

MEAT PRODUCTION, TRADE, CONSUMPTION AND SELF-SUFFICIENCY RATE IN ROMANIA IN THE PERIOD 2014-2022

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Abstract

The goal of the study is to analyze the dynamics of meat production, import, export, availability for human consumption and self-sufficiency rate (SSR) in Romania in the period 2014-2022 based on the data provided by National Institute of Statistics. The empirical data were processed using the growth rate, trend regression equations, determination coefficient, illustrative graphical representations and tabled results for the indicators taken into consideration. The results highlighted that in the studied period, total meat production (in fresh meat equivalent), decreased by 22.5%, from 1,291.9 thousand tons in 2014 to 1,001.6 thousand tons in 2022. But, by meat sort, the situation is different as follows: bovine meat production declined by 8.9% and pork production by - 16.4%, while sheep and goat meat increased by 27.2% and poultry meat by 43.8%. The imported quantities of meat registered an ascending trend from 383.9 thousand tons in 2014 to 628.5% in 2022 (+63.7%). By meat sort, the imported amounts increased by 12.4% for beef, by 200% for pork, by 400% for sheep and goat meat and by 8.1% in case of poultry meat. In 2022, Romania exported 166.8 thousand tons meat meaning by 31.61% more than in 2014. By meat type, the exported amounts increased by 200% for bovine meat, by 86 % in case of sheep and goat meat, by 45.2% in case of poultry meat, but in case of pork declined by 36%. The meat availability for consumption increased by 22.4% from 1,150.6 thousand tons in 2014 to 1,463.3 thousand tons in 2022. For total meat, self-sufficiency rate (SSR) declined from 83.3% in 2014 to 68.4% in 2022. By meat sort, SSR went up for bovine meat accounting for 87.1% in 2022 versus 82.1% in 2014, for pork SSR went down to 45.4% in 2022 versus 70.2% in 2014, SSR for sheep and goat meat was 100% in 2022 versus 106% in 2014 and for poultry meat, SSR increased from 87.5% to 95.2% in the studied period. In 2022, a Romanian consumed in average 74 kg meat, of which 38 kg pork, 27.9 kg poultry meat, 5 kg beef and veal and 2.6 kg sheep and goat meat, much more than in 2014, except bovine meat. As a conclusion, imports sustain pork domestic market as production is not enough to cover the demand, but also in smaller amounts for the other meat types. Romania is also an exporting country of meat, as long as the availability of meat on the internal market is raising.

Key words: meat, production, import, export, consumption availability, self-sufficiency, Romania

INTRODUCTION

The increase of the world population requires more and more food, but production is constrained by the limited natural resources especially land and water, and in addition by the negative impact of climate change [4].

Meat is an important component of human nutrition as it is a source of high value protein.

That is why at the global level, meat production registered a higher and higher level trying to meet the demand.

In 2022, 362.6 Million metric tons of meat were produced and in 2032 it is expected to reach 382 Million tons, but the growth rate will differ by species so that in 2032, pig meat will be by 11% higher, poultry meat by 15%, beef and veal by 10% and sheep meat by 15%. It

was also estimated that, in 2032, 41% of total animal protein will be provided by poultry meat [25].

Taking into account only the main species producing meat: swine, poultry, bovines and sheep and goats, the world meat production reached 350.5 Million Metric tons in the year 2023, being by 61.4% higher than in 2016, but by 3.6% smaller than in 2022.

The share of each meat type in the world meat output in 2023 was 39.8% poultry, 34.8% pork, 20.5% beef and veal and 4.9% sheep and goat meat [51].

The main producing countries of pork at the global level are: China EU, USA and Brazil [37, 54]. The top leaders in beef production are: USA, Brazil and China with a share of 50% in the global production, followed by EU, India and Argentina [55]. The largest poultry meat producing countries are USA, Brazil, China, Russia, which accounts for about 54% of the global output [19]. The top producing countries of sheep and goat meat are China, India, Australia, Nigeria, Iran, Turkey [18].

The EU contributes by about 12% to the global meat production. In 2022, the EU meat production attained 42.2 Million tons (pork, poultry, bovine and sheep and goat meat), being by 12.5% less than in the year 2007. In 2022, the contribution of the meat type to the EU meat production was: 50% pork, 30.8% poultry meat, 15.6% beef and veal, and 3.6% sheep and goat meat [13].

However, meat production in the EU is expected to decline by 2035. The situation is different by meat.

Beef production is expected to decrease, the main causes being: low productivity, high production cost related to the environment sustainability and climate change regulation, but it will continue to remain important for human health.

Pork production is also expected to decrease due to sustainability, health concerns, the uncontrolled African Swine Fever outbreaks, and high production costs.

Poultry meat will be the only meat type which is expected to reach a higher output, grace to its special qualities: healthy food, high protein content, lean meat, tasty and easy to cook, and a smaller price than beef and pork.

Sheep and goat meat is also expected to decline due to the reduction in livestock, but consumption will remain stable [12].

At the global level the average meat consumption per capita is 28.1 kg, but it is much higher in North America (78.6 kg), Oceania (55 kg), Europe (52.1 kg) and South America (49 kg). Meat consumption is smaller than the global mean in Asia (22.3 kg) and Africa (9.6 kg) [52].

According to FAO, the average food consumption requirement per day and capita must be over 2,700 Kcal and minimum 55 g protein, of which 50% should be of animal origin [16].

All the countries make efforts to assure a corresponding average daily diet to their inhabitants, but in the world there are still huge discrepancies among the developed and developing countries.

In general, the developed countries are able to produce more meat and other products of animal origin to cover the internal market needs and also to make export.

According to FAO, Self Sufficiency is defined as "the percentage of food consumed from the amount produced domestically".

Therefore, it shows the capacity of a country to cover the consumption requirements of its population from internal food production.

However, not all the countries are able to produce enough food and are obliged to make imports. Also, there are countries which are able to produce more, and in this case the surplus is exported. Thirdly, there are countries which produce enough food, but also apply for imports and make exports.

Therefore, the availability of food comes from production plus imports and minus exports, the expression being synthesized in Self Sufficiency rate (SSR) whose formula is:

$SSR = \text{Production} \times 100 / (\text{Production} + \text{Imports} - \text{Exports})$ [17].

SSR could be measured in various ways:

Quantitatively, SSR could be quantified in the volume of food production and by type of commodity (wheat, maize etc, meat, eggs, milk etc) reflecting the capacity of a country to cover its own population's needs for food products.

Qualitatively, SSR could be expressed in:

- Dietary energy production (DEP) of over 2,700 kcal per capita per day for a balanced diet reflecting the capacity of a country to assure the energy requirements.

- Protein, carbohydrates, fats per inhabitant per day, reflecting the capacity of a country to produce the need in high value nutrients in diet. In case of protein is 55 g per capita and day, of which 50% must be of animal origin.

-*Monetary value*, taking into account the value of its components, which allows comparisons regarding SSR among different countries and establishing their hierarchy in the world, continent, region, by group of countries depending on their development level.

SSR cannot be isolated from the country contribution to international trade and depending on Export/Import ratio, there are net exporting countries ($E/I > 1$) and net importing countries ($E/I < 1$).

In general, the majority of net exporting countries have a SSR over 100 and also a DEP higher than 2,700 kcal/capita.

However, self sufficiency is still a controversial topic among experts because a part of them sustains that SSR assures a stable food supply, while other experts deny and affirm that it could led to instability.

This aspect makes distinction between food self sufficiency and food security which are different notions, but they are connected to each other and interact in various ways [17].

Food Self sufficiency was studied by various researchers as literature has proved.

Porkka et al.(2013) affirmed that a higher dietary energy production per capita over 2,700 kcal is adequate for a balance diet [45].

Fader et al (2013) discussed about the countries where land and water resources are not enough to assure domestic food production and are obliged to make imports to cover the country needs [14].

O'Hagan (1975) approached the topic the national food self sufficiency [27].

