and goats had a positive influence on milk production as their number registered a considerable growth.

In addition, yield level per milking animal is still low and its variation depends on breed and genetic gain conferred by breeding program applied by farmer, the use of artificial insemination with frozen semen from the high breeding value bulls, growing system, feeding conditions, forage production, maintenance conditions and farm size.

Milk production coming from cows and buffaloes had a decreasing trend from 50,957 thousand hl in 2007 to 35,888 thousand hl in 2020, reflecting a loss of 29.58%.

At the same time, milk coming from sheep and goats registered an upward trend from

3,988 thousand hl in 2007 to 6,455 thousand hl in 2020, reflecting a growth rate of 61.86%. This ascension was stimulated by the growth of sheep and goat milking live stock (Fig 5).

The contribution to milk production by species changed a little in the analyzed interval.

Milk produced by dairy cows and buffaloes remained on the top position, but its share in the total production declined from 92.8% in 2007 to 84.7% in 2020, while the weight of sheep and goats contribution increased to 15.3% in 2020 compared to 7.2% in 2007.

This is a consequence of the decline in dairy cows and buffaloes live stock and the increase in sheep and goats milking live stock [38, 55, 62].

Milk production must meet consumption requirements and internal production is enough, but the common market allowed as milk and dairy products of foreign origin to appear on the shelves of the supermarkets [34, 35].

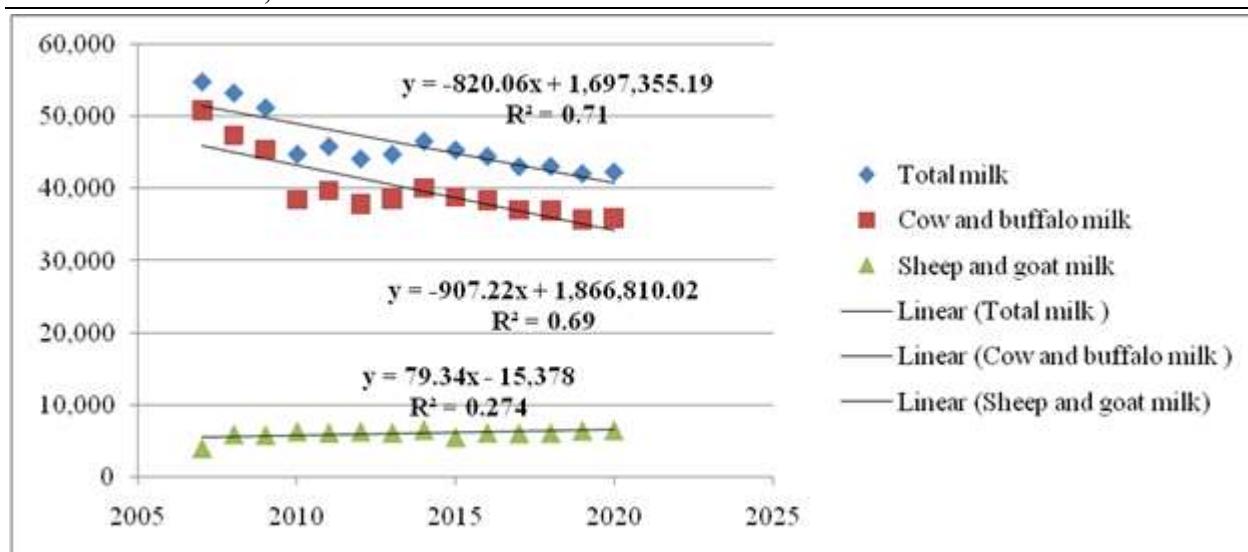


Fig. 5. Dynamics of milk production, Romania, 2007-2020 (Thousand hl)
 Source: Own calculation and design based on the data from NIS, 2023 [14].

An increasing preference was noticed regarding the dairy products carried out of sheep and goats milk which are sorts with a special quality regarding the small size of the fat globules which allows them to be easily assimilated. For this reason this milk sort is recommended for treating the persons with lung and intestinal diseases etc. [64]. Also, the cheese sorts have a specific flavor and taste and this has stimulated the extend of

production and offer in the EU, at the global level and also in Romania [25, 32].

