

Bioeconomical research on biodiversity of animal food resources in Romania

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Abstract

Since 1990, a number of novel elements appeared in Romanian animal husbandry, as a result of changes that have occurred in the structure of ownership of land and livestock, the organization of production in livestock holdings, new relationships of production factors, providing services as well as processing and marketing of livestock products.

This paper presents the analysis of the main indicators of livestock production in cattle, during 1990-2012, based on statistics provided by the National Institute of Statistics, Ministry of Agriculture and Rural Development and the National Breeding and Reproduction. Livestock evolution, total production obtained for the main breeds of cattle included in official control of production (Brown, Romanian Spotted, Romanian Black Spotted and Pinzgau), and evolution of milk production performance were evaluated.

During the analyzed period cattle had the largest decrease of total number (-62.66 %), their number decreased from 5381 thousand in 1990 to 2009.1 thousand heads in 2012. Concerning the main productions obtained from this species, we pointed out the favourable evolution of total milk production from 36,975 thousand hl milk in 1990 to 42,036 thousand hl milk in 2012, due to higher values of the main indicators of milk production, while the total meat production decreased from 633,000 tons in 1990 to 198,000 tons in 2012 when the lowest level of this indicator was achieved.

We can conclude that Romanian animal husbandry reflects the imprint of many social and economic transformations that have occurred in recent years and we believe it is very important that current guidelines regarding cattle breeding should be directed towards increasing the reproductive stock and structuring the cattle production in the two directions, milk and meat, taking into consideration the milk quota for Romania and last but not least the conversion of vegetal production into animal production.

Keywords: breed; livestock; indicators; production

1. Introduction

During time, biodiversity declined due to reduction of number of breeds that correspond to zoo-economic requirements. In fact, the reducing of biodiversity produces economic losses and threatens food security, leading to severe social dysfunction.

The fast evolution of technology and civilization in the last centuries, involved a massive replacement of extensive production systems, especially pastoral ones, with intensive systems and the selection process led to a high variability of morphological and productive characteristics, both compared with the wild ancestor and between breeds of the same species (1). The biggest threat in this moment is the narrowing of genetic basis due to the loss of rustic breeds presenting special characters, but not able to provide high productions under intensive exploitation. Genetic diversity provides farmers the opportunity to use a wide range

of environments and production systems to get the best products that meet market requirements and human communities (2, 3).

Increasing the number of livestock of economic interest, specialization and diversification of production are influenced by a number of farm factors (zoo-hygienic conditions, proper environment, feeding differentiation according to different physiological phases and productive levels, etc.) which influence the specific and dominant breeding capacity (Velea C., Mărginean Gh, 2012) (6, 11).

Biodiversity, prerequisite to sustainable development, represents for mankind the basis of renewable natural resources, support and factor that determines the stability and good functioning of the economy in the present, but especially in the future. In this context, the eco-economic approach becomes particularly important for sustainable development, thus resulting the need to overlap ecology to economy and to integrate environmental requirements in assessing the economic activities, the future economy being increasingly viewed through an ecological prism (Lester Brown, 2001) (4). This becomes necessary because the signals transmitted from markets are incorrect, they do not reflect environmental damage, which means costs that are supported by human society (5, 6).

2. The methodological support

Because the information about a phenomenon usually presents ample variations in time and space, the scientific rigor requires, as a condition, to choose the proper methods to process the database. In this case, we used the system of tables and data series, respectively, as an ordered form for presentation of data reflecting various quantitative sides of production activity.

Depending on the indicators underlying time series, these can provide information about the level of an indicator, the meaning of its evolution and the proportion in which it evolves from one period to another, from one moment to another.

For this paper, data from the National Institute of Statistics, Ministry of Agriculture and Rural Development and the National Improvement and Breeding Agency were used, systematized, analyzed and interpreted by statistical and mathematical methods, the main objective being overriding of bio-economic evaluation of cattle raising and identify areas for revival of this important sector of Romanian agriculture.

3. Results and Discussion

The evolution of socio-economic conditions of our country caused some structural imbalances in Romanian agriculture which have less beneficial effects on agriculture in general, connected to existing technical and material availability.

