Ensuring Regional Food Security in the Ryazan Region

Yu B Kostrova, O Yu Shibarshina, V V Tuarmenskiy and Yu O Lyaschuk

1Ryazan Branch of Moscow S.Yu. Vitte University, Ryazan, Russian Federation

Abstract. The article deals with the problem of regional food security. It is characterized by an integrated approach, since it accumulates the key factors of agro-industrial and economic modernization, the current state and trends in the development of agricultural and food production, the food market, the availability of food for the population and its purchasing power.

The authors estimate the level of food consumption by the population of the Ryazan region. They propose a system of indicators determining the economic availability of food for the population of the region. The cost structure of the minimum set of food products in the Ryazan region is analyzed. The analysis of statistical data on the materials of a sample survey of household budgets in the Ryazan region demonstrates the possibility and the need to increase demand for food by reducing income differentiation.

The issues of self-sufficiency of the region with food are also considered. The authors present generalized data on production and actual consumption of basic food products, determine the ratio of food needs according to medical standards and food resources, calculate coefficients of self-sufficiency of basic food products for the Ryazan region population. In conclusion special importance of developing the regional food market infrastructure for increasing the Ryazan region food self-sufficiency is proved.

1. Introduction

Recently, the interest in the problem of food security has been caused not only by the fact that providing the population with adequate nutrition is the most important task of the state, but also by the emergence of a whole range of new destabilizing institutional and economic processes that undermine the economy of the country as a whole and its regions [1].

The key role in ensuring food security of the Russian Federation is played by the regions. It is in them that the main production of agricultural products is concentrated, it is here that food resources are located, the provision of which is the strategic goal of food security for the population of the country [2]. The solution of the problem of ensuring food security requires significant efforts, both at the national and regional level. The development of federal relations, the large-scale division of power between the center and the subjects of the Federation, increase the responsibility of the regions in solving this problem [3].

The socio-economic aspects of the region's food security are an important aspect for not only for scientific research but also for state policy, it is a powerful geopolitical factor and one of the key tools for ensuring the region's social and economic development [4].

2. Data and methods

In the Russian economic science, the problem of food security has been paid attention to since the beginning of the 20th century. (N. Kondratiev, A. Chayanov, N. Bukharin and others). In the middle
of the last century this problem was touched upon in the works of V.F. Mayer, V.M. Rutgaizer, V.N. Sergievsky, I.S. Shevtsov. A significant contribution to its solution at the present stage has been made by such scientists as A.I. Altukhov, D.F. Vermel, R.R. Gumerov, V.V. Miloserdov, I.G. Ushachev, and others. At the same time, it is necessary to mention that some aspects of the problem of food security are still debatable and underdeveloped. The theoretical basis of the research has been the works of modern Russian scientists. The normative base has been the normative legal acts of the Russian Federation and the Ryazan Region. The methodological basis of the study has been a systematic approach to the analysis of food security in the region, a comparative analytical method, as well as a synthesis method.

3. The problems in the assessment of regional food security
Mechanisms and models of food security should be based on its standards which are characterized by the system of the appropriate basic quantitative and qualitative indicators.

Two world criteria are used to assess food security: the volume of world cereal resources being sufficient till the next harvest and the level of world cereal production per head [5].

The following can be singled out as key criteria to assess food security of a particular country:
- the degree of food self-sufficiency of the country and its import independence in food procurement;
- price stability for basic foods;
- the level of food quality, security and ecological compatibility;
- the real level and quality of nutrition with reference to regulated sufficient and minimally required levels;
- sufficiency of minimum wages, pensions and aids for the access of socially deprived people to foods at the regulated sufficient level;
- sufficiency of the level of agro-industrial production for constant provision of the population with foods at the minimally required level;
- the level of transient and strategic food stocks in relation to the regulated levels of food consumption by the population of the country [6].

It should be noted that it is incorrect to use the above indicator system to assess regional food security because of a number of causes.

