Analysis of the regional food supply

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Abstract. Food supply is the most important component of the life support system and indicator of the population quality of life [1, 2]. In the scientific work, the assessment of the food supply level of the region was carried out, using the example of the Saratov region. The authors have identified the dynamics of indicators characterizing the food security of the region: acreage, livestock and poultry population, cost of agricultural products produced, cost of importing food and agricultural raw materials. The production dynamics of certain types of products, their production and personal consumption, as well as losses by volume are considered. With the help of these indicators, the level of self-sufficiency of the Saratov region with food resources of its own production is determined. The dynamics of the staple food consumption and the diet compliance with the recommended norms in kilograms per person per year are considered. The consumption by residents of the Saratov region of such types of food as potato, meat and meat products, vegetables, milk and dairy products does not comply with scientifically established medical standards, which causes a high share of imported products in actual food consumption and threatens the food security of the region.

1. Introduction

Food security is the ability of the agricultural production system, both of the region and the country as a whole, to provide the population living in the relevant territory with food at the level of recommended norms [3, 4]. The main conditions for ensuring food security include the following: the economic availability of food and the optimal ratio of their own and interregional supplies. The problem of ensuring food security is relevant in modern conditions, both for the Russian Federation as a whole and for individual regions. This is due to the fact that the regions of Russia differ in types, volume of production of individual types of food products and the need for them. Assessment of the current state of food security of the population of the Saratov region will allow to achieve the goal of sustainable development of the region, especially in the conditions of economic independence of economic entities. The food supply of the Saratov region and other regions is influenced by the following specific features: natural and climatic conditions of the region; state of agro-industrial production and the food market; socio-economic situation; food adequacy, natural and climatic conditions of agricultural farming, agricultural land areas, etc.
2. Materials and Methods
The initial data for writing a scientific paper were used from the official website of the Federal State Statistics Service of Russia (www.gks.ru): The main characteristics of the subjects of the Russian Federation; Russia in numbers; Socio-economic indicators; Regions of Russia.

We will list the main methods of scientific research used during writing the paper. The statistical method of the study was used in the initial collection of quantitative data and determination of the dynamics of indicators characterizing the food supply of the Saratov region. The comparison method is used when comparing the indicators of the reporting and base periods. The coefficient method of the study determined the level of self-sufficiency in food resources of the Saratov region.

3. Results and Discussion
The economic policy of any state in the modern conditions of economic globalization should ensure its national security, the main of which is the food supply of the population with domestic types of food [5].

The assessment of food security in this article is carried out on the example of the Saratov region, which is part of the Volga Federal District. The administrative center is the city of Saratov. In accordance with Federal Law No. 131 "On the General Principles of the Organization of Local Self-Government in the Russian Federation", 439 municipalities and 38 municipal districts have been created on the territory of the Saratov region.

The degree of satisfaction of the needs of residents of the Saratov region with food resources and food supply on its territory is characterized by food security level [6]. To determine the food supply, indicators of production and consumption of the main types of products, their compliance with medical standards are used.

The assessment of indicators characterizing the food security of the Saratov region is carried out in Table 1.

| Indicator                              | 2017     | 2018     | 2019     | Deviation 2019 from 2017, (+; -) |
|----------------------------------------|----------|----------|----------|----------------------------------|
| Sown area of agricultural crops, thousand hectares | 1916.6   | 1991.3   | 2042.9   | 126.3                            |
| Livestock and poultry population, thousand heads |          |          |          |                                  |
| - cattle                               | 424.9    | 430.6    | 432.5    | 7.6                              |
| - pigs                                 | 283.1    | 271.8    | 275.4    | -7.7                             |
| - sheep and goats                      | 566.9    | 560.4    | 548.8    | -18.1                            |
| Agricultural products, million rubles  | 134973.4 | 129174.6 | 140037.7 | 5064.3                           |
| including crop production              | 90455.5  | 87912.4  | 100593.8 | 10138.3                          |
| animal husbandry                       | 44517.8  | 41262.3  | 39443.9  | -5073.9                          |
| Imports of food and agricultural raw materials, mln. dollars | 117.0    | 159.0    | 173.3    | 56.3                             |

