

COMPARATIVE STUDY OF THE DYNAMIC OF BEEF MEAT PRODUCTION CARRIED OUT AT THE GLOBAL LEVEL, IN THE EU MEMBER STATES AND IN ROMANIA

C. Țăran, G. Amariții*, F. Țenu, E. Amariei (Enache), V. Maciuc

“Ion Ionescu de la Brad” Iași University of Life Sciences, Romania

Abstract

The study compares the beef production obtained worldwide, in EU member countries and in Romania. To carry out the research, documentation was carried out based on official statistical data provided by Faostat, Eurostat and INS for the period 2014-2023. Thus, worldwide total beef production has increased continuously since 2020 and in 2023 reached 338389297 tons. The largest quantity was slaughtered in Asia, with production on the continent representing 35.39% of the total. European countries achieved 11.13%, which places Europe continent in third place. In Romania, amid the decrease in cattle herds, in 2024 meat production was 35,323 tons, which represented 3.98% of the total quantity of meat slaughtered in the country. Meat from cattle slaughter represents a valuable source of nutrients with high biological value and must make an increased contribution to supporting the growing demand for consumption.

Key words: meat beef, production, cattle stock

INTRODUCTION

Meat is a very important source of nutrients for the human diet due to the content of elements with very high biological value, its consumption providing the body with all essential and non-essential amino acids. The consumption of red meat (from mammals) is beneficial for all age groups. For example, in the case of the elderly, by consuming meat they maintain their muscle mass better and pregnant women ensure their necessary intake of amino acids. [1] Meat consumption has a heterogeneous distribution on different geographical levels but, globally, demand is increasing.

Beef is a complete food, with an average energy value of 2270 kcal/kg. The proteins contained have a digestibility of 97% and a net utilization coefficient of 70%. At the same fattening stage, beef has a lower fat content compared to meat obtained from pigs and sheep. Regarding the costs of

obtaining beef, this includes reduced expenses due to the fact that ruminants utilize a wide range of feeds, sometimes without economic value, which they convert into production. [2].

Among them, beef cattle breeds are distinguished among others by the variability of weight gain, feed efficiency and carcass quality, characters that are of great economic importance for farmers and the entire meat processing industry. On the other hand, consumers are interested in the nutritional value and sensory characteristics of the meat, such as texture, flavor and taste. [3]

In Romania, the most well-known and raised beef breeds are Aberdeen Angus, Charolaise and Limousin. The meat from these cattle breeds is renowned worldwide for its high nutritional levels and high marbling. [4] These breeds have high slaughter yields, up to 78.5% for the Charolaise breed and a meat index of 4.5 as is the case for Aberdeen Angus steers. [5, 6, 7]

* Corresponding author: gabriela.amaritii@iuls.ro

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Beef occupies a significant position in the global market, being the third most consumed meat in the world. The period 2013–2024 was characterized by complex dynamics, influenced by economic, climatic and legislative factors, especially in the European Union (EU). In the EU, the reduction in livestock numbers is mainly due to the political context, with farmers facing increased pressure to ensure sustainability in accordance with agricultural and environmental policy regulations. [8]

The objective of the paper is to carry out a comparative analysis of the evolution of total meat and beef production between years 2014 and 2023, as well as cattle herds, comparatively examining the dynamics at global, European Union (EU) and national levels where the instruments of the Common Agricultural Policy (CAP) have managed to reorient and stabilize the cattle breeding sector.

One of the most pressing challenges of the present is the production and consumption of meat, dairy and other protein products in a sustainable way, which reduces the impact on the environment. [10]

MATERIAL AND METHOD

The analysis is based on official statistical data made public by international and national institutions: FAOSTAT (worldwide livestock) [11], EUROSTAT and the European Commission (EU livestock, production and methodologies) and the National Institute of Statistics (INS) of Romania (meat production and cattle livestock). In the case of statistics on total meat production, the quantities refer to the weights of carcasses from slaughtered animals from farm species mainly cattle, poultry, sheep/mutton and goats, pork. At global level, statistics include wild game meat also. The primary data used in the research were statistically processed: media \bar{x} , error of the arithmetic mean $\pm s_{\bar{x}}$, standard deviation s , coefficient of

variability $V\%$ using the following computer programs: SAVC (Statistical Analysis of Variance and Covariance) respectively SPSS 16.00 for WINDOWS.