(c) Dynamics of egg production

The reduction in poultry live stock, especially of laying birds, had an important impact leading to a downward trend in egg production, which decreased from 6,522 million pieces in the year 2007 to 5,446 million pieces in 2020, meaning a loss by 16.5% (Fig. 6).

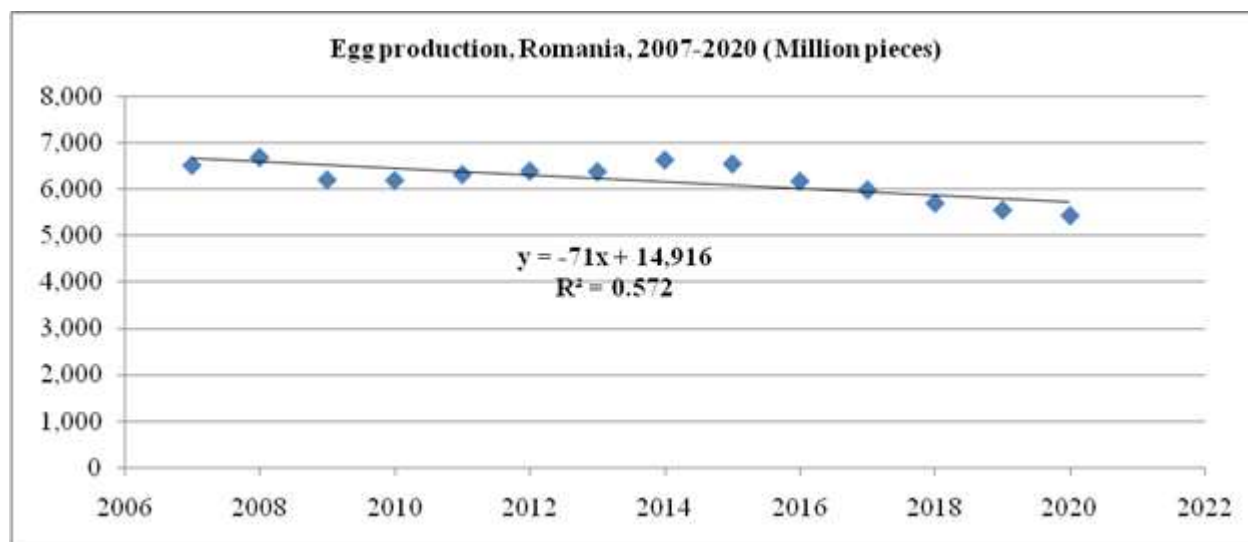


Fig. 6. Dynamics of egg production, Romania, 2007-2020 (Million pieces)
 Source: Own calculation and design based on NIS data, 2023 [14].

As mentioned before, the laying birds stock decline due to the higher production costs including one day chickens, concentrated fodder, electricity, water, transportation, fuel.

To diversify the offer on the Romanian market, there are also sold imported eggs mainly from Poland which compete with the eggs carried out by the local industrial poultry complexes and other breeders.

About 16% of the total egg production is achieved from the laying hens raised in improved cages in batteries, and the rest in the other growing systems: at the ground in sheds, in sheds and outdoors and in the organic system [1, 16, 18, 49].

(d) Dynamics of wool production

Wool production recorded a variation in the analyzed interval. In 2020, it accounted for

23,289 tons, being by 10.76% higher than in 2007.

However, from 2007 to 2013, it recorded a decline reaching the minimum level of 20,719 tons., but then the support offered by Ministry of Agriculture to sheep and goats breeders sustained the growth of the livestock, milk and meat production, and led to a higher wool production (Fig. 7).

