

# Analysis of indicators of food security of the Volgograd region

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**Abstract**—The article assesses the food security of the Volgograd Region in 2015. For this, the author's methodology for calculating food security at the regional level is applied. It analyzes the following parameters: the level of food self-sufficiency, the degree of satisfaction of the physiological needs of the population and the degree of economic access to food.

**Key words** — food security, region, food provision, consumption rates, self-sufficiency rate of food

## I. INTRODUCTION

One of the most important components of the country's economic security is food security, the provision of which is the main priority of the state's economic policy. Volgograd region belongs to regions with favorable natural and climatic conditions and great potential for the development of agricultural production and agro-industrial complex.

To assess the food security of the Volgograd region, we apply the methodology [1], which involves the analysis of the following indicators:

- 1) the level of food independence (self-sufficiency) of the region;
- 2) the degree of satisfaction of the physiological needs of the population in food products;
- 3) the level of economic accessibility of food.

## II. ANALYSIS OF FOOD SECURITY

The level of food independence (self-sufficiency) of the region for certain types of agricultural products is determined on the basis of self-sufficiency factors ( $C_s$ ). These indicators are calculated as the ratio of actual production volumes to the required volumes of food production in accordance with rational consumption norms. With the help of these coefficients it is possible to establish to what extent the needs of the population of the region are satisfied on the basis of local production of food products.

Knowing the population of the Volgograd region on January 1, 2016 – 2545.9 thousand people [2] and rational consumption norms [3], it is possible to determine the level of food independence of the region by main types of a food products (Table 1).

TABLE I. FOOD INDEPENDENCE LEVEL OF THE VOLGOGRAD REGION IN 2015

| Type of food products | Actual production, thousand tons ( $q$ ) | Place in the Russian Federation in 2015 | Required volumes of food production according to consumption rate ( $q_r$ ) | $C_s$ |
|-----------------------|--|---|---|-------|
| Potatoes              | 428.3                                    | 29                                      | 254.6   | 1.7   |
| Milk                  | 511.3                                    | 22                                      | 865.6   | 0.6   |
| Vegetables            | 899.1                                    | 2                                       | 356.4   | 2.5   |
| Meat                  | 146.9                                    | 22                                      | 191.0   | 0.8   |
| Eggs (million pieces) | 761.2                                    | 25                                      | 662.0   | 1.14  |

In 2015, Volgograd region produced 428.3 thousand tons of potatoes, which is almost 29 thousand more than in the previous year (2014 – 399.7 thousand tons). According to this indicator Volgograd region takes the second place in the Southern Federal District (SFD) after the Krasnodar Territory (615.4 thousand tons, 18th place in Russia) and 29th in Russia. The last place in the SFD for the production of potatoes is the Republic of Kalmykia (36.8 thousand tons, 58th place in the Russian Federation) [2].

The region's self-sufficiency ratio for potatoes was 1.7, i.e. more than one. This means that the Volgograd region fully covers its own needs through local production and has the ability to export this product to other regions of Russia.

According to the data of 2015, the Volgograd Region fully provided the region with the necessary quantity of vegetables ( $C_s = 2.5$ ) and eggs ( $C_s = 1.14$ ). In 2015, 899.1 thousand tons of vegetables were produced, which is almost 98 thousand more than in 2014 (801.3 thousand). In this indicator, our region is leading both in Russia (2nd place) and in the Southern Federal District (1st place). The second place in the SFD is the Astrakhan region (883.8 thousand, the third place

in the Russian Federation), at the last - the republic of Kalmykia (17,5 thousand, 73rd place in the Russian Federation).

In comparison with 2014, egg production also increased (2014 – 754.8 million units) in the Volgograd region. At the same time, the region is significantly behind the other regions of the Southern Federal District - Rostov Region (1907.7 million, the 2nd place in the Russian Federation) and the Krasnodar Territory (1543.2 million units, 5th place) in this indicator [2].

For other important food products - milk and meat, self-sufficiency rates are significantly less than 1. Thus, the region does not cover its needs for these goods at the expense of its own production. The total self-sufficiency ratio for the Volgograd region was 1.35 in 2015, which corresponds to the optimal level ( $C_s > 0.9$ ), it can be estimated for the region in 2 points [1].

