

MARKET STUDY ON ROMANIAN AGRICULTURAL PRODUCTS IN THE CONTEXT OF ENSURING FOOD SECURITY AT THE NATIONAL LEVEL

Andreea-Daniela GIUCĂ

Research Institute of Agriculture and Rural Development, Romania. 61, Marasti Boulevard, District 1, Bucharest, Romania, E-mails: andreeagiuca@yahoo.com, giuca.daniela@iceadr.ro

Corresponding author: giuca.daniela@iceadr.ro

Abstract

Food security has gained special attention from political representatives around the world, mainly due to the important role it plays in achieving the Sustainable Development Goals (SDGs). Considering that agricultural production contributes directly to ensuring food security, this study aimed to present an overview of the agricultural products market in Romania, in the context of ensuring food security. The study started from the analysis of statistical indicators regarding the average annual consumption per inhabitant, production per inhabitant and current prices for the main categories of agricultural products, provided by the National Institute of Statistics for the period 2018-2022. The presented indicators were processed by statistical methods, calculating: the average, the standard deviation, the coefficient of variation and the annual growth rate, and then analyzed for each category of agricultural products separately. The results showed that, an average annual consumption per inhabitant with a relatively constant dynamic for the categories of agricultural products analyzed. The category of agricultural products that recorded the highest consumption was milk and milk products in milk equivalent 3.5% fat (excluding butter). In terms of the production of the main agricultural products per capita, cereals for grains stood out by achieving the highest production per capita, followed by milk. Cereals value at producer price (including seeds) register the highest level.

Key words: food security, agricultural products, production, consumption, prices.

INTRODUCTION

One of the main objectives of the agricultural policy is the sustainable development of the regional food supply system and contributes to the systemic development of the agrifood sector. To achieve this objective, food security must be ensured, which represents one of the most important problems of the agri-food sector [4].

FAO defines food security as „the direct access of all people to the food they need to fulfill their vital functions and lead a healthy and active life” [8]. The basic principles of food security are self-sufficiency with the main agricultural products, availability, accessibility, balance and sustainability [12]. To ensure food security, it is necessary to understand the mechanism of the market for agricultural products, the relationships between production, trade and food

consumption. However, the social and environmental impact of food systems and dietary health requirements remain the biggest challenges. Responding to these challenges requires transformative changes to address the crisis in the food system. To this end, it is necessary to strengthen the links in the food chain and establish solid alliances between production and consumption with the objective of designing alternative food systems [10].

Studies show that price volatility of grain products affects factors of production and affects national food security. Under the influence of complex factors such as spatio-temporal influencing factors, price correlation and market diversity, it is increasingly important to improve the accuracy of cereal product price prediction for sustainable agricultural development [7].

The need to adopt current food systems has prioritized the issue of food and nutritional security at the center of the agro-food policies

of states and governments, imposing a commitment to health and social change, through public policies that can provide effective responses to respond to these requirements [6].

Food security, characterized by the availability, accessibility, use and stability of agri-food products, represents an essential concern in the context of the sustainable development of the agri-food sector and human well-being. The pandemic generated by the COVID-19 virus has further exacerbated existing challenges, putting even greater pressure on agri-food systems and exacerbating their vulnerabilities [3]. Food security issues have been amplified during the pandemic caused by the COVID-19 virus, intensifying significantly under the influence of the full-scale war between Russia and Ukraine, threatening global famine [2, 9].

Currently, the issue of food security is endangered by climate change which is seriously affecting agricultural production. A solution to this problem could be to encourage the adaptation of farmers to climate change, this solution can contribute to promoting sustainable agricultural production and ensuring food security [13].

In the climate change scenario, growing adequate food is a major challenge for food security. In order to provide food for the population, the introduction of new vegetable crops and the expansion of new varieties are important tasks of breeding programs [1]. Soil conservation and prevention of soil degradation have become imperative in efforts to ensure food security, protect biodiversity and maintain healthy ecosystems [5].

