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Indicators of Food Security in the System of Socio-Economic Diagnostics of the Region

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***Abstract*— The article assesses the food security of the Volgograd region in 2016. For this, the author's methodology for calculating food security at the regional level is used based on the integral index - the food security index of the region. The following parameters are analyzed: the level of food independence (self-sufficiency) of the region, the degree of satisfaction of the physiological needs of the population in basic food products and the level of economic accessibility of food. It was found that in 2016 the food security of the region under study was at an acceptable level. The deviation of the food safety index of the region from the optimal value was due to insufficient volumes of production of such important food products as milk and meat, a significant degree of differentiation of the population's incomes and a high proportion of food expenditures in the structure of household consumption expenditures.**

Keywords— food security, region, food provision, consumption rates, method of estimating food security.

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, 2017 – 2535 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 2016

Type of food products	*Actual production, thousand tons (q)*	*Place in the Russian Federation in 2016*	*Required volumes of food production according to consumption rate (q_r)*	C_s
Potatoes	415.7	28	254.6	1.8
Milk	515.6	21	865.6	0.6
Vegetables	923.2	2	356.4	2.6
Meat	142.6	24	191.0	0.8
Eggs (million pieces)	796.6	23	662.0	1.2

In 2016, Volgograd region produced 415.7 thousand tons of potatoes, which is less than in the previous year (2015 – 428. thousand tons). According to this indicator Volgograd region takes the third place in the Southern Federal District (SFD) after the Krasnodar Territory and the Rostov Region (622.7 thousand tons, 15th place in Russia and 445.2 thousand tons, the 24th place, respectively) and 28th in Russia. The last place in the Southern Federal District for the production of potatoes is Sevastopol (3.2 thousand tons, 81st place in the Russian Federation) [2].

The region's self-sufficiency ratio for potatoes was 1.8, 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 2016, the Volgograd Region also fully satisfies its own needs for vegetables (C_s = 2.6) and eggs (C_s = 1.2). In 2016, 923.2 thousand tons of vegetables were produced, which is 24 thousand more than in 2015 (899.1 thousand). In this indicator, our region is leading both in Russia (2nd place) and in the Southern Federal District (1st place). On the second place in the SFD is the Astrakhan region (905.3 thousand, the third place in the Russian Federation), at the last - Sevastopol (2.4 thousand, 80th place in the Russian Federation).

In comparison with 2015, egg production also increased (in 2015 – 761.2 million units, in 2016 - 796.6 million) in the Volgograd region. At the same time, according to this indicator, our region is much inferior to other regions of the Southern Federal District - Rostov Region (2121.5 million, 2nd place in the Russian Federation) and Krasnodar Territory (1722.4 million units, 4th place) and occupies the 23rd place in Russia [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 1.4 in 2016, 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 2016. 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 22th places, respectively). The consumption of eggs per capita increased from 300 pcs. per year in 2010 to 309 pcs. in 2016, 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 2016. 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 2016 in the Volgograd region, the consumption of milk and dairy products was 197 kg per year per person, which corresponds to only 60% of the recommended rate [2, 3]. The volume of consumption of vegetable oil in the Volgograd region in 2016 also slightly lagged behind the recommended norms - 99%. Meat and meat products 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 2016 was 1.13 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].

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 2016 average cash income per capita in the Volgograd region amounted to 20,739 rubles, which is lower than the similar indicator of 2015 (21,719 rubles) by 980 rubles. According to this indicator, our region is at one of the last places in Russia (73rd place). Among the subjects of the Southern Federal District this is also one of the lowest indicators.