In the analyzed period, the sown area of agricultural crops of the Saratov region increased by 126.3 thousand hectares and amounted to 2042.9 thousand hectares in 2019. In the Saratov region in 2017-2019, there was a trend of an increase in the number of cattle by 7.6 million heads and a reduction in the number of pigs and goats by 7.7 million heads and 18.1 million heads, respectively. Saratov region is the largest agricultural region of the Volga region and Russia. The geographical location and
climatic features of the region allow cultivating a wide range of agricultural crops. The cost of agricultural products increased by 5064.3 million rubles during the analyzed period and amounted to 140037.7 million rubles in 2019. This increase was caused by an increase in the cost of crop production by 10138.3 million rubles. The cost of livestock production in the Saratov region decreased by 5073.9 million rubles.

The level of self-sufficiency in food resources (LSFR) of the Saratov region is calculated as the ratio of the volume of production of a certain type of product to the need for this product [7-9].

$$LSFR = \frac{P}{PP + PPot + FLP}$$

where P is the volume of production of certain types of products per year;
PP is the volume of production consumption of certain types of products per year;
Ppot is the volume of losses of certain types of products for the year;
FLP is the fund of personal consumption of certain types of products by the population per year.

To determine the level of self-sufficiency of the Saratov region with food resources of its own production, we consider the dynamics of changes in industrial consumption, personal consumption, production and product losses in Tables 2-3.

**Table 2. Dynamics of indicators characterizing industrial and personal consumption of products produced in the Saratov region.**

| Product type            | Production consumption of products manufactured in the Saratov region | Personal consumption of products manufactured in the Saratov region |
|-------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------|
|                         | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |
| Potato, thousand tons   | 113.3| 111.6| 112.3| 140.4| 139.0| 138.1|
| Vegetables, thousand tons| 18.4 | 19.8 | 19.2 | 361.1| 377.6| 369.2|
| Milk and dairy products, thousand tons | 114.9 | 117.8 | 115.2 | 570.6 | 567.9 | 569.21|
| Meat and meat products, thousand tons | 0.1 | 0.1 | 0.1 | 146.5 | 151.1 | 148.6|
| Eggs, million eggs      | 16.8 | 16.6 | 16.7 | 791.8 | 775.8 | 782.2|

In 2017-2019, there was a tendency to reduce the production consumption of potato by 1 thousand tons, meat by 0.1 thousand tons and to increase in vegetables by 0.8 thousand tons, milk by 0.3 thousand tons. The volume of personal consumption of potato in 2019 amounted to 138.1 thousand tons, which is 2.3 thousand tons lower than in 2017. The volume of personal consumption of milk and dairy products for the analyzed period decreased by 1.39 thousand tons and reached the level of 569.2 thousand tons in 2019.

The dynamics of indicators characterizing the production and loss of products manufactured in the Saratov region is shown in Table 3.

**Table 3. Dynamics of indicators characterizing industrial and personal consumption of products produced in the Saratov region.**

| Product type            | Manufacturing of products manufactured in the Saratov region | Losses of products manufactured in the Saratov region |
|-------------------------|--------------------------------------------------------------|------------------------------------------------------|
|                         | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |



The volume of production of agricultural products in the Saratov region by volume for the analyzed period decreased: potato - by 3.6 thousand tons, vegetables - by 1.8 thousand tons, milk and dairy products - by 19.3 thousand tons, meat and meat products - by 0.9 thousand tons, eggs - by 4.5 million pieces. Losses of products produced in the Saratov region in 2017-2019 for potato and eggs increased by 1.3 thousand tons and 0.1 million units, respectively, and in vegetables decreased by 0.9 million tons.

The level of self-sufficiency of the Saratov region with food resources of its own production is shown in Table 4.