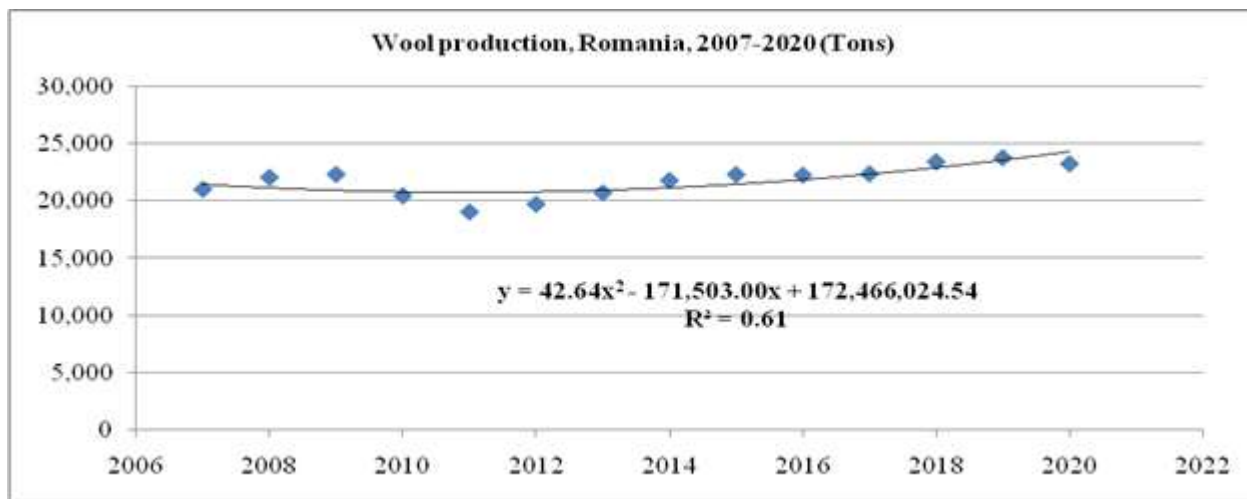


Fig. 7. Dynamics of wool production, Romania, 2007-2020 (tons)
 Source: Own calculation and design based on NIS data, 2023 [14].

(e) Honey production

Honey production increased in the studied period from 16,767 tons in 2007 to 30,724 tons in 2020, meaning by +83.24% (Fig. 8).

This was a result of the incentives given to beekeepers to grow the number of bee

families buying new hives, selected and high value bee queens, bee swarms, pavilion for the transportation of hives in the pastoral, centrifuge for honey extraction from honeycombs and other tools needed in the apiary.