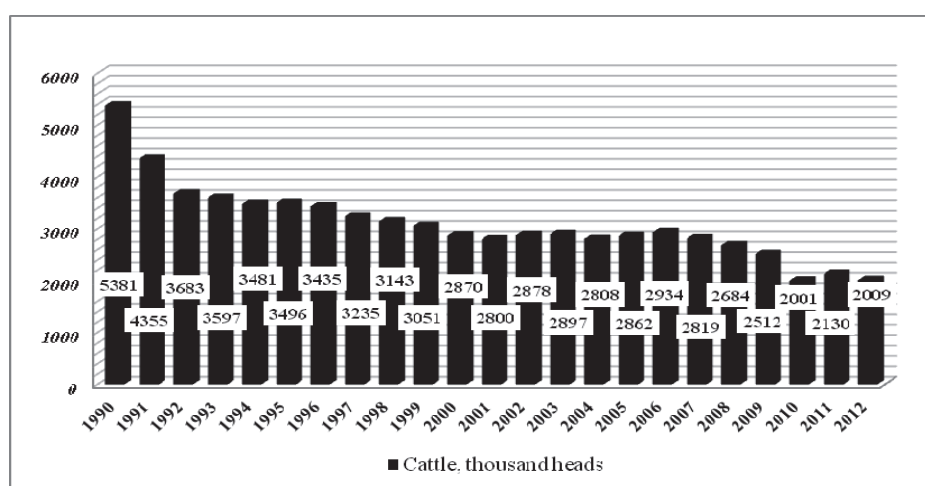
The return to private ownership resulted in excessive fragmentation of agricultural property, a large number of subsistence and semi-subsistence farms, a large share of farmers from total employment and a large number of elderly farmers that have modest facilities, lacking any financial support. At the same time, the lack of units specialized for services and the anti-cooperative education, created great difficulties for these modest holdings, preventing technical progress and therefore their efficiency (8).

Globally, livestock production is different from country to country depending on the development of the animal husbandry sector and the productive potential of existing breeds (Acatincăi Stelian, 2004) (1). Breeds and populations existing at the moment within each species, bear the imprint of environmental conditions and also of human directional activity and the benefits of each species must be interpreted in the light of technical and economic efficiency in relation with the biological adaptability to different growing and exploitation conditions.

Evolution of Romanian animal husbandry must be interpreted and analyzed in the context of social, economic, political and educational changes, that took place in recent years, which influenced both the socio-economic situation, technical and material basis and the view of those working in this field (8).

Regarding the dynamics of cattle stock in Romania, it bears the imprint of many social and economic transformations that have occurred in the last years, marking a huge decrease after 1990, the total number of cattle being at the moment, the lowest in the last 50 years. According to data from the National Institute of Statistics the total number of cattle in Romania decreased by 62.66%, during the period 1990 - 2012 from 5381 million in 1990 to 2009.1 thousand in 2012, and the density of cattle was reduced to 14.7 anim./100 ha in 2012, compared with 46 anim./100 ha in 1990 (figure no. 1) (8, 12).

Figure no. 1: Dynamics of cattle in during the 1990-2012 period



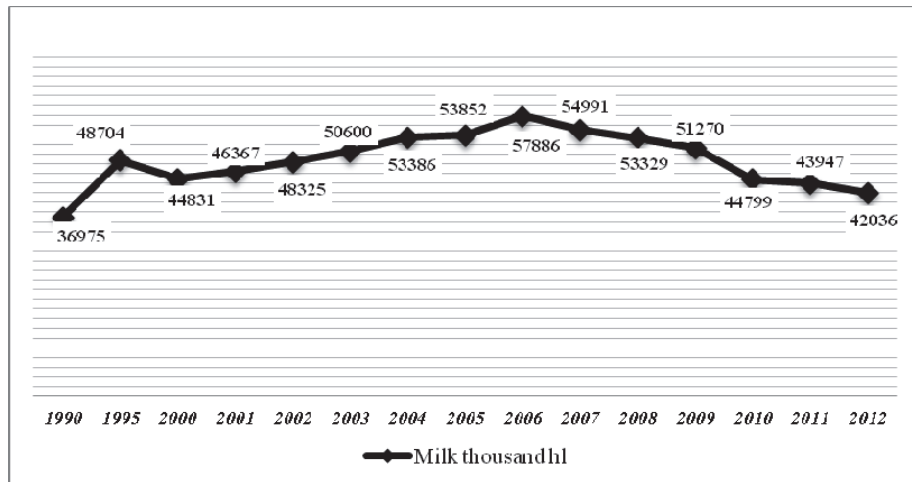
Source: National Institute of Statistics, data processed by the author

Achieving technical and economic indicators is dependent, to a large extent, on the structure of cattle stock, which in turn is dependent on the size of breeding stock from the total herd of cattle. In this context, the breeding stock (cows and heifers) decreased in 2012 by 2.5% representing 63.7% from the total. Meanwhile, over 71% of the total number of cattle are cows, this indicator highlighting on the one hand a low concern towards meat production and on the other hand fewer opportunities for growth and replacement of breeding stock.