In this context, the purpose of the research is to present the current situation of the agricultural products market in Romania, based on the statistical indicators published by the National Institute of Statistics, the research is relevant considering the objective of ensuring food security.

MATERIALS AND METHODS

The research is based on the representative indicators of the agricultural market in

Romania (demand and supply), the data series being provided by the National Institute of Statistics (INS).

To carry out the study, the following indicators were analyzed: average annual consumption for the main agri-food products - demand, production per inhabitant for the main agri-food products - supply and current prices (value at the producer's price) in the time frame 2018-2022.

During the research, the following statistical indicators were calculated and analyzed:

Arithmetic mean (m) which is the ratio between the sum of the values in the data series ($x_1, x_2 \dots x_n$) and the number of years considered (n):

$$m = \frac{x_1 + x_2 + \dots + x_n}{n}$$

The standard deviation that indicates how much the values are dispersed from the mean:

$$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

where:

σ = standard deviation;

x_i = values of the data series over a number of years;

n = number of years considered.

Coefficient of variation (C):

$$C = \frac{\sigma}{\bar{x}} * 100$$

whose value could be interpreted as follows:

-Between 0-10% - greater degree of homogeneity of the series;

-Between 10-20% - medium variation;

-Over 20% - high variation.

The annual growth rate indicates the annual growth of the analyzed phenomenon:

$$r = \sqrt[n-1]{\prod \left(\frac{p_n}{p_{n-1}} \right)} - 1$$

r = average annual growth rate;

$\prod p_n/p_{n-1}$ = indicators of chain growth.

The research methods used were quantitative analysis and comparative analysis.

The statistical research process involved the following stages: data collection and recording, data processing, analysis and interpretation of results.

RESULTS AND DISCUSSIONS

In the analyzed period, the average annual consumption for the main agricultural

products registered a slight upward trend, with the exception of cereals and cereal products in grain equivalent and vegetables and vegetable products in fresh vegetable equivalent, which registered a decrease at the level of the analyzed period of 0.033%, respectively 0.100%.

The highest increase (+0.034%) was recorded for eggs, from 236 pieces in 2018 to 244 pieces in 2022 (Table 1).

Table 1. Dynamics of average annual consumption per inhabitant in the period 2018-2022

Categories of agricultural products	MU	2018	2019	2020	2021	2022	2022/2018
Cereals and cereal products in grain equivalent	kg	205.3	204.2	199.9	200.6	198.6	-0.033
Potatoes	kg	95.4	92.2	93.4	98.1	97.7	0.024
Vegetables and vegetable products in fresh vegetable equivalent	kg	173.4	170.2	175	180.2	156	-0.100
Fruits and fruit products in fresh fruit equivalent	kg	110.8	111.3	107.6	115.3	112.2	0.013
Meat and meat products in fresh meat equivalent	kg	73.3	74.4	74.1	74.7	74	0.010
Milk and milk products in milk equivalent 3.5% fat (excluding butter)	liter	250.6	252.2	252.5	255.6	256.1	0.022
Egg	pieces	236	241	236	243	244	0.034

Source: data processing provided by INS-TEMPO ONLINE, CODE: CLV104A [11], Accessed on 06.09.2024.

From the analysis of the statistical indicators calculated for the average annual consumption per inhabitant, the following were highlighted:

- **For cereals and cereal products** in grain equivalent, it varied between 199 and 205 kg/inhabitant, registering an average of the period of 202 kg/inhabitant and a standard deviation of 3 kg/inhabitant. The 1.43% value of the coefficient of variation indicates the homogeneity of the analyzed data series, and the negative value (-0.83%) of the annual growth rate indicates the negative dynamics of consumption during the analyzed period.

- For potatoes, the average annual consumption oscillated between 92 and 98 kg/inhabitant, recording an average of 95 kg/inhabitant and a standard deviation of 3 kg/inhabitant. The value of the coefficient of variation (2.71%) shows the existence of a series of homogeneous data, and the value of the annual growth rate indicates the positive dynamics of the average consumption in the analyzed time interval.