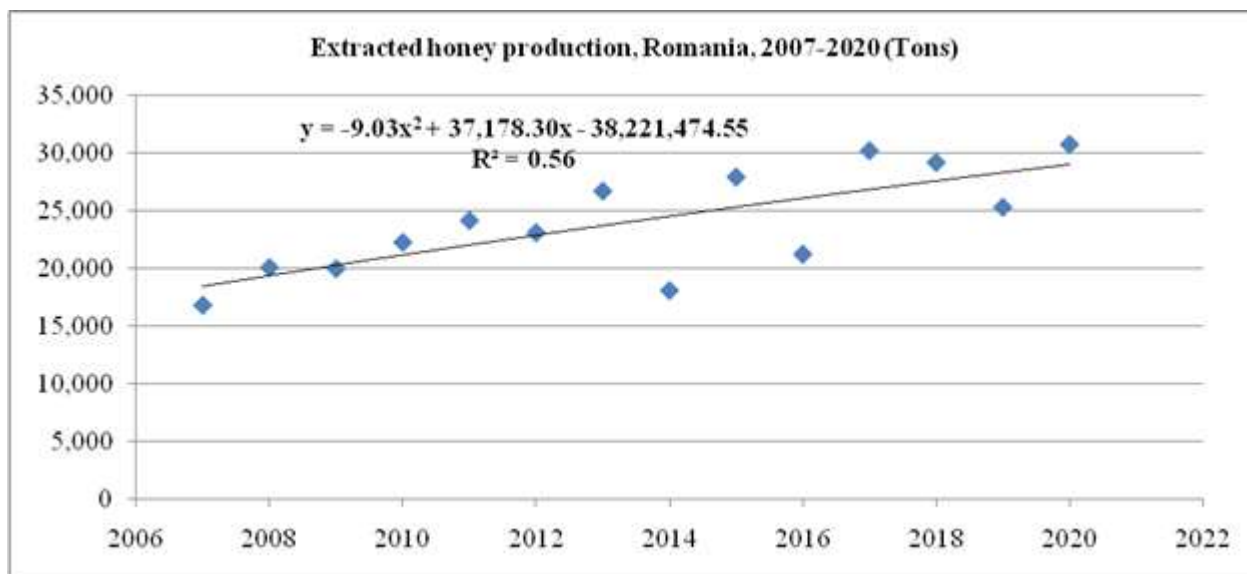


Fig. 8. Dynamics of extracted honey production, Romania, 2007-2020 (tons)
 Source: Own calculation and design based on NIS data, 2023 [14].

The funds came from the EU and Ministry of Agriculture for stimulating beekeeping sector to produce more honey especially for export, as in Romania the average yearly consumption per inhabitant is smaller than in the Western countries [43, 47, 48].

Comparison regarding animal production in the period P2- 2014-2020 and P1- 2007-2013

Live weight of the slaughtered animals for consumption

The average live weight of the slaughtered animals for consumption was by 4.62% higher in P2 than in P1.

A high and positive contribution had the poultry sector accounting for 45.10% in 2020 compared to only 27.73% in 2007. In P2, it was recorded a surplus of 30.46% live weight compared to P1, even though the number of poultry declined, but their live weight at slaughtered increased based on the broilers and adult poultry.

Also, a positive influence had the sheep and goats whose number raised with a deep impact on the mutton and Easter lamb production, whose consumption has slightly

increased being a red meat with less cholesterol and also a traditional meat at Easter and in the mountain areas. In Romania, there are specific dishes made of this sort of meat like: lamb soup, lamb stew, lamb tripe, mutton pastrami etc.

In P2, the live weight of sheep and goats at slaughter increased by 9.83% versus P1.

The live weight of the slaughtered bovines had a negative impact on the total live weight as in P2 it decreased by 22.64% versus P1. This was determined especially by the high reduction in live stock and also in the average weight at slaughter.

In addition, the reduction of the number of pigs had a negative impact. In P2, it was registered a loss of 5.18% live weight compared to P1.

Milk production continued to decline in P2 being by 8.95% smaller than in P1. The main causes of the downward trend consisted of: the decrease in the number of dairy cows and buffaloes, the low yield level, milk quality, low acquisition price at farm gate, the more preferred powdered milk by processors.

Table 2. Average animal production inP2- 2014-2020 versus P1- 2007-2013, Romania

		Multiannual average P1-2007-2013	Multiannual average P2- 2014-2020	Absolute differences P2-P1	Relative differences [(P2-P1)/ P1]x 100 (%)
Total animal live weight at slaughter for consumption (Tons)	Mean	1,380,931	1,444,801	+63,870	+4.62
	Total	9,666,517	10,113,607	+447,090	+4.62
-Bovine live weight (Tons)	Mean	244,549	189,166	-55,383	-22.64
	Total	1,711,843	1,324,162	-397,681	-22.64
-Pigs live weight (Tons)	Mean	577,496	547,549	-29,897	-5.18
	Total	4,042,472	3,832,843	-209,629	-5.18
-Sheep and goats live weight (Tons)	Mean	105,535	115,912	+10,377	+9.83
	Total	738,745	811,384	+72,639	+9.83
-Poultry live weight (Tons)	Mean	452,369	590,162	+137,794	+30.46
	Total	3,166,583	4,131,141	+964,558	+30.46
Milk production (Thousand hl), of which:	Mean	52,362	47,671	-4,691	-8.95
	Total	366,534	333,697	-32,837	-9.95
Cow and buffalo (Thousand hl)	Mean	41,647	37,575	-4,072	-9.77
	Total	291,529	263,025	-28,504	-9.77
Egg production (Million pieces)	Mean	6,391	6,013	-378	-5.91
	Total	44,737	42,092	-2,645	-5.91
Wool production (Tons)	Mean	20,766	22,772	+2,006	+9.67
	Total	145,367	159,410	+14,063	+9.67
Extracted Honey production (Tons)	Mean	21,833	26,067	+4,234	+19.39
	Total	152,839	182,467	+29,637	+19.39

Source: Own calculation based on the data from NIS, 2023 [14].

