

Development of dairy farming in Ensuring food security of the Irkutsk region

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Abstract. Russian food security consists of the specifics of the development of its regional components. The “food security” concept includes the economic and physical availability of food and its guaranteed quality. Providing the population with high-quality, economically affordable, and sufficient food products is one of the priorities of the Russian state policy in national security matters. The research relevance of the dairy industry in the Irkutsk region is determined by its position as the leading branch of the food industry that forms the food security of the region. Among the processing branches of the agro-industrial complex, the dairy industry is second only to the bakery industry in terms of production volumes. The novelty of the work consists in the fact that (1) it is the first time that the districts of the Irkutsk region are grouped, according to the degree of development of dairy farming; (2) the analysis of the features of the development of the dairy industry of the Irkutsk region, in the context of food security of the region, is carried out; (3) the features of the functioning and territorial differentiation of the dairy herd and milk production are identified; (4) the trends of the dynamics of the dairy herd are considered. As a result, conclusions were drawn about the deep territorial differentiation of the dairy industry under the influence of existing natural, historical, and socio-economic factors.

1 Introduction

The dairy industry is an industry that combines the processes for the production of various dairy products from milk. It is part of the dairy complex, which includes cyclic production blocks from the receipt of raw materials to the production of finished dairy products. Throughout Russia, the industry employs more than 1 million people, who serve about 20 thousand enterprises. The share of commercial milk in the total production volume is 65.3% [1-6]. In the field of self-sufficiency in milk and dairy products, the leading positions are occupied by the Republic of Khakassia, the Altai Krai, the Altai Republic, and the Omsk Region [7-11]. Nevertheless, the provision of the country’s population with dairy products does not reach the threshold values defined by the Food Security doctrine. It amounting to 83.9% in 2021, with a threshold level of 90%. [2].

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The dairy complex is a sensitive indicator of the cumulative effect of economic, climatic, and infrastructural processes in the region. It takes into account the traditions of economic and geographical development. This fully applies to the region under research. The indigenous ethnic group - the Buryats, who inhabit the territory of the Irkutsk region, even before the arrival of the Russians, had developed dairy and meat cattle breeding and based their livelihood on dairy products [12-14]. Their historically formed diet and food traditions had two scenarios: (1) summer, from the time of calving until the end of milking of the dairy herd, where dairy products dominated; (2) winter, where dairy products (pre-prepared cheeses, butter, in small volumes of milk) were supplemented with meat and grain products. Dairy ("white") food was sacred [1]. The Evenks, hunters and, reindeer herders borrowed the breeding of cattle and the traditions of cooking dairy food. They, along with the Tofalars, inhabitants of the mountain taiga of the Eastern Sayan, ate deer milk. In pre-revolutionary times, there are no data on the volume of consumption of dairy products in the region, with the exception of butter. During the period of collectivization, attempts were made to organize large-scale production of butter from deer milk in the national collective farms of the Tofalars. However, due to the small volumes of milk yield and the lack of such practice in the traditions of the people, they failed [10].

Milk production from semi-industrial enterprises in the early 20th century, by the end of the century, acquired an industrial character. In the mid-1990s, there were 13 dairy enterprises in the Irkutsk region, located in various cities of the region and producing dozens of food products. In the private sector, small-scale industries allowed producing cream, sour cream, butter, cottage cheese, and cheese [4]. Irkutsk is becoming one of the important centers of the dairy industry in the region. There are large dairy industry enterprises in Eastern Siberia, whose products are known not only in the Siberian region but also in the European part of the country and Mongolia and Kazakhstan [7]. At the same time, the dairy industry is experiencing the impact of crisis processes in the economy at the turn of the century.