The degree of satisfaction of the physiological needs of the population in basic foodstuffs can be estimated with the help of the coefficient of actual consumption of food ( $C_{fc}$ ) - the actual volumes of consumption over a certain period of time are compared with rational consumption norms. Consider the consumption of basic food products in the Volgograd region (Table 2).

The Volgograd region has traditionally been one of the leaders among the subjects of the Russian Federation in terms of consumption of vegetables and melons (third place). The dynamics of this indicator is positive. It has grown from 162

kg in 2010 to 171 kg in 2015. In addition, consumption of vegetables and melons exceeds the recommended consumption rates.

Consumption of sugar, potatoes, eggs, and bread products also slightly exceeds rational norms. Volgograd region in terms of consumption of eggs and potatoes outruns many Russian regions (14th and 20th places, respectively). The consumption of eggs per capita increased from 300 pcs. per year in 2010 to 306 pcs. in 2015, of sugar from 28 kg to 34 kg [2].

A negative trend is to reduce the consumption of milk and dairy products from 202 kg per capita in 2010 to 197 kg in 2015. By this indicator, the Volgograd region lags far behind most regions of Russia (63rd place). Consumption of these products is much lower than rational norms. Thus, in 2015 in the Volgograd region, the consumption of milk and dairy products was 197 kg per year per person, which corresponds to only 58% of the recommended rate [2,3]. The volume of consumption of meat and meat products in the Volgograd region in 2015 also slightly lagged behind the recommended norms - 99%. Vegetable oil was consumed at a rational level (100%) [2,3].

In general, based on the calculated coefficients of actual consumption of food products, it was revealed that this indicator in 2015 was 1.07 for the Volgograd Region. This corresponds to the optimal level ( $C_{fc} > 0.95$ ) and can be estimated for the region in 2 points [1].

TABLE II. CONSUMPTION OF FOODSTUFFS IN VOLGOGRAD REGION  
(per capita, kg per year)

| <i>Type of food products</i> | <i>2010</i> | <i>2011</i> | <i>2012</i> | <i>2013</i> | <i>2014</i> | <i>2015</i> | <i>Rational consumption rates</i> | <i>C<sub>fc</sub> in 2015</i> |
|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------------------------|-------------------------------|
| Meat and meat products       | 73          | 74          | 76          | 76          | 76          | 74          | 70-75                             | 0.99                          |
| Milk                         | 202         | 201         | 201         | 203         | 201         | 197         | 320-340                           | 0.58                          |
| Eggs (pcs.)                  | 300         | 302         | 305         | 297         | 306         | 306         | 260                               | 1.18                          |
| Sugar                        | 28          | 32          | 32          | 34          | 34          | 34          | 24-28                             | 1.21                          |
| Potatoes                     | 131         | 131         | 135         | 134         | 134         | 131         | 95-100                            | 1.31                          |
| Vegetables and melons        | 162         | 166         | 167         | 168         | 169         | 171         | 120-140                           | 1.22                          |
| Vegetable oil                | 12.2        | 12.7        | 12.7        | 12.5        | 12.6        | 12.0        | 10-12                             | 1.0                           |
| Bread                        | 128         | 128         | 127         | 124         | 125         | 116         | 95-105                            | 1.1                           |

The level of economic accessibility of food is determined by the ability of the population to purchase food. To characterize it, one should take into account the level of money incomes of the population and the level of prices for food products. The calculation of economic accessibility is based on the system of indicators [1]:

- 1) the poverty rate ( $C_p$ ) – the share of the population with incomes below the subsistence level;
- 2) coefficient of consumption ( $C_c$ ) – share of expenditure on food in the structure of consumer spending;
- 3) the Gini coefficient ( $C_G$ ).

