

DEVELOPMENT OF REGIONAL AGRICULTURAL MARKETS WHEN OPTIMIZING PRODUCTION

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Abstract: The relevance of the study is substantiated by production problems of food supply systems and the impact of agrifood policy on these processes by using a system for forecasting the productive capacity of the agrifood sector of the regional economy. These circumstances determine that it is necessary to develop the agrifood policy based on optimizing production capacities, distribution areas, exchange and consumption of agricultural products, on the one hand, and the realities and requirements of regional and national markets, on the other hand. The agrifood policy pursued in this way will aim at the dynamic and efficient development of all sectors of the regional food supply system and will contribute to the systemic development of this sector of the regional economy. That is why this is an important national problem to understand the direction of developing the national food supply system, to substantiate its forecast parameters, taking into account the problem sectors of the agrifood market. At the same time the present management task is to substantiate the measures taken within the agrifood policy, and to improve instruments and approaches to forecasting.

Keywords: development, agrifood policy, forecasting, condition analysis, agrifood market, problem sectors, functioning.

1 Introduction

The increase in the productive capacity of the national food supply system requires reconsidering the methodology and mechanism for pursuing the agrifood policy [1]. Its main provisions should be aimed at optimizing production capacities and taking into account parameters of developing the exchange and consumption of agricultural products, and market requirements. In addition, such policy pursued by the state should be aimed at the dynamic and efficient development of all branches of agribusiness in order to improve living standards of the population.

This issue is relevant in the context of the sanctions introduced by Western countries. Therefore, it is important to understand the trends of developing parameters (forecasts) of the problem sectors of the Russian agricultural and food market.

2 Materials and Methods

The methodical approach to suggesting offers on developing the agrifood policy based on the optimization of production capacities and market requirements in the region, and the methods for forecasting parameters of problem sectors in the agrifood market were used in the present work.

The studies are based on understanding the development trends of the regional food supply system, substantiating forecasts and determining parameters of the problem sectors of the food market that are based on a comprehensive analysis of the regional food supply system, identifying the current problems and developing offers for optimizing production opportunities and taking into account the needs of the food market in the region.

3 Results

Studying the development of the agrifood policy based on optimizing production capabilities and requirements of the market in the Republic of Mordovia, the authors offer a system of measures that ensure the resolving of the above problems. They consist of a number of stages.

At the first stage, it is necessary to clarify the essence of the agrarian and agrifood policy, how these concepts are interpreted. After that it is necessary to carry out studies: to obtain official data on the volume of agricultural production, taking into account consumption rates, to analyze the dynamics of the population structure, and to determine sales volumes by product groups per person.

The concept of “agrifood policy” is interpreted as follows: this is a part of the economic policy of a state or region in the investment, price, financial and infrastructure areas, aimed at the integrated development of the food security system as an economic sector and meeting the needs of the agrifood market in order to provide the population with food [2, 3].

The overall focus of the agrifood policy is determined by the needs of:

- Agrifood markets for reliable food supply of the population,
- Provision of the population with high quality food products at reasonable prices, and
- Preservation of the environment, preservation and reproduction of soil fertility, growth of productive properties of agricultural plants and animals, and environmental protection [4, 5].

Along with this, it is important to determine the production of specific types of food products during the integrated economic interaction within the food subcomplex.

Based on evaluating the methodological approaches that determine the capacity of the food market, a system of measures is offered to solve the above problems. It consists of a number of stages.

At the first stage, it is necessary to carry out research activities aimed at studying the capacity of the food market, analyzing the composition, structure and dynamics of the population and sales of product groups per person.

The second step of the first stage is to systematize data, to form grouping and analytical tables, and time series of the indicators under analysis.

The first stage results in obtaining the analytical data that make it possible to define the ratio of the actual and science-based agricultural livestock and the volume of livestock production in the Republic of Mordovia (under the current output of products per one conditional head).

At the second stage, the problem production sectors are analyzed through the example of the Republic of Mordovia.

Table 1 – Ratio of the Actual and Science-Based Acreage and Gross Yield of Vegetables in the Republic of Mordovia (under the Current Yield).

Indicators	Vegetables					
	2011	2012	2013	2014	2015	2016
Acreage, thous. ha	6.4	6.3	6.4	6.3	6.3	6.0
Yield, centner/ha	134.06	145.87	132.97	143.02	154.13	161.67
Gross collection, thous. t.	85.8	91.9	85.1	90.1	97.1	97.0
Actual sale, thous. t.	18.9	22.2	17.5	21.3	21.6	24.5

Population, persons	833,263	825,454	818,566	812,156	808,900	807,453
Under science-based indicators: vegetables – 130 kg.						
Acreage, thous. ha	8.08	7.36	8.00	7.38	6.82	6.49
Under the current yield, centner/ha (t/ha)	134.06 (13.41)	145.87 (14.59)	132.97 13.30	143.02 (14.30)	154.13 (15.41)	161.67 (16.17)
Science-based gross yield, thous. t.	108.32	107.31	106.41	105.58	105.16	104.97
Ratio of the actual and science-based acreage, %	79.21	85.60	80.00	85.37	92.38	92.45
Ratio of the actual and science-based gross yield, %	79.21	85.64	79.97	85.34	92.34	92.41
Ratio of the actual and science-based sale, %	17.45	20.69	16.45	20.17	20.54	23.34

Table 2 – Ratio of the Actual and Science-Based Agricultural Livestock and Livestock Production in the Republic of Mordovia (under the Current Output of Products per one Conditional Head).