As mentioned before, the laying birds stock decline due to the higher production costs including one day chickens, concentrated fodder, electricity, water, transportation, fuel. To diversify the offer on the Romanian market, there are also sold imported eggs mainly from Poland which compete with the eggs carried out by the local industrial poultry complexes and other breeders.

About 16% of the total egg production is achieved from the laying hens raised in improved cages in batteries, and the rest in the other growing systems: at the ground in sheds,

in sheds and outdoors and in the organic system [1, 16, 18, 49].

(d) Dynamics of wool production

Wool production recorded a variation in the analyzed interval. In 2020, it accounted for 23,289 tons, being by 10.76% higher than in 2007.

However, from 2007 to 2013, it recorded a decline reaching the minimum level of 20,719 tons., but then the support offered by Ministry of Agriculture to sheep and goats breeders sustained the growth of the livestock, milk and meat production, and led to a higher wool production (Fig. 7).

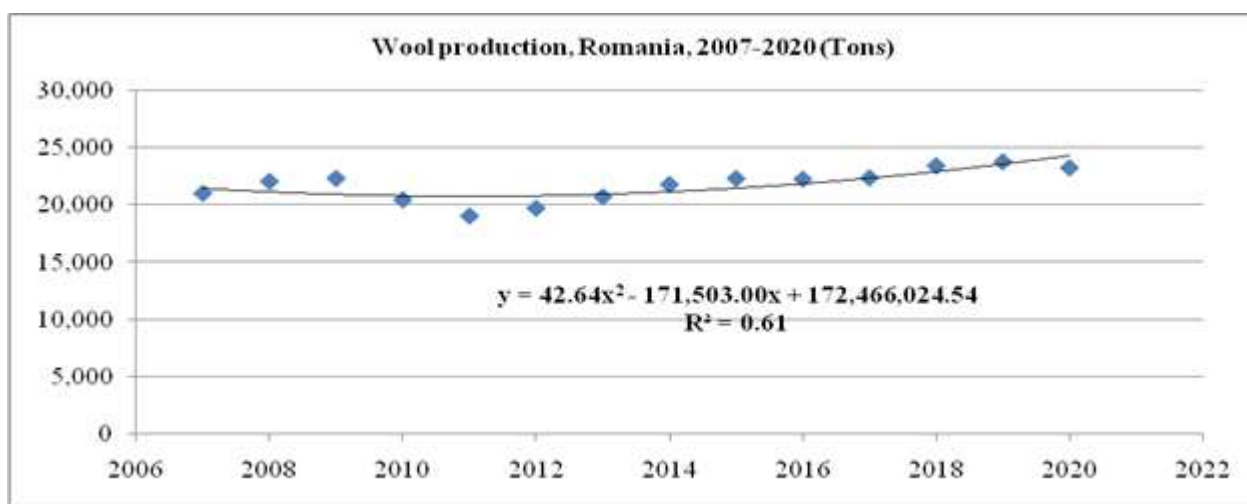


Fig. 7. Dynamics of wool production, Romania, 2007-2020 (tons)
 Source: Own calculation and design based on NIS data, 2023 [14].

