The effective development of milk stock-breeding in the condition produce organic product

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Abstract. Reduction in the size of the dairy herd livestock in the agricultural organizations led to a shortage of marketable commodity milk on the market of milk and dairy products. Bearing in mind the strategic role of dairy cattle breeding in the provision of dairy products, assessment of utmost importance the development of commodity market milk in agriculture regions of the Siberian Federal District. However, milk and dairy products traditionally are a vital link in the diet. In the cost of consumer's basket accounted for 16%. In doing so, Russia lags far behind developed countries in the consumption of milk and dairy products. To date, the average inhabitant of our country accounts for approximately 230 kg of these products annually, this is almost twice lower than the standards recommended by nutritionists.

1. Introduction
In the context of the new economic reality, the extension of economic sanctions, the problem of the development of sectoral food sub-complexes of the agro-industrial complex in the context of implementation is especially relevant. A shortage of raw milk and a reasonable lack of the possibility of increasing it in the short term, stagnation in milk production, a reduction in the number of cows, a significant share of low-commodity households in the production of raw milk; a decrease in the profitability of milk producers and processors due to an increase in the cost of its production and processing against the background of the devaluation of the national currency; high dependence on imports of dairy products (the level of self-sufficiency in milk and dairy products, according to various estimates, ranges from 70% to 77%); low investment activity due to the unacceptable cost of credit resources, the relatively low investment attractiveness of dairy cattle breeding due to the long payback period of financial investments; an increase in the share of counterfeit products in the dairy market; a decrease in consumer demand for milk and dairy products against the background of a decrease in the purchasing power of the population’s monetary incomes - factors restrain the development of the domestic dairy industry. In these conditions, the urgent problem is the development of the production of ecological and organic dairy products.

2. Materials and methods
The theoretical and methodological basis of this study was the works of domestic and foreign scientists-economists dedicated to the development of industry-specific product sub-complexes. The information base of the study was made up of statistical data of the Federal State Statistics Service, the Unified Interdepartmental Information Reference System, the Territorial Body of the Federal State Statistics Service for the Altai Territory, the Siberian Customs Administration, materials of scientific and practical
conferences on the problem under consideration, periodic and special editions. Concept of an integrated approach to the research problem, including the methods of scientific knowledge, how the method of comparative economic analysis is built, elements of the monographic research method, the economic and statistical research method.

3. Result

Farms of all categories are producers of raw milk in the region. However, significant structural changes led to a decrease in the share of agricultural enterprises from 78% (1985-1995) to 46% (2018), which is explained by a decrease in the number of agricultural organizations and a number of economic and social reasons. Dairy cattle breeding is locally unevenly distributed in all zones Altai Territory, the largest share falls on the Kulundinskaya (32%), Priobskaya (21%), Biysko-Chumyshskaya (20%) and Prialeiskaya (18%) zones (table 1).

They are also the main suppliers of raw milk for the dairy processing industry of the region. More than 80% of raw milk is concentrated in them, 72% of dairy cows from the total livestock in the region, 76% of fixed assets, 65% of workers employed in agricultural production.

Table 1. Localization and size of milk production by regions of the region on average for 2010-2018, % [1].

| Natural and economic zones | Livestock of cows | Forage area | The size of fixed assets in dairy farming | Milk production | Employed workers in the agricultural sector. production |
|----------------------------|------------------|------------|----------------------------------------|----------------|-------------------------------------------------|
|                           |                  |            |                                        |                |                                                 |
| Kulundinskaya             | 18.5             | 26.0       | 23.0                                   | 32.0           | 21.0                                            |
| Prialeiskaya              | 11.9             | 18.0       | 20.0                                   | 18.0           | 14.0                                            |
| Priobskaya                | 20.4             | 20.0       | 17.0                                   | 21.0           | 16.0                                            |
| Biysk-Chumyshskaya        | 21.7             | 9.0        | 16.0                                   | 20.0           | 14.0                                            |
| Prisalairskaya            | 4.6              | 11.0       | 10.0                                   | 2.0            | 16.0                                            |
| Prialaiskaya              | 13.9             | 11.0       | 11.0                                   | 4.0            | 12.0                                            |
| Altai                     | 10.0             | 5.0        | 3.0                                    | 3.0            | 4.0                                             |

