

Artículo de investigación

Formation of an integrated system for monitoring the food security of the region**Формирование комплексной системы мониторинга продовольственной безопасности региона**

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The agro-industrial complex at the current stage of operation requires a comprehensive analysis of the main directions of agricultural development and its development prospects, assessment of indicators determining the level of accessibility of food products - according to the global food security index, which allowed us to identify the main problems in ensuring the availability of food products. The subject of the study is the formation of an integrated system for monitoring food security in the agro-industrial complex of the region. The paper presents a comparative description of the methodological approaches to assessing the food security of the region. Indicators of the Russian Federation that are not fully synchronized with the main indicators of FAO food security have been identified. The aim and objective of the study is the introduction of progressive methodological approaches to assessing the physical accessibility of food products, which involves assessing the level of development of the distribution infrastructure taking into account the FAO system of food

Аннотация

Агропромышленный комплекс на современном этапе функционирования требует проведения комплексного анализа основных направлений развития сельского хозяйства и перспектив его развития, оценки показателей определяющих уровень доступности продовольственных товаров – согласно индексу глобальной продовольственной безопасности, который позволил выявить основные проблемы в обеспечении доступности продовольственных товаров. Предметом исследования является формирование комплексной системы мониторинга продовольственной безопасности агропромышленного комплекса региона. В работе представлена сравнительная характеристика методических подходов оценки продовольственной безопасности региона. Выявлены показатели РФ, которые не в полной мере синхронизированы с основными показателями продовольственной безопасности FAO. Целью и задачей

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safety indicators, which allows an objective assessment of the volume of domestic production, determine the country's comparative advantages in the production of basic food products, and also evaluate the effectiveness of this production. The identified systemic threats to the food security of the region make it possible to justify the reserves for improving the functioning of the regional agri-food market. The necessity of applying a systematic approach to assessing the level of regional food security, which consists in consolidating the organizational, managerial, financial, economic and regulatory mechanisms for regulating the food security of the region, is substantiated. This will provide an information basis for determining development priorities and guidelines, identifying problems and threats in the food sector, taking into account regional characteristics, increasing the efficiency of forms and methods of food flow movement based on the use of effective management methods, the capabilities of modern information technologies and logistic ties.

Keywords: Food security, affordability of food.

исследования является внедрение прогрессивных методических подходов по оценке физической доступности продовольственных товаров, предполагающий оценку уровня развития товаропроводящей инфраструктуры с учётом системы показателей продовольственной безопасности ФАО, позволяющий объективно оценивать объёмы внутреннего производства, определять сравнительные преимущества страны в производстве базовых продовольственных продуктов, а также оценивать эффективность этого производства. Выделенные системные угрозы продовольственной безопасности региона позволяют обосновать резервы повышения эффективности функционирования регионального агропродовольственного рынка. Обоснована необходимость применения системного подхода к оценке уровня региональной продовольственной безопасности, заключающегося в консолидации организационно-управленческого, финансово-экономического и нормативно-правового механизмов регулирования продовольственной безопасности региона, что позволит обеспечить информационную основу для определения приоритетов и ориентиров развития, выявления проблем и угроз в продовольственной сфере, учитывать региональные особенности, повысить эффективность форм и методов движения продовольственных потоков на основе использования методов эффективного управления, возможностей современных информационных технологий и логистических связей.

Ключевые слова: продовольственная безопасность, экономическая доступность продовольствия.

Introduction

Food security is one of the most important components of a country's national security. The level of food security depends on the effectiveness of the development and functioning of the agro-industrial complex. The experience of Russia's participation in the WTO, geopolitical instability, the imposition of sanctions on the one hand, and the embargo on food supplies, on the other hand, necessitated a change in the vector of Russia's agricultural and food policy in the direction of finding new reserves to improve the functioning of the agricultural and food market.

Such a policy should be aimed at reducing the gap between the Russian agro-industrial complex and the world leaders in agricultural production, increasing the profitability of all agricultural sectors, and ensuring the availability of high-quality food for the population throughout the country. The solution of the tasks set is impossible without sustainable food supply of the regions, primarily due to their own internal capabilities and reserves. A prerequisite for effective activation of import substitution processes is the identification and rational use of

reserves at the regional level, ensuring food security of the state, taking into account national and international criteria.