In 2015, average cash income per capita in the Volgograd region although increased compared to the previous year by

2,668 rubles, amounted to only 21,724 rubles. According to this indicator the region occupies the 70th place in the Russian Federation. Among the subjects of the Southern Federal District this is also one of the lowest indicators. For comparison, in the Krasnodar Territory – 31,373 rubles (19th place), in the Rostov region - 26,646 rubles (33rd place), Astrakhan region – 24,065 rubles (52nd place), the Republic of Adygea – 22,639 (61st place). The lowest figure was in the Republic of Kalmykia – 14,216 rubles (85th place).

To assess the growth in the level of prices for food products, the relevant indices are used. In 2015, the consumer price index (CPI) for food products in the Volgograd region amounted to 113.7%, which almost corresponds to the level of the SFD (113.9%) and slightly lower than the all-Russian

indicator (114.0%). For comparison, in 2014, the CPI for food products in the Volgograd region amounted to 118.8%, which is about 3% higher than the national average and 2.3% higher than in the Southern Federal District. In other regions of the Southern Federal District, the rise in food prices in 2015 compared to 2014 was slightly higher. For example, in the Krasnodar Territory, the CPI in 2015 amounted to 114.5%, in the Astrakhan region - 114.1% [2].

The definition of the poverty rate implies accounting for the number of people who have incomes below the subsistence minimum (Table 3).

As can be seen from the data in Table 3, in the Volgograd Region in 2015 the population with incomes below the subsistence minimum was 14.7%. This is higher than the all-Russian index by 1.4%. This indicator also exceeded similar indicators for the subjects of the Southern Federal District (the Republic of Adygea, the Astrakhan and Rostov regions, the Krasnodar Territory). The highest level of poverty is demonstrated by Kalmykia. Here, 33.6% of the population in 2015 had incomes below the subsistence level.

Note that in the Volgograd region, the proportion of the population with incomes below the subsistence minimum in 2015 increased by 0.7% compared to 2010. On the contrary, almost all other subjects of the SFD observed a decrease in this indicator (compared to 2010) [2].

In general, the value of the poverty rate for the Volgograd region in 2015 was 0.14, which corresponds to the optimal level ( $C_p \leq 0.2$ ) and can be estimated at 2 points [1].

The second indicator for assessing the economic accessibility of food is the share of expenditure on food in the structure of consumer spending. In 2015, in the Volgograd region, food expenditures amounted to 31.9%, which is about 4% lower than the national average and the indicator for the Southern Federal District (35.3% and 35.8%, respectively).

It should be noted that a high proportion of spending on food in consumer spending is not typical for developed countries (where this figure is 10-20%) and even for some developing countries (for example, in Brazil - 17.8%). If the cost of purchasing food products is more than 50% of the consumer's income, this indicates an extreme degree of poverty. According to some scientists, an acceptable standard of living of the population will be in the case when the cost of buying food is less than 30% of consumer income [4]. On the whole, the share of food expenditures ranged from 25 to 50% ( $C_c = 0.31$ ), which corresponded to the allowable level (the optimal level is less than 25%) and can be estimated for the Volgograd region at 1 point [1].

**TABLE III. NUMBER OF POPULATION WITH REVENUES BELOW THE QUANTITIES OF THE LIVING WAGE**  
(in% of the total population of the subject of the Russian Federation)

| <i>The subject of the Russian Federation</i> | <b>2010</b> | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| Russian Federation                           | 12.5        | 12.7        | 10.7        | 10.8        | 11.2        | 13.3        |
| Volgograd region                             | 14.0        | 15.1        | 13.6        | 13.6        | 14.0        | 14.7        |
| Republic of Adygea                           | 16.0        | 14.6        | 11.3        | 12.0        | 11.0        | 13.9        |
| Republic of Kalmykia                         | 35.7        | 35.8        | 30.7        | 35.4        | 34.7        | 33.6        |
| Krasnodar region                             | 15.2        | 13.5        | 11.2        | 10.4        | 10.1        | 11.7        |
| Astrakhan Region                             | 14.1        | 14.2        | 12.5        | 12.0        | 12.0        | 14.1        |
| Rostov region                                | 14.9        | 15.2        | 12.9        | 12.9        | 12.9        | 14.0        |

Finally, the third indicator, the Gini coefficient in 2015, was 0.356 for the Volgograd Region. This corresponds to the allowable level (optimal - less than 0.3) and is estimated at 1 point [1].

