

STUDY REGARDING THE BEEF MEAT PRODUCTION EVOLUTION WORLDWIDE AND NATIONAL LEVEL

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Abstract

The global beef industry has been growing steadily in recent years due to the fact that the largest beef exporters and importers in beef producing countries continue to invest financially in the global market. Beef, one of the most important products in the world livestock market, is often recognized as a premium source of protein in the human diet, therefore it is widely consumed in most countries around the world. In 2020, at the national level, the number of cattle slaughtered in industrial units (slaughterhouses) decreased by 15.6% compared to the previous year. Also, the beef production decreased from 196,000 tons in 2017 to 173,000 tons in 2020, even though the slaughter yield has increased. There are about 1 billion beef cattle worldwide, and compared to poultry and pigs, beef cattle have the lowest feed-to-meat conversion efficiency. Strategies to improve beef cattle performance emphasize operational and reproductive management, host genetics, functional efficiency of the rumen and respiratory microbiome, and forage structure and composition. There have also to consider the herd health and immunity and the need for beef cattle to thrive in a changing environment.

Key words: cattle, consumption, meat; production; nutritive value.

INTRODUCTION

The meat industry represents one of the most important sectors in the Romanian, national and world economy. An appropriate development of the food industry, correlated with the optimal use of available agricultural resources, may reduce the domestic market's dependence on imports and to ensure the nation's food security (Stanciu, 2014).

Beef represents a food source for population, being an essential social product in the rational human diet, reflecting the living standard of the population, respectively its quality of life. The social importance of beef is given by its high biological value and due to the fact that it is suitable to the processing of a wide range of prepared and semi-prepared products.

Beef contributes to the structure of food availability with 14.2% protein and 9.6% calories (Cziszter, 1999). Of the total meat production, the beef share is in average 33%,

with an obvious decrease rate in recent years (about 0.89% annually) (Georgescu et al., 2000).

On average, beef contains 68.1% water, 20% protein, 10.8% lipids, 1.1% mineral salts and 183 calories per 100 g.

Beef is obtained from the cattle growth and fattening, being a source of profit, which does the agriculture more efficient through a higher utilisation of cheap fodder resources, such as: natural meadows, coarse fodder, industrial residues, etc., which are transformed into meat, a product with high biological and nutritional value.

In Romania, for this species, meat production is ensured from reformed adult and semi-adult bulls, but especially from young, fattened males and a small share from half breed, respectively meat breeds (Maciuc et al., 2019; Liciu, 1999; www.insse.ro).

Table 1 The chemical meat composition depending on the fattening level

Species	Fattening level	Body parts	Water %	Protein	Fat	Ash	Water/protein ratio	Calories
Cattle	Thin	Shank	74.80	20.80	4.00	1.00	3.56	120
	Medium	Shank	66.40	20.00	8.00	0.90	3.32	160
	Fat	Shank	60.00	17.60	16.00	0.80	3.40	216
	Thin	Round	71.00	19.70	8.00	1.00	3.60	152
	Medium	Round	67.00	19.30	13.00	1.00	3.48	105
	Fat	Round	63.00	18.37	17.00	0.90	3.43	226
	Thin	Ribs	64.00	18.60	16.00	1.00	3.43	218
	Medium	Ribs	57.00	16.90	25.00	0.80	3.37	292
	Fat	Ribs	53.00	15.60	31.00	0.80	3.40	341

Source: Banu et al. (1996); Motoc (1986)

Even though there were imports of cattle breeds specialised in meat production: Aberdeen Angus, Charolaise, Limousine; Blonde d'Aquitaine, Hereford, Galloway; Highland; Aubrac; Romanian spotted - SIM etc., the total number of cattle is still reduced, and Romania, as an exporting country in the past, ended up importing beef (Pesonen et al., 2012; Holtcamp et al., 2019; Jiu et al., 2020).