Clapp (2017) discussed about the self sufficiency and food security and sustained that a country must be a part of international trade to assure the economic efficiency besides being focused on self sufficiency [10].

Fathelrahman et al. (2021) also sustained that food security could be assured only by an

openness to trade in order to increase availability of a higher food supply in India, Egypt, Pakistan, Saudi Arabia and United Arab Emirates [15].

Baeer (2019) referred to food security and food self sufficiency in various countries emphasizing the differences determined by agriculture peculiarities regarding natural, social and economic resources. Wealthy countries situated in favorable regions for agriculture (North America, Australia, New Zealand, Kazakhstan) have the capacity to assure food sufficiency and security. The EU, despite the small arable land area per capita, is able to carry out a high food production. In the Middle East, North Africa and South America, the countries depend on food imports. Sub-Saharan African and Central Asian countries continue to have a critical food situation [3].

Szainer (2024) assessed food production and self sufficiency in Ukraine compared to the EU and Poland and affirmed that Ukraine possible accession will have an important impact on the EU supply and demand [53].

Amhamed et al. (2023) analyzed food security strategy in Qatar destined to increase domestic food production and external exports [2].

Beltran-Pena et al (2020) were focused on sustainable food systems affirming that the major challenge of mankind is the higher global food demand and the limited resources of the Earth [4]. Silva et al (2024) discussed food sovereignty, food security and international trade in Chile [46].

According to Statista (2016), in 2015, the SSR for meat by type in the EU-28 accounted for 110% for pork, 107% for poultry, 99% for beef and veal and 83% for sheep and goat meat [50].

According to FAO (2020), in 2018, the EU SRR for meat accounted for pork 119%, for poultry 106%, for beef and veal 104% and for sheep and goat meat for 91%. Brankov et al. (2021) analyzed food self sufficiency and the influence of various factors on its level in the South Eastern European Countries [5].

Kołodziejczak (2019) analyzed SSR for meat in the EU in 2016 and found the in the EU-28 SSR was 106%, in the EU-15 107% and in the EU 13- 101%. The calculated forecast expectations by 2080 are: 103%, 99% and, respectively, 127%. Therefore, in the EU-13 it

is expected an increase in meat production which could cover consumption must better. The author specified that the main EU countries with the highest SSR for meat are, in the decreasing order: Denmark, Austria, Ireland, Belgium, Netherlands, Poland and Hungary [22].

Mateos et al. (2024) studied pig meat production in the EU-27 and found that in 2022, the EU produced 23 Million tons pork, representing 21% of the global production. Pork sector is facing the following main problems: high pork consumption which affects human health, African Swine Fever outbreaks, high production costs related to higher price for farm inputs, and also to the new regulations regarding farm management, environment sustainability and animal welfare [25]. Kubala (2018) found that the leaders in beef self sufficiency are Poland, Lithuania and Estonia, while the leaders in pork self sufficiency are Hungary and Estonia. The lowest self sufficiency is in Bulgaria and Slovakia for beef and in Slovenia for pork [23]. Kubala (2021) found that the highest SSR of poultry meat production is in Poland, Slovenia, Lithuania and Hungary, while the lowest SSR is in Bulgaria, Czechia, Estonia, Slovakia and Latvia [24].

Slaboch (2016), making a comparison among the Visegrad countries regarding self sufficiency for beef, pork and poultry meat affirmed that in Czechia and Slovakia SSR declined for pork and poultry meat, while in Poland production is able to cover consumption with a higher SSR for beef and poultry. Also, Hungary is able to cover domestic consumption by production [47].

In Romania, Grodea (2017) discussed about self sufficiency and food security for meat and found that it has a lower level than in other EU countries, but there are incentives to sustain internal production [21].

Popescu (2022) affirmed how important is production and import for assuring food availability for the population of Romania. In Romania, meat consumption increased and reached 74 kg per capita, the most preferred meat being pork which is traditional in the country, followed by poultry meat, then comes beef and veal and, finally, sheep and goat meat

[38]. Consumers like poultry meat for it is cheaper than pork, tasty, and healthier and easy to cook [6]. Beef consumption is about 5 kg per capita and year, as the price high, but it is healthier than pork. Production declined due to the reduction of livestock [30].

In Romania, pig herds went down, but consumption remained at a relative constant level of about 38 kg/capita/year and a similar trend was noticed in other EU countries [28, 29, 36].

Romania is a net importer of pork to cover internal market requirements, even thou pork price increased due to the high demand and lower production, even thou the farm inputs prices went up and increased production costs, reflecting a real crisis [35, 40].

Sheep and goat meat is preferred especially by breeders who are accustomed with its smell and taste, but also Romanians eat lamb which is the traditional meat at Easter [7, 8].

Sheep and goats are also raised in other EU countries like Greece, Italy and Spain [43].

In Romania, livestock declined in the last decade leading to the reduction of the number of slaughtered animals and their live weight affecting meat production [41, 44].

Also, the structure of meat production is deeply linked to the structure of animal farms [39].

Sheep and goats livestock followed an upward trend which lead to a slight production growth and consumption [31].

Romania sustains agro-food trade, exporting especially cereals and oil plants seeds, but also sheep and goats and poultry meat, the main beneficiaries being the EU countries and Arabian countries. Imports are supplied by the main EU partners and represented by processed meat and dairy products, and also by vegetables and fruits [32, 33, 42].

Food consumption has an important share in the Romanians' daily basket expenditures in close connection to the salary level, which is one of the smallest in the EU. For this reason, in GDP, a major contribution is given by consumption and not by export [34].

However, Romanians purchase much more than they consume, especially on the religious fests, which favour food loss and waste. For this reason, important measures and solutions

were taken and proposed to diminish food loss and waste along the food supply chain [49]. More than this, as long as, more and more consumers are interested of a healthier diet, a part of producers have become to be focused on organic agriculture not only in the vegetal sector, but also in the animal production to offer high quality products to the market [9]. In this context, the goal of this study is to quantify meat production, import, export, availability for human consumption, self-sufficiency rate (SSR) and average gross annual consumption of meat per inhabitant in Romania in the period 2014-2022.

MATERIALS AND METHODS

For this study, the empirical data were collected from the National Institute of Statistics for the period 2014-2022 for which the information were available in the year 2024 in Food Balances.

The key indicators approached in this research have been:

- (i) Total meat production
- (ii) The imported amount of meat
- (iii) The exported quantities of meat
- (iv) The available amount of meat for human consumption
- (v) Self-Sufficiency Rate (SSR), calculated according to the formula:

$$SSR = P \times 100 / (P + I - E) \dots \dots \dots (1)$$

where:

P = production, I= Import, E = Export

(v) Average gross annual meat consumption per inhabitant.

(vi) SSR in terms the average daily protein assured in Romania per inhabitant compared to the requirement of animal origin per capita of 27.5 g according to FAO.

(vii) SSR in terms of meat Export/Import ratio.

All these indicators from (i) to (vii) were also analyzed by meat type: bovine meat, pork, sheep and goat meat and poultry meat.

From a methodological point of view, the empirical data were processed using:

- The growth rate in the whole studied interval based on the fixed basis index, dividing the level of the indicator in the final year 2022 by its level in the first year, 2014, multiplying the result by 100.
- Regression equations were used for showing the evolution trend of each indicator according to the data spread in the graph;
- The coefficient of determination, R square, was calculated for quantifying in what measure the variations of the indicators were determined by the variation in time;
- The graphical representation of the data was necessary for helping the readers to better understand the dynamics of each studied indicator throughout the selected period.
- A part of the results were displayed in tables. The results were accompanied by suitable comments and, finally, the conclusions resulting from this research were drawn.

RESULTS AND DISCUSSIONS

Meat production (in equivalent fresh meat)

In Romania, meat production registered a decreasing trend from 1,291.9 thousand tons in the year 2014 to 1,001.6 thousand tons in 2022, meaning a reduction by 22.5%.