The location of processing plants geographically coincides with the zones of raw milk production. However, the available capacities of processing enterprises in the natural and economic zones of the region do not correspond to the raw materials in them. Thus, an excess of production capacity is observed in the Biysk-Chumysh zone (53%), in the Kulunda zone - more than 24%, in the Prialeiskaya - about 12%. The discrepancy between the processing capacities and raw materials leads to the irrational use of raw materials and the production of a limited range of dairy products.

On the market of raw milk, there is a steady dynamics of the prevalence of the share of households in the structure of milk production (table 2).

Table 2. Structure of commercial milk production by categories of farms, % [2,3].

| Name                        | Agricultural organizations | Peasant (farming) households and individual entrepreneurs | Households of the population |
|-----------------------------|----------------------------|----------------------------------------------------------|-------------------------------|
|                             | 2011 | 2018 | 2011 | 2018 | 2011 | 2018 |
| Russian Federation Siberian | 45.49 | 47.79 | 4.82  | 6.61  | 49.69 | 45.60 |
| Federal District             | 40.53 | 40.08 | 3.37  | 4.34  | 56.10 | 55.58 |
Taking into account the indicators of concentration ratios (CR3) and Genfindahl-Hirschman (HH1), the regional product markets for milk processing can be divided into highly concentrated, moderately concentrated and low concentrated market types. Studies have shown that a moderately concentrated type of market prevails in the regions of the Siberian Federal District, characterized by the presence of 3-4 large processing enterprises, the concentration ratio CR3 was in 2018. 58.8% (HH1 = 1640).

The use of the mapping method allows you to visualize the localization of the main raw material zones of the Altai Territory: raw materials are located in the north and west of the territory (Kulundinskaya and Priobskaya natural and economic zones), processing industries are localized - in the north, south and in the central part of the Altai Territory (Pralieiskaya, Priobskaya, Biysko-Chumyshskaya zone), which is reflected in the spatial remoteness of raw milk from industrial processing and production of dairy products. Milk processing enterprises are concentrated in the Kulunda and Biysko-Chumysh zones (24% and 53%) [4].

The concentration of processing enterprises in the Biysk-Chumysh, Kulunda and Prialei zones is explained by the concentration of markets for agricultural raw materials, since the territory is inhabited by the main number of food consumers (more than 75%).

Segmentation of local sectoral markets using the method of mapping-zoning of local segments makes it possible to draw a conclusion about the level and directions of raw milk flows and localization of processing facilities and develop recommendations for optimizing and rationalizing the functioning of the local dairy market of the Altai Territory.

The main flow of agricultural raw materials for processing industry enterprises located in the Biysko-Chumysh and Prialeiskaya zones is directed from the Kulunda and Priobskaya natural-economic zones.

Thus, it is necessary to concentrate efforts on the development of the raw materials market of the Biysk-Chumysh, Prisalair, Prialei zones due to the concentration of raw materials potential and the low degree of self-sufficiency of these zones.

The established direction of processing raw materials in the region is cheese-making butter, the production of whole milk products. The use of capacities for the production of basic dairy products is irrational. Oil production capacity utilization decreased from 62% (1991) to 50% (2015); cheese from 70% to 55%, which is associated with a reduction in the volume of raw materials supplied by agricultural producers and imperfect economic relations with partners of the agro-industrial complex.