Considering the above, and the accentuated decrease in herds and meat production, the malfunctioning of the reproduction system, the lack of a strong meat-producing sector - the commodity and not ultimately, the lack of assortment varieties of beef products (Stanciu, 2015), there was the need to do this research.

MATERIALS AND METHODS

In order to carry out the study, it was carried out a bibliographic documentation of cattle herds for meat on a global, European and national level for the recent years.

The data thus obtained were systematized, processed and interpreted through the methods specific to such research. The statistics, respectively the parameters, which characterize a normal distribution, are on the one hand the mean or median, and on the other hand the dispersion indices represented by the variance and the standard deviation of the observed character. For this purpose, the computer program S.A.V.C. was used. (Statistics Analysis of Variance and Covariance, 2003) to determine the arithmetic mean (\bar{X}), the error

of the arithmetic mean ($\pm s\bar{x}$) the standard deviation (s), the coefficient of variation (V %), and for the ANOVA significance tests respectively p, we used the computer program SPSS16.

RESULTS AND DISCUSSIONS

The aim of this research was to create an updated situation regarding the production of beef at the global, European and national level. Cattle herds are unevenly distributed across the globe and continents. Analysing the distribution of livestock in 2021 (according to FAO), may be noticed that worldwide there are over 1.5 billion heads, of which only 5% are found in the E.U. As seen in Figure 1, the larger cattle herds than in the EU are found in countries such as India, Brazil and the USA.

Analysing the global and regional beef production, it may be observed similar uneven distributions and specific productivity developments, with the hierarchical order by country and region being slightly modified. Thus, of the 72,446,078 tons of beef obtained worldwide in 2021, most of 18% was produced in the USA (12,733,643 tons), followed by Brazil with a share of 13% (9,750,000 tons). Comparatively, 9% of the total beef production (6,882,070 tons) was achieved in the EU. The evolution of beef production expressed in tons worldwide during the period 2016- 2021 has an upward trend, which is different from the dynamics in the EU where things evolve downward (Figure 2).

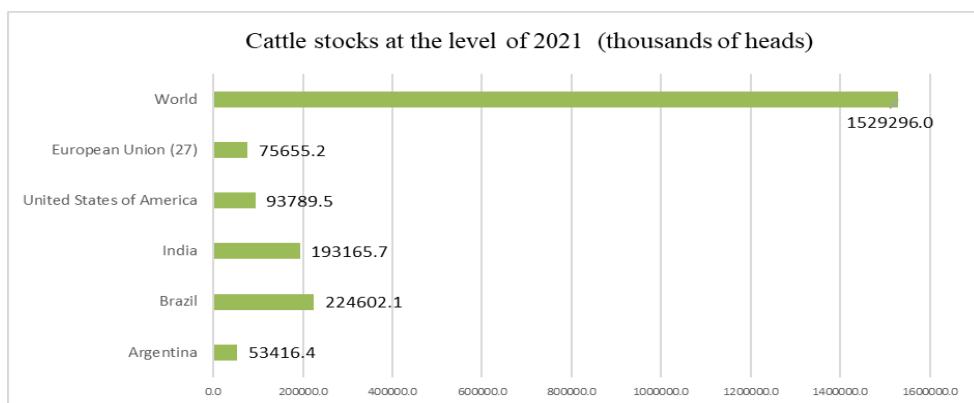


Figure 1. Cattle stocks in 2021 (thousand heads) (Source FAO)