Methodology

Under current realities, the problem of ensuring food security comes to the forefront in modern competition in the market (Ostaev et al., 2019). The problem of ensuring food security is multidimensional and reflects the objectively existing multifunctionality of agriculture. An important role in the process of developing an effective food security strategy is played by the study of global trends affecting the future of food security in the world and world experience in solving this problem. In order to determine the reproductive capabilities of the food complex, it is necessary to identify key problems in ensuring

food security based on international comparisons.

In the Russian Federation, ensuring food security is determined primarily by solving the problems of achieving food independence, import substitution, and ensuring the economic and physical accessibility of food products for all segments of the population. Such an approach significantly narrows the possibilities of using the existing potential of the country's food complex and restrains its development in other areas, limits the possibilities of forming organizational and managerial relations between participants in the agro-industrial market. This is confirmed by the data of the Country Global Food Security Index (GFSI), developed by the Economist Intelligence Unit (Table 1).

Table 1 - International ranking of countries by the global food security index for 2018 (Global Food Security Index)

Country	Global Ranking	Total Index	Profitability rank	Availability rank	Quality and safety rank
Singapore	1	86,9	94,3	1	24
Ireland	2	85,5	87,8	3	7
USA	3	85,0	86,8	5	4
Netherlands	5	84,7	82,8	10	6
France	10	82,9	80,5	19	2
Portugal	19	79,3	76,7	28	1
Hungary	30	72,8	75,6	31	33
Malaysia	40	68,1	71,4	36	38
Russia	42	67,0	70,5	37	25
Panama	50	61,9	63,0	53	52
Philippines	70	51,5	46,3	74	69
Ethiopia	100	36,0	26,0	103	99
Burundi	113	23,9	14,7	111	103

Based on the data of the Global Food Security Index, Singapore leads in the world ranking of countries, and the West European states, including Germany, are in the top ten. In 2018, Russia ranks 42nd, which is significantly higher than in previous periods (it occupied only 48th place in 2016) and corresponds to the level of the 2014 index. Rating growth is explained by an increase in profitability, affordability and quality food. The most significant increase is observed in terms of food availability. Only five of the 13

indicators analyzed in this group have positive dynamics and are in the green zone, exceeding the global average.

Results and discussion

Further, a more detailed analysis of indicators determining the level of accessibility of food products in the Russian Federation according to the global food security index (table 2) is carried out.

Table 2 - Indicators of the availability of food products of the Russian Federation according to GFSI for 2018

Indicator	Characteristic of indicator according to GFSI	Evaluation criterion	Indicator value	Deviation from the average international value according to GFSI, % 2018	Deviation from the international average according to GFSI, % 2016
1. Availability of food supplies	Measures food availability through food supplies in kcal / person / day and food aid levels.	Rating from 0 to 100	85,7	28,9	11,3
2. Medium feed	Estimates the amount of food per capita available for consumption.	kcal / person / day	3358	23,7	23,3
3. Dependence on systematic food assistance	The amount of non-emergency food aid for five years is determined.	Rating 0-2	1	43,4	-21,7
4. Government spending on research and development in agriculture	Research costs are the basis for agricultural innovation and technology, which improves the efficiency of the food market and access to food products.	Rating from 1 to 9	2	-3,1	-0,9
5. Agricultural infrastructure	An indicator that allows you to determine the ability to store and transport crops to the market.	Rating from 0 to 100	50,9	-7,8	-5,6
6. Warehouse availability	Qualitative assessment of the availability of sufficient means of storing grain, depending on the size of the agricultural sector and population.	Rating 0-1	1	7,1	13,3
7. Road infrastructure	Quality indicator of road infrastructure	Grade 0-4	1	-20,4	-19,0
8. Port infrastructure	Qualitative indicator of port infrastructure	Grade 0-4	2	-2,9	-2,2
9. Stability of agricultural production	The standard deviation of agricultural production growth over the last twenty years for which data are available.	Standard deviation	0,2	-9,5	-24,0
10. The risk of political instability	The degree of influence of political instability on the level of accessibility of food products is estimated.	Rating from 0 to 100	55	-11,5	-21,3
11. Level of corruption	Measures the prevalence of corruption in a country by assessing the risk of corruption. Corruption can affect the availability of food due to distortions and inefficiencies in the use of natural resources, as well as bottlenecks in the inefficiency of food distribution.	Rating from 0 to 4	4	-37,6	-36,5
12. Food Market Absorption Capacity	GDP as% of real change minus urban growth.	-	0,68	-1,1	-11,4
13. Loss of food	Post-harvest losses and losses incurred during the processing of raw materials are estimated.	Standard deviation	2	10,6	11,3