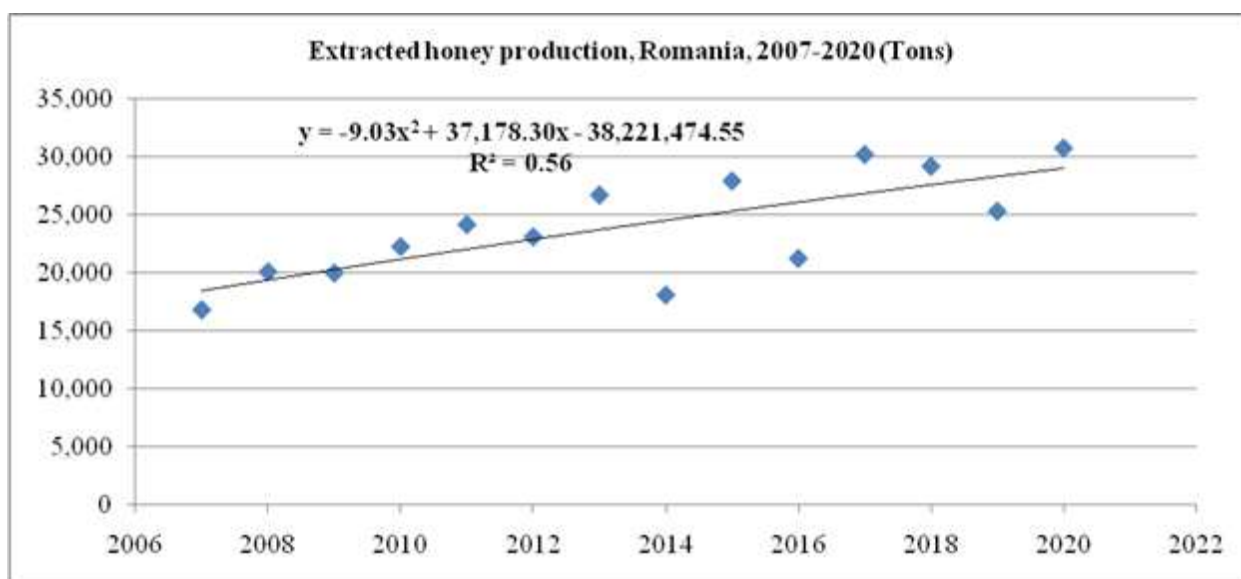


Fig. 8. Dynamics of extracted honey production, Romania, 2007-2020 (tons)
 Source: Own calculation and design based on NIS data, 2023 [14].

e)Honey production

Honey production increased in the studied period from 16,767 tons in 2007 to 30,724 tons in 2020, meaning by +83.24% (Fig. 8).

This was a result of the incentives given to beekeepers to grow the number of bee families buying new hives, selected and high value bee queens, bee swarms, pavilion for the transportation of hives in the pastoral, centrifuge for honey extraction from honeycombs and other tools needed in the apiary.

The funds came from the EU and Ministry of Agriculture for stimulating beekeeping sector to produce more honey especially for export, as in Romania the average yearly consumption per inhabitant is smaller than in the Western countries [43, 47, 48].

Comparison regarding animal production in the period P2- 2014-2020 and P1- 2007-2013

Live weight of the slaughtered animals for consumption

The average live weight of the slaughtered animals for consumption was by 4.62% higher in P2 than in P1.

A high and positive contribution had the poultry sector accounting for 45.10% in 2020 compared to only 27.73% in 2007. In P2, it was recorded a surplus of 30.46% live weight compared to P1, even though the number of poultry declined, but their live weight at slaughtered increased based on the broilers and adult poultry.

Also, a positive influence had the sheep and goats whose number raised with a deep impact on the mutton and Easter lamb production, whose consumption has slightly increased being a red meat with less cholesterol and also a traditional meat at Easter and in the mountain areas. In Romania, there are specific dishes made of this sort of meat like: lamb soup, lamb stew, lamb tripe, mutton pastrami etc.

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In P2, the live weight of sheep and goats at slaughter increased by 9.83% versus P1.

The live weight of the slaughtered bovines had a negative impact on the total live weight

as in P2 it decreased by 22.64% versus P1. This was determined especially by the high reduction in live stock and also in the average weight at slaughter.

In addition, the reduction of the number of pigs had a negative impact. In P2, it was registered a loss of 5.18% live weight compared to P1.

Milk production continued to decline in P2 being by 8.95% smaller than in P1. The main causes of the downward trend consisted of: the decrease in the number of dairy cows and buffaloes, the low yield level, milk quality, low acquisition price at farm gate, the more preferred powdered milk by processors.