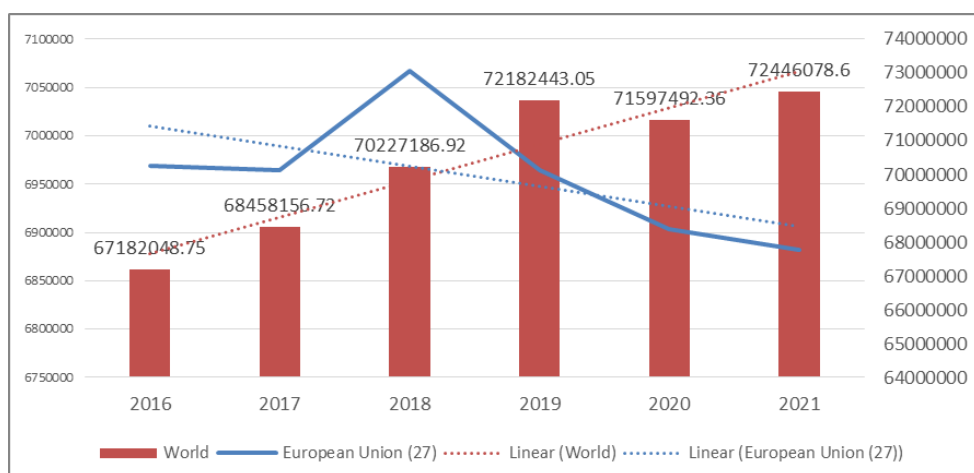


Figure 2. Evolution of beef production in the period 2016-2021 (thousands of tons) (source: FAO.org.)

In the E.U. beef was mainly obtained from slaughtered cows and young bulls, from herds specialised for beef production. Analyzing the

cattle herds registered in the E.U. may be remarked that the countries with the largest numbers are France and Germany (Table 2).

Table 2 The evolution of cattle number in E.U. (27) during 2016-2022 (thousand heads)

YEARS	2016	2017	2018	2019	2020	2021	2022
European Union - 27 countries (from 2020)	79,697.54	79,009.94	77,840.10	77,161.16	76,551.10	75,705.30	74,855.71
Germany	12,466.59	12,281.20	11,949.09	11,639.53	11,301.86	11,039.66	10,996.96
France	19,373.38	18,953.58	18,613.04	18,172.97	17,815.67	17,330.08	16,986.19
Hungary	852.00	870.00	885.00	909.00	932.90	909.90	894.00
Poland	5,970.20	6,035.70	6,183.30	6,261.60	6,278.90	6,378.70	6,448.29
Romania	2,049.70	2,011.10	1,977.20	1,923.30	1,875.20	1,826.80	1,825.10

Source: EUROSTAT

In 2022, may be noticed that from 74,856 thousand animals, 22% were distributed in

France (16,986 thousand heads), respectively 14.7% in Germany (10,997 thousand heads).

In the Eastern EU27 countries, the share of this activity is lower, and among them Poland occupies a more important role (8.6%), while Romania contributes only with 2.4%. From

these effectives, on average in 2022, at the EU level intended for meat consumption were only 30%, respectively 22,662 thousand cattle.

