

IMPROVEMENT OF THE FOOD SECURITY SYSTEM OF THE VORONEZH REGION BASED ON THE INTERNATIONAL EXPERIENCE

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The problem of providing the population with adequate amount of food is not something special and of course it is not unique only to the Russian Federation. It has always existed; it is preserved at the present time and it is a worldwide problem. The relevance of the research topic is conditioned by the need for guaranteed stable food provision, as well as the restoration of the volume of agricultural production that will ensure the state's food independence. A key role in solving this problem is played by various institutions that control and facilitate the uninterrupted supply of food to all parts of the state, as well as economic agents of the agro-industrial complex, primarily agricultural enterprises. A systematic analysis is required in order to find solutions to the problem of food supply and food security. At the same time, the problem should be solved both at the state level and at the level of regions within the development of the regional framework concepts of food security. The relevance of the research is also determined by the importance and necessity for the population of economic subjects to consume basic food products in a volume that corresponds to scientifically developed medical norms. Health, working capacity, life expectancy of a person and his intellectual abilities depend on the quantity and quality of food consumption. All these factors ensure the competitiveness of the regions. The aim of this research is to develop directions for improving food security in the Voronezh region and to evaluate the effectiveness of their implementation.

Key words: food security system, supply of food, Voronezh region.

СОВЕРШЕНСТВОВАНИЕ СИСТЕМЫ ПРОДОВОЛЬСТВЕННОЙ БЕЗОПАСНОСТИ ВОРОНЕЖСКОЙ ОБЛАСТИ НА ОСНОВЕ МЕЖДУНАРОДНОГО ОПЫТА

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Проблема обеспечения населения достаточным количеством продовольствия не является чем-то особенным и, конечно, не является уникальной только для Российской Федерации. Она существовала всегда, сохраняется и в настоящее время, и это общемировая проблема.

Актуальность темы исследования обусловлена необходимостью гарантированного стабильного продовольственного обеспечения, а также восстановления объемов сельскохозяйственного производства, что обеспечит продовольственную независимость государства. Ключевую роль в решении этой проблемы играют различные институты, контролирующие и способствующие бесперебойному снабжению продовольствием всех звеньев государства, а также хозяйствующие субъекты агропромышленного комплекса, прежде всего сельскохозяйственные предприятия. Для решения проблемы продовольственного снабжения и обеспечения продовольственной безопасности необходим системный анализ. При этом проблема должна решаться как на государственном уровне, так и на уровне регионов в рамках разработки региональных рамочных концепций продовольственной безопасности. Актуальность исследования определяется также важностью и необходимостью для населения хозяйствующих субъектов потреблять основные продукты питания в объеме, соответствующем научно разработанным медицинским нормам. Здоровье, работоспособность, продолжительность жизни человека и его интеллектуальные способности зависят от количества и качества потребляемой пищи. Все эти факторы обеспечивают конкурентоспособность регионов. Целью данного исследования является разработка направлений повышения продовольственной безопасности Воронежской области и оценка эффективности их реализации.

Ключевые слова: *система продовольственной безопасности, снабжение продовольствием, Воронежская область.*

Theoretical background

The problem of food security is being studied by many scientists¹. For the first time, world practice and economic science turned to food problems from the standpoint of world and national economic security in the middle of 1970s, after the decline in grain production in the leading grain-producing countries of the world. The world grain crisis that broke out in 1972-1973 contributed to the fact that the problem of food security has become an important factor in the national security of all countries. Food security as an economic problem has evolved. More and more global events and subsequent problems are connected with food security. Much attention is given to the impact of food on poverty, humanitarian crises, conflicts and climate change. All indications are that food security is a national security problem.

Ensuring food security is a priority of state policy, as it covers a wide range of national, economic, social, demographic and environmental factors. Therefore, the

¹Anfinogentova A. - "Food security of Russia: problems and prospects", 2004.

Balabanov V. - "Food security: international and internal aspects", 2002.

Samoylov A. - "Ensuring food security as one of the conditions for sustainable economic development", 2003.

Frankenberger T. – "Chronic and transitory food insecurity, key issues in emergency need assessments", 2003.

Barsukova S. and Dufi K. - "Food security: the history of the concept, the Russian context", 2016.

state's social and economic policy should be closely linked to food security which is based primarily on mobilizing domestic resources.