According to the data from the Ministry of Agriculture and Rural Development (MARD), in 2012, the total number of dairy cows was 1,241,283 heads from which a total production of 43,806.9 thousand hl milk, with an average of 3,529 liters of milk per cow was obtained. There were 869,400 cattle for meat production with a total production of 289,344 tons of meat in live weight and an average of 333 kg/capita.

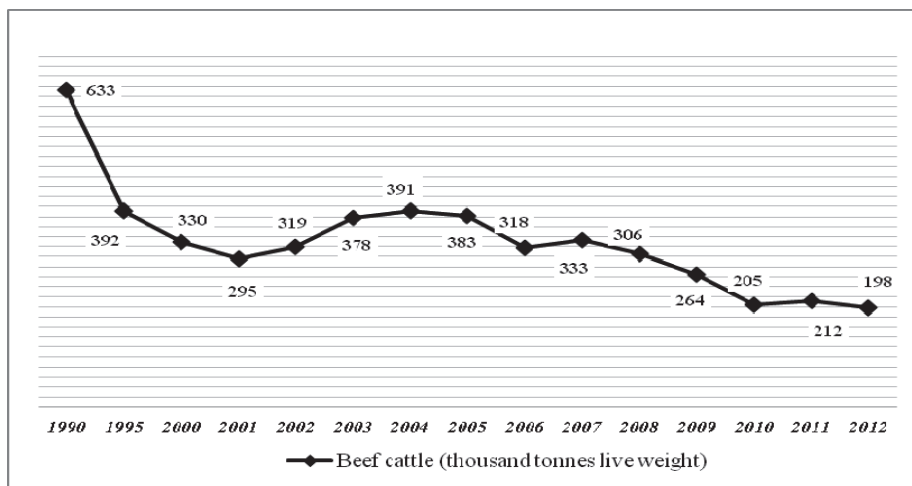
Concerning the main productions obtained from this species, we pointed out the favorable evolution of total milk production from 36,975 thousand hl milk in 1990 to 42,036 thousand hl milk in 2012 (figure no. 2), due to higher values of the main indicators of milk production, while the total meat production decreased from 633,000 tonnes in 1990 to 198,000 tons in 2012 when the lowest level of this indicator was achieved (figure no. 3).

Figure no. 2: Dynamics of total milk production in the period 1990-2012



Source: National Institute of Statistics data processed by the author

Figure no. 3: Dynamics of the total production of beef in the period 1990-2012



Source: National Institute of Statistics data processed by the author

Being the second most important sector in Romanian agriculture after meat production in 2012, 30% of livestock production has been obtained from cattle and 24.3% of the products obtained from milk processing in farms (www.madr.ro).

The small size of dairy farms, the low development of infrastructure, the inconsistency of agricultural policies and turbulent economic environment, especially in rural areas, is very well reflected in milk production, average results being lower, which lead to reductions in livestock production indicators (Seiciu *FL.*, Drugociu Ghe., Boitor *I.*, 1987 Samochiș B., 1999) (7, 9).

According to data from the National Agency for Amelioration and Reproduction, in 2011, the total number of registered female cattle was 1,604,061, 82.650 heads (-5.15%) less than in 2010, with the following structure of breeds: Brown 17.4%, Romanian Spotted 29.6%, Romanian Black Spotted 22.3%, Pinzgau 0.8%, crossbred 28.9%, other breeds 0.3% and undefined 0.7% (13).

For the main breeds of cattle included in the official control of production, Brown, Romanian Spotted, Romanian Spotted with Black and Pinzgauer we analyzed the performance evolution for milk production in the 1990-2010 period.

Results for milk production in Brown breed cows included in the official control of production (COP) (table no. 1), show that the average milk production increased by 55.13%

compared to 1990 and by 16.61% compared to 2000, the maximum milk production recorded being in 2005, 4214 kg.