- **For vegetables and vegetable products** in fresh vegetable equivalent, the average annual consumption recorded values between 156 and 180 kg/inhabitant, the average of the period was equal to 171 kg/inhabitant with a standard deviation of 9 kg/inhabitant. The low value of the coefficient of variation (5.33%) signifies the presence of a series of homogeneous data, and the annual negative growth rate (-2.61%) indicates the downward trend of the average annual consumption per inhabitant for the product category - vegetables.

- **For fruits and fruit products** in fresh fruit equivalent, the average annual consumption oscillated between 108 and 115 kg/inhabitant, registering an average of the period of 111 kg/inhabitant with a standard deviation of 3 kg/inhabitant. The coefficient of variation of 2.48% indicates the homogeneity of the data series, and the value of the annual growth rate (0.31%) indicates the positive dynamics of the

average annual consumption per inhabitant in the product category. - fruits.

- **For meat and meat products** in fresh meat equivalent, the average annual consumption was between 73 and 75 kg/inhabitant, registering an average of the period equal to 74 kg/inhabitant with a standard deviation of 1 kg/inhabitant. The value of the coefficient of variation (0.71%) indicated a homogeneous series of data, and the value of the annual growth rate (0.24%) indicated the positive dynamics of the average annual consumption per inhabitant in the product category - meat.

- **For milk and milk products** in milk equivalent 3.5% fat (excluding butter), the average annual consumption recorded values between 251 and 256 kg/inhabitant, recording an average of 253 kg/inhabitant with a standard deviation of 2 kg/ inhabitant The

value of the coefficient of variation (0.93%) indicates a series of homogeneous data, and the value of the annual growth rate (0.54%) indicates the positive dynamics of the average annual consumption for the product category - milk.

- **For eggs**, the average annual consumption oscillated between 236 and 244 pieces/inhabitant, the average of the analyzed period being equal to 240 pieces/inhabitant with a standard deviation of 4 pieces per inhabitant.

The coefficient of variation of 1.59% indicates the existence of a homogeneous data series, and the value of the annual growth rate of 0.84% indicates the positive dynamics of egg consumption in the analyzed time interval (Table 2).

Table 2. Statistical indicators calculated for the average annual consumption per inhabitant in the period 2018-2022

Product	MU	Minimum	Maximum	Mean	Average Standard Deviation	*Coefficient of Variation (%)	Annual Growth Rate (%)
Cereals and cereal products in grain equivalent	kg	199	205	202	3	1.43	-0.83
Potatoes	kg	92	98	95	3	2.71	0.60
Vegetables and vegetable products in fresh vegetable equivalent	kg	156	180	171	9	5.33	-2.61
Fruits and fruit products in fresh fruit equivalent	kg	108	115	111	3	2.48	0.31
Meat and meat products in fresh meat equivalent	kg	73	75	74	1	0.71	0.24
Milk and milk products in milk equivalent 3.5% fat (excluding butter)	liter	251	256	253	2	0.93	0.54
Egg	pieces	236	244	240	4	1.59	0.84

*Coefficient of variation: <10 - small; 10-20 - medium; >20 - high.

Source: data processing provided by INS-TEMPO ONLINE, CODE: CLV104A [11], Accessed on 06.09.2024.

In Figure 1, the quantities of agri-food products purchased by a household were graphically represented by product categories and social categories of household members, thus the following were highlighted: cereals and eggs were the most purchased product categories in households.

If we refer to the social categories, a greater buying tendency was observed among pensioners and employees (Figure 1).

Regarding production per inhabitant, the following trends were observed for the main agricultural products in the analyzed period:

- The highest production was registered in the category - cereals for grains, and the lowest production in the category - wool.
- At the level of the 2018-2022 period, decreasing trends in production per inhabitant were observed for the following product categories: sugar beet (-70.52%), potatoes

(-54.48%), grains for grains (-38.86%), vegetables (-34.63%), fruit (-16.33%), milk (-1.04%) and meat (-0.39%). For wool (+8.33%) and eggs (+7.51%), production growth trends per inhabitant were observed in the analyzed time frame (Table 3).