Nutritional level of the population characterizes the level of economic development and stability of the country, as production for sale is one of the basic revenue items of the state budget.

Any state is responsible for the health of the nation; it must guarantee the quality of food that is consumed by population, therefore the most important direction of the state should be the improvement of product standards, raw materials standards and quality control methods.

The word combination "food security" in the economic policy of Russia began to be actively introduced during the development of the law concerning food security of the Russian Federation (Balabanov 2002). Currently, there is no single generally accepted definition of the concept of "food security" each author makes his own adjustments to the definition. According to L.Chershinsky food security of the country should be understood as "ensuring the guaranteed saturation of its food needs (including current consumption and creation of food reserves) with the harmlessness of the products that are produced."(Kudryashova. and Presnyakova 2007)

Anfinogenova (2004) draws attention to 3 levels on which food security can be measured:

- 1) Food security at the state level, which is determined by the ratio of the volume of imports to the volume of production of own food, the share of imports in food consumption, the change in minimum per capita income and food prices;
- 2) Food security at the regional level, which is measured by data on food consumption and income.
- 3) Global food security, which is characterized by the size of grain stocks and the volume of its production per capita;

In 2002, the World Food Programme (WFP) defined food security as a situation where all people, at all times, have physical, social and economic access to safe and nutritious food that satisfies their nutritional needs in order to maintain an active and healthy lifestyle (FAO, 2017). Currently, WFP identifies four main areas of food security as follows: food availability, access to food, utilization and stability.

A very effective way of analyzing food security is to differentiate the concepts of food availability and food accessibility.

Food availability is associated with the availability of sufficient quantities of food of appropriate quality, which is provided mainly through domestic production. Availability refers to the physical presence of sufficient food stock for example, the physical capabilities of a particular tract of land for food production. Availability can also refer to the presence of food around the world, which can be distributed through the international trading system (import and export) or as food aid. Availability of sufficient food in general depends on effective agricultural production in a particular country.

However, the availability of food does not mean that everything is in order in the country with food security; Hunger also happens in countries where food is in abundance. Access to food means to ensure economic and physical accessibility of

food. In other words, accessibility means the ability of people in a particular country or region to have an actual access to food. Economic accessibility means that food should be affordable. People should be able to buy products to maintain an active life, without prejudice to their any other basic needs, for instance without sacrificing the ability to pay school fees, drugs or rent. Physical access means that food should be accessible to everyone, including physically vulnerable persons, such as children, sick, disabled or elderly, who may not easily go out for food. Access to food must also be guaranteed to the populations of remote areas and to victims of armed conflicts or natural disasters, as well as to prisoners.

The main idea of food stability is that food is available for current and future generations. Referring to food stability, Frankenberger (2003) notes that in emergency situations it is important to distinguish between different vulnerable groups so that proper targeted support can be provided so that these people do not become more vulnerable to shocks.

Vulnerability is defined as an exposure to risks and stress and lack of ability to cope with the consequences of risk; it attempts to describe an extent to which individuals and families can't cope with adverse events for a variety of reasons. Thus, it is a dynamic concept that describes how people are on the chopping block and how do they go out of poverty and become food secured. However, food security and poverty are static concepts that describe the life sustaining conditions at specific times. People who are constantly vulnerable, who suffer from lack of food and constantly unable to meet their food needs (for example, several months, a whole year or more) are considered to be permanently vulnerable from the point of food insecurity. This category of people usually experiences financial difficulties, chronically sick; they occupy low-paid works and etc. It is difficult to combat with these structural drawbacks. The constant food shortage is also associated with chronic poverty. Landless, female-headed households, the elderly, sick and disabled people and other disadvantaged low-income groups, are usually more vulnerable and vulnerable from the food point of view. People can also be or become chronically vulnerable due to the fact that they live in areas prone to natural disasters or live in conflict zones. When people are only temporarily unable to meet their food needs, they are called transitional, vulnerable to food security, but are limited to a time interval. This is mainly due to seasonal fluctuations in income, adverse price fluctuations or temporary shocks. Thus, people who experience temporary food shortages can't keep their level of consumption on the same rate when they face with shocks or fluctuations, but these people are expected to be able to return on their previous level of consumption after the end of this or that shock (Frankenberger 2003).