A very important aspect for the interpretation of production data in the EU is the SEUROP (Carcass Classification System) which standardises the classification of cattle carcasses (Z, A, B, C, D, E) according to category, conformation (from S – superior to P – poor) and fat cover (from 1 – low to 5 – very high). The transparency provided by the SEUROP classification is vital for the weekly reporting of prices in the single market. The price categories recorded focus on specific combinations of conformation and cover, such as U2, U3, R3, and O3, depending on the age category and sex of the animal. [12]

The fact that European markets operate under this rigid classification standard also determines production strategies. Mixed breeds (milk/meat) do not always manage to reach the higher conformation classes (E or U) that bring the highest prices. Thus, financial support, such as the Coupled Livestock Support (CLS) in Romania, is not just an income subsidy, but a qualitative alignment tool. It directs farmers' investments towards specialized meat breeds (e.g. Angus, Limousin), which guarantee higher-class carcasses, thus optimizing, according to SEUROP standards. [13]

RESULTS AND DISCUSSIONS

In the current context in which meat production is considered to have a major impact on the environment – increasing greenhouse gas emissions, agricultural land and freshwater use, it remains the main source of food for humans. Globally, there has been a continuous increase in consumption, as reflected in statistical data from the last 50 years, during which meat production has tripled precisely due to the need to cover market demand. Currently, world production in recent years has

reached over 350 million tons of meat obtained from all species. In 2023, world production was 362.9 million tons (fig. 1). [11, 14]

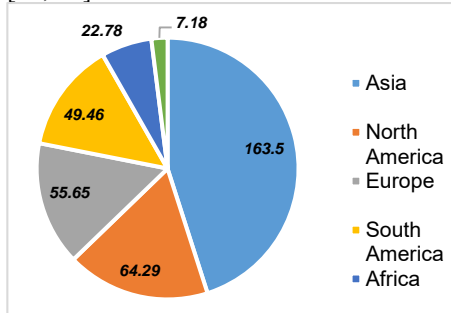


Fig 1. Meat production in 2023 by continent (million tons)

The largest meat production, 163.5 million tons, which represents 45.05%, is carried out in countries on the Asian continent. The two American continents, North and South, together produced a total production of 113.75 million tons of meat, or 31.34% of world meat production. In 2023, the European continent was ranked third, with a total production of 55.65 million tons, after Asia and North America.

Table 1 shows the meat production in the countries with the highest values for the period 2014-2023. [15].

Table 1. Dynamics of meat production in the main countries of the world in the period 2014-2023

Year	China	USA	Brazil	Russia	India
2014	86.35	42.8	25.89	9.07	9.05
2015	86.97	43.29	26.48	9.57	9.44
2016	85.38	44.65	26.75	9.85	9.83
2017	85.78	45.81	27.53	10.32	10.32
2018	86.42	46.84	27.7	10.71	10.63
2019	77.78	48.17	28.18	11.21	10.87
2020	77.71	47.05	28.57	11.22	10.95
2021	90.13	47.44	29.3	11.63	11.35
2022	93.43	47.75	30.4	12.4	12.24
2023	97.5	47.46	31.6	12.83	12.5

It can be seen that in all these countries, which have the highest production, it has been constantly increasing. In 2023 compared to 2014, the most spectacular increase is 29.31% and is recorded in the case of Russia, which is followed by India with 27.6% and Brazil, whose production increased by 22.05% during this period. The USA records a constant increase until 2019, after which, due to drought, production decreases in 2020 and returns to more than modest growth in the following years. [11]

The structuring of statistical data by animal species from which the meat comes, places poultry meat production in first place in the world, which in 2023 was 144.02 million tons, which represents 36.69% of total world production. In second place is the production of meat obtained from pigs of 124.67 million tons and then that of beef, which quantitatively was 76.56 million tons (20.82% of the total). The ranking is completed by the production of sheep and goat meat, which was 19 million tons, and other types of meat from other species (horse, camel, game). [16]

Production is primarily influenced by consumer preferences. Globally, pork is the most widely consumed meat, on average, per capita, and is the predominant choice, followed by poultry, beef/buffalo, sheep, and goat. Other types of meat account for a small percentage of total consumption. Consumption trends vary across the globe, depending on the region. Compared to the global average, in China pork accounts for approximately two-thirds of per capita meat consumption, in Argentina more than half of consumption is beef, while in New Zealand sheep and goat are preferred. [17]