Firstly, it is hardly reasonable to speak about food independence of a separate region within the bound of the country. Food independence of the country is defined as its ability to pay import of essential products at the expense of its own financial resources. However a separate subject of the Russian Federation may not have enough authority for mobilization of financial resources of a business corporation or a natural person, and regional budgets are deficient as a rule. So, we consider it more correct to speak about the degree of regional food relation rather than about their independence. If the country loses its food independence, its food security is disturbed – there is not such correlation at the regional level [7].

Secondly, as it has already been mentioned, the goal of federal authorities is to form and maintain strategic food resources in the appropriate volume which is not the function of the RF subjects. At the same time food reserves are of great importance for the regions [8].

Thirdly, it can be seen that all international indicators relate to cereal production. It would be incorrect to apply them for assessment of food security in RF regions since many of them do not have any conditions for the development of cereal branch.

Fourthly, being the constituent of national and economic security of the country food security is provided with a total arsenal of instruments for state administration which are not available for regions (customs rates, compensatory dues, excises, sales taxes, quotas, etc.) [9].

On the base of the above it may be concluded that the mentioned indicator systems to assess economic security are not regionally oriented. They do not permit regional peculiarities to be considered in providing food security. At the same time taking account of the significance and
specific features of regional problems separate work at the indicator system of regional food security should be conducted: it should meet the following demands:

- it should be cross-correlated with the general outline of the analysis and indicators used at the federal level;
- it should be compatible with the system of record, statistics and prediction currently in force;
- it should provide the possibility of regular monitoring and prediction of factors affecting the level of regional food security [10].

At present there is no unified approach or policy to assess the level of regional food security. Some authors consider the possibility of sustainable development of an agro-industrial complex to be the basic criterion of regional food security, while others believe that it is the level of food self-sufficiency of the population [11].

The authors think that a complex approach should be used to assess the level of regional food security. The most common criteria in ensuring regional food security are the following:

- compliance of the level and structure of final food consumption with physiological standards of rational nutrition. This indicator characterizes economic and physical food availability for population in the region.
- magnitude of productive potential of an agro-industrial complex (AIC) sufficient for the production of essential sorts of agricultural products and foodstuffs. This criterion indicates time-unlimited ability of a regional AIC to maintain food provision and to ensure the protection against external threats for food security. This criterion should also present information about availability and state of agricultural natural resources as the requirement for stable reproduction.
- compliance of volume and structure of food export-import with the safe regional level which is determined by the ability of economically expedient production of essential food staff in the region. This criterion reveals safe relationship between intra-regional production and inter-regional trade.
- correspondence of food quality and security with the requirements of sanitary, ecologic and epidemiologic standards of healthy nutrition. This criterion characterizes fulfillment of the requirement for food quality with the view of ensuring food security [12].

We believe that proceeding from the interpretation of the term “regional food security” which is used in the appropriate legislation for the assessment of its level two key aspects should be taken into consideration:

1. physical food availability:
   - production of basic sorts of agricultural products and foodstuffs per head;
   - magnitude of regional agricultural reserves and foodstuffs;
   - provision of the territory with commercial premises for food realization;
   - availability and diversity of logistic infrastructure for organization of food trade across the territory concerned;
   - the level of regional self-insurance with agricultural products and foodstuffs;
   - quality factor of foodstuffs which characterizes quality and security of produced and consumed foods in the region
   - the level of energy constituent in the diet of population calculated as the ratio between diet caloricity in a particular region and the accepted medical standards.
2. economic availability of foodstuffs:
   - purchasing ability of population’s income in relation to foodstuffs;
   - the levels of foodstuff availability and sufficiency;
   - average prices for agricultural products and foods (producer’s, wholesale and consumer prices);
   - expenses share for nourishment in the structure of consumers expenditure;
   - the level of regional dependence on food import;
   - the degree of satisfaction of population in relation to their demands concerning basic foodstuffs.

It should be also noted that a set of criteria and indicators that have been offered may be modified. However we believe that the content of the assessment would hardly change since its main goal is to
provide the basis for determination of the priority in the development and detecting the problems of ensuring regional food security.