This was determined by various causes, among which the most important is the decline in livestock of bovines by 11.27% and pigs by 23.98%, which a deep influence on the number of slaughtered animals. However, an important growth was achieved in case of sheep + 7.66%, goats + 4.65% and poultry livestock +3.67% (Table 1).

Table 1. Livestock by species in Romania in 2022 versus 2014 (Thousand heads)

	2014	2022	2022/2014 %
Bovines	2,068.8	1,833.7	88.63
Pigs	5,041.7	3,328.7	66.02
Sheep	9,518.2	10,247.3	107.66
Goats	1,417.1	1,483.1	104.65
Poultry	75,446.7	78,220.7	103.67

Source: Own calculations based on the data from NIS [26].

The occurrence of various diseases has affected the livestock in Romania, the identified infected and ill animals being slaughtered. It is about The African Swine Fever (ASF), which affected Romania starting from 2017, the country registering the highest number of outbreaks in the EU [1]. In 2017, Romania produced just 55.6% of pork requirements due to ASF [48].

After the first cases of Avian Influenza (Bird Flu) registered in 2006, 2007, 2010, in the year 2022, the disease reappeared in a poultry farm in Oinacu town, at the border with Bulgaria [11, 56].

To stop these diseases important measures of biosecurity, retains of animals from movement and transportation, sale and acquisition, hygiene and disinfection have been taken in households, sheds, and farms.

Another cause of the reduction in livestock was the negative impact of climate change in terms of high temperatures and long and severe droughts on forage production in arable land, pastures and hayfields [20].

In this context, to cover the population needs in meat, the imported quantities increased from 383.9 thousand tons in 2014 to 628.5 thousand tons in 2022, meaning + 63.7%.

The exported amounts of meat recorded an ascending trend from 126.7 thousand tons in 2014 to 170.5 thousand tons in 2018, but then, they registered a decline to 153.2 thousand tons in 2020, and had a slight recover to 166.8 thousand tons in 2022 (Fig. 1).

Only 65% of production change was cause by time variation and the difference by other factors.

Import varied definitely in a high proportion 93.4% throughout the analyzed period, while export changes were determined 55.3% by other factors in the studied period.

Taking into account production, import and export, the meat availability for human consumption increased by 22.4% from 1,150.6 thousand tons in 2014 to 1,463.3 thousand tons in 2022. However, the small R square of only 0.32 reflects that the variations across the time have had a low impact compared to other factors of influence (Fig. 2).

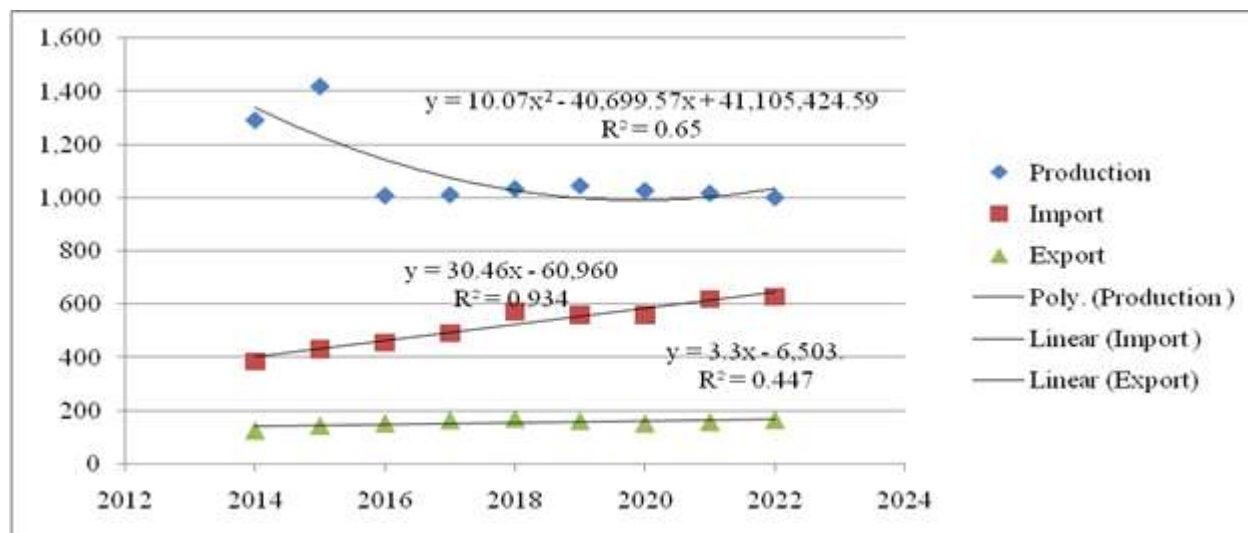


Fig.1. Dynamics of meat production, import and export in Romania in the period 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

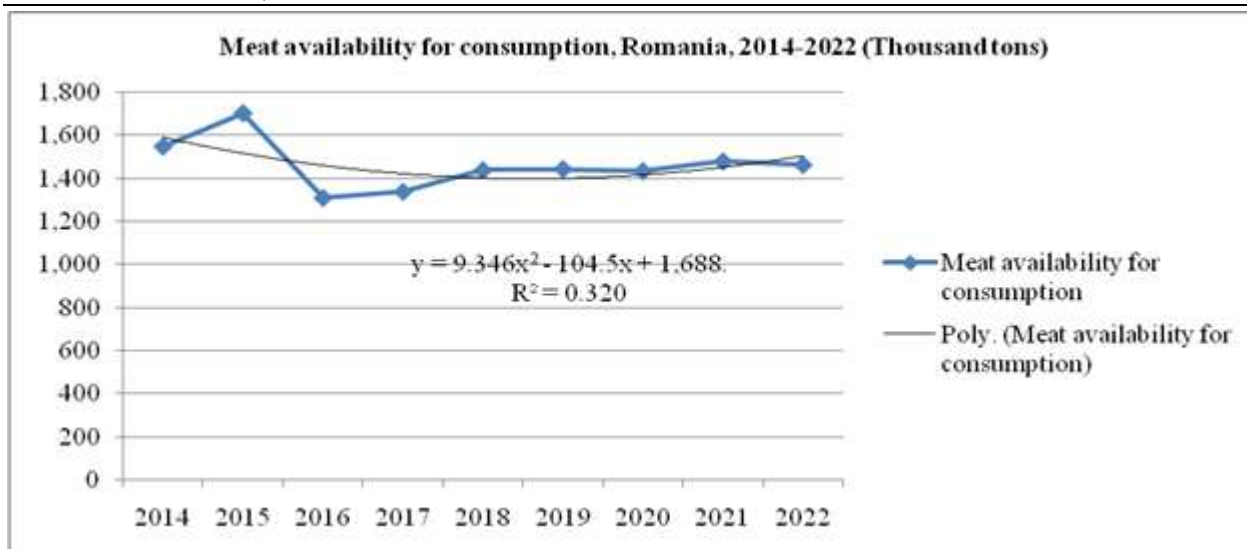


Fig. 2. Dynamics of meat availability for human consumption in Romania, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

Bovine meat (in equivalent fresh meat)

Bovine meat production registered a decline by 8.9% from 90.6 thousand tons in 2014 to 82.6 thousand tons in 2022 for the reasons related to the diminished forage production and low acquisition price offered by slaughterhouses. In addition, the low consumption of beef meat compared to the Western European countries did not encourage farmers to fatten too many bovines (young steers). In addition, Romanians prefer pork which is the traditional meat in the country gastronomy.

However, imports increased from 24.1 thousand tons in 2014 to 27.1 thousand tons in 2022 (+12.4%).

Because of the low consumption of about 5 kg/capita per year at present, twice times lower than the EU average, exports were encouraged especially to the EU market where the request of this sort of meat is much higher. In 2022, the amount of the exported bovine meat accounted for 14.9 thousand tons being 3.33 times higher than 4.47 thousand tons in 2014 (Fig. 3).

