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Abstract. The article discusses the regional aspects of ensuring the country’s food security. On the example of the Rostov region, the key problems of ensuring food security at the mesoscale are analyzed. A model of the organizational and economic mechanism for ensuring food security in the Rostov region is developed and a set of measures aimed at improving the region’s self-sufficiency in food is proposed.

1. Introduction

The problem of ensuring food security in modern conditions is complex and multidimensional in nature [1-3] and affects all levels of the organization of the economic system, possessing the corresponding specifics both in the global format and at the macro and mesoscale [4]. Being a certain guarantee of the sustainability of the socio-economic development of society, this problem affects the interests of both social groups and individual individuals, and states and regions [5-8], which determines its consideration as one of the most important elements of the country’s national and economic security system.

The need for food relates to basic needs and at the same time - the most important conditions for ensuring normal human life. Therefore, the increase in the level and life expectancy of the population, its health and working capacity, increased labor productivity and economic growth as a whole are largely determined by the extent to which the country’s population is provided with high-quality food products, which, in turn, is determined by the efficient functioning of the national agro-industrial complex. In this regard, ensuring food safety is a key objective of pursuing an effective socio-economic and, at the same time, agri-food policy and is becoming particularly relevant in the context of import substitution, in the light of the need to overcome the dependence of the Russian national market on international food supplies and the world food market. Thus, the problem of ensuring food security is a priority area of the national policy of any state and acts as an object of both legislative activity and scientific research [9, p. 49].

2. Materials and methods

Despite the presence of numerous international and national scientific studies in the field of food security, this concept has not yet received a single clear and unambiguous definition.

Certain aspects of the problem of food security related to food security were studied by Russian economists at the beginning of the twentieth century and were developed in the works of A. Chayanov, N. Bukharin, N. Kondratiev. The economic category «food security» itself first appeared in the scientific literature in 1974, but its essence was determined only 22 years later by the 1996 Rome Declaration on World Food Security. In this document, food security was proposed to mean «the state of the economy in which the...
population of the country as a whole and each citizen individually is guaranteed access to food, drinking water and other food products in quality, assortment and the volumes necessary and sufficient for the physical and social development of the individual, ensuring health and expanded reproduction of the country's population» [10].

The doctrine of food safety of the Russian Federation, approved by the Decree of the President of the Russian Federation of January 30, 2010 N 120 defines the latter as the state of the country's economy, which ensures food independence of the Russian Federation, guarantees the physical and economic accessibility for each citizen of the country of food products that meet the requirements of the legislation of the Russian Federation on technical regulation, in volumes not less than rational food consumption standards necessary for active and healthy lifestyle [11].

Based on the analysis and generalization of various interpretations of the concept of “food security” existing in national and international economic literature, we can conclude that the above economic category represents a real opportunity for the country's population at any time to have physical and economic access to safe and useful for health, food products of mainly national production, which allow satisfying dietary needs and taste preferences, in sizes sufficient for normal human life and leading an active and healthy lifestyle.

3. Results and Discussions
The national food security of Russia is largely determined by the ability of its regions to self-sufficiency and is defined as a system of economic, organizational, technological, social, environmental and other factors aimed at the stable functioning of the agro-industrial complex in order to satisfy the population with diverse and competitive food products at scientifically based standards, creating the required insurance stocks, and exporting their surplus.

At the regional level, in addition to federal problems, there are territorial features that predetermine the entire set of threats to food security.

Regional aspects of ensuring food security will be examined in more detail using the example of the Rostov Region.

The food security of any region can be assessed at four levels.
1. High: the share of imports does not exceed 10 -15%, the region fully provides itself with products of its own production.
2. Acceptable: the region provides itself with products of its own production along with imports not exceeding 30%.
3. Low: the region provides itself with products of its own production by 31-45%, the rest is imported.
4. Unacceptably low: the region provides itself with food, however, the share of imports ranges from 46 to 60%.

Rostov region has a slight degree of food dependence. In 2017, it provided itself with food products of its own production by 90% [12]. At the same time, it is one of the largest exporters of agricultural raw materials and food products (grain, sunflower oil, etc.). Nevertheless, in the area of food security in the region, in addition to the problems discussed above, there are a number of threats of a social, economic, and climatic nature that can aggravate the current food situation. To analyze the state of food security in the Rostov region, in our study, we used the method of a comprehensive assessment of D. G. Olovyannikov, which allows evaluating this indicator using four main criteria: physical accessibility of food, economic affordability of food, sufficiency of food consumption and its quality (table 1).

