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RESEARCHERS REGARDING THE SITUATION OF THE PIG HERDS IN ROMANIA, THE PRODUCTION OBTAINED AND THE CONSUMPTION OF PORK MEAT IN THE PERIOD 2016-2021

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Abstract

The work aims to analyze both the situation of pig herds, as well as the production and consumption of pork in Romania compared to other EU countries, given that the European Union ranks first in the world in terms of production and 3rd place in the world in terms of pork consumption. The analyzed indicators, which were collected from internal (INSSE) and international (Eurostat) databases, were: pig herds, total pork production, pig herd density; the number of slaughtered animals; consumption of pork. Based on this information, the standard deviation and the coefficient of variation were calculated both for the multi-year average of pig herds and for their density. The analysis highlighted the fact that pig herds have continuously decreased during the analyzed period (the decrease being 27% in 2021 compared to 2015), the reasons being both economic (increasing prices, energy crisis, etc.), but also the impossibility of proper management of outbreaks of Swine Fever Africana that led on the one hand to the slaughter of livestock, and on the other hand to the prohibition or reduction of exports. Regarding the consumption of pork, Romania is below the European Union average, but an increase in consumption is noted from 31.3 kg/inhabitant in 2015 to 37.8 kg/inhabitant in 2021.

Key words: *herds of pigs, production, consumption, import, export*

INTRODUCTION

Pig breeding, along with other categories of domestic animals intended for consumption, represents one of the important branches of agriculture worldwide. According to statistics, obtaining meat production requires 77% of agricultural land globally in 2021, consumes approximately 35% of grain production and emits approximately 15% of greenhouse gases [29], which demonstrates both the important role of this branches of animal husbandry in the economy, as well as its important consumption of resources [28].

On the other hand, the same statistics estimated in 2021 an increase in global pork production of 13% for the next 10 years. It can be seen that the estimated growth rate is much lower than in the previous period, the reasons being multiple. One of these is represented by African Swine Fever, which contributed to the decrease in production, production that will suffer at least until 2023 [21]. Afterwards, it will be possible to return to previous productions, provided that no other vulnerabilities will appear. The country that was estimated to return the fastest to the previous production of African Pigfish was China, while the European Union and the United Kingdom will be the ones where the productions will decrease, taking into account both the economic aspects and the concerns related to the protection of the environment and global warming, phenomena that affect the world worldwide and which were important topics of discussion at the Davos Conference in 2022 [26, 27]. Without taking measures in this direction, both the planet and food security will be strongly disrupted [23]. With the start of the war in Ukraine, other vulnerabilities appeared as a result of the energy crisis or the export crisis. The effect of

the increase in the price of energy or the price of feed, there was also an increase in the price of food, including meat.

Globally, in 2022, the increase was approximately 10%, as it appears from an FAO report [27], but at the stock exchanges in Paris or Chicago the price increases were much higher. Only for corn, for example, the price increased by 55% and 31%, respectively. The same FAO report shows that if in 2021 the increase in meat production was 5.4%, in 2022 it was much lower (according to estimates of only 1.4%) [27]. In these conditions, the main countries that faced problems were Spain and China, the 2 largest producers of pork worldwide, but at an individual level each farmer suffered. Another vulnerability was represented by the drought, another effect produced by global warming, which led to the decrease of pig herds and productions. An example is Canada, which in 2021 faced a strong drought. But she is not the only one, because other areas of the world, including Romania, have faced extreme climatic conditions.

Regarding the consumption of pork, they face various concerns from political factors, as well as from consumers. The carbon footprint and the water footprint, which have significant values in the case of raising animals, raise an economic and social problem [22]. Another problem, encountered especially in Europe, is the concern of citizens regarding the security and safety of animals [19], which will certainly influence the consumption of meat, which will decrease. Estimates show that from a consumption of 32.5 kg of pork/capita in 2021, it will reach a consumption of 31.0 kg/capita in 2031, which means a decrease of approximately 0.5%. These decreases will cause a decrease in pork production of approximately 0.8% at the level of the European Union, which will produce almost 22 million tons of pork in 2031 [3]. However, worldwide, pork will still remain the main type of meat consumed [25], and the growth of the planet's population will continue to demand an increasing production, even if there will be a reduction in the weight that meat will have in human nutrition, due to the fact that switching to healthier foods will have a favorable impact on the planet. Another factor that contributed to the increase in consumption was represented by the phenomenon of urbanization, which in turn generated an increase in income [24].