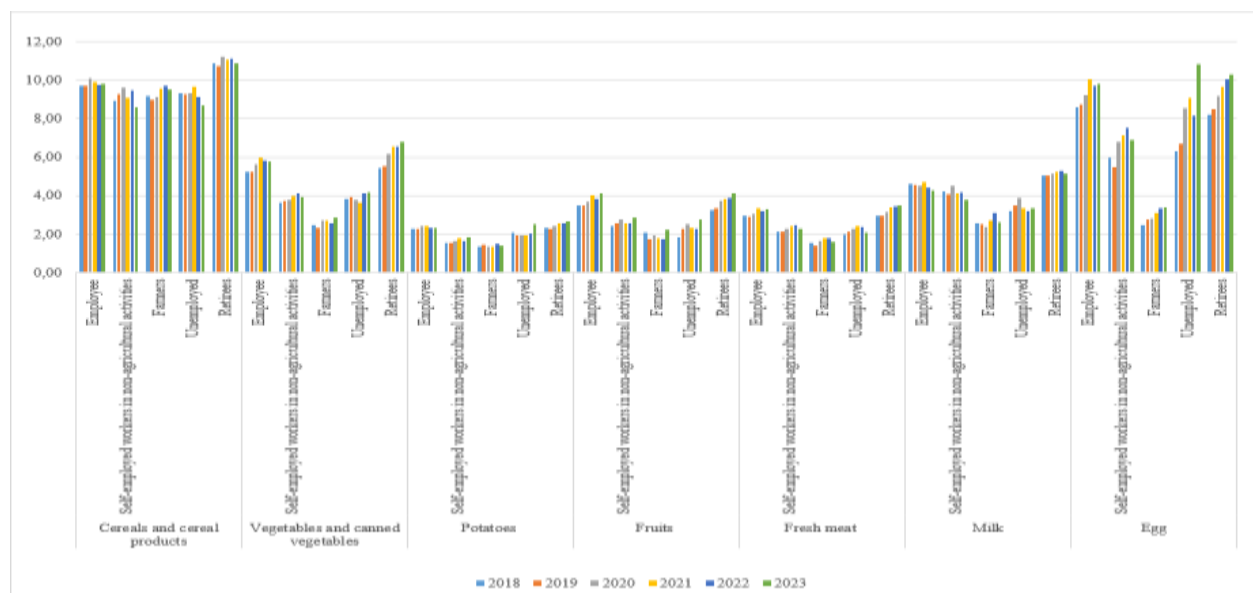


Fig. 1. The dynamics of the quantities of agri-food products purchased by a household by product category and the main social categories in the period 2018-2023

Source: data processing provided by INS TEMPO ONLINE, BUF113J [11], Accessed on 22.10.2024.

Table 3. Production dynamics of the main agricultural products, per inhabitant in the period 2018-2022

Products	MU	2018	2019	2020	2021	2022	2022/2018
Cereals for grains	kg	1,619.5	1,569.6	940.8	1453	990.1	-38.86%
Sugar beet	kg	50.2	47.3	37.2	41	14.8	-70.52%
Potatoes	kg	155.1	135.6	83	73.1	70.6	-54.48%
Vegetables	kg	194.9	182.2	180.5	182.7	127.4	-34.63%
Fruits	kg	93.1	76.8	82.4	89.1	77.9	-16.33%
Meat	kg	76.2	77.2	75.8	76.1	75.9	-0.39%
Milk	liter	239.9	238.2	240.2	237.8	237.4	-1.04%
Wool	kg	1.2	1.2	1.2	1.2	1.3	8.33%
Eggs	pieces	293	287	282	310	315	7.51%

Source: data processing provided by INS-TEMPO ONLINE, CODE: AGR200A [11], Accessed on 06.09.2024.