Indicators	Beef						Pork					
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016
Annual average livestock number (meat cattle, pigs and cows), thous. heads.	194.30	194.10	188.05	180.45	166.40	152.25	302.50	310.90	316.00	304.75	293.80	306.95
Output of products per one conditional head of livestock, centner/head	1.06	1.05	0.99	0.90	0.81	0.86	1.08	1.10	1.06	1.33	1.40	1.51
Volume of production, thous. t.	205	203	186	162	134	131	326	342	336	406	411	462
Actual sales, thous. t.	15.5	14.0	14.5	13.9	13.3	16.06	21.0	22.2	24.4	25.2	33.3	40.04
Population, persons	833,263	825,454	818,566	812,156	808,900	807,453	833,263	825,454	818,566	812,156	808,900	807,453
Under science-based indicators: beef and veal – 25 kg, pork – 14 kg.												
Annual average livestock number, thous. heads	197.45	197.31	206.90	226.16	251.13	234.60	108.25	105.05	107.78	85.35	80.96	75.10
Under the current output of products per one conditional head of livestock, centner/head	1.06	1.05	0.99	0.90	0.81	0.86	1.08	1.10	1.06	1.33	1.40	1.51
Science-based volume of production, thous. centner	208.32	206.36	204.64	203.04	202.23	201.86	116.66	115.56	114.60	113.70	113.25	113.04
Ratio of the actual and science-based livestock, %	98.40	98.37	90.89	79.79	66.26	64.90	279.45	295.95	293.19	357.06	362.90	408.72
Ratio of the actual and science-based gross production, %	98.41	98.37	90.89	79.79	66.26	64.90	279.44	295.95	293.19	357.08	362.91	408.70
Ratio of the actual and science-based sale, %	74.40	67.84	70.86	68.46	65.77	79.56	180.01	192.11	212.91	221.64	294.04	354.21

Thus, it is possible to make the following conclusions based on analyzing the ratio of the actual and science-based sales of agricultural products in the Republic of Mordovia in the area of problem sectors.

According to the indicators stated in Tables 1 and 2, it is possible to see that in the Re-public of Mordovia, in 2016 the actual production of vegetables and cucurbits was 23.3 % of the science-based volume, pork exceeded the science-based volume by 308.70 % in 2016, accordingly, in contrast to beef (in 2016, the actual production was less than the science-based one by 35.10 %).

The third stage is to forecast the development of the problem sectors of the agrifood market. Thus, in order to forecast indicators of the agricultural production and consumption based on taking into account the number of the population, the Excel

software and official statistical reporting data for the previous eleven years were used. This was done in order to forecast development trends in the future for 2018 – 2020, taking into account the probabilistic characteristics of the model.

In order to create terms and conditions for the sustainable development and functioning of the food supply system, it is necessary to forecast production: in crop production – vegetables and cucurbits, and in livestock production – beef and veal.

To forecast trends in the agricultural market under the current population, the authors use the capabilities of Excel and the official statistical reporting data for the previous ten years.

Taking into account the probabilistic characteristics of the model, the authors calculate the forecast data for 2017 – 2020 (Table 3).

Table 3 – The Actual and Forecast Indicators of Gross Collection and Per Capita Consumption of Vegetables and Cucurbits in the Republic of Mordovia.

Year	Population, thous. per.	Gross collection of vegetables and cucurbits, thous. kg	Per capita consumption, kg	Required production of vegetables and cucurbits, thous. kg (while the rational norm is 130 kg per capita)
Actual indicators				
2004	878.3	100,000	113.86	114,179
2005	871.8	87,500	100.37	113,334

2006	864.7	83,400	96.45	112,411
2007	857.9	93,500	108.99	111,527
2008	851.7	88,100	103.44	110,721
2009	845.0	91,100	107.81	109,850
2010	839.2	69,900	83.29	109,096
2011	833.3	85,800	102.96	108,329
2012	825.5	91,900	111.33	107,315
2013	818.6	85,100	103.96	106,418
2014	812.2	90,100	110.93	105,586
2015	808.9	97,100	120.04	105,160
2016	807.5	97,000	120.12	104,970
2017	796.1	96,900	121.71	103,493
2018	789.9	90,100	114.06	102,687
2019	783.6	89,000	113.57	101,868
2020	777.4	88,900	114.35	101,062

According to the forecast indicators in Table 3, for 2017 – 2020, the population of the Republic of Mordovia should decrease by 30.1 thousand people. Accordingly, the consumption of vegetables and cucurbits during this period will be reduced by 3.27 kg per year.