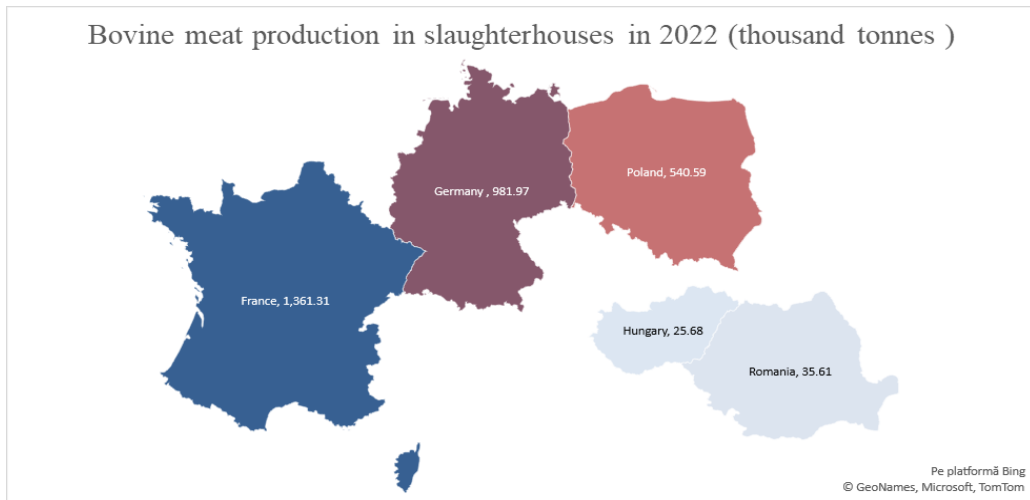


Figure 3. The distribution of bovine meat production in slaughterhouses for UE 27 in 2022 (thousand tonnes) (source: EUROSTAT)

The meat quantity resulting from the cattle slaughter in slaughterhouses for the period 2013-2022 to the EU level had a complex, winding evolution, with a general trend of growth until 2017, followed by a decrease process until the end of the analysed period.

This trend differed across countries. Thus, in Germany the process was more accentuated, respectively by 15%, Hungary by 8%, Poland by 3%, respectively Romania by 40% for the same period. (Table 3 and Figure 3).

Table 3 Distribution of beef production to EU27 level (2016-2022, thousand tons)

	2016	2017	2018	2019	2020	2021	2022
European Union - 27 countries	6,888.36	6,898.10	7,008.99	6,907.99	6,822.30	6,801.91	6,636.95
Germany	1,148.00	1,124.00	1,102.00	1,106.00	1,090.00	1,072.02	981.97
France	1,464.15	1,442.18	1,460.00	1,428.46	1,434.59	1,424.32	1,361.31
Hungary	28.07	27.21	29.15	29.73	28.07	28.93	25.68
Poland	501.46	558.58	564.72	560.45	559.38	555.12	540.59
Romania	57.53	59.14	49.92	43.54	32.19	36.20	35.61

To the EU level there is an increase determined by a higher slaughter body mass and of the slaughter yield, starting with 2020, which is influenced by the productive performances' improvement and a continuous improvement of maintenance and nutrition technologies that are specific to the targeted category. It can be seen

that the growth rate and direction vary widely, from one country to another, with differences that reflect different growth, economic and social conditions, but may be observed that in 2022 the slaughter yield growth remained on a floating line in some countries, and in others such as Romania it decreased (Figure 4).

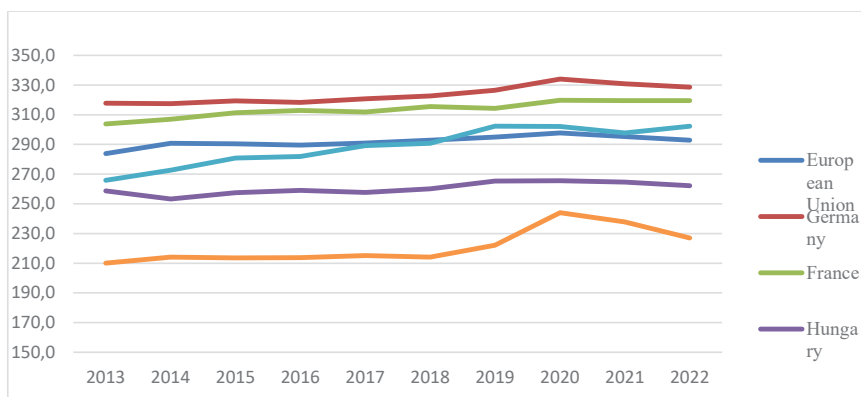


Figure 4. Evolution of the yield on slaughtered bovine carcass (source: EUROSTAT)

Romania, which has a high potential regarding grazing and raising beef cattle in extensive system, is ideally placed to meet the demands of the beef market. Romanian farmers have the ability to sustainably increase meat production in order to meet global demand. Aberdeen Angus cattle farms have the ability to produce quality meat, respecting the process of continuous welfare of the cattle, but also the environment.