Based on these considerations, research estimates a need for pork that will reach 181 million tons in 2050 [29].

Data recorded worldwide on pork consumption show that in 2021 China is in first place (Hong-Kong with 61 kg/capita, Macao with 52 kg/capita, mainland China with 37 kg/capita per inhabitant), followed by Belarus (41.8 /capita) and the European Union (41.1 /capita).

A characteristic of pig farming in the European Union is the predominantly intensive system, which still requires large areas of agricultural land, but which allows obtaining pork at affordable prices.

Another characteristic is the legislative system that imposes an increased concern on the part of producers for the welfare of animals and for the protection of the environment [20].

MATERIALS AND METHODS

The research involved the analysis of specialized works and data from internal and international databases. The data were processed statistically and were the basis for establishing the results and formulating the conclusions.

The indicators analyzed were: pig herds, pig herd density, total pork production, slaughtered herds, pork consumption, standard deviation and coefficient of variation that were calculated both for the multi-year average of pig herds, as well as for their density. The indicators registered at the national level were compared with those existing at the level of the European Union.

The mentioned indicators were analyzed dynamically, using indices with a fixed base and indices with a chain base:

$$I_{i/0} = \frac{Xi}{X0} \times 100 \quad (1)$$

$$I_{i/i-1} = \frac{Xi}{Xi-1} \times 100 \quad (2)$$

in which:
X_0 - initial level
X_1, X_2,..X_n – period level

To establish the frequency of the groups, relative sizes of structure are used, thus determined:

$$g_i = \frac{xi}{\sum_{i=0}^{n} xi} \times 100 \quad \text{.....(3)[2]}$$

where:
x – indicator level

The calculation of the standard deviation and the coefficient of variation was done with the help of Excel, which is based on the following calculation formulas:

$$\sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{(n-1)}} \quad \text{,,,,,,,,,,,,,,,(4)[1]}$$

$$Cv = \frac{\sigma}{\bar{x}} \quad \text{.....(5)}$$

where:
σ - standard deviation
x – statistical characteristic
Cv – coefficient of variation

RESULTS AND DISCUSSIONS

For the period 2015-2021, the analysis of pig herds, production and consumption of pork was carried out, so that it is possible to follow the way in which this livestock sector has evolved.
The data published by the National Institute of Statistics highlight the fact that the number of heads decreased continuously during the analyzed period, the decreases being 27% in 2021 compared to 2015. Thus, if in 2015 the pig herds numbered almost 5 million heads, in 2021 they have reached approximately 3.6 million heads. The decreases were due both to the fact that domestic production failed to be competitive in relation to imported products, but also to the fact that during this period the most outbreaks of African Swine Fever existing at the level of the European Union were those in Romania, which caused the number of livestock to decrease, due to their slaughter.

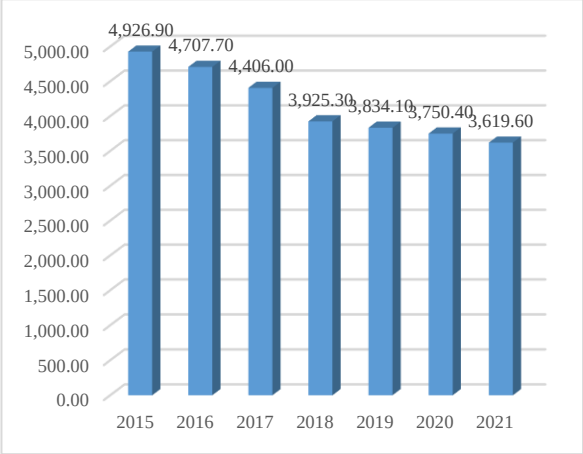


Fig. 1. The situation of pig herds in the period 2015-2021
Source: own processing [11-18].

Taking the year 2015 as a benchmark, we made a ranking of the first 10 countries in the European Union, both in relation to the herds of pigs owned, but also in relation to their density, expressed in heads/100 ha of land. The analysis was carried out for the period 2015-2021, determining both the multi-year average of pig herds, but also the standard deviation and the coefficient of variation (Table 1).

Table 1. Standard deviation and coefficient of variation for multi-year average pig herds

Country	Multi-year average (2015–2022) of pig herds - heads	Deviation Standard	The Coefficient of Variation (%)
Spain	30,987.01	2,064.73	6.66
Germany	26,419.59	1,359.78	5.15
France	13,319.00	401.35	3.01
Denmark	12,818.29	360.78	2.81
Netherlands	11,842.57	520.76	4.40
Poland	11,115.47	583.40	5.25
Italy	8,526.49	86.25	1.01
Belgium	6,172.73	107.37	1.74
Romania	4,167.14	511.43	12.27
Hungary	2,872.83	155.47	5.41

Source: own processing [11-18].