According to experts of the Economist Intelligence Unit, the main problems in ensuring food security in the Russian Federation are: a high level of corruption; low government spending on food safety research; insufficient level of GDP per capita (at purchasing power parity); low ability of the economy to adapt to the processes of urbanization, to ensure food security at the required level; the high degree of influence of political instability on the level of accessibility of food products as a result of a decrease in the physical availability of food or a reduction in the obligation to provide food assistance; undeveloped agricultural infrastructure; instability of agricultural production. In order to determine the key areas of threat labeling in the field of food security of the Russian Federation, taking into account international comparisons, it is necessary to conduct comprehensive monitoring of organizational, managerial and financial-economic processes in the food sector of the Russian Federation.

The functional basis of modern research on the mechanisms of formation and regulation of economic relations in the agri-food market of the Russian Federation and recommendations in this area is to reduce costs in the distribution system, increase the competitiveness of domestic food both in the domestic and foreign markets. A criterion for the effectiveness of these processes is to achieve the necessary level of food supply for the population, both at the macro and mesoscale levels.

The level of food security of the state is determined by the effectiveness of the development and functioning of regional agribusiness. Analysis and assessment of the level of physical and economic accessibility of food at the regional level is fundamental to identify new reserves to improve the functioning of both the state as a whole and the region in particular. The level of food security in each

region is determined taking into account specific features: the natural and climatic conditions of the subject of the Russian Federation, the socio-economic situation, the state of agricultural production and the food market, and food sufficiency. Therefore, regional characteristics predetermine the totality of real and potential threats that affect the level of food security at the macro- and mesoscale levels.

Krasnodar Territory was selected as the object of comprehensive monitoring of regional organizational, managerial, and financial and economic processes in the food sector. The Krasnodar Territory belongs to the regions that have the most favorable natural and economic conditions, a high density of the rural population, a developed transport network, and significant potential for agricultural land, food and processing industries.

Summarizing modern approaches to assessing the current level of food supply, four groups of indicators can be distinguished.

- 1) Indicators characterizing the supply of food, i.e. its physical availability;
- 2) Indicators characterizing solvent demand, i.e. food accessibility;
- 3) Indicators characterizing the level of food consumption, i.e. food sufficiency;
- 4) Indicators characterizing the quality and safety of food.

The methodology for a comprehensive assessment of the content of the criteria for food independence in the region includes an assessment of the level of self-sufficiency, the share of imports, a comparison with the criteria recommended by the Food Security Doctrine of the Russian Federation for basic food products. Based on the considered indicators, we analyze the food independence of the Krasnodar Territory for 2012-2017 (table 3).

Table 3 - Criteria for assessing food independence of the Krasnodar Territory, % (Federal State Statistics Service)

Criteria for evaluation	2013	2014	2015	2016	2017
Potatoes					
1. In terms of self-sufficiency	87,9	86,3	90,3	90,1	90,4
2. By share of imports	36,2	28,4	36,8	39,0	22,9
3. According to the Doctrine - not less than 95%	82,5	88,0	89,7	82,4	99,1
Meat and meat products					
1. In terms of self-sufficiency	97,4	76,7	76,4	81,6	78,0

2. By share of imports	47,5	48,7	59,5	60,4	70,4
3. According to the Doctrine - not less than 80%	95,1	99,4	77,8	80,6	80,2
Milk and Dairy Products					
1. In terms of self-sufficiency	105,1	99,5	97,8	98,3	99,8
2. By share of imports	38,5	43,8	45,1	43,6	51,8
3. According to the Doctrine - not less than 90%	104,1	99,6	98,4	98,0	100,9
Vegetables					
1. In terms of self-sufficiency	110,6	92,7	97,8	108,2	107,8
2. By share of imports	74,4	79,6	79,9	72,3	46,7
3. According to the Doctrine	115,3	107,3	107,6	111,2	120,2
Eggs					
1. In terms of self-sufficiency	89,1	81,9	76,8	81,8	88,9
2. By share of imports	15,8	22,5	40,3	48,7	50,4
3. According to the Doctrine	88,9	82,2	77,4	81,7	88,9
Fruits					
1. In terms of self-sufficiency	53,2	68,3	63,3	60,4	76,5
2. By share of imports	127,5	149,2	158,1	142,6	133,2
3. According to the Doctrine	51,6	60,0	71,3	64,2	81,0