2 Materials and Methods

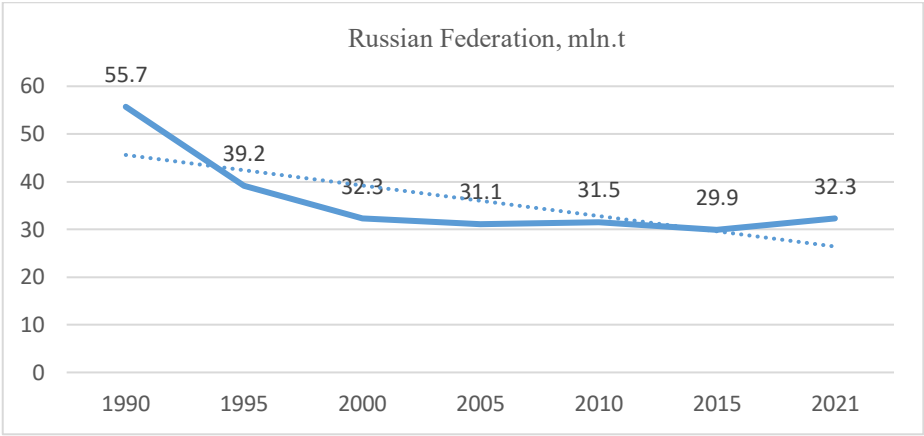
The research aims to analyze the regional differentiation of the development of the dairy industry and its importance in ensuring food security in the Irkutsk region. The objectives of the researches are to identify the features of the functioning, and territorial differentiation of the dairy herd and milk production, to study the trends in the dynamics of the dairy herd and milk production volumes in the context of municipalities. Ensuring food security, assuming economic, physical availability, and quality of food, concerning the dairy complex of the region, is significant in the context of preserving the health of the population, improving the demographic situation, and national security. The problems hindering the development of the dairy complex consist in (1) insufficient production volumes and supplies of raw materials to enterprises; (2) a reduction in the number of dairy herds; (3) an unbalanced concentration of production capacities and service infrastructure facilities; (4) uneven receipt of state support by enterprises [6; 12]; (5) insufficiently rapid growth of household incomes [16]. In the Irkutsk region, additional difficulties are associated with territorial imbalances in the development of municipal districts, difficulties in transporting products over long distances from the manufacturer to the consumer, heterogeneity of natural resource conditions, climatic fluctuations that cause feed shortages.

All this determines the relevance of the topic and the need to identify specific features of the functioning, structural and territorial differentiation of the dairy industry in the Irkutsk region. For the analysis, the data of state statistics are used, interpreted from the standpoint of systematic and comparative geographical approaches. They allow tracing the dynamics and territorial features of the dairy complex in the region and its significance in the context of the life support of the population.

3 Results

The effectiveness of milk production in the last 30 years has a wave-like character (Fig. 1).

1)



2)

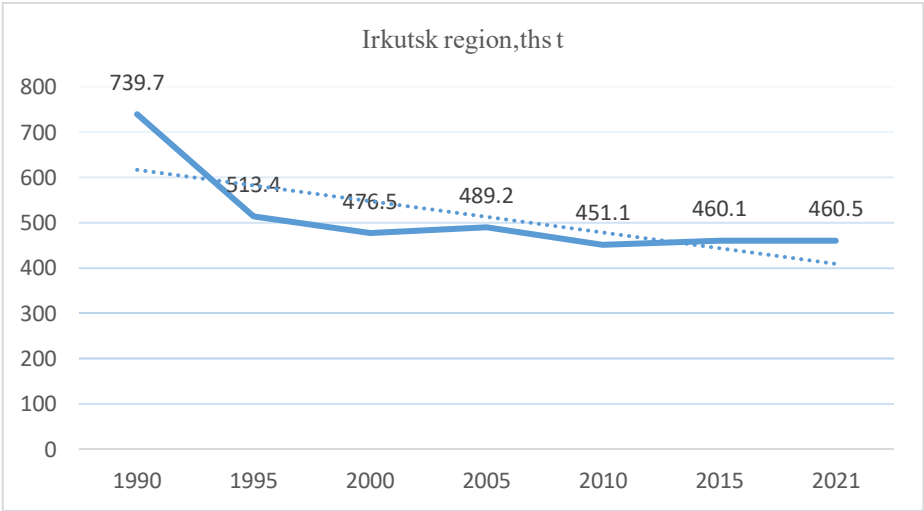


Fig. 1. Dynamics of milk production in Russia (1) and the Irkutsk region (2). *Source:* Compiled by the authors based on [8].