4. Assessment of food security in Ryazan region
The authors assessed food security in Ryazan region in 2016 on the base of their investigations (Table 1) [13]

**Table 1.** Sufficiency and availability rates of foodstuffs consumption by the inhabitants of Ryazan region.

| Indicators                  | 2017  |
|-----------------------------|-------|
| Cost rate of sufficiency    | 2.62  |
| Natural rate of sufficiency | 0.801 |
| General rate of availability| 0.19  |
| Crisis rate of sufficiency  | 1.12  |
| Crisis rate of availability | 0.11  |

Cost and natural rates of food sufficiency are the most important criteria of food security.

Natural rate of food availability in Ryazan region in 2017 was 0.801. So, energy value of nourishment of inhabitants in Ryazan region is only 80% relative to the recommended medical norms.

To calculate cost rate of food availability the cost of actual monthly ration as well as the ration according to the medical norms should be determined. Actual cost of monthly ration of the inhabitants of Ryazan region was calculated taking account of average income and expenses share for foods. In 2017 it was 11898.35 rubles. Ration cost according to medical norms for the inhabitants of Ryazan region in 2017 was 4534.38 rubles per month. Thus, cost factor of food availability is 2.62. This means that the expenses of the inhabitants of Ryazan region for foodstuffs are 2.6 times as much as those according to recommended medical norms. However the results of investigation revealed deficiency of energy value of nourishment. Thus, it may be concluded that population’s nourishment in Ryazan region is unbalanced [14].

General rate of food availability in Ryazan region of 0.19 reveals that its inhabitants may only spend 19% of average per capita income for purchasing a rational food basket.

Crisis rate of food sufficiency for the inhabitants of Ryazan region is 1.12. This is evidence of the fact that energy value of dietary intake in Ryazan region is only 12% higher than the value of crisis threshold of daily ration [15].

Crisis rate of food availability for the inhabitants of Ryazan region shows that spending only 11% of average per capita income they may purchase a set of products corresponding to minimal ration basket.

To sum up, it may be concluded that starvation does not menace to the inhabitants of Ryazan region so far and food availability is ensured.

Another criterion to assess the degree of food security in the region is the level of self-provision.

The level of self-provision in Ryazan region may be determined by summarizing the data related to the production and consumption of basic foodstuffs (Table 2). If in 1990 the level of self-provision with all sorts of foodstuffs under analysis exceeded 100%, that is inter-regional consumption could be fully provided at the expense of in-house resources, in 2017 this ratio for meat and vegetables became less than 100%. Self-provision with other products concerning their actual consumption is in the progress so far [16].
The level of self-provision with basic agricultural products in Ryazan region (actual consumption, %).

| Products       | 2010 | 2014 | 2015 | 2016 | 2017 |
|----------------|------|------|------|------|------|
| Meat           | 74.1 | 66.7 | 66.2 | 72.4 | 70.5 |
| Milk           | 110.0| 112.4| 118.2| 126.4| 131.9|
| Eggs           | 162.8| 208.8| 209.7| 222.0| 224.3|
| Potatoes       | 137.1| 118.5| 125.7| 140.1| 121.4|
| Vegetables     | 93.6 | 97.0 | 103.9| 104.1| 93.1 |
| watermelons    |      |      |      |      |      |

It should be noted that self-provision in the region is not achieved by increasing or at least by preservation of food production volume but by decreasing their average per capita consumption and reduction of population size [17].

Having compared the information about basic food production in Ryazan region with the recommended norms of consumption we can get generalized data presented in Table 3.