Research question and research

The aim of this research is to develop directions for improving food security in the Voronezh region and to evaluate the effectiveness of their implementation. In order to achieve this goal, it was required to formulate and then to solve the following tasks:

- *to determine the nature and content of food security;*
- *to generalize evaluation methods for assessing food security, systematize criteria and indicators for ensuring food security;*
- *to analyze the state of food security, the level of food dependence of the Voronezh region on the importation of food;*
- *to identify risks and threats to the system of ensuring food security;*
- *To undertake a comparative analysis of approaches in ensuring food security in the Russian Federation and China as BRICS participants;*
- *To develop directions that might promote the growth of food security in the region.*

The practical significance of the research is that its basic calculations, as well as the proposed ways of improvement, could be applied by:

- *Regional authorities in the process of developing ways to improve food security in the Voronezh region;*
- *Agricultural enterprises in order to achieve the growth of their own production and profitability;*
- *Scientific workers, students of economic universities for the analysis of food security in other regions.*

Evaluation of risks and threats to the system of ensuring food security in Russia and the Voronezh region

The state policy in the field of ensuring food security must take into account risks and threats that can significantly weaken it. This includes factors such as a shortage of qualified personnel, price disproportions, modern systems for monitoring the state of the food market. The main groups of food security risks are defined by the Decree of the President of the Russian Federation of January 30, 2010 No. 120 "Concerning Approval the Doctrine of Food Security of the Russian Federation" in the form of macroeconomic, technological, agroecological and foreign trade (Decree 2010).

Macroeconomic risks are caused by a decrease in the investment attractiveness of the domestic real sector of the economy and the competitiveness of domestic products, as well as the dependence of the most important spheres of the economy on the external economic situation. First of all it is necessary to consider risks that arose from the point of view of the sanctions that have been imposed on the Russian Federation by a number of Western countries. Sanctions of the USA, the European Union, Australia, Canada and Norway, should be considered with the food embargo that was imposed by Russia in August 7, 2014. It was motivated, first of all, because sanctions of these countries affected the largest state banks of the Russian Federation which act as financial institutions for the development of the agricultural sector.

It is necessary to mention that the Russian embargo was adopted when the country began to go out to an acceptable level for a number of indicators after a long period of rigid import dependence. For example, Russia provides 89% for poultry meat, 82% for pork and 71% for beef. Restrictions have affected only 2.5% of the

consumption of beef in the country, 10% of milk and dairy products, 5% of vegetables; the highest level of exclusion was fruit share - 50% and cheeses up to 30%. The Russian Federation imported only 10% of pork, vegetables and fruits from the "banned" countries according to official data of the Ministry of Agriculture. The other categories of goods have an even lower index.

If we estimate the embargo list of products, we will see that the choice of goods was not made accidentally. First of all, there are wide opportunities for a rapid replacement of suppliers and for implementation of supply diversification. Secondly, there are enough capacities to increase the production of own food products, which are not used in full within Russia today.

Agro-ecological risks are the second group of risks to the country's food security. These include adverse climatic changes as well as the consequences of natural and man-made disasters. These risks are caused not only by adverse climatic changes, they are inherent in the problems that are associated with the consequences of natural and man-made disasters, soil, water and groundwater pollution that has been accumulating over many years, as well as the development of genetic engineering. This is already the environment of immediate human activity.

Technological risks belong to the third group and represent a set of problems, such as deprivation of technological development of the domestic production base, the organization of a system for monitoring compliance connected with food safety standards.

The reasons for technological risks are directly related to low innovation and investment activity in the production of agricultural and fishery products, raw materials and food, to a reduction in the national genetic resources of animals and plants, and to a shortage of personnel in the countryside. There is an acute problem with a shortage of agricultural machinery and technologies in Russian villages according to experts. High costs of electricity, low purchasing prices for agricultural products could be so devastating to a food security situation. Production funds are worn down by 70-80% according to different estimates. New agricultural machinery arrivals have slowed down as its production decreased by more than 10 times. The largest gap is observed in the meat and dairy industry where the share of obsolete equipment with a service life of more than 25 years reached the point of 52%, in baking - 67% (IFC 2006)