After analyzing the data, it turns out that Romania, although it holds the 9th place in

the ranking, is still the country that had the biggest decrease in pig herds. The coefficient of variation had the value 12.27 of the fact that pig herds decreased by 27% in 2021 compared to 2015.

Reductions of 13% were also recorded in the Netherlands and Hungary. The only country where the number of pigs increased is Spain, the increase being 21%.

Regarding the density/100 ha, it can be seen that Romania occupied the 16th place (in the years 2016, 2017, 2018, 2020 and 2021), respectively the 17th place (in the years 2015 and 2019) among the countries of the European Union. For the first 10 countries of the E.U. the density varied between 102 heads/100 ha (Poland) to 1,156 heads/100 ha (Netherlands). The highest value of the standard deviation was 40.12, and the lowest was 1.48, which shows that the most important decrease in density was recorded in the Netherlands (the decrease being 10%), while in Austria there was an increase of the density of 1%. The countries where density decreases were Belgium (-11%), Germany (-13%), Italy (-6%), Poland (-3%) and Romania (-25%), and the countries where the density increased were Denmark (+22%), Ireland (+28%) and Portugal (+15%). The coefficient of variation, which is determined as the ratio between the standard deviation and the density average, highlights the existing situation in the period 2015-2022 (Table 2).

Table 2. Standard deviation and coefficient of variation for multi-year densities (heads/100 ha)

Country	Multi-year average (2015–2022) of density (heads/100 ha)	Deviation Standard	The Coefficient of Variation (%)
Netherlands	1,155.81	40.12	3.47
Belgium	727.60	26.72	3.67
Denmark	538.23	14.46	2.69
Ireland	357.26	23.77	6.65
Spain	252.87	22.56	8.92
Germany	224.50	10.45	4.66
Austria	209.91	1.48	0.71
Portugal	223.10	20.55	9.21
Italy	126.39	2.72	2.15
Poland	101.73	5.37	5.28
Romania	47.91	5.70	11.89

Source: own processing [11-18]

From the analysis of pig herds by development region, it can be seen that although they decreased in all 8 regions, the most significant decreases were recorded in Bucharest-Ilfov, South-Muntenia and North-East (Table 3).

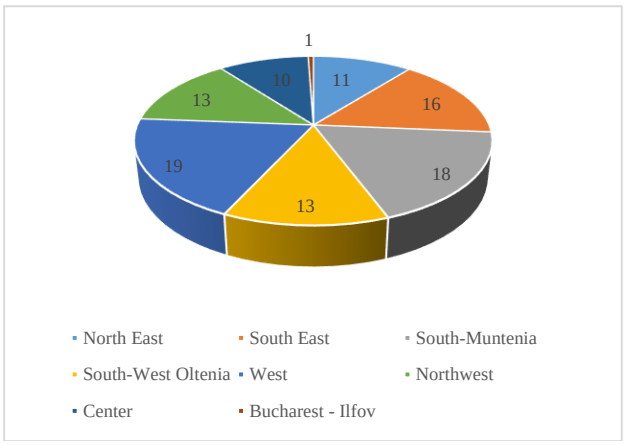
Table 3. Pig livestock by development region, 2015-2021 (heads)

Heads	2015	2016	2017	2018	2019	2020	2021
North-East	525,687	488,421	458,394	447,482	381,248	385,979	428,086
South-East	772,094	739,728	723,825	468,624	482,007	468,669	483,508
South-Muntenia	885,263	832,731	753,815	649,680	583,808	520,812	483,125
South-West Oltenia	620,505	588,082	558,292	519,960	499,081	483,415	469,426
West	952,062	944,369	919,331	914,638	944,700	949,632	851,039
Northwest	663,666	624,440	564,142	526,530	560,871	547,087	541,799
Center	479,522	456,815	400,891	374,579	372,419	382,624	357,377
Bucharest-Ilfov	28,129	33,083	27,324	23,610	10,002	12,144	5,221

Source: own processing [11-18].

The largest share of the total livestock, state for the year 2021, as well as for the year 2015, can be found in the West region (with 19%, respectively 24%), followed by the South-Muntenia region in 2015 (with a weight of 18%) and by the North-West region in 2021 (with a weight of 15%) (Fig. 2 and Fig. 3).