Studying the forecast indicators, it is possible to note that the gross yield of vegetables and cucurbits during 2017 – 2020 should decrease and amount to 88,900 thous. kg, and the necessary production should decrease by 2,431 thous. kg and reach 101,062 thous. kg.

The development of the vegetable market is of great national economic importance. The lack of vegetables affects the health of the population of the Republic of Mordovia because they contain the vitamins required by the human body [6].

The beef market is one of the most important markets for livestock products in the Republic of Mordovia. However, the situation is quite complicated now.

Beef contains essential proteins, fats, minerals, vitamins, enzymes and other elements of animal origin and is of great importance for the formation, becoming and functioning of the human body. It is considered to be the most useful type of meat because the nutrients it contains are absorbed by the human body by almost 100 %.

According to the forecast, the gross production of beef and veal for 2017 – 2020 will decrease by 7,556 thous. kg and amount to 16,377 thous. kg, while the necessary production will decrease by 364 thous. kg and will be 9,798 thous. kg, i.e., the forecast of indicators in the beef market for the coming years is unfavorable. At the same time, the forecast accuracy is rather high due to the high values of the approximation coefficients ($R^2 = 0.98$ and $R^2 = 1.0$).

The analysis of the forecast indicators in Table 4 states the following: in the Republic of Mordovia for 2017 – 2020, the consumption of beef and veal per capita should decrease by 2.4 kg per year, which is a negative factor in the dynamics of consumption.

Thus, despite the fact that today the Republic of Mordovia manages to almost completely provide itself with many basic types of products, there are still considerable disproportions in the structure of markets: in some markets there is an overproduction of own products (for example, grain, eggs), and in others – underproduction (for example, vegetables, beef).

Thus, it is necessary to note that among the agricultural markets of the Republic of Mordovia, the most vulnerable are those of vegetables and beef. The actual sales of products in them lag behind the science-based indicators. Under the modern conditions, this trend is a threat to the rational food supply of the Republic of Mordovia and requires taking measures to eliminate it [7, 8].

The fourth, final stage is the development of directions of the agrifood policy that, on the one hand, takes into account the problem production sectors, and the forecast of the development of the agrifood market, on the other hand.

Based on analyzing the problem sectors and the forecast for the development of the agri-food market, it is necessary to formulate the following directions of the agrifood policy of the Republic of Mordovia:

- Formation of the production resource base (expansion of dairy and meat production, expansion of areas for greenhouses and open ground areas), clarifying measures on management by the state,
- State support of the breeding reproduction and creation of regional seed-growing structures, and
- Preservation and reproduction of the soil fertility of the existing areas for vegetable crops and the reproduction of the infrastructure for camping and stationary breeding of meat livestock.

4 Discussion

It is offered to form the mechanism for pursuing the agrifood policy under the impact of external and internal factors as a set of measures of the economic policy of the state or region in the investment, price, financial and infrastructural areas aimed at meeting the needs of the state and the agrifood market in order to provide the population with food in accordance with rational norms consumption [8-11].

The overall focus of the agrifood policy is determined by the following areas [10, 12, 13]:

- Creating terms and conditions for the functioning of agrifood markets for sustainable and reliable food supply of the population,
- Provision of the population with high quality food products at reasonable prices, and
- Preservation of the environment, preservation and reproduction of soil fertility, growth of productive properties of agricultural plants and animals, and environmental protection.

It is possible to make the following conclusions based on analyzing the ratio of the actual and science-based sales of the agricultural products in the Republic of Mordovia in the area of problem sectors.

According to the indicators stated in Tables 1 and 2, it is possible to see that in the Republic of Mordovia, in 2016 the actual production of vegetables and cucurbits was 23.3 % of the science-based volume, pork exceeded the science-based volume by 308.70 % in 2016, accordingly, in contrast to beef (in 2016, the actual production was less than the science-based one by 35.10 %).

Thus, despite the fact that today the Republic of Mordovia manages to almost completely provide itself with many basic

types of products, there are still considerable disproportions in the structure of agricultural products markets: in some markets there is an overproduction of own products (for example, grain, poultry meat, eggs), and in others – underproduction (for example, lamb meat, fish, vegetables, fruits, beef).

5 Conclusion

Based on analyzing problem sectors and forecasting the development of the agrifood market, it is necessary to formulate the following directions of the agrifood policy in the Republic of Mordovia:

- Formation of the production resource base (meat production capacity (dairy and meat production), expansion of areas for greenhouses and open ground areas to produce vegetables, orchards and berry fields, production capacities for their processing) supported by the state and the region,
- State support of the breeding reproduction and the reconstruction of own seed-growing structures, and
- Preservation and reproduction of the soil fertility of the existing areas for vegetable crops and the reproduction of the infrastructure for camping and stationary breeding of meat livestock.

Thus, the relevance of this study is stipulated by today's lack of sufficiently substantiated approaches and offers for developing the agrifood policy related to the problem agricultural sectors in Russian regions.

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