Brown breed is a precocious one, reaching full maturity around the age of four years, and being able for reproduction at 18-20 months, having a birth rate between 80-93% depending on the technology used.

The age at first calving gradually decreased from 39 months and 25 days in 1990 to 30 months and 19 days in 2010. The economic life of Brown breed cows is 6-8 lactations with an average of over 300 days of lactation and, according to the rank of lactation, the highest milk production is reached in the 3rd and 4th lactation, the content of fat and protein having a linear evolution throughout the whole production period.

Table no. 1: Main indicators of milk production per standard lactation in Brown breed

Year	No. COP cows	No. lactations completed	Milk Kg.	Fat		Protein		Lactation days	Age at first calving		Interval between calving days
				Kg.	%	Kg.	%		Months	Days	
1990	57.977	43.510	2.280	85	3,74			350	39	25	477
1995	33.013	19.973	3.215	122	3,80			322	35	17	443
2000	47.191	19.630	3.033	115	3,78	128	3,22	323	32	9	425
2001	18.920	19.815	3.299	124	3,76	106	3,27	326	31	16	421
2005	19.256	10.616	4.214	166	3,94	136	3,24	329	30	12	415
2010	18.057	8.954	3.537	138	3,91	107	3,02	325	30	19	405

Source: National Agency for Amelioration and Reproduction data processed by the author

Table no. 2: Main indicators of milk production per standard lactation in Romanian Spotted breed

Year	No. COP cows	No. lactations completed	Milk Kg.	Fat		Protein		Lactation days	Age at first calving		Interval between calving days
				Kg.	%	Kg.	%		Months	Days	
1990	88.676	70.510	2.532	95	3,72			348	40	02	467
1995	57.335	32.281	3.411	129	3,77			327	37	27	468
2000	72.773	34.736	3.252	122	3,76	131	3,17	328	34	13	432
2001	64.146	32.373	3.541	135	3,82	115	3,16	327	33	22	440
2005	32.526	18.239	4.795	186	3,88	154	3,20	329	33	22	440
2010	56.284	29.968	4.754	186	3,92	155	3,00	339	33	07	425

Source: National Agency for Amelioration and Reproduction data processed by the author

According to official control of production (COP) in Romanian Spotted breed livestock (table 2.), milk production recorded 87.75% higher values in 2010 compared to 1990, containing 3.92% fat and 3.0% protein, which means 341 kg as combined volume of the two components.

Romanian Spotted breed is a semi-precocious breed, having an economic life of 8-9 lactations with maximum quantity of milk per lactation nr. 3, reaching full maturity at 4 – 4 1/2 years and breeding maturity at 20 months, having a birth rate of more than 90%.

The results presented in Table 3 show that the level of milk production in herds of Romanian Black Spotted breed, contained in official control of production, increased by 53% since 1990 and by 30.88% as compared to 2000, with a fat content of 3.8 to 3.9% and 3.2-3.9%.

3.3% protein, i.e. a cumulative amount of the two components of 360-370 Kg. The highest average milk production was recorded in 2005, 5327 kg.

Table no. 3: Main indicators of milk production per lactation standard Romanian Black Spotted breed

Year	No. COP cows	No. lactations completed	Milk Kg.	Fat		Protein		Lactation days	Age at first calving		Interval between calving days
				Kg.	%	Kg.	%		Months	Days	
1990	85.021	57.725	3.216	122	3,77			345	36	3	454
1995	96.634	48.580	3.545	135	3,81			338	33	1	444
2000	68.047	31.110	3.762	142	3,79	136	3,24	340	32	22	451
2001	40.314	31.671	4.063	155	3,81	131	3,17	337	31	15	441
2005	48.630	23.920	5.327	211	3,95	171	3,21	335	30	0	421
2010	65.342	34.485	4.924	190	3,86	164	3,33	336	30	16	416

Source: National Agency for Amelioration and Reproduction data processed by the author

The large differences recorded between milk productions from one year to another in herds included in official control of production are the result of rearing and operating conditions. Analysis of existing data shows that Romanian Black Spotted breed is characterized by an age of 30-31 months at first calving, the maximum milk production is achieved at the 4th lactation and the average life for exploitation is 5-6 years.