The last group of risks includes foreign trade risks represented by fluctuating market conditions and the application of government support measures in foreign countries. It can be assumed that the embargo that have been recently introduced gives cartel blanks to domestic producers and guarantees state support in the amount of 185 billion rubles. [55]

However, Abalkin (1994) in his work outlined that in order to reach self-sufficiency in food the country does not have to cling to autarky and isolation from the world market. The world practice has developed a number of important and reliable approaches to solve this problem, among them - flexible and effective protection of domestic producers. Moreover, if the production capacity of several products in the country is extremely limited or nonexistent the government should allow to import such products. In order to cover the expenses on import the country

should export such products in which it has competitive advantage and the production of which is more effective.

In general, the current period is proliferated by various threats to food security, namely:

- Growing inflation;
- Low real income of the population;
- *Social disintegration and the dissipation of social property.*
- Rising unemployment
- Deteriorating social situation in the villages
- Dependence of the agro-industrial (agro-food) market on the energy market;
- Concentration of production within individual enterprises (holdings), and hence the reduction in the number of small forms of management;
- Low competitiveness of the food industry and agriculture;
- Loss of foreign economic relations with a number of states.

Import substitution is not an end in itself but it is a necessity to create such production in our country when we can produce normal, high quality and competitive goods by ourselves.

The Voronezh region has sufficient natural resources, which allow it to play an important role in providing the country with products of agro-industrial production. Such security makes it possible to simultaneously solve the problems of food self-sufficiency and food security.

There are all conditions for the effective functioning of agricultural production of the main types of products in the Voronezh region today. The Voronezh region is one of the largest agricultural regions of the Russian Federation. The resources that are provided by nature give a great opportunity to use this potential for the successful development of the region. This determines the characteristics of the economic development of the subject and its potential direction in the economic plan. The role of the Voronezh region in providing the country with agricultural products is quite significant. The Voronezh region acts as a supplier of such important crops for life as grains, sunflowers etc. into a number of developed regions of Russia. It also acts as one of the largest exporters of dairy and meat products.

Despite extremely favourable natural conditions for the formation of an effective agro-industrial complex, there are also difficulties that are associated with specific features of the functioning of the agro-industrial complex, among which the greatest danger is represented by natural risks. In other words, there is a probability of unfavorable consequences from the impact of environmental factors on the conduct of entrepreneurial activities in the sphere of agro-industrial complex. The main sources of natural hazards include meteorological and other extreme natural phenomena (potential fire hazard of forests, steppes, etc.).

In addition to this, the Voronezh region cannot ignore a number of risks, among which the most significant are macroeconomic risks. This includes tightening competition in the agricultural market; the very cyclical nature of the market economy, and, of course, the raw material nature of the Russian economy and the food embargo.

Financial and economic crises lead to a shortage of financial resources, a rise in the cost of money in conditions of increased demand for them, which reduce the entrepreneurial opportunities of agricultural producers. A decrease in the investment activity of the producer is caused by limitations that arise in investment activities and by high interest rates on loans.

The formation of infrastructure risks is associated with the imperfection of the development of the market infrastructure. This applies primarily to rural areas. It is necessary to have sufficient infrastructural security for sustainable development of vital activity of the rural population. Analysis of infrastructure development in rural areas of the Voronezh region has revealed a significant danger to the occurrence of infrastructural risks. These include the risks of production, transport and social infrastructure.

Environmental risks lead to negative impact on the environment, which is expressed in negative consequences for it in the long term. This will not only lead to an exacerbation of environmental problems, but will also affect the potential to have the sufficient quantity and quality of resources needed for efficient production in the long-term future.

The concept of the participation of the Russian Federation in the program of food security of the BRICS countries

A distinctive characteristic of the current phase of international cooperation is the fact that the BRICS association, where Russian Federation is a member, is establishing cooperation on ensuring food security. BRICS is a group of five rapidly developing countries (Brazil, Russia, India, China, South Africa) that is united by the tasks of reforming the institutions of global governance, effective economic development and building a multipolar world (BRICS 2015).