Table 3. The ratio between the demands in foodstuffs according to medical norms and food resources in Ryazan region.

| Indicators                             | 1990* | 2015   | 2016   | 2017   |
|----------------------------------------|-------|--------|--------|--------|
| Population size in the region, thousand of people | 1348.4| 1135.4 | 1130.1 | 1126.7 |
| Potatoes (consumption rate per head – 95-100 kg per year) | 152.4 | 110.8- | 107.9- | 107.0- |
| Total demand, thousand of tons         | 993.8 | 361.6  | 442.3  | 369.4  |
| Total production, thousand of tons     | 652.1 | 318.6- | 391.4- | 327.8- |
| Production relative to demands (%)     | 187.4 | 136.2- | 135.6- | 135.2- |
| Vegetables (consumption rate per head – 120-140 kg per year) | 129.2 | 159.0  | 158.2  | 157.7  |
| Total demand, thousand of tons         | 129.2 | 111.1  | 110.2  | 106.7  |
| Production relative to demands (%)     | 68.9  | 69.9-81.6 | 69.7-81.3 | 67.7-78.9 |
| Meat (consumption rate per head – 70-75 kg per year) | 99.8  | 79.5-85.2 | 79.1-84.8 | 78.9-84.5 |
| Total demand, thousand of tons         | 203.1 | 67.3   | 70.4   | 68.1   |
| Total production, thousand of tons     | 203.5 | 78.9-84.7 | 83.0-89.0 | 80.6-86.3 |
| Production relative to demands (%)     | 1054.3| 365.1  | 374.9  | 381.1  |
| Milk (consumption rate per head – 320-340 kg per year) | 201.0 | 94.6- | 97.6- | 99.5- |
| Total demand, thousand of tons         | 524.5 | 363.3- | 361.6- | 360.5- |
| Total production, thousand of tons     | 1054.3| 365.1  | 374.9  | 381.1  |
| Production relative to demands (%)     | 201.0 | 94.6- | 97.6- | 99.5- |
| Eggs (consumption rate per head – 260 per year) | 100.5 | 103.7  | 105.7  | 105.7  |
Total demand, million  391.0 295.2 293.8 292.9  
Total production , million  543.3 733.7 787.1 789.8  
Production relative to demands (%) 139.0 248.5 267.9 269.6  

* - foodstuffs demands in 1990 were calculated according to the recommended rational norms of food consumption being in force at that moment.

The results obtained revealed that only demands in vegetables and meat cannot be fully satisfied in Ryazan region at the expense of in-house production. Under the existent climatic conditions there is not a full range of vegetables that can be grown in the region, so, to make population’s nutrition balanced some sorts of vegetables should be imported.

In accord with the Law of Ryazan region “On food security and agricultural and foodstuffs market in the territory of Ryazan region” food security is considered to be achieved if food provision of in-house production is not less than 65% relative to food demands of the local population according to physiological norms. So, security of basic agricultural products in Ryazan region is ensured [18].

5. Results and conclusions

Summing up the above, it should be noted that in Ryazan region there are also some negative trends in the sphere of food production and consumption which are revealed as a decrease of production volume of basic articles of food (those of animal husbandry, in particular) [19]. It may be stated that in whole food security in Ryazan region is ensured, though there is some imbalance which indicates food security disturbance in Ryazan region.

The results of investigation conducted showed that there are reserves in Ryazan region for provision of local population with food articles of in-house production. Thus, necessity arises to stimulate their usage more complete by the Government of Ryazan region with the view of forming adequate conditions and opportunities to provide criteria of physical and economic accessibility, autonomy and economic self-sufficiency of regional food system, its reliability and stability.

The analysis of regional government activity showed the emphasis to be made on the development of only production sphere of agro-industrial complex. Whereas for complete ensuring of food security both production and realization spheres should develop equally alongside with development of consumption culture, providing food security and quality, i.e. a complex approach to solve this problem should be used [20].

Today the course of state food security control in Ryazan region should be directed at solving the following problems:
- existence of substantial imbalance in providing the consumers with foodstuffs;
- inequality of intermediators’ disposition in the region area;
- lack of stable channels of movement of goods adequate to demographic regional structure;
- price disproportions both horizontal (regional profile - disproportions between subjects of the region) and vertical ones (price correlations between tradable groups);
- multilink process of movement of goods to a consumer;
- a high level of delivery-distribution allowances;
- high transport costs, disintegration of forwarding services;
- low level of informational support of food market participants (producers, commercial agents, purchasers) and domestic product advertising;
- considerable portion of imported products and their extensive advertising;
- underdevelopment of market infrastructure.

