Modernization of the Regional Dairy Product Subcomplex in the Framework of Import Substitution Policies

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Abstract This article presents the results of the analysis of the key provisions of the state agrarian policy of the regions in the framework of the Concept of long-term socio-economic development of the Russian Federation for the period up to 2020. The Vologda region, as one of the leaders in the production of milk and dairy products with a significant production potential for the development of the industry, were chosen as the object to study the implementation of the growth points indicated in the document. The paper analyzes the functioning of the region's dairy subcomplex over the past 17 years. The research shows that, despite the presence of a number of systemic problems (such as stagnation of the production base in the industry), there have been positive trends. In particular, the gradual modernization of economic facilities and processes continues, new equipment is acquired, companies attract highly qualified personnel and increase the livestock productivity.

Keywords Agro-industrial complex · Dairy subcomplex · Dairy cattle breeding · Import substitution · Potential · Modernization · Region · Vologda region

1 Introduction

The problem of providing the population with food is the main and strategic task for any state. In the Russian Federation today, this problem is acute, especially in the regional context, as, due to the decrease in the food potential of the agro-industrial complex, there is a sharp decline in agricultural production, even in regions of deep specialization. Moreover, insufficient production of agricultural products has led to the fact that imported agricultural products (in particular surrogates and cheaper substitutes) gradually displaced domestic products from the market, which led to higher prices and a shortage of quality products. Therefore, to meet the needs of the population in food products, it is necessary to form a food market based on the laws

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of the market economy, where institutional, economic and legal norms of mutually beneficial and equitable cooperation are thought out. This task requires solving a number of theoretical and practical problems [3, 9].

The mechanism of formation and functioning of the food market is represented as the interaction of objectively acting factors, phenomena and processes in the production, distribution, exchange and consumption of food products. The functioning of this market is determined by the ratio of the needs of the population, internal production capabilities and development of inter-territorial relations. Taking all these factors into account is a difficult but necessary task of the study of this problem [2].

2 Discussion

The importance of sustainable and innovative development of agriculture with a focus on a new technological way in the era of digitalization is associated with the policy of import substitution [1, 8]. Its relevance was noted in the speech of the President of the Russian Federation, Vladimir Putin, in May 2014 at the St. Petersburg economic forum. He said that it is necessary to analyze the possibilities of competitive import substitution in industry and agriculture in a short time. At the same time, the president noted that the basis for import substitution should be domestic sources of growth.

In the concept of long-term socioeconomic development of the Russian Federation for the period up to 2020 [6] in the formation of import substitution policy in the framework of the transition from the export of raw materials to an innovative model of economic growth as the target, the following areas were identified:

- Consolidation and expansion of Russia's global competitive advantages in traditional areas (energy, transportation, agriculture, processing of natural resources), including the implementation of agricultural potential in terms of exporting grain and other agricultural products, production of environmentally friendly products and import substitution in the domestic market;
- Growth (including through import substitution) of medium-technology production—the food industry, the construction materials industry, woodworking, and the pulp and paper industry, as well as the export-oriented chemical industry and non-ferrous metallurgy;
- The development of dual technologies and the technological renewal of mass sectors of the economy (the automotive industry, transportation engineering and machine tools), which play a crucial role in increasing the average technological level of industry and import substitution;
- Intensive processes of import substitution in the food industry, household appliances and the automotive industry.

In addition to the above areas, the concept also reflects in detail the main objectives of the state agricultural policy in the long term:

- Meeting the needs of the population with agricultural products and food produced in Russia;

- Sustainable development of rural areas, improving the standard of living of the rural population;
- Improving the competitiveness of the Russian agricultural sector;
- Effective import substitution in the market of livestock products and the creation of developed export potential (especially in crop production), allowing a future stable position in the world market of agricultural products;
- Improvement and increase of productivity of land and other natural resources used in agricultural production.

It should be noted that the achievement of these goals in the long term will be based on the formation of an adequate state policy that provides the Russian agro-industrial complex with equal competitive conditions with developed countries [7].

In order to achieve these goals, the following priority areas are envisaged.