Russia and China were the main initiators of the creation and promotion of the BRICS group. The organization was founded in June 2006 within the Economic Forum in St. Petersburg (Russia) with the participation of the Ministers of Economy of Brazil, Russia, India, and China. Initially, this organization included four states, but China became the initiator for the entry of South Africa in 2010. The BRICS countries signed a framework agreement on financial cooperation in 2011, which was an important step in promoting economic cooperation within the group. Currently, the states are supporting further transformation of the group into a platform for collaborative cooperation in resolving the most important issues of the world economy and politics (Russia-China 2017). An important principle of the organization's activity is the construction of relations based on equal cooperation and the development of shared visions. From this point of view, it is very interesting to consider the relations between Russia and China within the organization. In the event of contradictions or discrepancies on these or those issues, a complex work is carried out to find compromise solutions. It is important to notice that this approach, on the one hand, complicates the decision-making process, on the other hand, facilitates the development of an equitable dialogue between the group members.

Russia and China currently show an interest in interacting within the BRICS framework. This format of cooperation contributes to the preservation and strengthening of their international status, both in economic and political spheres. The presence of common foreign policy tasks shows that there is much common ground in approaches to participation within the group.

Today the Russian Federation is developing a joint project of the Federal Antimonopoly Service and the Higher School of Economics that is entitled as "Regulation of the food industry: a new model of competition and innovation policy for the BRICS countries" (FAS 2017). The project includes a comprehensive analysis of the regulatory landscape of commodity chains in the food sector - from agrarian and biotechnological production to retail trade. The main aim is to identify key areas and zones for the transformation of the intellectual property regime and competition policy in the production and trade of food for the development of Russia and the partner countries in Eurasian Economic Union and BRICS, taking into account the rapid change in food production technologies and the organizational models that are used by the agro-technological business. One of the focuses of the project is the analysis of regulation in the field of biotechnological (including genetic engineering) seed production and their subsequent distribution and how this affects the global value chain in the food sector. Proposals for transformation of antimonopoly regulation regimes and regulation of intellectual property issues for the development of the food sector in Russia and other BRICS countries will be made on the basis of the project results.

The main objectives of the Russian Federation's participation in cooperation with the BRICS partners in the field of food security are:

- The expansion of mutual trade in agricultural products, primarily oriented to the growth of Russian exports; attracting investments in domestic agriculture to accelerate its modernization;
- Exchange of information on policies in specific sectors of agriculture on investment policies in agriculture, on prices and volumes of production, processing and consumption of basic agricultural products;
- Interaction in order to adapt agriculture to climate change;
- Co-development of new agricultural machinery and technologies, including biotechnology in order to increase the productivity of agricultural production;
- Active use of the established mechanism of cooperation in this field, including regular meetings of the Ministers of Agriculture of the BRICS member states.

Measures to improve food security of the Voronezh region and the evaluation of the effectiveness of their implementation

The experience that was gained from the analysis of China's food security and measures that were aimed at improving food security², should be used as practice of

²Huang, J. and S Rozelle.– "Trade Reform, WTO and China's Food Economy in the 21st Century", 2003

improving the food system in the Voronezh region. Therefore, we need to consider the Voronezh region, relying on the "resource-structured-system" model that is used in China in order to determine measures that need to be applied to improve the food security of the region.

To determine the resource potential of the Voronezh region, firstly it is necessary to focus on the structure of the land fund and agricultural land, determine the efficiency of land use. The surface of agricultural land of the Voronezh Region is 4219 thousand hectares. Of these, 3,797 thousand hectares are farmlands, 2916 thousand is arable lands, 857.5 thousand hectares is grazing lands and hayfields. A feature of the region's land fund is the dominance of agricultural land, and among them - arable land.

To determine the efficiency of land use (L_u), we use the following formula:

$$L_u = F_s / A_s$$

Where,

F_s - The surface of farmland;
 A_s - The surface of agricultural land;

Thus, the coefficient of efficiency of land use in the Voronezh region is 0.9 or 90%.

Also it is worth paying attention to such an indicator as the degree of use of agricultural land. (A_{du})

$$A_{du} = A_r / F_s$$

Where,

F_s - The surface of farmland;
 A_r - The surface of arable land;

As a result, the coefficient of agricultural land use in the Voronezh region is 0.76 or 76%.