Even though there have been recent increases in the beef price, also, are challenges for the meat industry, such as: production economics, changing regulations to the E.U. level, managing the perception of cattle health and

welfare notions or the continuous protection of the environment.

If we refer to cattle herds, Romania is placed on the IX-th among the EU member states, after countries such as France, Germany, Spain, Ireland, Italy, Poland, Holland and Belgium. If we refer to the cattle density per 100 ha, Romania is placed on XX-th place, out of the 22 European countries, followed by Greece and Bulgaria. In Romania, the number of slaughtered cattle was decreasing throughout the period 2012-2021, the trend being accelerated after 2017. The same downward trend may be found in the North-East Region and South Muntenia Region (Figure 5).

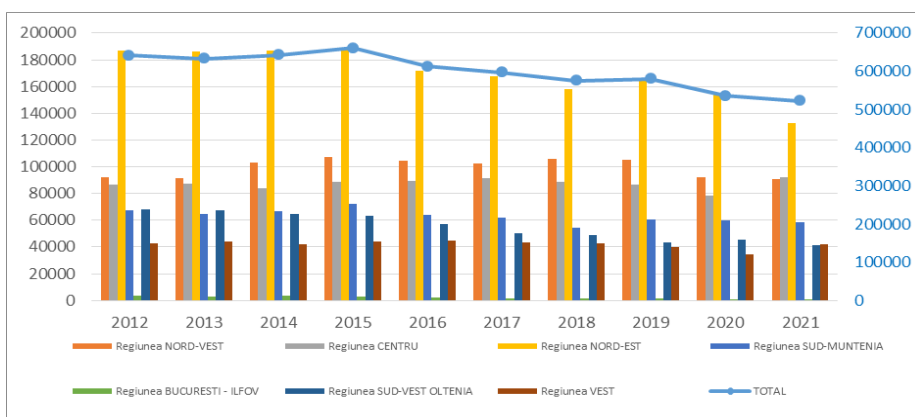


Figure 5. Total number of slaughtered cattle on development regions (2012-2021) (Source: INSSE)

According to INSSE data, in our country in 2021, cattle slaughtered in slaughterhouses were unevenly divided by region as follows: 44% of the total herd slaughtered was in the

North East region, 21.62% in the South-Muntenia region, 13% in the Centre region 10%, and 11.28% in the North-West region (Figure 6).

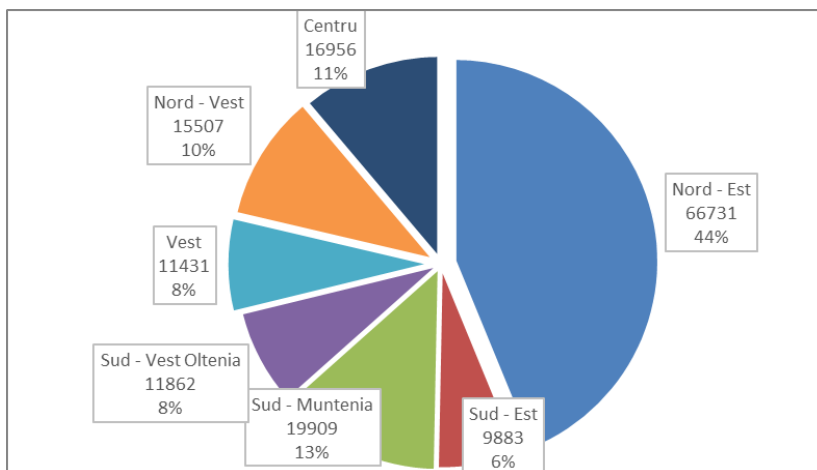


Figure 6. The cattle number slaughtered in Romanian slaughterhouses in 2021 (source: INSSE)

Regarding beef production, in 2022 totalised a 35,613 tons production, being down by 1.6% compared to 2021, when there was recorded a production of 36,198 tons of carcass, and the average weight of carcasses decreased by 5% in

2022 compared to 2021. Reported by region, in 2021 the largest share of production was in the North-East region (46%), followed by South Muntenia-(14%), respectively the Center (12%) (Figure 7).