The first direction is to improve the general conditions for the functioning of agriculture, especially livestock, on the basis of:

- Improving forms, mechanisms and increasing the volume of state support in order to increase the profitability and investment attractiveness of agriculture, technical and technological modernization of the industry, as well as ensuring the effective use of land and other natural resources;
- Increasing the availability of credit resources, the development of land mortgages and strengthening of competitive principles in the areas of lending and insurance and in the leasing market;
- Support, training, consolidation and attraction of qualified personnel for agriculture and the improvement of their living conditions;
- Transition of staffing of agro-industrial complex to a qualitatively new level, corresponding to the needs of innovative development of the agricultural economy;
- Improving the financial stability of all forms of farming in rural areas;
- Development of the domestic agri-food market's infrastructure and maintenance of the products' export potential as competitive on the world market by improving the measures of state regulation of agricultural markets and protecting the interests of Russian producers; this includes consideration of the World Trade Organization's requirements through the development of the commodity distribution network and the extension of export support measures for certain types of agricultural products—increase the volume of exchange trade, state support for the construction and reconstruction of large infrastructure facilities (e.g., storage and primary processing of agricultural products), the development of cooperation, expansion of participation of unions (i.e., associations) of agricultural producers and service industries in the formation of the state agricultural policy.

The second direction involves the creation of prerequisites for the sustainable development of rural areas, including:

- Implementation of measures to improve the demographic situation in rural areas and ensure employment of the rural population with the creation of new jobs, the development of alternative activities, and the reduction of rural poverty;

- The development of social and engineering infrastructure development in rural areas;
- Improvement of the rural population's living conditions, support of complex compact development and improvement of rural settlements;
- Increase in the prestige of agricultural work
- Development of local self-government and civil institutions in rural areas
- Preservation and improvement of traditional agricultural landscapes

The third direction is to increase the efficiency of land resource use and its reproduction on the basis of:

- Improving soil fertility, upgrading irrigation and drainage systems and expanding land reclamation. The use of fertilizers will meet the optimal needs—the application of mineral fertilizers (in terms of 100% nutrients) per hectare of crops will have increased from 33 kg in 2007 to 50 kg in 2011 and to 130–150 kg in 2020
- Development of effective land turnover and creation of conditions for acreage expansion
- The fourth direction is to develop agricultural technologies and increase agricultural competitiveness by methods that include:
- Increase of labor productivity on the basis of incentives to use modern technologies, more organized production and the organization of work and management (labor productivity will increase by 170% from 2007 to 2020)
- Increase in livestock breeding and livestock productivity to a level comparable with similar indicators in European countries
- Development of intensive technologies in crop production, support for elite seed production and a sharp increase in the yield of major crops. Significantly expand the acreage of crops occupied by high-yield varieties. By 2020, their share in total crops will increase to 35–40%, while the total acreage will increase [6, 9].

3 Results

Currently, taking into account the current economic conditions of management, mutual sanctions with many countries, implementation of state sectoral programs and the transition to the digital economy, Russian agricultural producers have received a number of advantages that have had a positive impact on the development of agriculture in general and the dairy subcomplex in particular [2]. However, to maintain the momentum and further sustainable development in dairy cattle breeding, we believe that it is necessary to modernize the industry, which will allow it to reach a new, higher quality and intensive development to be more competitive in the market.

It should be noted that the theoretical and methodological studies of scientists at the Federal Scientific Center for Agrarian Economy and Social Development of Rural Areas—VNIIESH, VNIOPTUSKH, RGAZU, and other scientific institutions and countries, especially Finland and Germany, indicate the relevance and importance

of modernization in agriculture, including dairy cattle breeding, in the conditions of a digitized economy [1, 4].

Let's start with the fact that the Vologda oblast for research is not chosen by chance—this region is one of the leading dairy cattle breeders in the Russian Federation [5]. For example, in 2017, for the production of milk by agricultural organizations per capita, it took 4th place, cow productivity—5th place, etc. In general, for 2000–2017, the region produced about 32% of the milk of the North-Western Federal district [3]. This position of the region is due to a number of factors. These are, first of all, natural and climatic conditions (moderately cold winter and warm summer, heavy rainfall, rare herbs, etc.); producing high-quality natural dairy products in high demand both within the region and abroad; proximity to markets (Moscow and St. Petersburg). There are also significant areas of agricultural land (over 1 million hectares, including arable land—750 thousand hectares), sufficient to provide the industry with feed; the number of cattle, represented by five adapted breeds of dairy and dairy-meat areas of productivity (class "elite" and "elite-record": black-and-white, Ayrshire, Kholmogorskaya, Holstein, Yaroslavl Simmental and brown shvitskaya); more than 1,000 premises for keeping cattle with a capacity of 205 thousand cattle; improved breeding; about 26% of the total number of agricultural workers—livestock workers, etc. [[AUTHOR: These last sentences and lists are hard to understand. Please review. Thank you.]].

It should be noted that in 2000–2017, positive trends were formed in the development of dairy cattle breeding (Table 1), which, first of all, is explained by the activity conducted in recent years, the course of modernization of the sub-sector (updating the herd, the construction of new modern farms, the use of achievements of NTP, and so on). For example, there was an increase in milk production in 2017 compared to 2016 by 3.9% (higher than in 2000 by 2.8%). It was achieved due to the growth of cow productivity. Thus, the average milk yield from one cow in the agricultural organizations of the region for 2017 amounted to 6,916 kg, which is higher than the level of 2016 by 3.7% and the level of 2000 by 2.3 times (Table 1).