Under these condition, milk production achieved by cows and buffaloes decreased by 9.77% in P2 versus P1.

However, the increased contribution to milk production by sheep and goats had a positive impact.

Egg production was by 5.91% smaller in P2 compared to P1 as a result of the decline in the number of laying birds, caused by the high input costs (Table 2).

Wool production increased by 9.67% in P2 versus P1 grace to the growth in live stock. However, wool delivery to processors is a big

problem, but the fact that Romanians love traditional handicrafts and carpets, this sort of small business has been developed locally. In addition, wool is also used as raw material in constructions for resistance and protection against heat and cold (Table 2).

Honey production carried out a substantial growth, accounting for 19.29% in P2 versus P1 as the number of beekeepers, apiaries, bee hives and bee families increased as export requires more honey (Table 2).

Contribution of animal sector to agricultural output value

The value of animal production increased by 20.42 trillion lei in the 2nd decade when it accounted for 172.31 trillion lei compared to 151.89 trillion lei in the 1st decade, meaning a surplus of +13.44%.

Table 3 presents the comparative situation of the agricultural production value in P2 versus P1 pointing out the absolute and relative differences in the animal sector, vegetal and service sectors.

The figures show that while the vegetal sector and services had an ascending share, animal sector diminished its weight in the total output value.

Table 3. The multiannual average of animal production value compared to vegetal and service sector in the decade 2024-2020 versus the decade 2007-2013 (Million Lei)

		Multiannual average P1- 2007-2013	Multiannual average P2-2014-2020	Absolute differences P2-P1	Relative differences [(P2-P1)/ P1]x 100 (%)
Agricultural production value	Average	65,472,475	78,407,931.7	+12,935,456.7	+19.75
	Total	458,307,325	546,855,522	+90,548,197	+19.75
Vegetal production value	Average	43,126,047	52,570,705	+9,444,658	+21.90
	Total	301,882,335	367,994,984	+66,112,599	+21.90
Animal production value	Average	21,698,813	24,616,026	+2,917,213	+13.44
	Total	151,891,691	172,312,153	+20,420,462	+13.44
Agricultural services value	Average	647,615	1,221,213	+573,597	+82.39
	Total	4,533,309	8,548,485	+4,015,176	+82.39

Source: Own calculations based on the data from NIS, 2023 [14].

Taking into account the agricultural production value increased in 2020 reaching 548.85 trillion lei, being by +19.75% higher than in 2007, the contribution of animal sector to the output value in Romania's agriculture

declined from 33.14% in the year 2007 to 31.39% in the year 2020 (Fig. 9).

These structural changes reflect the reality as a way of adaptation of agriculture to market pressure and consumers' preferences [12].

In Romania, animal production will continue to develop in order to better cover the domestic market and create a surplus which to be commercialized on the external market, mainly on the EU market, the key agro-food partner [56].

The high consumption, as a determinant factor of Romania's GDP, reflects the importance of agriculture among other economic sectors which give their contribution to GDP.

In the daily basket, food keeps a high percentage in close relationship with the purchasing power of the population. This means that agriculture has to continue its development to assure a diversified offer of quality agro-food products to meet in a larger proportion the needs of the population of different ages and income level [36, 50, 51].