From the analysis of the statistical indicators calculated for **the production of the main agricultural products per inhabitant**, the following were highlighted:

- For cereals for grains, production varied between 940.8 and 1,619.5 kg/inhabitant recording a period average of 1,315 kg/inhabitant with a standard deviation of 325%. The high value of the coefficient of variation of 24.71% suggests the existence of an inhomogeneous data series, and the value

of the annual growth rate indicates the negative dynamics of grain production per inhabitant (Table 4).

- For sugar beet, production varied between 14.8 and 50.2 kg/capita, the average of the period being 38kg/capita with a standard deviation of 14 kg/capita. The coefficient of variation of 36.73% indicated an inhomogeneous series of data, while the annual negative growth rate (-26.31%)

indicated the downward trend of sugar beet production per inhabitant (Table 4).

- *For potatoes*, production oscillated between 70.6 and 155.1 kg/inhabitant recording an average of the period of 103 kg/inhabitant with a standard deviation of 39 kg/inhabitant. The high value of the coefficient of variation of 37.80% indicates an inhomogeneous data series, and the negative annual growth rate (-17.86%) indicates the downward trend of potato production per inhabitant (Table 4).

- *For vegetables*, production ranged between 127.4 and 240.2 kg/capita, with a mean of 174 kg/capita and a standard deviation of 26 kg/capita. The coefficient of variation showed an average value (15.23%), which suggests a slightly homogeneous data series, and the negative annual growth rate (-10.08%)

indicates+ a downward trend in vegetable production per inhabitant (Table 4).

- *For fruits*, production varied between 76.6 and 77.2 kg/capita recording a period average of 84 kg/capita and a standard deviation of 7 kg/capita. The coefficient of variation value (8.44%) indicates a homogeneous data series, and the annual growth rate (-4.36%) indicates the negative dynamics of fruit production per inhabitant (Table 4).

- *For meat*, production was between 75.8 and 77.2 kg/inhabitant, the average of the period being 76 kg/inhabitant with a standard deviation of 1 kg/inhabitant. The value of the coefficient of variation of 0.73% indicates the existence of a homogeneous data series, and the annual growth rate of -0.10% indicates the negative dynamics of meat production per inhabitant (Table 4).

Table 4. Statistical indicators calculated for the production of the main agricultural products, per inhabitant in the period 2018-2022

Product	MU	Minimum	Maximum	Mean	Average Standard Deviation	*Coefficient of Variation (%)	Annual Growth Rate (%)
Cereals for grains	kg	940.8	1,619.5	1,315	325	24.71	-11.58
Sugar beet	kg	14.8	50.2	38	14	36.73	-26.31
Potatoes	kg	70.6	155.1	103	39	37.80	-17.86
Vegetables	kg	127.4	194.9	174	26	15.23	-10.08
Fruits	kg	76.8	93.1	84	7	8.44	-4.36
Meat	kg	75.8	77.2	76	1	0.73	-0.10
Milk	liter	237.4	240.2	239	1	0.53	-0.26
Wool	kg	1.2	1.3	1	0	3.67	2.02
Eggs	pieces	282	315	297	14	4.85	1.83

*Coefficient of variation: <10 - small; 10-20 - medium; >20 - high.

Source: data processing provided by INS-TEMPO ONLINE, CODE: AGR200A [11], Accessed on 06.09.2024.

- *For milk*, production showed values between 237.4 and 240.2 kg/inhabitant, the average of the period being 239 kg/inhabitant with a standard deviation of 1 kg/inhabitant. The coefficient of variation was 0.53% indicating the existence of a homogeneous data series, while the negative annual growth rate (0.26%) indicated the decreasing trend of milk production per inhabitant (Table 4).