Table no. 4: Main indicators of milk production per lactation standard breed Pizgau

Year	No. COP cows	No. lactations completed	Milk Kg.	Fat		Protein		Lactation days	Age at first calving		Interval between calving days
				Kg.	%	Kg.	%		Months	Days	
1990	1.375	1.152	2.353	88	3,75			330	33	27	451
1995	3.638	1.013	2.850	108	3,77			316	37	2	397
2000	1.730	1.237	2.963	113	3,82	116	3,24	312	32	2	414
2005	393	280	3.642	141	3,86	117	3,21	311	29	29	406
2010	629	179	4.188	162	3,88	136	3,25	304	30	0	365

Source: National Agency for Amelioration and Reproduction data processed by the author

Pinzgauer breed is resistant to environmental conditions, with a middle precocity, the age at the first calving is 30 months, the economic life is 5-6 lactations and the birth rate is around 85%. Analysis of data in table no. 4, shows an increase in average milk production in Pinzgauer breed registered in COP of 77.98% in 2010 compared to 1990 and an increase of 41.34% compared to 2000, with 3.88 % fat and 3.25% protein. The presented data show that the age at first calving was reduced in all analyzed cattle breeds. Age at first calving is a character with special economic implications, because the younger the age at first breeding the shorter the unproductive period (from the end of testing to service). Reduction of the age at first calving shortens the period without income and thus reduces the overall volume of expenses in the farm (Fl. Seiciu, Ghe. Drugociu, I. Boitor, 1987).

One of the difficult problems facing both Romanian animal husbandry and farmers at this moment is the operational parameters and the productive capacity of farms. Based on these facts, it is clear that for short, medium and long term development and improvement of

the livestock sector, it is necessary to operate with other tools to achieve the fundamental objective that is good products for market from livestock producers, in order to satisfy the population needs and to provide raw materials to industry.

We can conclude that Romanian animal husbandry bears the imprint of many social and economic transformations that have taken place in recent years and we believe it is very important that the current guidelines regarding cattle breeding should be directed to:

- ✓ increasing the breeding stock of cattle and structuring the productions in both directions, milk and meat, taking into account the milk quota of Romania;
- ✓ geographic zoning of livestock based on agricultural potential of the region;
- ✓ optimizing current operational and growth technologies, differentiated according to different productive morphological types and breeds, to better express the production potential of animals;
- ✓ genetic improvement of cattle populations aiming to increase the productive potential of cattle breeds;
- ✓ founding efficient livestock units of optimal size, which can work in terms of economic efficiency;
- ✓ growth and exploitation of cattle for meat, according to the geo-climatic conditions and the increased demand for bovine meat in the European market;
- ✓ encouraging the organization and development of breeders' associations and cooperatives for market production and to represent their interests in the relationship with suppliers of inputs;
- ✓ conversion of crop production to livestock production.

We also appreciate that the orientation of a large number of livestock farmers for meat cattle breeding and exploitation can be a solution to revive this important livestock sector, Romania having a large area of land of which about 4 million hectares are mountain and sub-mountainous pastures insufficiently exploited today.

4. Conclusions

Cattle, the most important species of animals in agriculture economy and for people alimentation (meat, milk, butter, cheese), had the largest decrease in the total number during the 1990-2012 period, 37.34% in 2012 compared to 1990, the most severe decrease in the number being recorded between 1990 - 1995 and after the integration to the European Union, one of the reasons being the setting of the milk quota for Romania.

Being the second most important sector in Romanian agriculture after meat production in 2012, 30% of livestock production has been obtained from cattle and 24.3% of the products obtained from the processing of milk in livestock farms. However, the average production per cow per year is lower (below 4000 kg/cow/year) than productions obtained in countries like Denmark, Portugal, Finland and Sweden (about 8000 kg /cow /year).

The level of milk production in cows included in official control of production showed an upward trend during the period under review. Thus, the milk production of Romanian Black Spotted breed increased by 53% in 2010 compared to 1990, with a fat content of 3.8 to 3.9% and 3.2-3.3% protein, in Brown breed cows the growth was of 55.13% compared to 1990 with 3.91% fat and 3.02% protein and Pinzgau breed had an increase of 77.98% with 3.88% fat and 3.25% protein.

In Romania, the main challenge is to increase agricultural productivity in a sustainable manner that meets the needs of small farms and creating opportunities for their development where productivity potential of the area is low. At this moment, revitalizing agriculture is difficult or even impossible without the development of the livestock sector by reconsidering the role and place which this sector must have in the national economy.

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