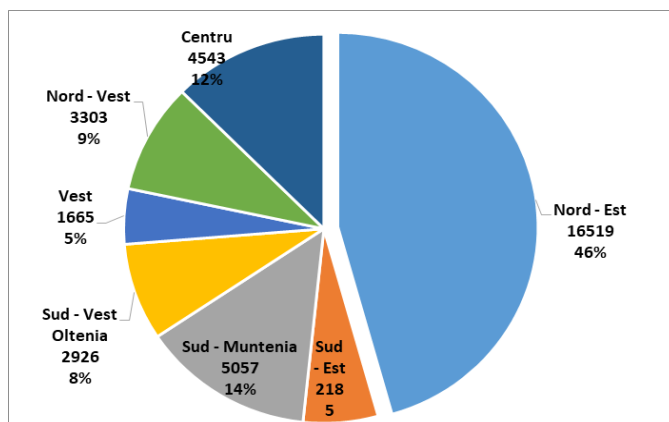


Figure 7. Beef cattle production obtained in slaughterhouses in Romania 2021(thousands of tons) (source: INSSE)

Table 4. Livestock dynamics, meat production and average carcass weight in the period 2021-2022 (source: INSSE)

	Slaughtered animals (thousands of heads) -		Carcass wight - tons		Average carcass weight	
	2021	2022	2021	2022	2021	2022
Total cattle livestock	523	503	85351	82618	163,2	164,3
Of which: in specialized industrial units (slaughterhouses)	152	157	36198	35613	238,1	226,8

CONCLUSIONS

Analysing in perspective the livestock and beef production evolution, may be observed that at the European level and even at the level of our country, the total production registers a slight decrease in the analysed period. This decrease will continue in the following decades, due to the influence of the increase of fodder and energy costs, following the war in Ukraine, which from 2021 has aggravated the problems for farmers around the world who were already struggling with drought and the reduction of land areas intended for grazing.

The limiting causes in the beef production increase are multiple, both at the European level but especially at the national level, the most important being:

- neglect of private owners of cattle raised for meat production;
- failure to ensure the fodder base, quantitatively and qualitatively;
- the reduced reproduction indices value to cows;
- the high morbidity and mortality rate in cattle subjected to fattening;
- reduced slaughter efficiency;
- the low level of weight gain, achieving, on average, at the national level, 60-66% of the average daily weight gain recorded in the EU countries.

The significant increase in fodder price, but also the change in food preferences of the modern people, influences meat production. In the coming years, beef will face a fierce competition from the pork and poultry market, which is considered as being tastier and obtained at lower costs.

Quality increasing of beef production will aim to maintain meat consumption at least at the current level. Improving the beef quality may be achieved by improving the juiciness, tenderness, aroma, colour and marbling of the meat, shelf life increase of the products obtained after processing (hamburger), by feeding red beets to cattle (Marrone et al., 2021).

Specialists recommend the expansion of industrial crossings between milk and meat breeds, the F1 crossbreeds being entirely intended for fattening and utilisation for meat. Increasing meat production is recommended

through industrial crossings of milk breeds with bulls from meat breeds with hypermetric development (Charolaise, Blanc Belgian Blue, Blonde d'Aquitaine, Simmental and Limousine). The of ecological meat production intensification is achieved through the use of hypometric English breeds (Galloway and Highland) in crossbreeding.

The beef consumption increase may be achieved by improving cattle fattening technologies, producing specialties, much better paid by consumers. In the future, production will be concentrated and specialised, by reducing the number of farms, but with an increase in the average herd raised on farm.

In the future, beef production will also belong to family farms, but the basis will be large, industrial-type production units. Regarding the meat production utilisation, it will be done in the form of prepared and semi-prepared products, in an integrated system.

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