- *For wool*, production varied between 1.2 and 1.3 kg/inhabitant recording a period average of 1 kg/inhabitant with a standard deviation of 0 kg/inhabitant. The value of the coefficient of

variation of 3.67% characterizes the data series as a homogeneous one, and the positive annual growth rate (2.02%) indicates the increasing trend of wool production per inhabitant.

-*For eggs*, production recorded limits between 282 and 315 kg/inhabitant, the average of the period being 297 kg/inhabitant with a standard deviation of 14 kg/inhabitant. The coefficient of variation of 4.85% indicates the homogeneity of the data series, and the annual growth rate of 1.83% indicates the positive

dynamics of egg production during the analyzed period (Table 4).

In the period 2018-2022, the trends in the value of the main categories of agricultural products at the producer price have increased for all analyzed products, less for potatoes for which the trend was one of decrease (-22.39%), from 4.107 million lei in 2018 to

3.187 million lei in 2022. The most significant increases in the value of producer prices were observed for eggs and milk. For eggs, at the level of the period, an increase of 53.46% was recorded, from 3,274 million lei in 2018 to 5,025 million lei in 2022, and for milk the increase was 50.25%, from 4,320 million lei in 2018 to 6,490 million lei in 2022 (Table 5).

Table 5. The value of agricultural products at the producer price in the period 2018-2022 (millions LEI)

Products	2018	2019	2020	2021	2022	2022/2018
Cereal (including seeds)	22.700	22.610	14.927	27.708	27.149	19.60%
Vegetables and horticultural products	11.344	12.560	12.683	15.864	14.578	28.51%
Potatoes (including seed)	4.107	5.390	5.086	2.297	3.187	-22.39%
Fruits	6.686	5.971	6.927	7.853	7.362	10.11%
Animal products	9.338	9.592	10.041	10.824	13.708	46.80%
Milk	4.320	4.562	4.949	5.247	6.490	50.25%
Egg	3.274	3.294	3.163	3.712	5.025	53.46%

Source: data processing provided by INS TEMPO ONLINE, CODE: AGR208A [11], Accessed on 12.09.2024.

From the analysis of the statistical indicators calculated for **the average value** of the agricultural products at the producer price in the time frame 2018-2022, the following aspects were highlighted:

-For cereals, the average value at the producer price varied between 14,927 and 27,708 million lei, registering an average of the period equal to 23,019 million lei and a standard deviation of 5,119 million lei. The high value of the coefficient of variation of 22.24% indicates the existence of a non-homogeneous data series, and the positive annual growth rate of 4.58% indicates the increasing trend of the value at the producer price for this category of agricultural products.

- For vegetables and horticultural products, the average value at the producer price was between 11,344 and 15,864 million lei, the average of the period being 13,406 million lei with a standard deviation of 1,796 million lei. The value of the coefficient of variation (13.40%) indicates an inhomogeneous series of data, and the value of the annual growth

rate (6.47%) indicates the positive dynamics of the value at the producer price for this category of agricultural products (Table 6).

- For potatoes, the average value at the producer price oscillated between 2,297 million lei and 5,390 million lei, registering an average of 4,013 million lei for the period with a standard deviation of 1,292 million lei. The coefficient of variation presented a value of 32.20%, indicating the inhomogeneity of the analyzed data series, and the negative annual growth rate (-6.14%) suggests the downward trend of the producer price value for this category of agricultural products.

- For fruits, the value at the producer price varied between 5,971 and 7,853 million lei, recording an average of the period of 6,960 million lei and a standard deviation of 710 million lei. The value of the coefficient of variation (10.20%) characterizes the data series as inhomogeneous, and the value of the annual growth rate (2.44%) indicates the positive dynamics of the value at the producer price for this category of agricultural products (Table 6).