Analyzing the evolution of live weight for pig herds, the same trend of decrease in the analyzed period is found, being 12% in 2021 compared to 2015. In 2021, the number of slaughtered heads decreased by 16% compared to 2015.



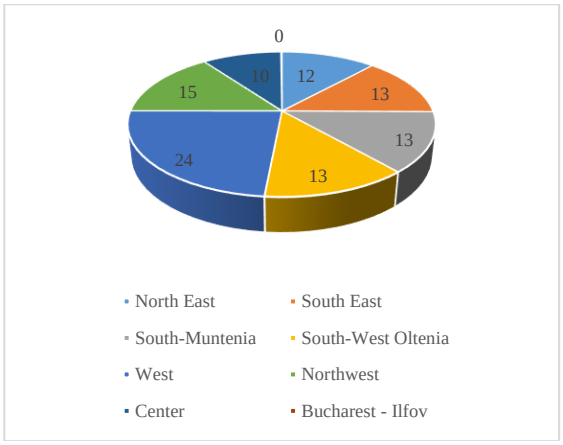


Fig. 2 and 3. The structure of pig herds, by region, in 2015 and 2021
Source: own processing, [11, 18].

Regarding the production of pork used for consumption, it is found that it comes from both domestic production and imports.

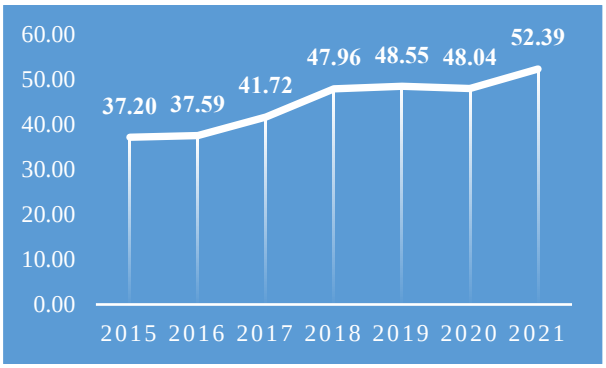


Fig. 4. The evolution of pork imports (% of consumption available)
Source: own processing [4 -10].

As domestic production decreased, the necessary was ensured by imports, which made their share in the total available consumption increase and vary from 37% in 2015, to 48% in 2018 and to 52% in 2021 (Figure 4). Romania is also an exporter of pork, but these exports decreased from approximately 33 thousand tons to 23 thousand tons. At the level of Romania, the consumption availability was approximately 640 thousand tons in 2015, increasing by 21% and reaching almost 772 thousand tons in 2021. Analyzing the average consumption expressed in kg/inhabitant, it is found that the highest consumptions worldwide are recorded in China, in all three regions (Hong Kong, Macao and Mainland), in the European Union and Belarus, with an increase in consumption from 29 kg/inhabitant in 2015 to 41.7 kg/inhabitant in 2021 (Table 4).

Table 4. Evolution of average pork consumption

Country/Region	2015	2016	2017	2018	2019	2020	2021
E.U.	47.1	43.2	43.2	44	42.2	40.6	41.4
China - Mainland	41.4	40.4	40	39.4	31.9	29.4	37.3
China - Hong Kong	71	72.6	77.5	72.3	53.9	58.9	60.5
China -Macao	58.1	62	62.6	60.2	62.5	52.4	51.8
Belarus	29.0	35.1	36.6	38.4	38.4	41.2	41.7
Romania	31.3	32.9	36.1	38.3	38.0	37.3	37.8

Source: own processing [11-18].

Romania registers consumption below the European Union average, but the difference compared to this average decreased significantly in the analyzed period. Thus, if in 2015 the difference was 158 kg/inhabitant, it reached 3.6 kg/inhabitant in 2021.

CONCLUSIONS

As it emerges from the study based on statistical data, it appears that pig herds in Romania have decreased dramatically in recent decades, reaching approximately 3.6

million heads in 2021. Although the capacity of farms is much higher, the main reason that contributed to the reduction of herds is represented by the swine fever which led the slaughter of animals, due to the fact that large farms faced the infection of animals with the African swine fever virus. This had a negative impact from an economic point of view, both on farms as a result of the ban on pork exports from Romania, and on the trade balance.

On the other hand, the increase in prices made many businesses no longer profitable and give up this activity. The reasons that led to the increase in pork costs and prices in the last year were: the European energy crisis; the drought that affected corn production; swine fever and import dependence.

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