As a results, the bovine meat availability for human consumption in the domestic market decreased from 110.4 thousand tons in 2014 to 94.4 thousand tons in 2022, meaning by 14.5% less (Fig. 4).

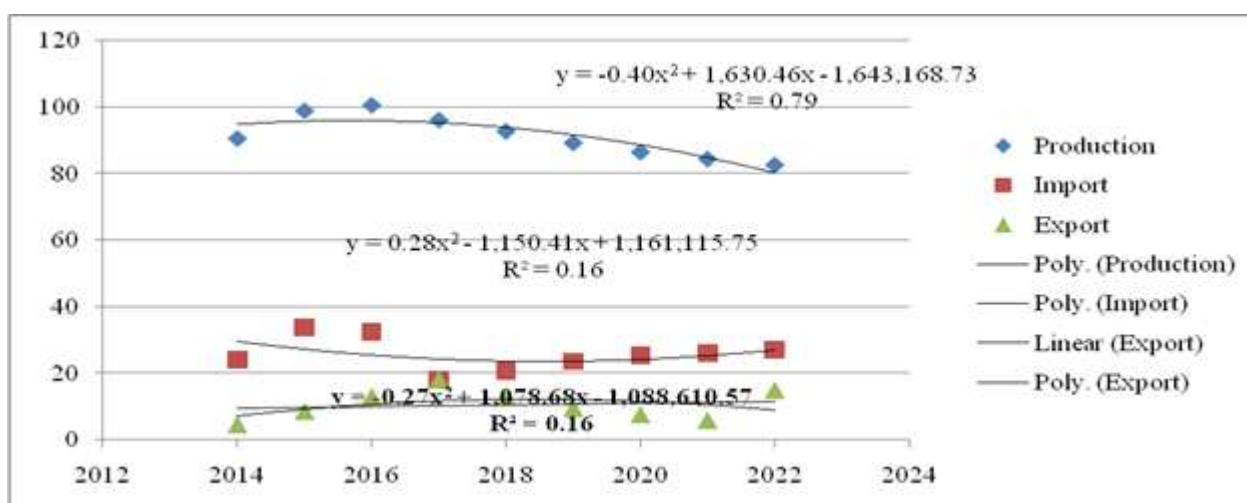


Fig. 3. Dynamics of bovine meat production, import and export, Romania, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

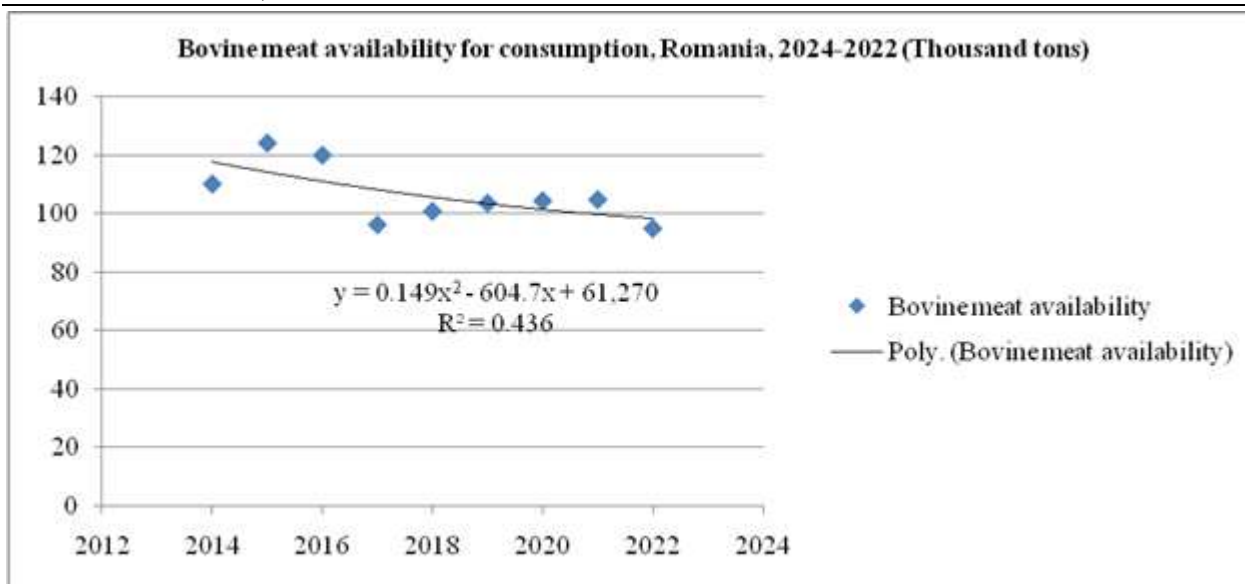


Fig. 4. Dynamics of bovine meat availability for human consumption, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

Pork meat (in equivalent fresh meat)

Pork meat suffered a deep decline from 412.3 thousand tons in 2014 to 344.9 thousand tons in 2022, meaning a reduction by 16.4%.

The causes are well known regarding the impact of African Swine Fever (ASF), the smaller forage production as the result of the climate change, the lack of piglets for fattening, the small acquisition price offer by slaughterhouses to pig growers.

Being the most preferred meat by consumers, important amounts of pork were imported to

cover the internal market demand. In 2022, there were imported 436.9 thousand tons pork by more than double than in 2014 (208.4 thousand tons).

Under these conditions, the exported quantities declined from 33.9 thousand tons in 2014 to 21.7 thousand tons in 2022 (-36%) (Fig. 5).

The imported amounts of pork added to the internal production saved the pork availability for consumption, whose level increased by 25.2% from 577.9 thousand tons in 2024 to 723.9 thousand tons in 2022 (Fig. 6).

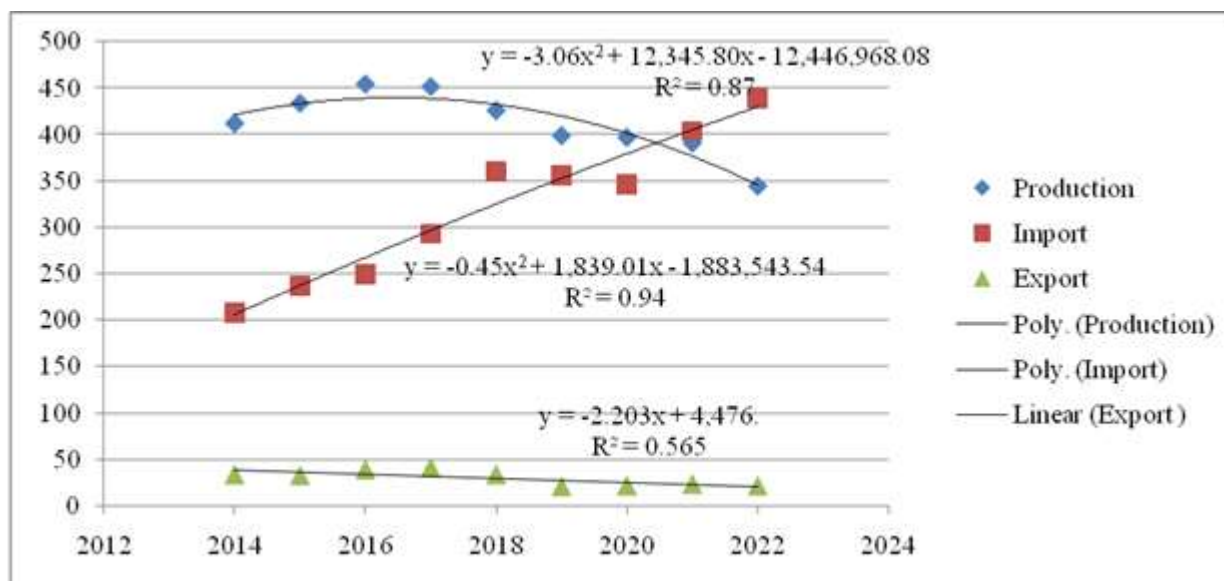


Fig. 5. Dynamics of pork meat production, import and export, Romania, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