A sharp drop in production, caused by the structural, economic, and systemic crisis of the agro-industrial complex, was observed in 1990–2002. Then it reaches a “plateau” with cyclical fluctuations, caused by a complex of reasons. The main among which is a reduction in the number of livestock. Thus, the number of cows in Russia by the 2000s decreased by 40% from 1990 and continued to decrease by 1% annually. From 2013 to 2021, milk production in Russia increased by 2.5% (753 thousand tons) [8]. Similar but faster rates of decline and relatively early, in 1995, the achievement of the “plateau” was observed in the Irkutsk region. The formation of peasant farms, agricultural cooperatives, and the high value of dairy cattle in personal subsidiary (including Buryat) farms have become features of

adaptation to the crisis of collective cattle breeding and new economic realities. Natural factors are that the droughts of 2010 and 2016–2017 in the Irkutsk region, and the resulting shortage of procurement of coarse and succulent fodder had a negative impact on the number of dairy herds.

All districts of the Irkutsk region were grouped, according to the degree of development of dairy farming. The first, most dairy-oriented group of districts (Cheremkhovsky, Ekhirit-Bulagatsky, Bayandayevsky, Nukutsky, Alarsky, Osinsky), have relatively favorable natural and climatic conditions, a feed base, a predominance of the share of the rural population over the urban, historically established agricultural traditions, coming from Buryat dairy cattle breeding. From 2010 to 2021, the number of livestock in this group of districts increased by 16397 heads [8].

Irkutsky, Zalarinsky, Bokhansky, Kuytunsky, Taishetsky, Usolsky, Ust-Udinsky, and Olkhonsky districts are assigned to the second group with a lower significance of dairy farming. These are relatively populated areas, and all of them, except the last two, are characterized by a decrease in the number of cows from 2010 to 2021, at average quantitative values (from 2000 to 6000 heads). These regions are focused on the development of dairy and meat, and meat animal husbandry.

The third group includes areas with a minimal contribution of dairy farming - Bodaybinsky, Zhigalovsky, Kazachinsko-Lensky, Katangsky, Kirensky, Mamsko-Chuysky, Nizhneilimsky, Slyudyansky, Ust-Ilimsky, Ust-Kutsky, Shelekhovsky. With the exception of Shelekhovsky and Slyudyansky, these are northern regions with severe natural and climatic conditions, infrastructural difficulties, and limited labor resources of animal husbandry. They specialize in industrial production of lumber, mining, non-ferrous metallurgy, etc. A decrease in the number of cows by 2021 was noted in all districts [8]. The number of livestock and milk production in the municipal districts of the Irkutsk region vary, while maintaining the patterns of the selected groups. There are apparent leading districts (Cheremkhovsky, Bayandayevsky, Ekhirit-Bulagatsky), which account for 29% of all milk production. In 2010–2021, the yield in them increased by 12.2 thousand tons. The outsider districts of the dairy and meat direction (Bodaybinsky, Zhigalovsky, Kazachinsko-Lensky) have the smallest number of cows. Irkutsky, Zalarinsky, Bokhansky, Kuytunsky, Taishetsky, Usolsky, Ust-Udinsky, and Olkhonsky districts have an intermediate position. They produce about half of the volume of milk in the territory of the Irkutsk region.