Table 6. Statistical indicators; mean, minimum, maximum, standard deviation, coefficient of variation and annual growth rate calculated for the value at the producer's price in the period 2018-2022 (millions of LEI)

Product	Minimum	Maximum	Mean	Average Standard Deviation	*Coefficient of Variation (%)	Annual Growth Rate (%)
Cereal (including seeds)	14.927	27.708	23.019	5.119	22.24	4.58
Vegetables and horticultural products	11.344	15.864	13.406	1.796	13.40	6.47
Potatoes (including seed)	2.297	5.390	4.013	1.292	32.20	-6.14
Fruits	5.971	7.853	6.960	710	10.20	2.44
Animal products	9.338	13.708	10.700	1.773	16.57	10.07
Milk	4.320	6.490	5.114	848	16.58	10.71
Egg	3.163	5.025	3.694	773	20.92	11.30

*Coefficient of variation: <10 - small; 10-20 - medium; >20 - high.

Source: data processing provided by INS-TEMPO ONLINE, CODE: AGR208A [13], Accessed on 12.09.2024

- For products of animal origin, the value of the producer price oscillates between 9,338 and 13,708 million lei, recording an average of 10,700 million lei for the period with a standard deviation of 1,773 million lei. The value of the coefficient of variation (16.57%) indicates the existence of an inhomogeneous data series, and the annual growth rate (10.07%) indicates the positive dynamics of the producer price value for this category of agri-food products.

- For milk, the value at the producer price oscillated between 4,320 and 6,490 million lei, the average of the period being 5,114 million lei with a standard deviation of 848 million lei. The coefficient of variation of 16.58% highlights a less homogenous series of data, and the positive value of the annual growth rate indicates the tendency to increase the value at the producer price for this category of agri-food products.

- For eggs, the value at the producer's price recorded limits between 3,163 and 5,025 million lei, the average of the period being 3,694 million lei with a standard deviation of 773 million lei. The high value of the coefficient of variation was 20.92% indicates the presence of an inhomogeneous data series, and the positive annual growth rate of 11.30% indicates the tendency of the increase in the value at the producer's price for this category of agri-food products (Table 6).

CONCLUSIONS

The average consumption per inhabitant of the main categories of agro-food products analyzed in this study showed a relatively constant dynamic. The category of agri-food products that recorded the highest consumption was milk and milk products in milk equivalent 3.5% fat (excluding butter).

In terms of the production of the main agricultural products per capita, cereals for grains stood out by achieving the highest production per capita, followed by milk.

Regarding the current prices – value at the producer price, cereals (including seeds) register the highest price, followed by vegetables and horticultural products.

Regarding the current prices – value at the producer price, cereals (including seeds) register the highest price, followed by vegetables and horticultural products.

The results of the study showed the following:

- For cereals for grains, the demand was lower than the supply, at the level of 2022 the average annual consumption was 198.6 kg/inhabitant while the production was 990.1 kg/inhabitant.

- For potatoes, the demand is higher than the supply, in 2022 the average annual potato consumption was 97.7 kg/inhabitant, while the production recorded 70.6 kg/inhabitant.

- For vegetables and products in fresh produce equivalent, the demand was higher than the supply in 2022 when the average annual consumption was 156 kg/inhabitant, while the production was 127.4 kg/inhabitant.

- For fruits and fruit products in fresh fruit equivalent, the demand was also higher than the supply, the average annual consumption was 112.2 kg/inhabitant, and the production was 77.9 kg/inhabitant.

- For meat and meat products in fresh meat equivalent, in 2022, the demand was approximately equal to the supply. Average annual consumption was 74 kg/capita, while production was 75.9 kg/capita.

- For milk and milk products in milk equivalent 3.5% fat (excluding butter), the demand is higher than the supply. In 2022, the average annual consumption was 256.1 liters/capita, while the production recorded 237.4 liters/capita.

- For eggs, demand is lower than supply. The average annual consumption recorded in 2022 244 pieces/inhabitant, while the production was 315 pieces/inhabitant.

The increase in agricultural production can represent a solution for ensuring national food security, but it cannot completely solve this problem, as the supply needs to be supplemented with imported products.