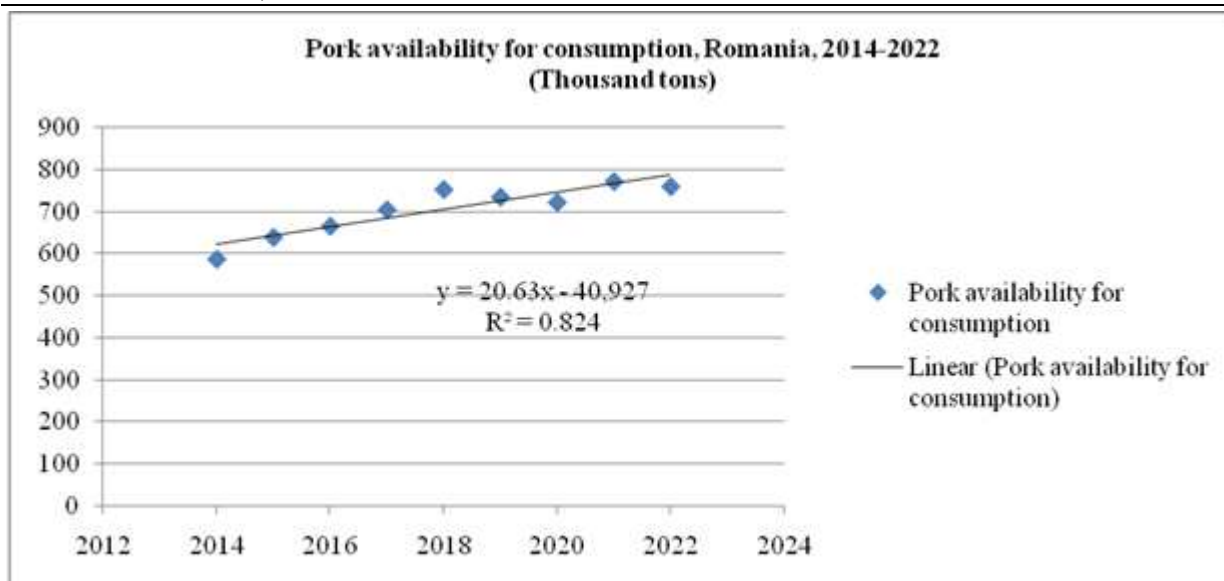


Fig. 6. Dynamics of pork meat availability for human consumption, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

Sheep and goat meat (in equivalent fresh meat)

The number of sheep and goats had an ascending trend during the last decade, so that it could sustain not only milk production, but also meat production and export.

In 2022, sheep and goat meat output reached 62.2 thousand tons being by 27.2 % higher than in 2014 when it accounted for 48.9 thousand tons. This aspect stimulated consumption and also export.

Romania also imported sheep and goat meat whose amount accounted for 2.49 thousand

tons in 2022, being 4.8 times higher than in 2014.

The exported quantities of sheep and goat meat increased from 3.6 thousand tons in 2014 to 10.3 thousand tons in 2019 (+86%), but since the year 2020, Romania exported only 2,4 thousand tons of this sort of meat (Fig. 7).

The available sheep and goat meat for consumption increased by 9.3% from 45.8 thousand tons in 2014 to 50.1 thousand tons in 2022 (Fig. 8).

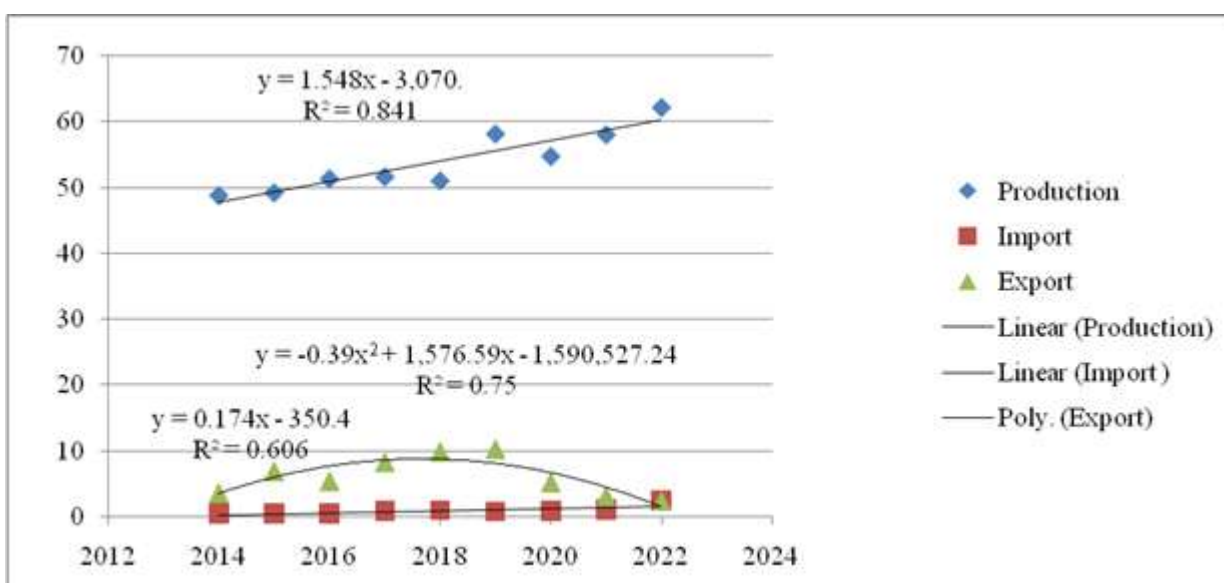


Fig. 7. Dynamics of sheep and goat meat production, import and export, Romania, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

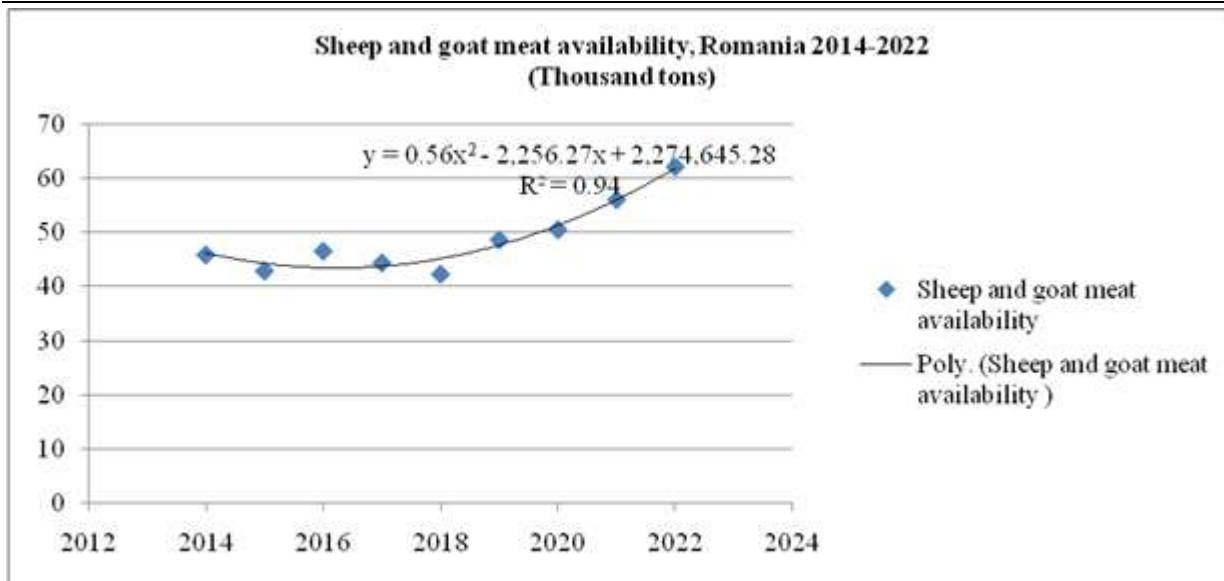


Fig. 8. Dynamics of sheep and goat meat availability for human consumption, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

Poultry meat (in equivalent fresh meat)

After pork, poultry meat comes on the 2nd position in the preferences of the Romanian consumers. Poultry growing is an economic sector of agriculture with a high economic efficiency as broilers chickens have a short fattening period, relatively lower production costs and meat is better marketed. Poultry meat production increased by 43.8% from 355.5 thousand tons in 2014 to 511.4 thousand tons in 2022.