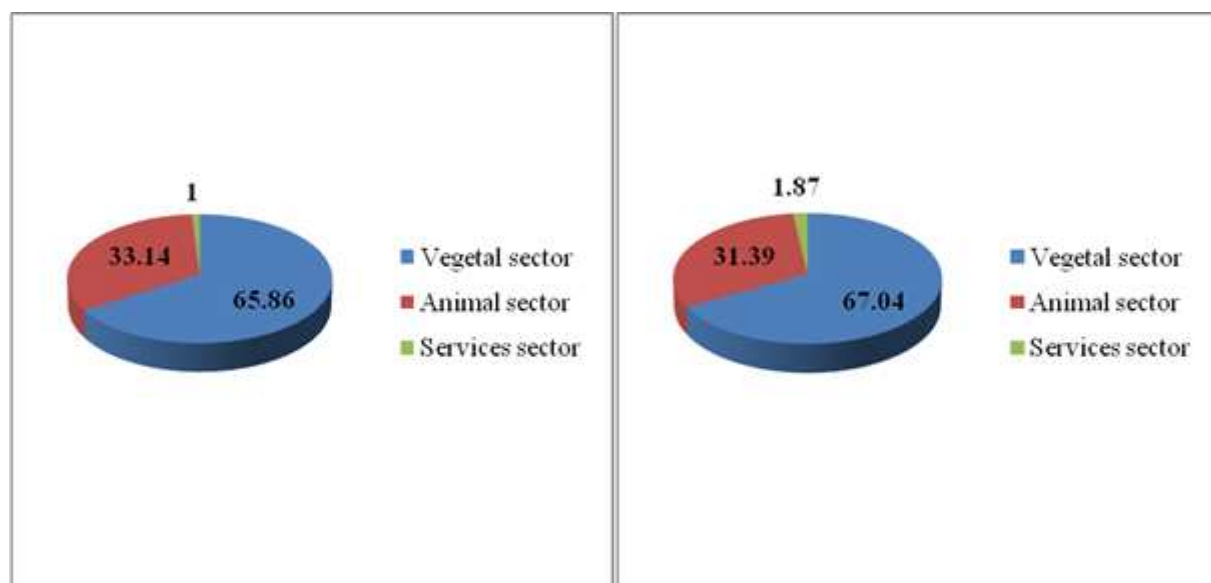


Fig. 9. Contribution of vegetal, animal and services sectors to agricultural production value in 2020 compared to 2007 (%)

Source: Own calculation and design based on the data from NIS, 2023 [14].

CONCLUSIONS

This research work pointed out the main trends in livestock and animal production in the period 2007-2020 in Romania and offered an overview about what happened in the second period P2 2014-2020 compared to the 1st period P1- 2007-2013.

The analysis of the results reflects the following aspects:

- Regarding livestock, the main trends are different depending on species: while the number of bovines, pigs and poultry decreased, the number of sheep and goats and bee families increase.

- The total animal live weight at slaughter had an downward trend determined by the diminished production in slaughtered bovines and pigs. However, the increase in sheep and goats livestock led to a growth of the live

weight of these species at slaughter. Also, the higher performances in poultry fattening had a positive impact.

- Milk production decline and egg production as well, while wool and honey production increased.

- In the second period P2 2014-2020, the situation of animal sector worsened. The bovine, pig and poultry livestock continued to decline. A positive aspect was that the number of sheep and goats and bee families continued to grow.

- The total live weight of slaughtered animals for consumption, implicitly meat production, milk production and egg production continued to go down. However, the poultry live weight and meat had an upward trend and wool and honey production as well.

- As a result, the agricultural production value produced by the animal sector in Romania's

agriculture is much smaller than in the vegetal sector. Its decline continued from a year to another.

-In 2020, the value of agricultural production in animal growing was by +20,420 trillion Lei higher in 2007. More than this, in the analyzed period 2007-2020, the value of agricultural production produced in the animal sector increased by 13.44%, in a lower measure than the value produced by vegetal sector which increased by 21.90%.

-The gaps of production on in the domestic market regarding milk, meat, eggs did not meet consumers' requirements and for this reason domestic demand had to be covered by imports whose volume and value were higher and higher leading to a negative agri-food trade balance.

The decline in animal livestock is not only in Romania, but also in many other EU countries, but there production performance per animal is higher.

Despite that the EU CAP allotted higher funds accounting for 100 Billion Euro in the period 2014-2020 for combating the impact of climate change by reducing the CO₂ emissions, the result has been weak.

The emissions generated by animal growing represent 50% of total emission coming from agriculture and remained stable at the level of the year 2010. Under this situation, the CAP measures promote the products of animal origin whose consumption have not registered any decline since 2014.

Therefore, farmers have to set up new strategies for their future business in animal production adapting the technologies which are more friendly with the environment and reduce CO₂ emissions.

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