Let us analyze each of the above criteria in relation to the Rostov region.
1. The criterion of physical accessibility of food.

This indicator can be calculated using the coefficient of coverage of food imports (Up), defined as the ratio of exports of food products and imports of similar goods and raw materials needed for their production in the region. Criteria for assessing the level of physical accessibility of food are presented in table 1.

The assessment of the level of physical accessibility of food over time from 2013 to 2016 is presented in table 2.
1. As can be seen from the table, the level of physical accessibility in the Rostov region is quite
high, which allows satisfying the solvent demand for food products in full. Over the course of three years, the level of physical accessibility has demonstrated positive dynamics, which undoubtedly can be regarded as a positive trend in ensuring the food security of the region.

Table 1. Criteria for assessing the degree of regional food security

| Criterion for assessing the level of physical accessibility | High | Allowable | Low | Unallowable |
|-------------------------------------------------------------|------|----------|-----|-------------|
| Food import coverage ratio                                  | 1.00 | 0.75 – 0.99 | 0.30 – 0.75 | Below 0.30 |

Table 2. Assessment of the level of physical accessibility of food in the Rostov region [13-16]

| Indicator | Year | 2014 | 2015 | 2016 | 2016 to 2015 |
|-----------|------|------|------|------|--------------|
| Food export (including export), mln. USD | 2600.4 | 899.4 | 2245.9 | 0.86367482 |
| Food imports (including imports), mln. USD | 288.7 | 125.5 | 218.2 | 0.75580187 |
| Food import coverage ratio | 9.00727399 | 7.16653386 | 10.292851 | 1.14272649 |
| Physical accessibility level | High | High | High | |

Table 3. Assessment of the affordability of food in the Rostov region [13-16]

| Indicator | Year | 2014 | 2015 | 2016 | 2016 to 2015 |
|-----------|------|------|------|------|--------------|
| Poverty rate (kb) | | 0.129 | 0.14 | 0.141 | 1.093 |
| The coefficient of purchasing power of income | | 0.32 | 0.35 | 0.34 | 1.0625 |
| Gini coefficient | | 0.398 | 0.398 | 0.392 | 0.9849 |

2. The criterion of economic affordability of food.
This indicator characterizes the distribution of food products between different social groups of the population at the current level of prices and incomes and is determined using the system of coefficients presented in table 1. The corresponding data for the Rostov region is presented in table 3.

During the analyzed period, the purchasing power coefficient increased only 1.0625 times. The Gini coefficient for the same period decreased just as slightly, indicating a decrease in the degree of uneven distribution of the population by income.

3. The criterion of sufficiency of food consumption. This indicator represents the consumption by the population of a minimum of a certain set of food products that is necessary for medical standards.
A set of parameters to assess the criterion of sufficiency of food consumption is presented in table 1. In order to assess the sufficiency of food consumption, a comparison was made of the consumption of basic foodstuffs per capita per year and the calorie level of the daily diet for various groups of the population of the Rostov Region with the norms of physiological requirements for energy and nutrients recommended by the Ministry of Health and Social Development of the Russian Federation. They represent the average value of the required intake of food and biologically active substances, ensuring the optimal implementation of physiological and biochemical processes in the human body (Table 4).

As it can be seen from the table, in the period from 2014 to 2016, 4 out of 7 product categories under consideration were within the norm. The highest consumption is observed for food products of the «eggs and egg products» group, the lowest - for milk and dairy products, the consumption of which amounted to only 79.7% of the physiologically reasonable consumption rate. Thus, in the Rostov region, a high level of consumption of carbohydrate-containing products remains with a protein deficiency. The energy value of products consumed during the day has noticeably decreased in recent years. Nevertheless, according to the threshold criteria for food security, the level of consumption adequacy in the Rostov region is within acceptable limits.

Table 4. Assessment of sufficiency of food consumption in the Rostov region, kg per year [17, p. 72-74]

| Product consumption, kg per year | Years | 2014 | Off | 2015 | Off | 2016 | Off | 2016 to 2015, % | Rational consumption |
|---------------------------------|-------|------|------|------|------|------|------|-----------------|---------------------|
| Meat products                   |       | 71   | -4   | 71   | -4   | 70   | -5   | 98.6            | 75                  |
| Milk and Dairy Products         |       | 278  | -62  | 274  | -66  | 261  | -9   | 95.3            | 340                 |
| Eggs and egg products           |       | 311  | 51   | 313  | 53   | 319  | 59   | 101.9           | 260                 |
| Sugar                           |       | 40   | 12   | 40   | 12   | 39   | 11   | 97.5            | 24-28               |
| Vegetables and food melons      |       | 145  | 5    | 146  | 6    | 147  | 7    | 100.7           | 120-140             |
| Fruits and berries              |       | 70   | -30  | 71   | -29  | 66   | -34  | 93.0            | 90-100              |
| Bread products                  |       | 106  | 1    | 106  | 1    | 106  | 1    | 100.0           | 95-105              |