SHPK Prisukhonskoye of the Vologda region remains in first place regarding the productivity of cows during the last years—10,829 kg per cow, (+219 kg over 2016), second is Pokrovskoye LLC of the Gryazovets area (9,514 kg, + 510 kg), and third is SEC PKZ Vologda of the Vologda area (9,008 kg). It should be noted that the number of breeding stock in the total number of cattle in the region increases every year. The share of breeding cows in the total structure of the herd was more than 63%.[1]

It should be noted that the achieved level of productivity is ensured through the introduction of modern technologies for the maintenance and feeding of cows, by conducting a high level of breeding work with the herd, and through the use of a program-targeted approach in the planning of budget expenditures in the provision of state support to the industry. For example, agricultural producers increased the number of cows in 2017 from the regional budget, using the subsidies in the amount of 69.97 million rubles. Received an increase in cows due to their own reproduction of the herd and the purchase of livestock—2551 head. Also provided a subsidy for

[1] As of 01.01.2018, 57 breeding organizations are registered in the region.

Table 1 Some indicators capturing the dairy cattle breeding development in the Vologda region

Indicator	Year										2017/2016, %	2017/2000, %
	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017		
Gross milk yield, thousand tons	494.9	470.1	443	446.6	461.9	430.2	444.6	469.6	489.3	508.6	103.9	102.8
Milk yield per 1 cow, kg	2,975	4,219	4,890	5,129	5,527	5,524	6,028	6,411	6,668	6,916	103.7	2.3 times

the increase in the number of cows in private farms in the amount of 1.96 million rubles. (+40 cows).

There is also an increase in the quality of milk sold; a slowdown in the rate of reduction of livestock (the main reason for the disposal of cows is planned culling, and the livestock are expected to be restored during the current reporting period); an increase in the proportion of purebred and fourth-generation animals, etc. Note that the growth in milk production (raw materials) in the Vologda region in 2017 had a positive impact on the activities of the food and processing industry. Thus, in the dairy complex, the production of butter has increased by 22%, cottage cheese by 7%, dairy products by 4.5%, meat and meat products by 53% and 16%, respectively, etc. In general, the industry of industrial milk processing occupied a leading place in the food and processing industry of the region in 2017—its share was about 51.2%.

At the same time, regional producers completely cover the needs of the population of the region in accordance with medical standards in milk and dairy products by 1.8 times (Table 2).

Increases in general and milk resources (Table 3) can be, for example, sent to the territory of the ECR to provide the population with basic food products [3].

When analyzing the functioning of the industry, we believe it is important to note the fact that the modernization of production in the industry is primarily constrained by the outdated material and technical base and the lack of the number of farms, machinery and equipment.

As for milking machines and units, dairy farms in the region use a wide range of milking equipment, both domestic and imported, depending on the technological features of milking (in the milk pipeline, in the stationary milking parlor, in the carousel type hall, voluntary milking robots, etc.). However, for 2000–2017, the number of milking units and installations in the region decreased from 1433 to 434 (by 69.7%, Table 4).

Work continued in 2017 to solve the existing problem of insufficient technical equipment for agricultural work (more than 60% of grain harvesters and 74% of seeders and forage harvesters are used beyond the depreciation period (older than

Table 2 Livestock production per capita, kg per year

Type of product	Territory	2009	2010	2011	2012	2013	2014	2015	2016	2016/2009, %
Milk	Russia	230	223	221	222	213	211	210	210	91.3
	Vologda region	**383**	**368**	**372**	**386**	**360**	**373**	**395**	**396**	**103.4**
Meat	Russia	47	50	53	56	60	62	65	67	142.6
	Vologda region	41	42	41	36	32	28	28	32	78.0
Eggs (PCs.)	Russia	278	284	288	294	288	287	291	297	106.8
	Vologda region	473	488	501	577	494	395	398	474	100.2

Table 3 Resources and use of major food groups in the region

	2009	2010	2011	2012	2013	2014	2015	2016	2016/2009, %
Milk and dairy products, thousand tons									
Resources, total	582.3	539.3	507.1	536.9	524.9	531.7	519.9	531.8	91.3
Use of all	574.1	528.5	489.7	526.9	517.5	519.9	505.1	521.9	90.9
Meat and meat products, thousand tons									
Resources, total	87.1	91.2	96.3	96.1	96.3	92.5	94,1	95.0	109.1
Use of all	83.5	86.7	91.6	92.1	92.7	89.5	90.9	92.0	110.2
Eggs, million PCs									
Resources, total	721.1	732.2	761.2	823.9	723.1	620.6	627.9	639.6	102.6
Use of all	712.2	715.8	750.6	813.3	712.0	612.9	618.5	629.4	102.4