Also, imports went up by 8.1% from 130.7 thousand tons in 2014 to 141.4 thousand tons in the same interval to diversify the offer. Romania's export of poultry meat also had an ascending tendency, in 2022, the exported amounts accounted for 115.9 thousand tons being by 45.2% higher than in 2014 when they were only 79.8 thousand tons (Fig. 9). The availability of poultry meat for internal consumption increased by 32.4% from 400.7 thousand tons in 2014 to 530.9 thousand tons in 2022 (Fig.10).

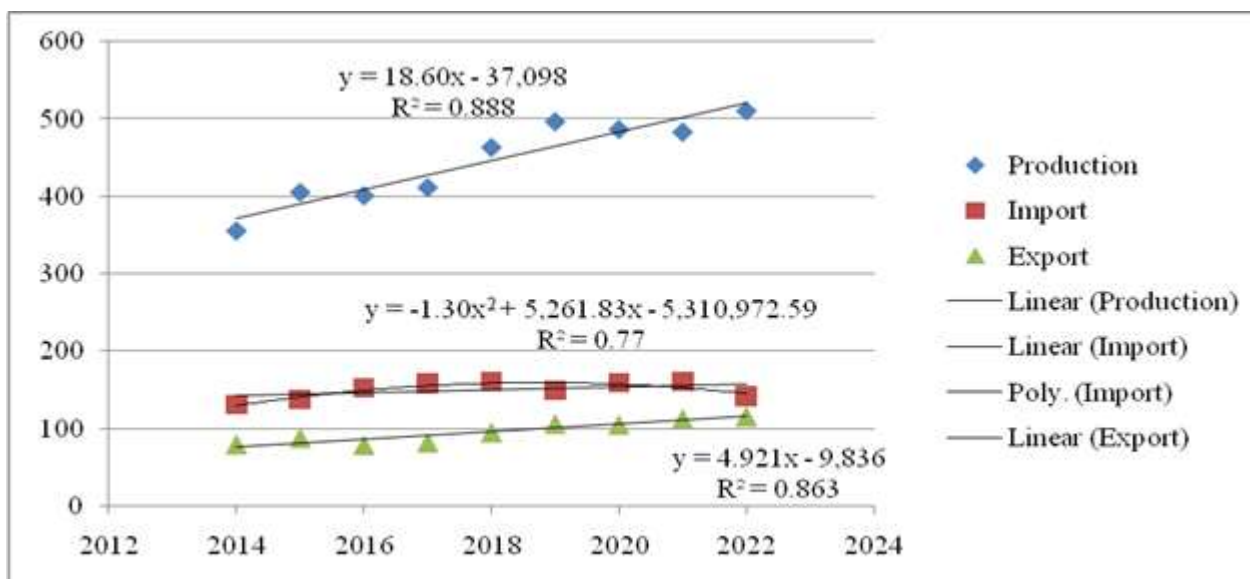


Fig. 9. Dynamics of poultry meat production, import and export, Romania, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

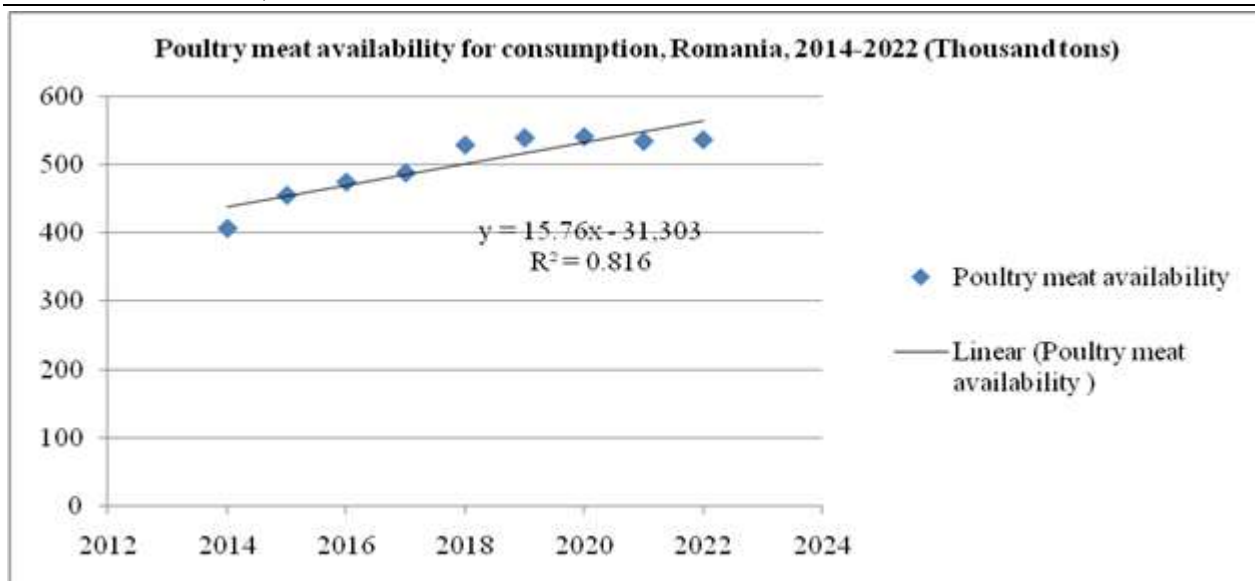


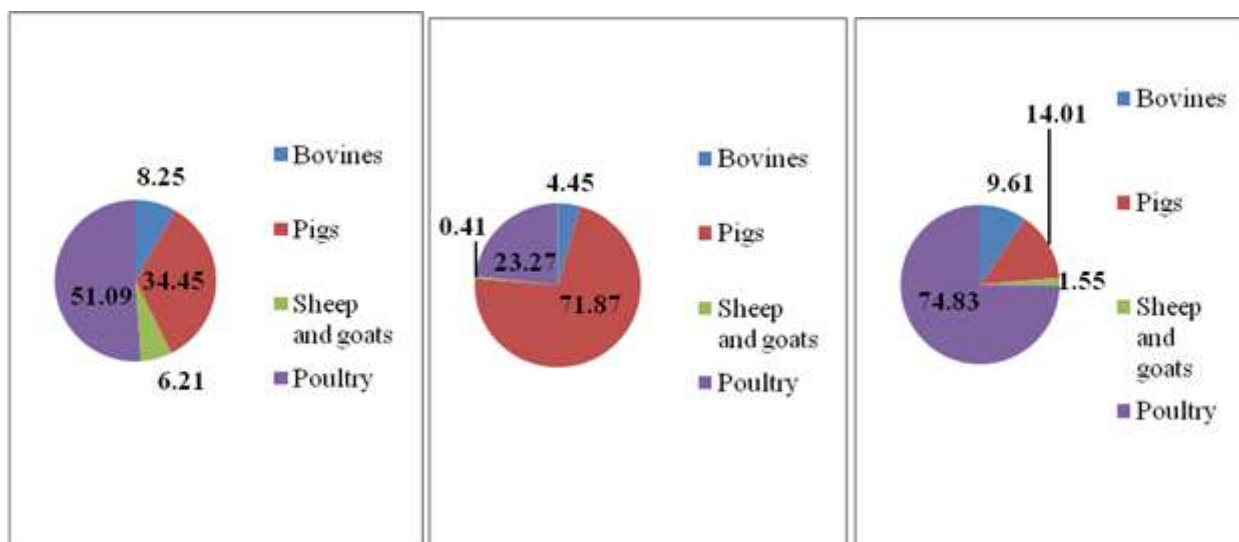
Fig. 10. Dynamics of poultry meat availability for human consumption, 2014-2022 (Thousand tons)
 Source: Own design based on the data from NIS [26].