Table 4. The level of self-sufficiency of the Saratov region with food resources of its own production, %.

| Product type               | Threshold value | 2017  | 2018  | 2019  | Deviation 2019 from 2017, (+;−) |
|----------------------------|-----------------|-------|-------|-------|---------------------------------|
| Potato                     | 95              | 56.55 | 55.01 | 55.61 | -0.94                           |
| Vegetables                 | -               | 24.15 | 23.08 | 23.22 | -0.93                           |
| Milk and dairy products    | 90              | 112.47| 107.44| 109.83| -2.64                           |
| Meat and meat products     | 85              | 83.38 | 79.39 | 81.65 | -1.73                           |
| Eggs                       | -               | 118.86| 116.07| 119.72| 0.86                            |

The level of self-sufficiency in food resources of the Saratov region in 2017-2019 is decreasing for potato by 0.94%, vegetables - by 0.93%, milk - by 2.64%, meat by - 1.73%. There was an increase in the level of self-sufficiency in the Saratov region only for eggs - by 0.86%.

The dynamics of the consumption of staple foods and the compliance of the diet with the recommended standards in the Saratov region are considered in Table 5.

Table 5. Consumption of staple foods and compliance of the diet with the recommended norms, kg per person per year.

| Product type                        | Threshold value | 2017 | 2018 | 2019  | 2019 to rational norms, % |
|-------------------------------------|-----------------|------|------|-------|--------------------------|
| Potato                             | 90              | 58   | 57   | 57    | 63.33                    |
| Vegetables and cucurbits crops     | 140             | 102  | 105  | 118   | 84.29                    |
| Meat and meat products             | 73              | 57   | 59   | 62    | 84.93                    |
| Milk and dairy                     | 325             | 231  | 231  | 232   | 71.38                    |
### Products Consumption in the Saratov Region (2017-2019)

| Products          | 2017 | 2018 | 2019 | 2019 average |
|-------------------|------|------|------|--------------|
| Eggs, pcs.        | 260  | 316  | 320  | 316          |
| Bread products    | 96   | 104  | 104  | 104          |

In the Saratov region, the consumption of staple foods is increasing (except potato). Thus, in 2017-2019, vegetable consumption increased by 15.69% and amounted to 118 kg per person per year in 2019. Consumption of meat and meat products in 2019 amounted to 62 kg per person, which is 8.77% higher than in 2017. The consumption of milk and dairy products during the analyzed period increased by 0.43% and reached 232 kg per person in 2019. The consumption of bread products during the analyzed period did not change and amounted to 104 kg per person. The level of consumption by the population of such types of food as potato, vegetables, meat and meat products, milk and dairy products in the Saratov region is at a level below the scientifically established medical standards.

### 4. Conclusion

As a result of the conducted research, it was determined that in the Saratov region the indicators of self-sufficiency in food are lower than the normative values approved by the Food Security Doctrine of the Russian Federation for most types of products. The consumption of staple foods by the population of the Saratov region did not correspond to the diet recommended standards for basic products in 2017-2019. Analysis of the food security level in the Saratov region cannot ensure the food security of the region, but it encourages regional and local authorities to develop and implement a set of measures to ensure it.

Therefore, the implementation of the measures provided for by the Russian Food Security Doctrine in compliance with the norms and requirements of the WTO should be assigned to areas with favorable conditions for the production of food resources. It is necessary that the volume of production of food resources would ensure their import substitution [10-12].

It is possible to propose the following directions for improving the food supply of the Saratov region:

- to attract highly qualified labor resources to the agro-industrial complex of the region;
- to increase the number and availability of benefits of regional and local authorities to agricultural producers;
- to increase the volume of production of food resources (potato, cucurbits crops, vegetables) through the use of foreign experience;
- provision of agricultural production of the region with high-performance equipment;
- to modernize work places in agriculture to the level of international standards;
- to improve the quality and competitiveness of food resources of the Saratov region.

The implementation of the proposed measures will make it possible to provide residents of the Saratov region with high-quality products, increase self-sufficiency with food resources of their own production, ensure the consumption of staple foods and compliance of the diet with recommended standards.

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