In order to retain market share and the possibility of local development, dairy processing enterprises of the region are integrated with 22 agricultural enterprises, the sown area is 77.6 thousand hectares, the livestock of cattle is 51.3 thousand heads, 18, 1 thousand cows, the gross milk yield is 81 , 1 thousand tons or 5.7% of the total milk production by all categories of farms in the region [4]. (table 3)

| Table 3. | The level of integration in the dairy product subcomplex [5]. |
|---------------------------------------------------------------|
| Indicators | Total livestock, thousand heads | Milk yield per 1 cow, kg | Gross milk yield, thousand tons |
|-------------|---------------------------------|-------------------------|-------------------------------|
| KRSincl. cows | 2018 | 2018 | 2018 to 2014, % |
| Overall along the edge Agricultural enterprises integrated with milk processing enterprises | 817.3 | 552.9 | 4527 | 1414.9 | 100.0 |
| Agricultural enterprises integrated with milk processing enterprises | 51.3 | 18.1 | 4636 | 106.3 | 81.1 |
| Agricultural enterprises integrated with milk processing enterprises | 6.3 | 5.1 | - | 5.7 | - |

The problem of storage and packaging of final products is very urgent. From a functional point of view, packaging protects the product all the way from production to consumer. From the aesthetic point of view, it allows you to maintain the market position of the company's brand: size, color, font, etc.
Dairy products are packaged mainly in paper, plastic containers. At the same time, during the shipment of products, transportation of dairy products to the consumer, their losses occur.

To analyze the product portfolio, we analyzed the main commodity positions of dairy products using the BKG matrix (figure 1). Matrix Boston Consulting Group (BKG) allows you to segment products by market share and growth rates of demand for this type of dairy products.

Children's, dietetic and curd products are characterized by a relatively low market share and low rates of demand - up to 15% of sales. These products have a relatively high price and competition from imported domestic products (Moscow, Novosibirsk, Omsk, Belgorod, etc.). Its promotion in the market requires significant marketing costs. The most popular dairy products include fermented milk products - up to 35% of the market share. It is affordable (it is a recycled product), useful for all categories of consumers, diverse in its assortment. The products with a high share of sales volume include cheese of various varieties and animal oil - up to 65%. Buyers prefer local butter as the highest quality, cheeses of the brands: "Altai", "Kiprinsky", "Soviet", "Gorny". There is a tendency in preference for the brands of cheese "Maasdam", "Wetsberg", "Gouda" and others from 12% (2012) to 35% (2019). CMP and ice cream are traditional products for the regional consumer due to the limited terms of sale and the pronounced seasonality of consumption (ice cream). These products occupy up to 95% of the market share and are the least influenced by competitors. [5,6]

![Figure 1. Dairy BKG Matrix, 2019.](image)

The red sector is the segment of whole milk products, the green segment is butter, fermented milk products; blue segment - yoghurts; light blue segment - food products and baby food; blue segment - milk powder and canned milk; violet segment - cheeses and rennet products; orange segment-ice cream.

At the same time, it is necessary to reverse the trend of deterioration in the quality of dairy products.
For the purpose of detailed segmentation of consumers of dairy products, we have carried out marketing research on the main commodity groups of dairy products.

Thus, marketing research made it possible to assess the current state of the local segment of dairy products in the Altai Territory and draw the following conclusions:

1) In the dairy market, the largest share belongs to the segment of cheeses and cheese products: in terms of value, this segment is 54%;

2) The natural volume of the butter segment for the period under review decreased: the average annual rate of decline was 0.1%; the segment of milk and cream in solid forms showed a greater decline: the average annual rate of decrease in volume was 6.6%;

3) The milk produced in the region does not meet the quality requirements of the companies. Since most of the milk is used for the production of cheese and butter, the production of which requires particularly high-quality raw materials, the problem with the quality of milk in the region is acute.

Thus, there are objective prerequisites for improving the production and sale of natural dairy products in the region, taking into account the needs of consumers.

Prospective functioning of the dairy-food subcomplex is possible in the context of the concept of progressive systemic development. The main objectives are to increase the livestock and productivity of cows; increasing the level of marketability of milk; production of quality dairy products.[6]

The logical scheme for the development of the dairy subcomplex provides for a sequence from determining the capabilities of agricultural producers to regional and federal demand for dairy products, their assortment and quality, taking into account the main directions of the Strategy for the Development of the Food and Processing Industry of the Altai Territory for the Period up to 2025 [6,7].