The contribution of each species to meat production, import and export in Romania

The highest contribution to meat production is given by poultry whose share accounts for 51.09%, being followed by pigs with 34.45%, bovines with 8.25% and finally sheep and goats with only 6.21%

The highest share in the amount of imported meat belongs to pork, 71.87%, followed by poultry meat, 23.27. Bovine meat has a much

smaller share, 4.45% and finally, sheep and goat meat have the smallest level, only 0.41%. The top contributor to the exported amounts of meat are poultry which accounts for 74.83%. On the second position is pork whose share in meat exports is 14.01%. Bovine meat keeps only 9.61% of the meat exports and finally sheep and goat meat only 1.55% (Fig. 11 a, b and c).



(a)-Contribution to meat production (%) b- Contribution to meat import (%) (c) Contribution to meat export (%)
 Fig. 11. The contribution of each species to meat production (a). import (b) and export (c) in Romania in 2022 (%)
 Source: Own design and calculations

Taking into account meat production, import and export, the self-sufficiency rate had a

different level and evolution in the analyzed interval, depending on the meat sort.

In case of total meat, SSR reflected a decline from 83.35 in 2024 to 68.4% in 2022.

SSR for bovine meat showed an increase from 82.1% in 2014 to 100% in 2017, but then, it decreased to 80.5% in 2021 and increased again in 2022 attaining 87.1%.

In case of pork, SSR registered a deep decline from 79.2% in 2014 to 45.4% in 2022, which is an alarm bell in connection to the internal market needs which call for imports to be covered and satisfy the population requirements.

In case of sheep and goats meat, SSR is ensured as the values of this indicator are over 100 in each year of the studied period.

SSR for poultry meat increased from 87.5% in 2014 to 95.2% in 2022 which reflects a satisfactory situation that internal production and also imports sustain the domestic market and consumption, at the same time the country being an important exporter of this type of meat (Table 2).

Table 2. Meat Self-Sufficiency Rate (SSR) dynamics by meat type, Romania, 2014-2022 (%)

	Total meat	Bovine meat	Pork meat	Sheep and goats meat	Poultry meat
2014	83.3	82.1	70.2	106.7	87.5
2015	83.2	79.4	67.9	115.2	89.1
2016	77.1	83.8	68.3	110.5	84.4
2017	75.6	100.0	64.1	116.7	84.4
2018	71.9	92.1	56.5	121.1	87.6
2019	72.4	86.2	54.2	119.7	92.2
2020	71.6	82.8	54.9	106.5	90.0
2021	68.9	80.5	50.6	103.5	90.5
2022	68.4	87.1	45.4	100.0	95.2

Source: Own calculations.

Similar results were found by Stanciu, A. (2022) who affirmed that in the year 2020, sheep meat had a SSR higher than 100, poultry meat was assured 90.4%, and bovine meat 82.9% [48].

Average annual gross meat consumption per inhabitant

As a result of production and imports, meat availability registered an increasing trend as shown before.

In consequence, the mean of meat consumption per inhabitant per year increased from 57.8 kg in 2014 to 74 kg in 2022, meaning a surplus of 28% (Fig. 12).

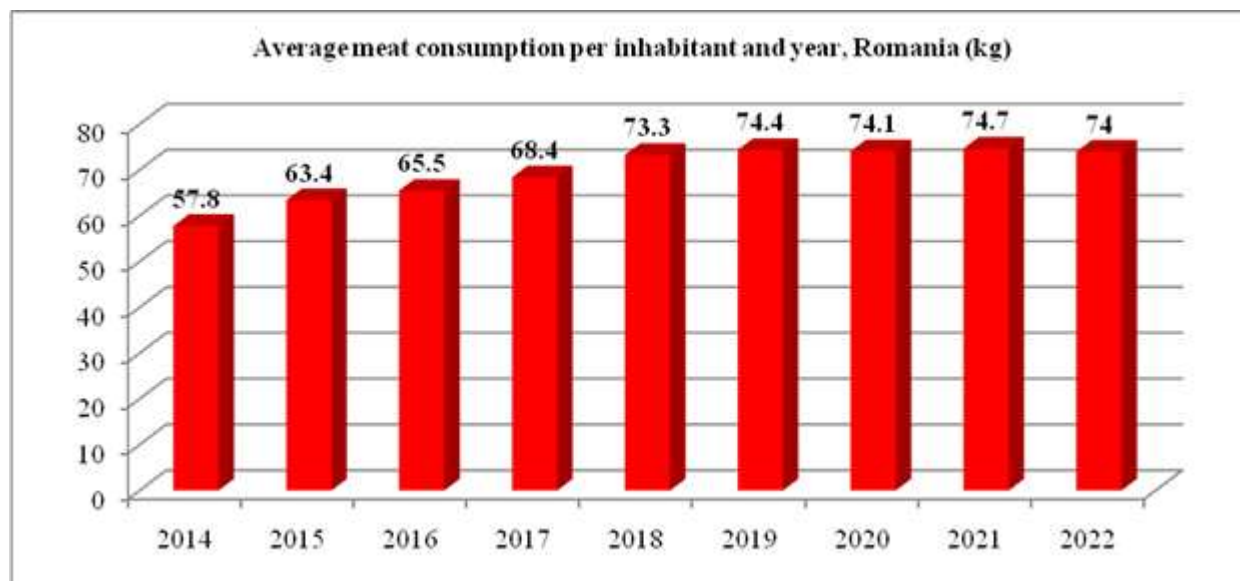


Fig. 12. Average annual gross meat consumption per capita, Romania, 2014-2022

Source: Own design based on the data from NIS [26].

Bovine meat consumption is the only case which shows a slight decline from 5.6 kg/capita in 2014 to 5 kg/capita in 2022 (-10.8%).

Pork consumption increased by 31% from 29 kg/capita in 2014 to 38 kg/capita in 2022.

Sheep and goats meat consumption registered an increase by 13% from 2.3 kg/inhabitant in 2014 to 2.6 kg in 2022.

Poultry meat consumption went up per capita by 38.8% from 20.1 kg in 2014 to 27.9 kg in 2022 (Fig. 13).

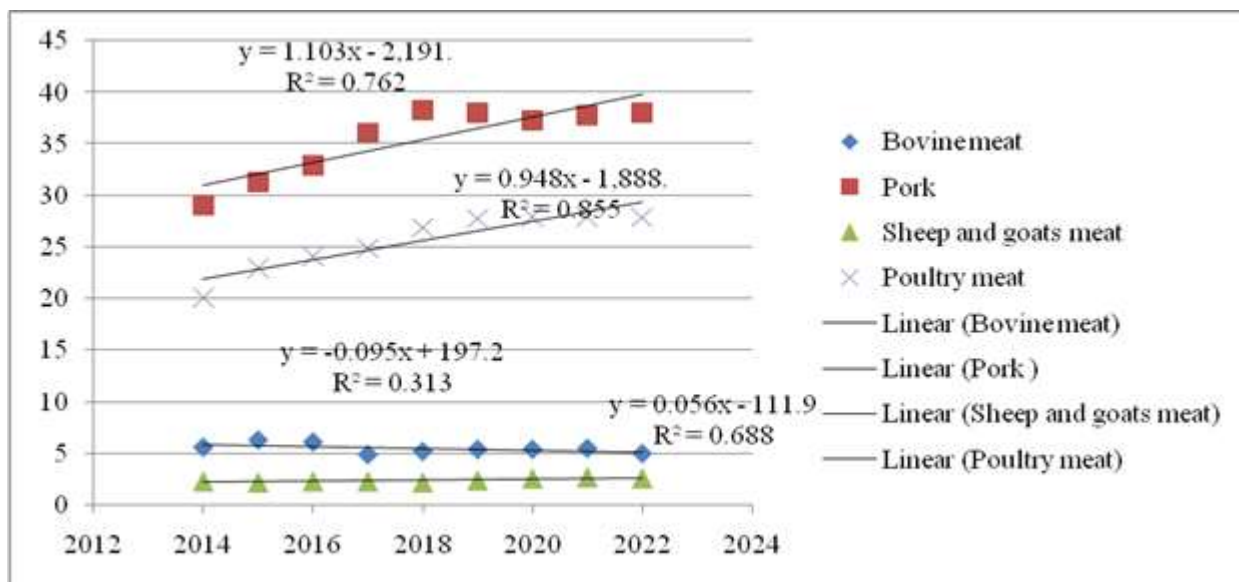


Fig. 13. Dynamics of average annual gross meat consumption by meat sort, Romania, 2014-2022 (kg/inhabitant)
 Source: Own design based on the data from NIS [26].