The level of self-sufficiency in all food groups is characterized by a downward trend, with the exception of groups such as potatoes and fruits. The decrease in the level of self-sufficiency is due, on the one hand, to an increase in consumption and a decrease in the production of food products such as milk and meat, and, on the other hand, an excess of the growth rate of consumption over the growth rate of production of vegetables and eggs. The share of imports is characterized by an increase in the external supply of food products for such products as meat, milk, eggs, fruits, with the exception of potatoes, vegetables, they are characterized by a decrease in imports. The growth in the share of imports of meat, milk, eggs and fruits is characterized by an excess of demand over supply for these products, since the level of

consumption in the analyzed period significantly exceeds the level of production, which in turn requires an increase in imports to ensure that the needs of the population are met at the expense of countries such as Belarus, Kazakhstan, China, Turkey and Egypt.

The physical accessibility of food implies the uninterrupted supply of food to places of consumption in volumes and assortments corresponding to solvent demand. Based on the updated methodological tools for assessing the level of food security in the Krasnodar Territory for 2013-2017, it was determined that the physical accessibility of food is low. Calculations of the coefficient of coverage of food imports, which had a value of 0.60 in 2017, shows this (table 4).

Table 4 - The Physical availability of food by the population of the Krasnodar Territory (Federal State Statistics Service)

Index	2013	2014	2015	2016	2017	Growth rate, %
1. Food export (including export), million US dollars	1184,4	1671,0	1747,9	2319,8	1515,4	127,9
2. Food imports (including imports), million US dollars	2631,1	2394,0	3080,5	2766,0	2541,4	96,59
3. The coverage ratio of food imports	0,45	0,70	0,57	0,84	0,60	x
4. Level of physical accessibility	low			acceptable	low	x

The question of how much agricultural products to produce in the region and how much to import is relevant in the context of the socio-economic aspect. It is important for the state, business and the population of the region interested in the growth of rural employment through the development of agricultural production and ensuring food independence of the regions and

the country. It is worth noting that the provision of the population in the Krasnodar Territory with basic agricultural products, which are indicated in the Food Doctrine, has a fairly high level, but at the same time, stable failure to meet the established criteria for some indicators is noted (table 5).

Table 5 - Key indicators of the market of basic food products of the Krasnodar Territory (Federal State Statistics Service)

Type of product	Period	Production, thousand tons	Import, including import, thousand tons	Export, including export, thousand tons	Foreign trade balance, thousand tons	Market size, thousand tons	Security level, %
1. Cereals and legumes	2015	12038,0	1296,1	9603,7	8307,6	3730,4	322,7
	2016	12871,0	2436,1	10702,8	8266,7	4604,3	279,5
	2017	13710,6	3566,7	13687,0	10120,3	3590,3	381,9
2. Vegetables and gourds	2015	716,0	615,2	659,8	44,6	671,4	106,6
	2016	767,0	623,6	671,6	48,0	719,0	106,7
	2017	869,8	581,0	658,9	77,9	791,9	109,8
3. Potato	2015	562,0	185,3	99,0	-86,3	648,3	86,7
	2016	604,0	246,3	171,2	-75,1	679,1	88,9
	2017	615,4	266,2	140,0	-126,2	741,6	83,0
4. Milk and dairy products (in terms of milk of established fat content)	2015	780,1	580,6	574,5	-6,1	786,2	99,2
	2016	771,0	601,2	579,8	-21,4	792,4	97,3
	2017	794,4	589,1	561,9	-27,2	821,6	96,7
5. Milk and dairy products (in terms of milk of established fat content)	2015	272,9	213,4	114,2	-99,2	372,1	73,3
	2016	283,2	264,4	164,5	-99,9	383,1	73,9
	2017	306,4	267,8	180,8	-87,0	393,4	77,9
6. Eggs (million pieces)	2015	713,4	408,5	85,1	-323,4	1036,8	68,8
	2016	636,5	734,4	320,8	-413,6	1050,1	60,6
	2017	769,6	919,3	573,7	-345,6	1115,2	69,0

In recent years, grain production in the Krasnodar Territory has noticeably increased, which has become an important export commodity. The leading place in the structure of this indicator is traditionally given to wheat; its harvest has almost doubled (Expert and analytical center of agribusiness).