The dynamics of the world's cattle herds describe an upward trend in the period 2014-2023 (table 2) being heterogeneous at the continental level. Thus, in 2023 the world's cattle herds increased by 9.48% compared to 2014. [11] While most continents follow this trend, Oceania presents a heterogeneous evolution and

Europe records a decrease starting with 2017, a situation that mirrors the evolution at the EU level, as a result of the agricultural and environmental policy adopted and followed by the member countries. In addition, compliance with the high quality standards imposed by the EU (SEUROP classification for carcasses, environmental regulations) has also determined an increase in production costs. This is leading to a shift in consumption towards cheaper protein sources such as chicken. [8, 17] Because beef carcass prices do not reflect the real price, even when high, many farmers have exited the market, leading to accelerated herd liquidation, particularly in western

European member states.[18] This situation indicates that although regulations are designed to improve quality and sustainability, they may undermine the competitiveness of the domestic beef sector in the short term.

Throughout the 2014-2023 reference period, Asia was the leader in terms of the size of owned cattle herds, holding an average of 30.71% of the total global cattle herd.

If we were to rank countries based on their livestock in 2023, the top three are Brazil, India, the USA, China and Ethiopia. (fig 2) [11]

Table 2 Evolution of cattle herds in the period 2014 - 2023 worldwide (millions of heads)

Continent	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Asia	439.46	443.7	450.7	454	455.64	461.7	470.57	475.77	482.16	483.8
South America	351.7	353.6	357.47	357.81	357.81	362.8	375.56	374.08	382.67	390.39
Africa	328.1	335.59	343.62	344.96	353.59	361.36	364.94	372.9	380.21	387.79
North America	157.88	158.83	161.88	163.95	165.43	166.5	165.75	166.72	164.92	162.48
Europe	122.2	122.02	121.61	120.85	118.7	117.35	116.24	114.83	113.22	111.42
Oceania	40	37.96	35.59	36.78	36.95	35.34	34.03	35.03	34.61	39.9
World total	1439.34	1451.7	1470.87	1478.35	1488.12	1505.05	1527.09	1539.33	1557.79	1575.78
UE	79.18	79.7	80.03	79.6	77.84	77.16	76.55	75.71	74.81	73.75

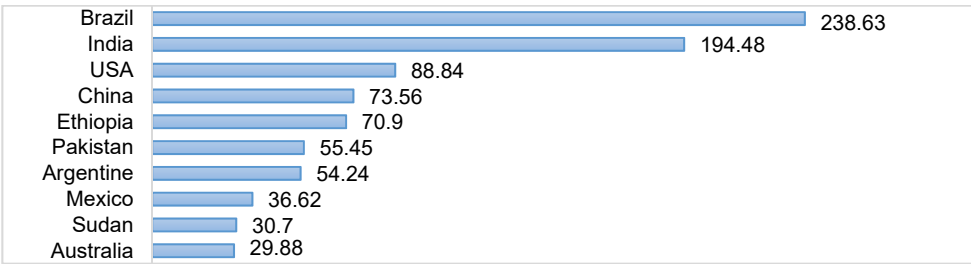


Fig. 2 Ranking of countries with the largest cattle herds in the world in 2023 (million heads)

Regarding meat consumption per capita/year in the EU, as shown by EUROSTAT statistics, in 2022 the average was 102 kg and in Romania only 77.79 kg. [17]

In the EU, beef production in 2023 was 6384.77 thousand tons, which represents a decrease of 4.73% compared to the production in 2014. If until 2018 beef production recorded continuous increases,

starting with the following year (the year of the pandemic) it decreased from year to year, returning to growth in 2024 to 6584.01 thousand tons, 3.12% higher than the previous year. [18]

Cattle herds in the European Union have been continuously decreasing since 2017, with percentage values between 0.54 - 2.21% from one year to the next, a situation

determined by a combination of unfavorable factors such as high operational costs, legislative uncertainty caused by environmental regulations and a consumer demand oriented towards cheaper sources of protein. [19]