Currently, Romania exports significant amounts of raw materials and imports finished products, one of the negative effects generated by this situation is the lack of factories for processing agricultural products at the national level. In this context, in order for Romania to be able to ensure the food security of the country, it is imperative to make some investments to develop the food industry. Also, introducing artificial intelligence to improve quality and ensure food safety while delivering significant capital savings and optimizing resources can be a sustainable solution.

At the same time, ensuring agricultural prices is an important tool for maintaining food security, it has been observed that the elasticity of supply is higher than the elasticity of demand for most agricultural products. In this context, price insurance of agricultural products changes the supply curve of these types of products by reducing the elasticity of supply, having a positive impact by reducing price fluctuations and stabilizing production.

REFERENCES

- [1]Agapie, O. L., Vinătoru, C., Barcanu, E., Tănase, B. E., Gherase, I., Dobre, G., 2022, Survey on consumers preference in the new acclimatized specie in Romania: *Benincasa hispida*. Scientific Papers. Series B. Horticulture, 66(1).
- [2]Blihar, V., Sirovatskyi, V., Godyak, A., Lyuklian, M., Starchak, B., 2023, Legal regulation of the problems of ensuring food security in Ukraine and the countries of the European Union in the conditions of challenges and dangers of today. Financial and Credit Activity Problems of Theory and Practice, 4(51), 408–416. <https://doi.org/10.55643/fcaptop.4.51.2023.4137>
- [3]Bobeică, M., Arghiroiu, G. A., Beciu, S., 2023, Assessing Romania's food security status in 2022: a comparative analysis with regional peers. Scientific Papers Series Management, Economic Engineering in Agriculture & Rural Development, 23(4), 95-102.
- [4]Burlankov, S. P., Ananiev, M. A., Savkina, R. V., Kazakova, N. A., 2019, Development of regional agricultural markets when optimizing production. Ad Alta: Journal of Interdisciplinary Research, 9(2).
- [5]Buzatu, C. S., Ghiuleanu, I. V., Tudor, V. C., 2023, Dynamics of land fund and strategies on soil conservation and prevention of soil degradation in Romania. Scientific Papers Series Management, Economic Engineering in Agriculture & Rural Development, 23(4), 149-156.
- [6]Fagundes, J.R., Cario, S.A.F., Costa, A.M., 2023, A magnifying glass on the agrifood policy of the municipality of Anchieta from the perspective of social innovation. Confins-Revue Franco-Brasilienne de Geographie-Revista Franco-Brasileira De Geografia 59. <https://doi.org/10.4000/confins.52696>
- [7]Guo, Y., Tang, D., Tang, W., Yang, S., Tang, Q., Feng, Y., Zhang, F., 2022, Agricultural price prediction based on combined forecasting model under spatial-temporal influencing factors. Sustainability, 14(17), 10483.
- [8]Malos, G. I., Malos, G., 2022, Research on the safety and resilience of the meat and meat products sector in Romania. Scientific Papers. Series D. Animal Science. Vol. LXV, No. 1, 500-504.
- [9]Mazo, A. F., 2023, Impact of the Pandemic on Global Food Security: The Need to Strengthen Agri-Food Systems. Ius Humani, Revista de Derecho, 12(1), 19-49.
- [10]Moranta, J., Florido-del-Corral, D., López-López, L., Gómez, S., Agujetas, J., Albo-Puigserver, M., ... & Villasante, S., 2023, Sowing potential transformative changes in the fishing and agrifood systems–Conference report. Marine Policy, 154, 105673.
- [11]National Institute of Statistics, (INS) – Tempo online, <http://statistici.insse.ro:8077/tempo-online/>, Accessed on October 5, 2024.
- [12]Skopenko, N., Sakhnenko, A., 2015, Availability of food products in Ukraine in the context of food security. Transformations in Business & Economics, 14(3).
- [32]Zheng, H., Ma, W., Zhou, X., 2024, Promoting sustainable agrifood production under climate change: adaptation, returns, and food security implications.