It should be noted that the dynamics of the areas of agricultural land used by landowners and land users engaged in agricultural production in the Voronezh region shows that it has decreased by 1.4% during 2000-2016. There is also a tendency in the decrease of acreage in general - by 14.4%. The degree of intensity of agricultural land use is clearly evidenced by the percentage of plowing that exceeds the ecologically permissible limit and varies from 66.0% to 88.7% in the Voronezh region. Over the past 10 years, the number of tractors has decreased by 2.3 times (the load of arable land per tractor increased from 49 to 106 ha.). The number of combines has decreased, so there were 142 harvesters per 1000 hectares in 2005, and 57

Huang, J., S. Rozelle and M. Chang.– “The Nature of Distortions to Agricultural Incentives in China and Implications of WTO Accession”, 2004.

<http://fas.gov.ru/international-partnership/briks/prodovolstvennaya-bezopasnost>

<http://wits.worldbank.org/CountryProfile/en/CHN>

harvesters in 2015 (2.5 times decrease). Also, the number of seeders, cultivators, combines, mowers and other agricultural machinery has reduced. Nevertheless, despite the negative dynamics, the yield of crops from the harvested area increases every year (Figure 1). Currently, the Voronezh region is ranked as 7th among the regions of the Russian Federation in terms of gross wheat harvest.

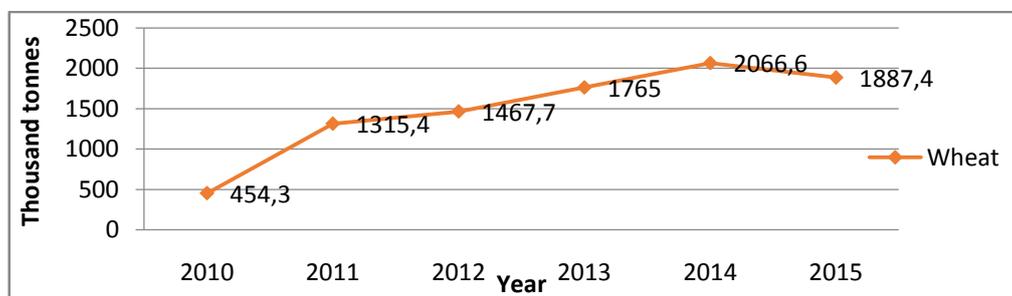


Figure 1 – Gross harvest of wheat, Voronezh region

From the structural point of view, the fall in the ruble exchange rate and the growth of dollar prices for grain have increased the profitability of Russian grain exports. According to the analytical center of ZAO “Rusagrotrans”, the yield of wheat exports with VAT refunds reaches 400-950 rubles per ton in 2015 (Rusagrotrans 2016). At the same time, exports from the Voronezh region are profitable and without VAT refunds. In general, the yield of wheat exports for the country in 2016 increased 1.5 times - to 1.46 billion dollars, compared with 981 million in the same period last year.

If we analyze food security in the Voronezh region as a system as a whole, then currently there are all the prerequisites for the development of the agro-industrial complex. Meetings with agricultural producers are held on a monthly basis at the government level, at which possible prospects for further development are discussed. Moreover, currently in the Russian Federation there is a process of simplification of obtaining rights to land ownership.

The above approach to assessing food security, based on the “resource-structural-system” base, is not able to reflect the full picture that is associated with providing the region with food, since it is complex and applicable mainly at the state level. In this regard, the problem of assessing the effectiveness of agro-food policy measures seems to be theoretically and practically significant because it is important to correlate the results of the functioning of the regional agro-industrial complex and the spending of the budgets of the territory, and monitor their compliance with WTO requirements. The methods of assessing regional food security that are used in world practice nowadays are not complex, not sufficiently formalized, they are oriented to assess certain aspects of food security and rely heavily on expert assessments. The methodology that is proposed below and which is based on the indicators of the assessment of production and consumption of food, as defined by the Doctrine of Food Security of the Russian Federation, will allow us to overcome these shortcomings. The indicators for assessing the food security of the region are correlated with the following criteria:

- level of food self-sufficiency in the region;
- degree of satisfaction of the physiological needs of the population in food products;
- level of economic accessibility of food.