The main criteria for assessing the food security of a region include economic accessibility and food independence, determined by the level of

inflation, the dynamics of the price level of individual food products, cash incomes of the population, purchasing power of average per capita incomes, the main indicators of agricultural development, and the level of food self-sufficiency. During the analyzed period, there was a significant increase in prices for basic food products. This trend is observed against the background of a decrease in the solvency of the population (table 6).

Table 6 - Purchasing power of the population kg per month in the Krasnodar Territory (Federal State Statistics Service)

Index	2013	2014	2015	2016	2017	Growth rate, %
1. Beef (except boneless meat)	90,4	107,8	114,8	105,2	106,2	17,5
2. Frozen fish (except salmon species)	188,6	221,2	214,8	168,5	163,1	-13,5
3. Sunflower oil,	305	355,8	408,2	334,9	299,2	-1,9
4. Milk 2.5-3.2% fat	727,5	783,7	710,1	703,6	705,7	-3
5. Chicken eggs, 10 pcs.	571,9	583,2	591,2	551,4	570,3	-0,3
6. Sugar	702	824,6	781	597,8	609,8	-13,1
7. Wheat flour	1077,3	1006,5	1157,1	1058,5	1067,6	-0,9
8. Polished rice	614,7	703,3	664,8	506	549,5	-10,6
9. Potato	1153,5	1002,2	924,2	1018,3	1282,2	11,2

The purchasing power of the population of the Krasnodar Territory decreased for all food products, with the exception of beef and potatoes. Given the fact that with a decrease in real incomes of the population, an increase in prices for food products is observed, a decrease in purchasing power poses a real threat to the economic affordability of the necessary food products to the population.

The level of sufficiency and balanced diet is an important criterion for the quality of food supply. In order to assess the quality of the diet in domestic and foreign practice, nutritional standards have been developed that take into account dietary characteristics by age, gender, physical activity, occupation, place of residence,

and features of national cuisine. In addition, the FAO norms determine the minimum calorie intake at the level of 1819 kcal per day (Food and Agriculture Organization of the United Nations). Significant deviations from the developed norms, both in caloric content and in the balance of the diet, adversely affect a person's state of health, his working capacity, duration and quality of life. Analysis of data on the consumption of basic food products in the Krasnodar Territory suggests that the consumption structure is unbalanced. In 2016, the Ministry of Health of the Russian Federation adopted new recommendations on rational food consumption standards that meet modern requirements for a healthy diet (Order of the Ministry of Health of Russia No. 614) (table 7).

Table 7 - The Average annual food consumption in the Krasnodar Territory

Product	Years					Consumption 2010	Consumption 2016
	2013	2014	2015	2016	2017		
1. Bread products (bread and pasta in terms of flour, flour, cereals and legumes), kg / person	133,0	132,0	133,0	132,0	132,0	95–105	96
2. Potato, kg / person	88,0	90,0	90,0	92,0	94,0	95–100	90
3. Fruits and berries, kg / person	97,0	96,0	96,0	96,0	93,0	90–100	100
4. Eggs and egg products, pieces / person	317,0	321,0	313,0	313,0	320,0	260	260
5. Sugar, including confectionery in terms of sugar, kg / person	49,0	49,0	49,0	49,0	49,0	24–28	24
6. Vegetable oil, kg / person	17,0	17,3	17,4	17,4	17,4	10–12	12
7. Vegetables and melons food, kg / person	132,0	134,0	135,0	136,0	137,0	120–140	140

8. Deviation from the 2010 consumption rate, kg / person	0	0	0	0	0	x	x
9. Meat and meat products, kg / person	76,0	79,0	81,0	81,0	81,0	70–75	73
10. Deviation from the 2010 consumption rate, kg / person	1,0	4,0	6,0	6,0	6,0	x	x
11. Milk and dairy products, kg / person	222,0	224,0	224,0	223,0	224,0	320–340	325
Deviation from the norm of consumption in 2010, kg / person	-98,0	-96,0	-96,0	-97,0	-96,0	x	x
Fish and fish products, kg / person	24,1	20,4	20,3	21,9	21,8	18–22	22
Deviation from the norm of consumption in 2010, kg / person	2,1	0	0	0	0	x	x
Nutrition Factor	Low					x	x

Negative changes are observed in the structure of food consumption in the Krasnodar Territory. Consumption of main types of products, such as potatoes and milk and dairy products, stably falls below the recommended level. A significant excess of the standards of the Ministry of Health of the Russian Federation was noted in the

consumption of sugar, meat and meat products, bread products, eggs and vegetable oil.