The substantiation of the concept of the development of the dairy subcomplex was carried out in several stages (figure 2).

![Figure 2. Algorithm of directions for the prospective development of the dairy subcomplex in the context of the concept of organic production.](image-url)
First, the volume and structure of the demand for dairy products by main commodity items is substantiated.

The volume of demand for raw milk and dairy products for the forecast period is calculated taking into account the full provision of the region due to its own production, export supplies, production needs;

secondly, the volume of milk production is determined, taking into account the local location in the natural and economic zones of the Altai Territory;

third, to optimize the volume of raw materials in terms of reproduction processes in dairy cattle breeding in the region, the level of development of the fodder base and fodder production, while observing balanced feeding;

fourthly, the development of waste-free technologies in the production of dairy products, involving an in-depth level of processing both raw milk and secondary milk resources;

fifth, the modernization of the material and technical base of dairy cattle breeding and the processing industry, which involves not only improving the quality indicators of the industry's development, but also introducing progressive technologies and innovative developments;

sixth, the production of import-substituting types of dairy products and cheese-making products based on the use of advanced technologies, in particular, the production of soft cheeses of various fractions in the Altai Territory;

seventh, optimization of the logistics infrastructure, which implies the development of a warehouse network in the main zones for the production of cheeses with a long ripening period; butter, as well as certain types of whole milk products;

eighth, the need for investment resources for the development of the industry is substantiated.

On the basis of the calculations, proposals are substantiated for the development of the market for raw milk and dairy products in the context of the localization of the raw material base and processing facilities of the dairy industry in the region, taking into account the placement of pedigree livestock of the corresponding specialization.[9]

We have proposed a number of directions for the development of the market for raw milk and dairy products.

Adaptation of the participants of the milk and dairy products market, in our opinion, will increase not only its investment attractiveness, but will also make it possible to more effectively respond to changes in market conditions. The target indicator for the implementation of the proposed areas is to increase the share of natural dairy products with an expanded range.

In the current environment, modernization of production, increasing the efficiency of the dairy industry and financial recovery of its participants, increasing milk production, improving the quality of dairy products and reducing the existing dependence on imports are impossible without the participation of the public sector.

4. Conclusion
Altai Territory has favorable conditions for organizing the production of environmentally friendly dairy products. With the rational use of the available resource potential of the Altai Territory, it is possible to develop this industry, provide the population with high-quality dairy products and find their place in the world market through the export of environmentally friendly products.

References
[1] Kovalev A 2016 Functioning of the local market of dairy products in the system of agricultural industry of the region: trends and prospects of development: monograph (Barnaul.: LLC "Concept") p 108
[2] Federal State Statistics Service for the Russian Federation http://www. gks. ru
[3] Altai Territory Administration for Food, Processing, Pharmaceutical Industry and Biotechnology http://www. altairegion 22. ru / gov / administration / stuct / dppp
[4] 2016 State report «On the state and protection of the environment in the Altai Territory in 2015» Barnaul 167
[5] Kovalev A 2016 The functioning of the dairy industry in the region in the context of the development of the local market *Economics and Entrepreneurship* 10(2) 773-8

[6] Kovalyova I and Khrenova Y 2007 Marketing research of the market of milk and dairy production regions of agro industrial complex: problems and prospects *Herald of the Altay State Agrarian University* 10(36) 89-94

[7] Burobkin I N, Goncharov V D and Kazarinov B N 2009 Meat and dairy subcomplex of Russia: development problems *Economy of agricultural and processing enterprises* 2 9-11

[8] Veklenko E V, Prusov N S and Dorodnykh D I 2007 Ways to strengthen the fodder base of dairy cattle breeding *Bulletin of the Kursk State Agricultural Academy – 2013* 6

[9] Lichman A A 2017 Some aspects of the production of ecologically clean agricultural products in Russia *Nikonov readings* 12 12-3