SSR expressed in a qualitative manner answering to the question: In what measure does meat cover the requirement of average protein consumption per capita and day?

According to FAO, the need of average protein consumption per capita an day is 55 g, of which 50% that is 27.5 g must be of animal origin coming from meat, egg, milk etc.

This is a qualitative expression of SSR in relation to the food quality reflected by high biological nutrients.

The data from Table 3 reflects that in Romania, in the period 2014-2016, meat consumption of animal protein per day and capita was below 27.5 g, while starting from 2017 it exceeded the requirement level reaching 29.30 g in 2022 after recording a peak of 29.54 g in 2021.

Therefore, from this point of view, Romania is able to assure a corresponding protein level of animal origin in the daily average meat consumption per inhabitant.

Table 3. Contribution of meat consumption by type to the average daily protein requirement of animal origin per capita of 27.5 g

	Total meat and meat products	Bovine meat	Pork	Sheep and Goat meat	Poultry meat
2014	22.78	1.96	10.94	0.85	8.69
2015	24.99	2.20	11.78	0.81	9.93
2016	25.81	2.14	12.40	0.83	10.40
2017	27.03	1.71	13.62	0.85	10.74
2018	28.97	1.80	14.45	0.82	11.62
2019	29.45	1.90	14.33	0.88	12.00
2020	29.36	1.90	14.07	0.95	12.10
2021	29.54	1.92	14.24	0.99	12.10
2022	29.30	1.75	14.33	0.95	12.06

Source: NIS, Meat and meat products balance [26].

Is Romania a meat net importing or exporting country?

To answer this question, SSR could be expressed by Export/Import ratio. In case that the result is < 1 , the country is a net importer of meat and, if E/I ratio is > 1 , the country is a net exporter of this product.

The results presented in Table 4 reflects that Romania is a net importing country of meat, as

regards total meat, pork, bovine and poultry meat. But, it is also a net exporting country of sheep and goat meat as E/I level is higher than 1 in almost the whole studied period, except the year 2022.

In case of poultry meat, an increasing trend for E/I ratio was noticed, the maximum level 0.82 being recorded in the year 2022.

Table 4. SSR in terms of meat Export/Import ratio, Romania, 2014-2022

	Total meat and meat products	Bovine meat	Pork	Sheep and Goat meat	Poultry meat
2014	0.33	0.18	0.16	7.05	0.61
2015	0.33	0.25	0.14	14.37	0.64
2016	0.34	0.40	0.16	9.47	0.52
2017	0.34	1.00	0.14	9.22	0.52
2018	0.30	0.60	0.09	10.00	0.59
2019	0.29	0.40	0.06	13.20	0.72
2020	0.27	0.29	0.06	5.84	0.66
2021	0.26	0.22	0.06	2.69	0.70
2022	0.26	0.55	0.05	0.96	0.82

Source: Own calculations.

In case of bovine meat, in 2017, the E/I ratio was an exception accounting for 1 reflecting self-sufficiency.

But in the other years, it was far away of such a status, despite that in the year 2022, the E/I ratio attained 0.55.

In case of sheep and goats the E/I ratio has high values, the maximum being 14.27 recorded in the year 2015 and also other high levels were noticed in 2019 accounting for 13.20 and in 2018 for 10.

In case of poultry meat, the highest E/I ratio 0.82 was registered in the year 2022, but in 2019 was recorded 0.72 and also in 2021 was attained 0.70 (Table 3).

CONCLUSIONS

The study analyzed meat production, import, export, consumption availability and self sufficiency rate in Romania aiming to identify the dynamics of these indicators in the interval 2014-2022.

Self sufficiency is an important specific indicator which provides information about the country capacity to carry out a corresponding production to cover the population needs. In other words, consumption to be assured from domestic output.

In case of meat, the results showed that Romania's production is not self sufficient for meat as a whole, and by meat type, the only sufficient meat production is sheep and goats meat. Regarding the other meat sorts, the self sufficiency rate was below 100%. If in case of poultry meat, the situation is very good, in case of bovine meat and especially in case of pork we cannot talk about self sufficiency.

These results were proved by the decline in total meat production by 22.5% in the analyzed period, in pork production by 16.4% and in bovine meat production by 8.9%. Compared to 2014 level, poultry meat production increased by 43.8% and in case of sheep and goat meat by 27.2%.

The contribution of these four species to Romania's meat output is poultry 51.09%, pigs 34.45%, bovines 8.25% and sheep and goats 6.21%.

Therefore, to cover the consumption requirements, Romania was obliged to import more pork and beef. However, it also purchased poultry meat and sheep and goat meat from other countries in smaller amounts to diversify the offer.

Taking into account the imports and exports made by Romania, the ratio Export/Import is unbalanced, with a level below 1 in case of

pork and bovine meat and also in a smaller proportion in case of poultry meat. Only in case of sheep and goat meat, this ratio reflected that exports exceed imports. As a result Romania proved to be a net importing country of meat. In the year 2022, the SSR accounted for 68.4 for the whole meat, 87% for bovine meat, 45.4% for pork, 100% for sheep and goat meat and 95.2% for poultry meat.

In 2022, a Romanian consumed 74 kg meat, by 28% more than in 2014. Bovine meat consumption per capita was about 5kg per year and inhabitant by 10.8% lower than in 2014.

Pork consumption increased by 31% from 29 kg/capita in 2014 to 38 kg/capita in 2022.

Sheep and goats meat consumption registered an increase from 2.3 kg/inhabitant to 2.6 kg in 2022, meaning a surplus of 13%, while poultry meat attained 27.9 kg in 2022 versus 20.1 kg in 2024 (+38.8%).

The average protein consumption per capita coming from animals in Romania was below 27.5 g/capita/day in the interval 2014-2016, but since 2017, Romania succeeded to exceed the world average so that in 2022 it accounted for 29.3 g.

In 2022, Romania's SSR in terms of meat Export/Import ratio was: 0.26 for total meat, 0.96 for sheep and goat meat, 0.82 for poultry meat, 0.55 for bovine meat and 0.05 for pork, which reflects the status of net importing country.

These results oblige us to propose measures which could be taken for improving the situation of meat sector as follows:

-Implementation of modern technologies in farm animals based on the progress in genetics, nutrition, reproduction research;

-Investments in new raising systems which could assure a higher productivity in terms of daily gain, superior live weight at slaughter, a better carcass quality and a higher food conversion in meat.

As long as the livestock has no chance to recover due to the causes mentioned in the study, breeders must pay more attention to solutions which could grow the performance per animal in terms of a higher live weight, a shorter period of fattening and higher meat quality.

This means a better and sufficient amount of forages, the use of the heterosis effect by crossing the local breeds with other breeds specialized in meat production, more attention for maintaining the animal health and welfare. Also, farmers have to look for solutions to diminish production costs to assure a high economic efficiency in their business. Studying the market and looking for new suppliers which offer farm inputs at a more convenient price and also for beneficiaries which could offer a higher price per live weight will have a beneficial effect from a financial point of view.

More meat production will diminish the imports and will lead to a higher capacity of Romania to better cover consumption needs and increase self sufficiency rate.

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