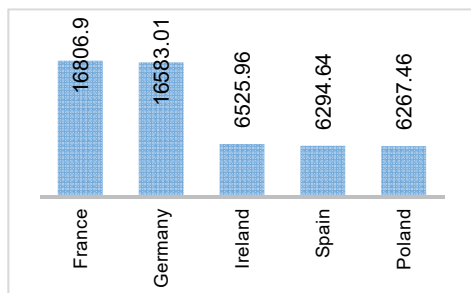


Fig 3 Ranking of countries with the largest cattle herds in the EU in 2023 (thousands of heads)

Among EU member states, in 2023, France and Germany together hold 45.27% of the EU's total cattle population. (fig. 3). France remains the leader in raising specialized beef cattle breeds (Charolaise, Limousine) [20]

At the national level, total meat production reached a peak of 880.69 thousand tons in 2019, after which it

decreased and in 2022 reached a minimum of 799.269 thousand tons. In Romania, in 2023, the total production of carcass meat, obtained in slaughterhouses in the country, was 811,112 tons, of which 62.96% was poultry meat. Poultry meat production in slaughterhouses remains high, frequently exceeding 60% because poultry meat being obtained at lower costs. In 2023, pork represented 32.53% of total production at the national level and that from slaughtered cattle represents 3.88%, i.e. 31,491 tons. [20, 21].

Comparing consumption by meat category, Romanians have pork as their first preference, which in 2023 represented 50.74% of total consumption, followed by chicken and then beef, whose consumption this year was 4.68 kg/head/year. [17]

Regarding the production of beef from slaughterhouses in the period 2014-2023, it increased until 2017 when it was 59,141 thousand tons, which represents 7.36% of the total production of that year. Compared to this year, the production of beef in 2023 was 31,491 thousand tons, i.e. 46.75% lower and represented 3.88% of the total production. (fig. 4) [20, 21]

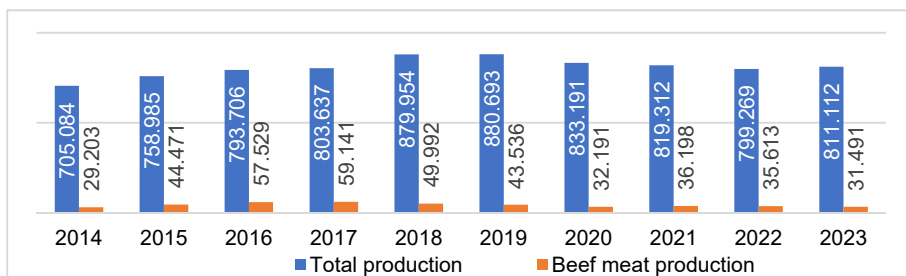


Fig 4. Evolution of total meat and beef production in Romania between 2014-2023 (thousand tons)

In Romania, the evolution of cattle herds is similar to that at EU level, reaching a level where in 2023 they will be 12.28% lower compared to 2014. (fig. 5). In 2023 our country ranked tenth among EU countries in terms of cattle herds owned. The animal density is very low, being 14.5 heads/100 ha, compared to countries such as the Netherlands where it is 210.7 heads/100

ha or Belgium with a cattle density of 166.8 heads/100 ha. [21]

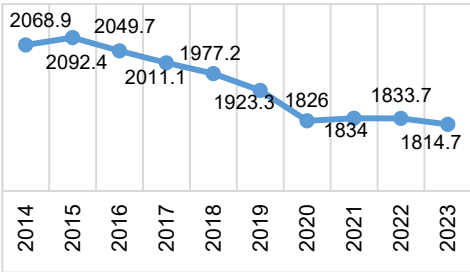


Fig 5. Evolution of cattle herds in Romania between 2014 - 2023 (thousands of heads)

At the same time, at the national level, the evolution of cattle herds specialized for meat production was different, in the sense that from 2015 to 2023 it were 8.5-fold increase. (fig. 6). The most spectacular increase in herds was in the case of the Aberdeen Angus breed. [22]

Although Romania did not have a strong tradition in raising specialized meat breeds, the sector has experienced significant growth in recent years, driven by imports of quality genetic material and by the application of hybridization with bulls from

specialized breeds. [23] This reorientation has been encouraged by the CAP mechanisms.