6. References
[1] Altukhov A I 2016 Potential risks and threats of national food security and independence AIC: economics management 5 4-15
[2] Kostyaev A I, Kostusenko I I 2012 Providing food security of Russia: a regional aspect
Economics of agricultural and processing enterprises 5 4-7

[3] Minat V N 2016 Conception of economic security and financial policy of the state. In Financial policy of the state: current trends and perspectives: collective papers of All-Russian theoretical and practical conference with international participants 200-202 Ryazan: Academy of FSIN of Russia

[4] Krylatykh E N 2013 Food security under the circumstances of integration: trends, achievements, threats Economics of agricultural and processing enterprises 4 16-19

[5] Kostusenko I I 2009 Regional food security and food independence: essence and approach to their assessment Ural agrarian herald 1(55) 8-13

[6] Akimova A Yu, Fedoskina I V, Minat V N 2018 Criteria of food security assessment and measures for providing economic efficiency of agricultural production In Actual problems of contemporary science: collection of scientific papers 275-282 Ryazan: RIRO

[7] McLaughlin D, Kinzelbach W 2015 Food security and sustainable resource management Water Resources Research 7 vol 3 4966-4985

[8] Minat V N 2018 Concept, essence and structure of regional economic security Actual problems of modern science collection of scientific works (Ryazan) 397-407

[9] Rodin I K, Minat V N 2018 Essence and goals of food security in the system of an economic management mechanism Actual problems of contemporary science: collected scientific papers 266-275

[10] Porter J R, Challinor A J, Xie L, Cochrane K, Jordan J, Howden S M, Iqbal M M, Lobell D B, Travasso M I, Aggarwal P, Hakala K 2014 Food security and food production systems Climate Change 2014 Impacts, Adaptation and Vulnerability Part A: Global and Sectoral Aspects 485-534

[11] Gravshina I N, Denisova N I, Kostrova Yu B 2016 Management of the regional food market (on materials of the Ryazan region) Moscow: Moscow S.Yu. Vitte University

[12] Martynushkin A B, Lyaschuk Yu O 2014 The state of material and technical basis and agricultural production risks in Ryazan region Economics, labor, management in agriculture 3(20) 65-67

[13] 2018 Basic agricultural indicators in Ryazan region: Statistical collection Ryazanstat Ryazan 164

[14] Kostrova Yu B, Martynushkin A B Assessment of level of self-sufficiency in Ryazan region with food Bulletin of Ryazan state agrotechnological University After P. A. Kostychev 3(23) 73-77

[15] Gravshina I N, Denisova N I, Kostrova Yu B 2016 Management of the regional food market (on materials of the Ryazan region) Moscow: Moscow S Yu Vitte University

[16] Shibarshina O Yu 2018 The mechanism of realization of economic policy in the sphere of food security of the Ryazan region Donetsk readings 2018: education, science, innovation, culture and challenges of modernity Proceedings of the III International scientific conference 354-356 Donetsk: Donetsk national University

[17] Kostrova Yu B, Martynushkin A B Assessment of the level of self-sufficiency of the Ryazan region with food Bulletin of Ryazan state agrotechnological University 3(23) 73-77

[18] Kostrova Yu B, Kurochkina Ye N 2015 Assessment of the level of food consumption by the population of the Ryazan region International research journal 10-1(41) 44-48

[19] Lyaschuk Yu O 2012 Management of food quality on the basis of HAASP system Materials of theoretical and practical conference "Innovation tendency and methods of realization of scientific investigations in AIC"163-168 Ryazan, RGATU

[20] Kostrova Yu B, Lyaschuk Yu O, Shibarshina O Yu 2018 Socio-economic aspects of increasing regional food security (on the materials of the Ryazan region) Moscow: Moscow S.Yu. Vitte University