To assess the level of food security in the Volgograd Region in 2015, it is necessary to determine the integral index ( $I_{fs}$  – the food security index of the region), as the sum of the scores for each of the analyzed indicators (Table 4).

**TABLE IV. INTEGRATED FOOD SECURITY ASSESSMENT IN VOLGOGRAD REGION IN 2015**

| <i>Value of indicator</i>  | <i>Points Quantity</i> |
|--|------------------------|
| 1) level of food independence (self-sufficiency) of the region, $C_s = 1.35$                             | 2                      |
| 2) degree of satisfaction of the physiological needs of the population in food products, $C_{fc} = 1.07$ | 2                      |
| 3) poverty rate, $C_p = 0.14$  | 2                      |
| 4) coefficient of consumption, $C_c = 0.31$  | 1                      |
| 5) Gini coefficient, $C_G = 0.356$   | 1                      |
|  | <b>8 points</b>        |

Then it is required to compare the obtained value with the criteria of food security at the regional level (table 5).

**TABLE V. FOOD SECURITY CRITERIA OF THE REGION**

| <i>Points Quantity</i> | <i>Food Security Level</i>                                |
|------------------------|---|
| 9-10                   | <i>optimal, high level of food security of the region</i> |
| 5-8                    | <i>middle, permissible level of food security</i>         |
| <5                     | <i>low level of food security</i>                         |

### III. CONCLUSIONS

Thus, the food security of the Volgograd region in 2015 was at an permissible level:

$$I_{fs} = C_s + C_{fc} + C_p + C_c + C_G = 8 \text{ points}$$

Note that in 2014, the food security of the Volgograd region was at a similar level [5].

The analysis made it possible to identify a number of problems that prevented the Volgograd Region from achieving the optimal level of food security. That is an insufficient level of milk and meat production; the imbalance in the consumption basket, in which most of the expenditure goes to food; a high level of differentiation of incomes of the

population, which affects the structure of consumption and the standard of living in the region. The economic policy in the region, including the agrarian policy, must be carried out taking into account the need for its optimization in the direction of correcting the above-mentioned problems.

### **References**

- [1] Antamoshkina E.N. Integral assessment of food security of the Southern Federal District regions [Integral'naja ocenka prodovol'stvennoj bezopasnosti regionov JuFO] // Bulletin of Volgograd State University. Ser. 3, The Economy. Ecology [Vestnik Volgogradskogo gosudarstvennogo universiteta. Ser. 3, Jekonomika. Jekologija]. 2014. № 1. P. 6-16.
- [2] Regions of Russia. Socio-economic indicators. 2016. [Regiony Rossii. Social'no-jekonomicheskie pokazateli. 2016.] Statistical collection. Moscow: Rosstat, 2016.
- [3] Order of the Ministry of Health and Social Development of Russia of August 2, 2010, No. 593 "On approval of recommendations on rational norms for the consumption of food products that meet modern requirements for healthy eating" [Prikaz Minzdravsocrazvitija Rossii ot 02.08.2010 № 593 «Ob utverzhdenii rekomendacij po racional'nym normam potreblenija pishhevyh produktov, otvechajushhim sovremennym trebovanijam zdorovogo pitaniya»]. URL: <http://base.garant.ru/12179471/>.
- [4] Molchan A.S., Ternavshenko K.O., Francisco O.Yu. Estimation of the level of food provision for the population of the Krasnodar Territory [Ocenka urovnja prodovol'stvennogo obespechenija naselenija Krasnodarskogo kraja] // Economics and Entrepreneurship [Jekonomika i predprinimatel'stvo]. 2017. No. 9 (part 1). Pp. 322-329.
- [5] Timofeeva G.V., Ivanov O.V., Antamoshkina E.N., Gurzhiev V.A. Food security in the system of economic security of the region [Prodovol'stvennaja bezopasnost' v sisteme jekonomicheskoy bezopasnosti regiona] // Economics and management: problems, solutions [Jekonomika i upravlenie: problemy, reshenija]. 2016. T.1. No. 11. P. 26-32.