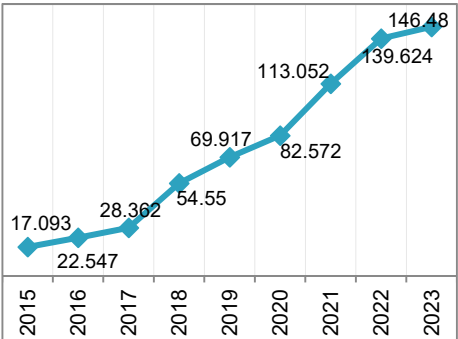


Fig 6 Evolution of cattle herds specialized for meat production in Romania, between 2015-2023 (thousands of heads)

The analysis of the dynamics of cattle herds by breeds specialized for meat production at the national level is represented in Fig. 7. [23]

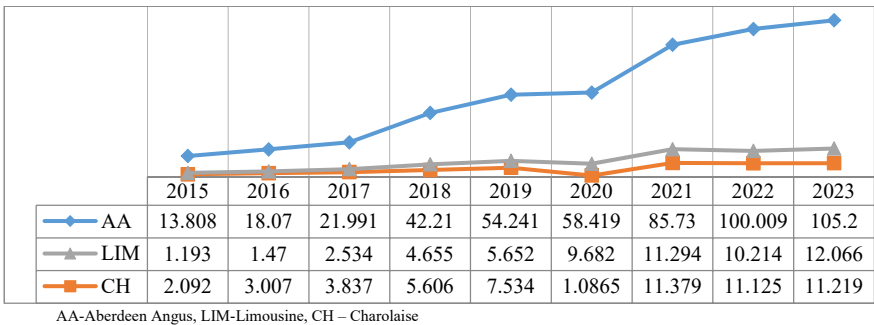


Fig 7 Evolution of cattle herds of main meat breeds between 2015-2023 in Romania (thousands of heads)

Among the breeds specialized for meat production that are dominant in the Romanian herds, we mention Aberdeen Angus, Limousine and Charolaise. These are breeds eligible for the Coupled Livestock Support (CLS) for beef cattle. The CLS mechanism (introduced in Romania in 2015 with the CAP reform), aimed to improve the competitiveness,

sustainability and quality of production. [24]

The granting of the CLS was strictly conditional on breeding activity, requiring farmers to register their animals in the herd register. This conditionality transformed the CLS from a simple subsidy into an effective tool for genetic selection.

The eligibility criteria require holding a herd of between a minimum of 10 and a maximum of 250 adult beef cattle/beneficiary. In addition, cows from eligible beef breeds must have products (calves) registered in the Genealogical Register to receive support, thus ensuring traceability and continuity of breeding. The allocation of significant funds (13.125 million euros for beef cattle) [25] has strengthened the foundations of this niche sector.

CONCLUSIONS

Data analysis for the period 2014–2023 reveals differences at the three geographical levels in terms of the dynamics of the cattle sector with reference to the evolution of herds and meat production:

- globally, meat production is increasing and continues to be dominated by the China, USA and Brazil, while the countries with the largest cattle herds are Brazil, India and the USA;

- at EU level both livestock numbers and beef production are decreasing as a result of the European CAP policy;

- at the national level, cattle herds are decreasing slightly from year to year and the trend is the same in the case of beef production, which means that beef is truly becoming a niche product;

- meat consumption is low in Romania, at 77.79 kg/capita/year, with the largest share being represented by pork, followed by poultry and then beef.

- at national level, cattle herds and are decreasing annually and the trend is the same in the case of beef production, similar with UE level evolution.

In Romania, financial mechanisms such as CLS facilitated a restructuring of cattle herds with a strategic and accelerated reorientation towards the development of a specialized beef cattle segment (Angus, Limousine, Charolaise). In this context, some recommendations can be formulated:

- supporting associative (cooperative) forms focused on meat breeds, with an emphasis on investments in slaughtering and processing that would ensure complete traceability and optimal utilization of higher-classified carcasses (according to SEUROP), which would maximize the added value embodied in profit at the national level;

- stimulating domestic consumption of quality meat through marketing campaigns that focus on educating Romanian consumers about the benefits and qualities (tenderness, marbling) of beef;

- continuous monitoring of the effectiveness of the CAP through a periodic assessment at national level of the increase in the number of beef animals in the Genealogical Registers, which will justify the maintenance of CLS funding in the future as a tool for improving livestock numbers and improving the performance of the sector.

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