The level of food self-sufficiency of the region is suggested to be estimated by using the self-sufficiency indicator (SS), which characterizes how fully the region provides the population's needs for various types of food products through local production:

$$SS = \frac{q}{n * Qp}$$

To calculate this indicator, we need to obtain the data on actual volumes of production of the main types of agricultural products in the region for the reporting period (q); the information on the population of the region (n). It will be necessary to determine how much food is needed for a given region in accordance with established rational consumption norms (Qp) (Table 1).

As a result of the calculations, SS indicator may assume a different value: the value of the indicator can be attributed to a low level ($SS \leq 0.5$), permissible level ($0.5 < SS \leq 0.9$) or an optimal level ($0.9 < Ks \leq 1$) of the region's self-sufficiency.

Table 1 – The level of food self-sufficiency in the Voronezh region [27]

	Actual volume of production, thousand tons (q)	The necessary volumes of food production in accordance with rational norms (n * Qp)	SS
Potatoes	1562	1281	1,21
Vegetables	541	567	0,95
Milk	829	785	1,05
Meat and meat products	259	231	1,12
Eggs, million pieces	598	397	1,5

The average value of self-sufficiency in the Voronezh region is 1,16.

To estimate the degree of satisfaction of the physiological needs of the population in food, it is advisable to use the coefficient of actual food consumption (FC), which shows the actual level of food consumption over a certain period of time (q_{fact}) in comparison with rational consumption norms (q_{norms})(Table 2).

$$FC = \frac{Q_{\text{actual}}}{Q_{\text{normal}}}$$

The coefficient of actual consumption of the population of the region of food (FC) can take the following values: $FC \leq 0,5$ – low level; $0,5 < FC \leq 0,95$ – allowable level; $0,95 < FC \leq 1$ is the optimal one. Based on the calculation of the actual

consumption of food for different types of food, the average value of the indicator should be determined.

Table 2–Consumption of food products in the Voronezh region [27]

	Bread	Potatoes	Vegetables	Meat	Milk	Eggs, pcs.	Sugar
The Voronezh region	125	119	123	74	286	275	41
Rational consumption norms	95–105	95–100	120–140	70–75	320–340	260	24–28
FC	1,19	1,19	0,87	0,99	0,84	1,05	1,46

The average value of actual food consumption in the Voronezh region is 1.08.

To assess the economic accessibility of food, several indicators need to be analyzed: poverty rate (Pr), expense rate (Er), Gini coefficient (Gc) (Table 3).

Table 3–The system of indicators and criteria for the economic accessibility of food

Criteria	Index	Indicator value
1) the share of the population with incomes below the established level of the subsistence minimum	Pr	Pr > 0,4 - high; 0.2 < Pr ≤ 0.4 - acceptable; Pr ≤ 0,2 optimal.
2) share of food expenditures in the structure of consumer spending	Er	Er > 0,5 (or > 50%) - high; 0,25 < Er ≤ 0,5 - acceptable; Er < 0.25 optimal.
3) inequality among values of a frequency distribution	Gc	Gc > 0.5 - high; 0.3 ≤ Gc < 0.5 acceptable; Gc < 0.3 optimal.

The share of the population with incomes below the subsistence level in the Voronezh region in 2016 is averaged 9.2%. Accordingly, the value of the indicator Pr is 0.09.

The share of food expenditures in the structure of consumer spending was 70.4% in the Voronezh region. Accordingly, the value of the indicator Er is 0.7.

The Gini coefficient (income concentration index) for the Voronezh region is 0.414.

Table 4–Assessment of Food Security in the Voronezh Region

Valuation indicators	Number of points
1) Self-sufficiency in food rate, SS = 1,16	2

2) Actual consumption rate, $F_c = 1,08$	2
3) Poverty Ratio, $Pr = 0,09$	2
4) The share of food expenditures, $Er = 0,7$	0
5 The Gini coefficient, $G_c = 0,414$	1
Overall	7

Overall index = $SS + F_c + Pr + Er + G_c = 7$ points

The overall result is that the food security of the Voronezh region was at acceptable level in 2016.

Distinctive features of the proposed methodology are its complexity and universality, that allow conduct a comparative analysis of the level of food security in the regions of the country and propose corrective measures in the agro-food policy, taking into account the requirements of the WTO. The recommended set of indicators and evaluation criteria can be transformed, additional criteria and indicators may be introduced depending on how much the agricultural orientation of the region is expressed and agricultural production is developed.