| Nutrition factor | Allowable | Energy value, kcal per day | 2966 | 5 | 2978 | 14 | 2857 | -104 | 2903 | 2961 |
|------------------|-----------|----------------------------|------|---|------|----|------|-----|------|-----|
| Sufficiency ratio| Allowable  |                           |      |   |      |    |      |     |      |     |

4. Criterion of food quality.
In accordance with the analysis methodology, food quality is assessed using a quality factor (QF), which is the proportion of rejected products (meat and meat products, milk and dairy products, fish). The final assessment is carried out according to the average value of indicators. The evaluation criteria for this indicator are presented in table 1.

The assessment of the quality of food products in the Rostov region in the period 2014-2016 indicates a fairly low level. During the period under review, the quality factor did not rise above the «low» level, as evidenced by the data given in table 5.

As it can be seen from the table, the highest level of marriage in the group of products "Fish and fish products", which in 2015 reached 53.9%. Despite the fact that in 2016 its value decreased by 19.5%, on the whole it can be concluded that there are serious problems in providing the population of the region with high-quality and safe food.
Table 5. Assessment of food quality in the Rostov region [17, p. 75]

| Indicator                  | 2014 | 2015 | 2016 | 2016 to 2015 |
|----------------------------|------|------|------|--------------|
| Milk and Dairy Products    | 11.4 | 11.5 | 14   | -2.5         |
| Fish and fish products     | 45   | 53.9 | 34.4 | 19.5         |
| Meat and meat products     | 4.2  | 3.5  | 3.3  | 0.2          |
| Quality factor             | Unallowable | Unallowable | Low |

The most serious threats to food security in the Rostov Region are social threats, primarily the problems of the availability of quality food in the required quantity for low-income groups. Over the past years, in the region and its capital, the city of Rostov-on-Don, there has been a steady decline in the indicator of real disposable cash incomes of the population (table 6) against the background of a slight decrease in unemployment.

Table 6. Dynamics of key indicators of income and employment of the population of the Rostov region in 2013-2017 [18, p. 28, 236-237]

| Indicators                  | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------------------|------|------|------|------|------|
| The registered unemployment rate, % | 0.4  | 0.4  | 0.5  | 0.4  | 0.4  |
| Rostov-on-Don              | 0.8  | 0.8  | 0.9  | 0.6  | 0.8  |
| Rostov region              | 1.3  | 1.2  | 1.3  | 1.2  | 1.1  |
| Russian Federation         | 30.8 | 33.3 | 38.5 | 33.3 | 36.4 |
| The ratio of pH / D and RF  | 110.7| 107.8| 101.3| 97.3 | -    |
| Rostov-on-Don              | 109.3| 102.3| 99.5 | 94.7 | -    |
| Rostov region              | 103.3| 99.3 | 95.7 | 94.1 | -    |
| Russian Federation         | 103.3| 99.3 | 95.7 | 94.1 | -    |

The problem of affordability of food is exacerbated by a significant differentiation of incomes of various groups of the population of the region. A significant part of the region’s population employed in agriculture, due to low wages, does not have the opportunity to purchase food products that are physiological in terms of quality and variety. The priority in ensuring food security belongs to bakery products, sugar, vegetable oil, dairy and meat products and fish. In the Rostov Region, compared to other regions of the Southern Federal District, the level of energy value of diets (2850 kcal) remains relatively low, exceeding the minimum level by 3.5%, and the level of protein intake does not reach the minimum value (67.4 g at a rate of 75.0 g).

Most of the expenses of the population of the Rostov region are for the purchase of goods and payment for services. Despite the fact that since 2012 this indicator decreased from 85% to 78.8%, its value remains high.

Thus, despite the presence of a number of favorable trends, in general, the state of food security in the Rostov region remains unstable. The high level of physical accessibility of food is not supported by a sufficient level of economic accessibility, which is caused by the inability of part of the population to purchase goods at affordable prices. As a result, part of the region’s population is not able to consume food in quantities and quality that are acceptable by medical standards and consistent with the Food Security Doctrine of the Russian Federation.