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

Type of food products	***2010***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***Consumption rates***	***C_{fc}, in 2016***
Meat and meat products	73	74	76	76	76	74	74	73	0.99
Milk	202	201	201	203	201	197	197	325	0.58
Eggs (pcs.)	300	302	305	297	306	306	309	260	1.18
Sugar	28	32	32	34	34	34	34	24	1.21
Potatoes	131	131	135	134	134	131	131	90	1.31
Vegetables and melons	162	166	167	168	169	171	171	140	1.22
Vegetable oil	12.2	12.7	12.7	12.5	12.6	12.0	11.9	12	1.0
Bread	128	128	127	124	125	116	115	96	1.1

For comparison, in the Krasnodar Territory – 32,785 rubles (15th place in Russia), in the Rostov region – 27,104 rubles (35th place), in Sevastopol – 24,937 (46th place), in the Republic of Adygea – 23,600 (55th place), in the Astrakhan region – 22,760 rubles (61st place). The lowest figure in the Republic of Kalmykia is 14,569 rubles (84th place in Russia) [2].

To assess the growth in the level of prices for food products, the relevant indices are used. In 2016, the consumer price index (CPI) for food products in the Volgograd region amounted to 105.1%, which almost corresponds to the level of the SFD (105.7%) and the all-Russian indicator (105.4%). For comparison, in 2015, the CPI for food in the Volgograd region was 113.2%, the all-Russian indicator was 112.9%, the indicator for the Southern Federal District – 112.6% [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 2016 the population with incomes below the subsistence minimum was 15.3%, which exceeded the indicator of the previous year (by 0.6%) and the all-Russian indicator (by 1.9%). This indicator was also higher than similar parameters for the subjects of the Southern Federal District (the Republic of Adygea, the Rostov Region, the Krasnodar Territory, Sevastopol). The highest level of poverty is demonstrated by Kalmykia. Here, more than 30% of the population had incomes below the subsistence level.

A negative trend is the growth of poverty in the Volgograd Region (compared to 2010), in other regions of the Southern Federal District (except for Astrakhan Oblast), on the contrary, there was a decrease in the poverty level of the population.

In general, the value of the poverty rate for the Volgograd region in 2016 was 0.15, 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 2016, in the Volgograd region, food expenditures amounted to 31.4%, which is about 4.1% lower than the national average and the indicator for the Southern Federal District (35.5% and 37.4%, respectively).

It should be noted that the share of spending on food in consumer spending in other regions of the SFD is even higher: in the Krasnodar Territory - 35.1%, in the Rostov Region - 36.9%, in the Adygea Republic - 38.8%, in the Republic of Kalmykia - 39.1%, in the Astrakhan Region - 40.6% 51.6% and Sevastopol - 52.3% [2].

As a rule, a high proportion of expenditures on food products in consumer spending is not typical for developed countries (there is 10-20% there), and even for some developing countries (for example, in Brazil - 17.8%) A third of the cost of food is spent by poor families. 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].

Finally, the third indicator, the Gini coefficient in 2016, was 0.344 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 2016, 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 2016

Value of indicator	***Points Quantity***
1) level of food independence (self-sufficiency) of the region, C_s = 1.4	2
2) degree of satisfaction of the physiological needs of the population in food products, C_{fc} = 1.13	2
3) poverty rate, C_p = 0.15	2
4) coefficient of consumption, C_c= 0.31	1
5) Gini coefficient, C_G = 0.344	1
	8 points

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)

The subject of the Russian Federation	***2010***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***
Russian Federation	12.5	12.7	10.7	10.8	11.2	13.3	13,4
Volgograd region	14.0	15.1	13.6	13.6	14.0	14.7	15,3
Republic of Adygea	16.0	14.6	11.3	12.0	11.0	13.9	13,7
Republic of Kalmykia	35.7	35.8	30.7	35.4	34.7	33.6	31,2
Krasnodar region	15.2	13.5	11.2	10.4	10.1	11.7	11,6
Astrakhan Region	14.1	14.2	12.5	12.0	12.0	14.1	16,2
Rostov region	14.9	15.2	12.9	12.9	12.9	14.0	14,0
Republic of Crimea	-	-	-	-	-	23,1	22,2
Sevastopol	-	-	-	-	-	15,1	13,7

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

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

III. CONCLUSIONS

Thus, the food security of the Volgograd region in 2016 was at an permissible level:

Ifs = Cs + Cfc + Cp + Cc + CG = 8 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.

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