Table 4 Milking equipment in the dairy cattle breeding of the Vologda region

Indicator	Year						2017/2016, %	2017/2000, %
	2000	2005	2010	2015	2016	2017		
Availability of milking machines and units at the beginning of the year, units	1,433	996	672	481	456	434	95.2	30.2
The coefficient of elimination of milking installations and units in the agricultural, %	3.6	10.0	14.0	6.8	3.3	2.5	–	–
The coefficient update of the milking installations and units in the agricultural, %	1.6	1.7	3.6	2.7	2.9	2.1	–	–

11 years). In 2017, 118.5 million rubles (80% more than in 2016) were allocated in the form of subsidies from the regional budget for the renewal of the Park of agricultural machinery).[2] Despite the purchase of new equipment, the supply of equipment for sowing and harvesting at the farms of the region remains low. Note

[2]It should be noted that every year the size of state support for the reimbursement of the cost of the purchase of equipment increases. Thus, in 2018, it is planned to allocate 193,8 million rubles. In total, the purchase of 90 units of agricultural machinery was subsidized.

that the introduction of modern agricultural machinery can reduce sowing time, perform the full range of functions in one pass, save seeds and fertilizer, significantly reduce harvest time, improve the quality of harvested feed and reduce crop losses up to 20%.

The lack of qualified personnel also has a significant impact on the development of dairy cattle breeding; difficulties introducing new technologies arise not only because of the lack of funds for the purchase of new equipment but also due to the lack of qualified specialists serving it.

Another problem is that, despite the annual expansion of state support for agriculture, which contributes to the mobilization of internal reserves of agricultural organizations, its level is insufficient for the zone of risky agriculture. At the same time, the mechanism of providing state support to agricultural producers in the region remains imperfect: budget funds are allocated to economically strong farms that can provide a return of credit resources with a collateral base and large volumes of sales. Of course, this concentration of credit resources provides relatively efficient budget support, but the situation of medium-sized agricultural organizations and small businesses (private farms, farms) is aggravated.

Modernization in dairy cattle breeding is also hampered by the lack of an integrated approach, which provides for the creation of clusters of technologically related industries for interactions between economic sub-sectors. For effective development of dairy cattle breeding in the region, it is advisable to have a system-network management structure, including public, private, economic, scientific, and social institutions. Active involvement in decision-making processes for the development of the sub-sector of all these organizations means the mobilization of additional information, management and organizational resources concerning economic and social processes.

Despite the existing number of problems in the region as a whole, a phased technical and technological modernization of livestock facilities is being carried out. It should be noted that in the advanced farms of the region in this direction, there are already positive results.

For example, on the farms of one of the leading agricultural enterprises with loose cattle housing (milking in the milking parlor and via the robot), the production costs of 1C of milk are also lower (7.5% and 7.3% in the third year, respectively). However, according to the chief economist of the collective farm, reducing production costs is not a priority for the farm, which focuses instead on significantly reducing the labor costs for production. So in the third year of studies on loose housing (e.g., on the new yard No. 6), labor costs for 1C of milk amounted to only 0.46 people per hour, 22.3% lower than the labor costs of tethering dairy cattle.

Also, in 2018, one of the leading farms in the region launched a modern dairy complex using the latest technologies in dairy cattle: loose cows with voluntary

milking robot stations, which have computerized milking processes, and the identification of zootechnical and veterinary accounting.[3] Mobile dispensers-faucets will prepare and distribute to the cows balanced for all components of the feed. In the complex—a barn on 544 of the head with the dairy block, the eight robot milkers. The new complex, according to experts, will increase the number of breeding stock by 300 heads, the gross production of milk by seven tons per day, improve the quality of milk and reduce production costs.

4 Conclusion

Summing up the above, it should be said that within the framework of the ongoing digitalization of the agriculture and dairy cattle industry of the Vologda region, in particular, despite a number of systemic problems, it will have to move to a new level of development, actively carrying out the modernization of production and using new achievements of science and practice, etc. In addition, at present, the region, in comparison with the subjects of the North-Western Federal district, has already noted higher rates of development of dairy cattle breeding, and it has quite large reserves of increasing intensification on the basis of modernization of production and digitalization in general.

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[3]This complex is opened on the basis of one of the most advanced and largest farms in the region. It contains about 5,5 thousand heads of cattle, and its productivity is almost 20 thousand tons of milk a year.

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