Thus, for increasing food security of the Voronezh region, a number of measures are needed:

1. To boost productive forces of earth by cultivation, meliorative actions; to prove scientifically the level of use of fertilizers and various additives; to reach high productivity; to increase security of agriculture with agricultural machinery. Regional authorities can provide direct subsidies for means of production to support agricultural producers. Moreover, they can establish the minimum of admissible purchase prices for agricultural products; regulate prices and tariffs for consumption of the electric power, heat, transport, fuels and lubricants; put into practice the centralized purchase of food for emergency cases (to create a target stock of food).
2. It is necessary to involve workers on rural areas, because rural population represents human resources capacity of agrarian and industrial complex. The example of China is significant: production costs of grain have increased as a result of urbanization and labor outflow from rural areas. Regional authorities need to develop programs for involving population to rural areas, because labor force seems to be the defining resource in goals achievement.
3. It is essential to provide insurance against loss (death) of harvest of crops and long-term plantings by disasters and other natural phenomena.
4. To pay attention to environmental friendliness of food which will influence positively on the health of population. Moreover, it is necessary to produce high-quality raw materials from the very beginning of production (it is easier than eliminating its defects).
5. To invest in highly effective equipment and progressive technologies of foodstuff packing; to increase the production of frozen semi-finished products, because this segment of the market develops dynamically.

6. To make tougher the control of sanitary and hygienic observance requirements of domestic and import food (share of poor quality imported products is very high). It is necessary to pass gradually from export of raw materials (for example, grains) to export of goods with high value added (pasta, confectionery and flour products) for proving food security.

Conclusion

Firstly, we can conclude that food security might be considered at global, state and regional level. Methods for assessing food security vary depending on the level. Moreover, it is important to notice once again that three paradigm shifts have taken place recently and affected the evaluation approach of measuring food security. Prices and food endowment are not the most important factors, which determine food security. The measurement now is related to access to food and household behavior.

Secondly, it was made an analysis of food security situation in Russian Federation and the Voronezh region. The country has announced a policy of import substitution for food. Thus, it was essential to analyze the dependence of the country and the region on import. The main conclusion is that the Voronezh region is quite stable and self-sufficient in food production. However the consumption of fruits and prices for them still depend on foreign suppliers.

Finally, it was analyzed the concept of membership of Russian Federation in BRICS. It is clearly that members of BRICS are deeply concerned about food security in general and they are deeply involved in the process of solving problems that are relevant to this topic. Russia offers steps in order to achieve sustainable development in the food security field. Moreover, the Chinese approach to ensuring food security and the experience that was gained from analyzing this approach gave an opportunity to view food security of the region from another angle.

Based on the theoretical justification, as well as the analysis of indicators of food security in the Voronezh region, the following conclusions can be drawn:

- The region fully meets the demand for meat, milk, eggs, wheat. There is still dependence on fruit import, but the tendency shows that this dependence is decreasing.
- Incomes of the population have grown more than 2 times for the last 5 years. Over the past 2 years, there has been a decrease in daily intake of kcal, however, we can assume that while the population of the region consumes the required number of calories. The population with incomes below the subsistence level decreases. Moreover, there is a decrease in the share of food expenditures. However the ratio is still quite high.

As a result of the analysis of food security in the region, we came to the conclusion that at the moment there are 2 obvious threats to food security in the region, namely: dependence of consumption on imported fruits and high share of food expenditures of the population. In order to improve the current situation, it is necessary to increase regional support for agricultural producers, increase soil

fertility, increase the material base of agriculture, attract workers to the countryside (increasing the level and quality of their life). At food industry enterprises, it is necessary to increase the use of production capacities, carry out more profound processing of raw materials, invest in modern equipment and advanced technologies. It is necessary to pay special attention to the quality of produced and imported food. In the export of foodstuffs, it is necessary to move from the export of raw materials to the export of goods with high added value. Regional authorities need to promote the growth of employment, to ensure economic access to food. Moreover, it is important to use the experience of foreign countries like China and to attract foreign investments into the agro industrial sphere.

In general, the situation with food security in the region, in many respects, does not cause concern.

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