A comprehensive assessment of the food security of the Krasnodar Territory was carried out (table 8).

Table 8 - The values of food security indicators of the Krasnodar Territory

Indicator	2013	2014	2015	2016	2017
Affordability Level					
1. The coefficient of purchasing power of income	low				
Rank	3	3	3	3	3
2. The poverty rate	permissible	high		permissible	
Rank	2	1	1	2	2
3. Gini coefficient	low				
Rank	3	3	3	3	3
Physical accessibility level					
4. The coverage ratio of food imports	low			permissible	low
Rank	3	3	3	2	3
Food sufficiency level					
5. The ratio of food adequacy	permissible				
Rank	2	2	2	2	2
6. The ratio of the structure of nutrition	low				
Rank	3	3	3	3	3
Food quality level					
7. Quality factor	low				
Rank	3	3	3	3	3
Total points for the year:	19	18	18	18	19
Food security	low				

The data presented indicate the negative nature of the observed trends in the food supply of the region.

In our opinion, the ultimate goal and key characteristics of the formation of effective economic relations between all participants in the food market and the creation of the necessary conditions for the organization of marketing of products should be the quality and safety of the final food product.

According to the Food Security Doctrine of the Russian Federation, daily caloric value and balanced diet can be classified as indicators that assess the level of food quality (Decree of the President of the Russian Federation of 30.01.2010 N 120). According to the methodology for a comprehensive assessment of the degree of regional food security, food quality is assessed by the quality factor, measured through the share of rejected products of imported and domestic production (Nagovitsyna and Davydova, 2015). The data of the product quality coefficient in the Krasnodar Territory indicate a low level of food quality and an unfavorable trend of values throughout the analyzed period.

Conclusions and recommendations

In connection with all of the above, a number of problems can be identified that predetermined low values of indicators characterizing the level of food supply in the Krasnodar Territory.

1. The imbalance of the consumer basket. The current minimum consumer basket does not meet the objectives of the country's dynamic development, since it retains all the signs of a "survival model": most of the expenses fall on the "food" group, which is typical for underdeveloped economies.
2. Unbalanced nutrition. The nutrition of the majority of the inhabitants of the Krasnodar Territory does not meet the requirements and criteria for a healthy diet due to the consumption of food products, the manufacture of which used cheap vegetable fats, a lack of dairy products, fish and seafood, and functional foods in the diet.
3. Lack of the required number of specially equipped rooms for storing vegetables and fruits that meet not only quantitative, but also qualitative requirements. The shortage and high wear of the warehouse does not provide

the possibility of long-term storage of agricultural products with minimal losses.

4. Raw material export of grain. Zeroing grain export duties is not a favorable factor for the Krasnodar Territory, contributing to the development and increase of agricultural production efficiency. The agro-industrial complex suffers losses in animal husbandry, and agricultural producers strive to switch to grain production and sell unprocessed grain for export. As a result, the region does not receive value added.
5. Low development of the logistics system, characterized by the formation of separate supply chains at different stages of distribution. Using the rules of logistics in practice implies a clear interaction between the manufacturer, seller, buyer and logistics intermediaries, which leads to lower shipping costs and meeting the needs of the domestic market. The implementation of the logistics concept should include a focus on improving the processes of moving goods, optimizing inventory and costs, and ensuring high quality customer service. The development of the logistics management of the agro-industrial complex could help organize the promotion of local agricultural products on the Russian and regional markets and the information exchange between the participants of the regional food market. The modernization and development of the transport and logistics infrastructure of the Krasnodar Territory is one of the most important tasks of the development of the region, which cannot be solved without the federal budget.
6. Low level of food quality and consumption culture.

A comprehensive assessment of the physical and economic availability of food, as well as its quality, is fundamental for identifying new reserves for improving the functioning of the agri-food market in the field of rationalization of economic relations between agricultural producers and wholesale and retail enterprises of the agro-industrial complex, as well as for the development of more efficient methods of food movement flows using efficient management, opportunities of modern information technologies and logistic connections.