4 Discussion

The described situation is typical for spatially extended and landscape-contrasting regions of Siberia and the Far East, with a disproportionate distribution of agro-industrial enterprises and the population. Similar phenomena were observed in other large Siberian regions: (1) a three-fold decrease in the number of dairy herds over 25 years, from 1990 to 2015, was observed in the Krasnoyarsk Krai and the Irkutsk Region; (2) a four-fold decrease in the Omsk, Kemerovo, Tomsk regions [15, 865]. In the republics of Khakassia, Buryatia, Tuva, and in the Trans-Baikal Territory, dairy cattle breeding is one of the foundations of the traditional life support of the population, including the indigenous peoples of the Khakas, Buryats, and Tuvans. In these regions, the number of livestock decreased less, from 21% to 41%. In the Altai Republic, the population increased by more than a third, due to personal farms [15, 866]. A. V. Rozhkova and J. A. Olentsova concluded that the reduction in the number of dairy cows in the Krasnoyarsk Krai led to an increase in the cost of the product, and state support is not effective enough [13].

The situation is different in the western and southern regions of the country. Researches conducted in the Kirov region show (1) a high level of intraregional relations; (2) cooperation of producers of dairy raw materials; (3) technological reserves, existing at dairy enterprises;

(4) the oversaturation of the dairy market [5]. The consumption and production of dairy products in the Stavropol Krai demonstrates an upward trend with a low level of differences within the subject [3].

In the Irkutsk region, the differences within the subject are quite significant. They are dictated by the natural, economic, and demographic situation. Therefore, the criteria for food security are implemented to a different extent. The disproportions between physical accessibility and economic accessibility and the quality of food have regional specifics. Thus, our results correlate with the gradation of the Irkutsk region districts with the highest physical availability of food, proposed based on R. V. Filippov's regression analysis [11]. The leaders were Cheremkhovsky, Bayandaevsky, Ekhirit-Bulagatsky (first group) where, among other things, the traditions of dairy cattle breeding of the indigenous and old-time population have developed. A less pronounced, but still sufficient level of physical accessibility (the second group) distinguishes the Zalarinsky, Bokhansky, Kuytunsky, Taishetsky, Usolsky, Ust-Udinsky, and Olkhonsky districts, where the dairy farming of Buryats and Russian old-timers was also developed. Similar conclusions were obtained for the group of northern districts (the third). Bodaibinsky, Zhigalovsky, Kazachinsko-Lensky, Katangsky, Mamsko-Chuysky districts have the worst indicators of physical and economic availability of agricultural products, primarily milk. The ethnic component of the dairy economy is less pronounced here. The task of establishing a balance between the design of indicators of self-sufficiency of municipal districts with dairy products by interregional (intraregional) cooperation should be the starting premise for the creation of regional food security programs. This conclusion is due to the specifics of the natural conditions and economic development of the region.

The solution of the problems of the dairy complex of the Irkutsk region can take into account the experience of China in scaling and combining the forms of enterprises of various dimensions. At the same time, the value of both small and large highly specialized cooperatives is determined by the contribution to the sustainable development of the region from the perspective of both economic and social effects [9].

5 Conclusion

The trends in the dynamics of milk production in Russia and the Irkutsk region are similar, due to the impact of the radical transformation of the country's economy on all its territorial subjects, since the beginning of the post-Soviet transformations.

The Irkutsk region, due to its territorial extent, the natural and geographical diversity of landscapes that cause heterogeneity and different productivity of feed resources, features of settlement systems, and territorial organization of the agro-industrial complex, is characterized by pronounced intraregional variability of the dairy industry and heterogeneous potential for its development.

Natural, historical, socio-economic, and ethno-cultural factors have caused a high level of territorial differentiation of the dairy complex. Therefore, to ensure food security, it is necessary to take into account the identified grouping of districts and the dynamic trends of their development. State support measures, including the regional program "Development of agriculture and regulation of agricultural products, raw materials, and food markets," consider the differences of the regions. However, according to the authors, monitoring of the ongoing changes is necessary. Since the dairy complex is sensitive to economic and social processes and is an indicator of changes in the natural environment (including extreme droughts, fires, floods). To increase the food security of the lagging agricultural areas of the Irkutsk region in the field of the dairy complex, it is necessary to maintain a balance between self-sufficiency of the territory, which is limited both geographically and economically, and orientation to inter-district or interregional cooperation, in combination with state support for local producers.

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