The need to solve the problems in the field of food security in the Rostov region actualizes the task of developing a regional food security strategy aimed at meeting the current need for high-quality and safe for human health agricultural products and creating conditions for the real availability of food for
all population groups. The model for ensuring food security in the Rostov region, based on the use of favorable factors in the region, is presented in Figure 1.

The result of the functioning of the organizational and economic mechanism for ensuring food security in the Rostov Region should be the amount of agricultural production that is necessary to ensure expanded reproduction, taking into account the production and economic potential of the agricultural sector in the region. The priority areas should be providing social support and increasing the economic affordability of basic foodstuffs for the population of the Don Region.

In the long run, the food security strategy of the Rostov Region, like any other Russian region, should focus on the following priority areas:

1. The development of land relations in agriculture, the creation of civilized market relations between the subjects of the agri-food complex, the organization of effective state control in the use of agricultural land.

![Figure 1. Model of the organizational and economic mechanism for ensuring food security in the Rostov region](image)

Agricultural land is the most important livelihood resource for the Russian Federation and its regions; however, with 9% of the world's agricultural land, Russia produces only 1.5% of the gross
world agricultural product. Over the past 15 years, the area of arable land has decreased by more than 10 million hectares. The land rights of agricultural producers are not properly registered; only 3.5% have state registration of rights. The land legislation of the Russian Federation has still not resolved a number of contradictions in terms of regulating the turnover of land shares, forming land plots, protecting agricultural land from inappropriate and inappropriate use (more than 30 million hectares of agricultural land are currently not used for their intended purpose), protection valuable lands. [19, p. 84-88] In this regard, both at the federal and regional levels, it is necessary to improve land legislation in order to support national producers of the agricultural sector, ensure import substitution and, accordingly, food security at the macro and mesoscale.

2. The implementation of institutional policies aimed at improving the competitiveness of local agricultural producers. Serious attention should be paid to the creation of a modern infrastructure of the agricultural sector of the region, including a system of dealer enterprises, pedigree and seed organizations, veterinary services, enterprises of the agrochemical industry and plant protection, information and computing centers, etc.

3. Promoting the use in agriculture and livestock raising, as well as in the processing and storage of agricultural products of high-performance and at the same time environmentally friendly and economical technologies, the expansion of the use of international quality standards, primarily for processing enterprises. In the Rostov region, it is necessary to create conditions for the development of innovation in the agricultural sector, aimed at modernizing the technological base of its main industries.

4. The development of the market infrastructure of the agri-food market, the creation of grain, vegetable and other agro-exchanges and other mechanisms that ensure the formation of organized markets for agricultural products and food. One of the most important areas in this block of measures is the expansion of the state system of market information and counseling, as well as legal and organizational assistance to the formation of a risk insurance system in agricultural production.

5. The intensification of financial and credit support to agribusiness enterprises, primarily, increasing the availability of credit funds for all categories of producers (agricultural, processing and wholesale agribusiness enterprises, including peasant farms, private household plots and private entrepreneurs) [20, p. 96]. As an incentive for the participation of regional banks and microfinance organizations in lending to agricultural producers, tax incentives are needed for lenders advanced in funds for innovative projects related to the modernization of production and the introduction of advanced technologies. The most important measures in this direction are the development of the National Guarantee System and syndicated lending and project financing mechanisms («VEB Project Financing Factory»), oriented respectively to support small and medium enterprises and large manufacturers in the regions.

6. The integration of agribusiness entities: the creation of integration ties of agricultural producers with processing, serving enterprises and trade, which will provide such advantages as: elimination of speculative mark-ups of character intermediaries; demonopolization of the sales market and increasing the degree of protection of corporation participants in a competitive environment; vertical formation of agro-industrial relations from the bottom up taking into account the specifics of production and consumer preferences.

7. The development of alternative forms of employment in the village, aimed at the implementation by the agri-food complex of the functions of resource and food support for the reproduction of a physically healthy society, including maintaining the stability of the food supply for the population of the region. One of these areas may be rural tourism [21, p. 64].

4. Conclusions

Thus, state food security policy at the regional level should be systematic and comprehensive. As experience shows, agricultural enterprises operating in a closed cycle system «production - processing – sales» have a more stable position. At the same time, integrated agricultural formations,
characterized by a wide variety of legal forms, types of activities, as well as forms of ownership and interaction of participants, are most effective. Therefore, given the limited possibilities of the state budget, it is necessary to increase the emphasis on intra-regional resources in the creation of agricultural holdings and agricultural reserves, primarily on the development of cooperation and agro-industrial integration, as areas that contribute to the growth of agricultural production efficiency and food security.

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Conflict of Interest
The authors have no conflict of interest to declare.

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