The agro-industrial complex should be considered by regional authorities as a fundamental economic system that will ensure food security. Meanwhile, the analysis of the effectiveness of agri-food policy as a fundamental methodology for assessing the food security of a region cannot be considered sufficient. To a greater extent, the methodology for assessing food security should be based on assessing the quality of food security, which cannot be assessed using a single indicator.

To assess the state of food security at the domestic level, those methodological approaches are more acceptable, the basis of which is the principle of sufficient, balanced and high-quality nutrition, taking into account the physiological dietary standards of the population, age, profession, place of residence and national characteristics. Indicators that include a wide range of characteristics make up a model of regional food security. At the regional level, the management of the agro-industrial complex,

including in municipalities, is carried out through organizational, managerial, financial, economic and regulatory mechanisms (Kovaleva et al., 2018).

The organizational and managerial mechanism in the Krasnodar Territory is implemented by the Ministry of Agriculture and Processing Industry of the Krasnodar Territory, which operates in accordance with the legislation of the Russian Federation and the Krasnodar Territory, as well as the Regulation on the Ministry; accordingly, the regional agricultural administrations at the municipal level (Ostaev et al., 2019)

An assessment of regional food security should include a detailed analysis of these areas using specialized assessment indicators. In addition to the list of indicators used, it is proposed to supplement the methodology for assessing food security in the region with a number of security indicators with the definition of levels of control over them (table 9).

Table 9 - Additional list of regional food security assessment indicators

Indicators by direction	Who is rating
1. Affordability	
1.1 Prevalence of Malnutrition	
2. Physical accessibility	Ministry of Agriculture and Processing Industry of the Krasnodar Territory
2.1 Development of road infrastructure	
2.2 Development of railway infrastructure	
3. Food quality	
3.1 The proportion of products containing potentially harmful substances, the use of which leads to an increase in the incidence of	Office of the Federal Service for Supervision of Consumer Rights Protection and Human Well-Being in the Krasnodar Territory
4. Food Adequacy	
4.1 The share of cereals, root crops, tubers in the energy value of the diet	
4.2 The extent of the spread of deficiency of vitamins and minerals	

The main activity vector of the Directorate of the Federal Service for Supervision of Consumer Rights Protection and Human Well-being should to a greater extent be aimed at anticipating food quality problems by tightening quality requirements in the GOST system for food products (GOST R 51074-2003).

The financial and economic mechanism for regulating relations in the agro-industrial complex is associated with the determination of needs and the use of budgetary funds for the implementation of targeted programs, training, provision of benefits, subsidies, etc. An

important form of state support for the regional agricultural sector is insurance. The main goal of state support for crop insurance is to protect the property interests of agricultural producers from possible damage due to the presence of natural and climatic risk factors.

The regulatory mechanism of state regulation is implemented through a system of regulations that create the institutional environment for the implementation of the activities of agricultural organizations. Thus, the regional executive bodies have a very wide range of instruments for managing the agro-industrial complex. However,

the amount of funds allocated under the ongoing programs is insufficient, as evidenced by the existing problems in the food sector.

Comprehensive monitoring of regional organizational, managerial and financial-economic processes will improve the functioning of the regional agri-food market and ensure:

- 1) The development of international integration in the field of food supply;
- 2) Increasing the effectiveness of support for regions with insufficient food production;
- 3) Increasing the transport accessibility of regions for a guaranteed and uniform supply of food products;
- 4) Conditions for increasing the number of objects of the trade infra-structure.

Agro-industrial integration is aimed at creating effective interaction between all aspects of ensuring food security. Balanced development and effective interaction of all sectors is a prerequisite for the formation of food independence and food security of the country as a whole and its individual regions. Therefore, to achieve the required level of food security of a country or a separate region, there is an urgent need for integrated effective development of all allocated systems, since a failure even in one of them can level all the achievements of others (Molchan, Ternavshchenko, Francisco, 2017).

New reserves for improving the functioning of the agri-food market need to be identified in the field of rationalizing economic relations between agricultural producers and wholesale and retail enterprises of agricultural products, the development of more efficient forms and methods of movement of food flows through the use of effective management methods, the capabilities of modern information technologies and logistics (Molchan et al., 2017).

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