Agricultural potential of upper Prilenye in ensuring the food security of the Irkutsk region

Abstract. Traditionally, the main agricultural zone of the Irkutsk region is considered to be the Trans-Siberian zone and the districts of the Ust-Orda Buryat district. Since the production of food products is the most crucial aspect of providing food to the population of the Irkutsk region, the territorial expansion and increase of agricultural potential are relevant. The novelty of the research is the study and the proposal for more active inclusion of the Upper Prilenye districts in the agricultural profile of the Irkutsk region. They form an agrarian area of dairy and meat production, cultivation of vegetables of the closed ground, and potatoes. The purpose of the research is to study the natural resource potential of the Upper Prilenye in solving issues of food security in the region. Methods used in the research are statistical, historical, and cartographic. Research results are that the agricultural potential of the Upper Prilenye is based on significant land resources that are suitable for the development of crop production. The area is located in a zone of risky agriculture with unfavorable agro-climatic conditions. Thus, the current direction in grain production is the production of feed grain to create a local base for feed production in dairy and meat livestock. It is necessary to use the agricultural production potential of the area for more successful development of traditional branches of the agro-industrial complex of the Irkutsk region.

1 Introduction

As a component of national security, food security is one of the main goals of the state’s economic activity. The agrarian policy aims to ensure that all segments of the population have physical access to food in sufficient quantity and of the necessary quality. The severity of natural and climatic conditions on the territory of the Irkutsk region and the attribution of most of it to the zone of risky farming do not contribute to obtaining a high level of profitability of agricultural activities. Therefore, there is a low level of physical availability of food.

Food security as a phenomenon has a pronounced territorial hierarchy and can be traced from local to international levels [1; 2]. At the local level, the economic and physical availability of food for an individual or household is ensured. At the international (higher)
level respectively, for humanity. At the present stage, studies of food security components at the regional level are relevant. That is, at the taxonomic level of municipal districts, that form territorial communities or areas on various grounds: (1) features of geographical location; (2) natural and climatic conditions; (3) the nature of development and settlement processes; (4) priorities of socio-economic development. This statement is due to a high degree of territorial differentiation of socio-economic development of Russian regions, both at the level of federal subjects and internal, at the level of municipal districts. Regional studies in the field of food security include various aspects, among which the authors note the general analysis of the development of the agricultural production complex, its state, production volumes, development prospects [3,4,5]. Therefore, research is relevant in the context of the municipalities of the region that form the area of pioneer industrial development, which are currently experiencing a period of “new industrialization.” These include the taiga areas of development of river navigation along the river Lena, and the provision of “northern delivery.” The agro-industrial complex of the Upper Prilenye was formed during the Soviet period of industrialization and was assigned to the areas of “pioneer development” and territorial composition of the Upper Prilenye includes Kachugsky, Zhigalovsky, and Kazachinsk-Lensky districts of the Irkutsk region. The territory covers an area of 87.5 thousand hectares or 11.4% of the territory of the Irkutsk region, where only 2.4% of the inhabitants live, respectively. The development of agriculture in the Upper Prilenye, as an industry that complements the economic complex, was formed in the 30s of the early 20th century, during the period of active collectivization. The main type of farming was characterized as taiga with the established cattle-breeding, agricultural, and commercial specialization. The crop rotation of that period was dominated by rye, oats, wheat. Animal husbandry is represented by a combination of driving and pasture with stable cattle in winter. Commercial activities are associated with hunting and fishing, which, as a rule, were engaged in by the local indigenous population (Buryats and Evenks). A powerful impetus to the development of the Upper Prilenye was given by the active construction of transport infrastructure (the construction of the Baikal-Amur mainline), geological exploration, and the discovery of the Kovykta gas condensate field. Thus, agriculture is closely interrelated with the industrial profile of the taiga regions (which is of a commercial, mining nature), the development of river navigation along the river Lena, and the provision of “northern delivery.” The agro-industrial complex of the Upper Prilenye is considered as promising in solving the problems of providing food to the local population and creating a stable base of feed production for the development of dairy and meat livestock. At the same time, agriculture, as before, plays a concomitant role in the general direction of socio-economic development. An exceptional position is occupied by the Kachugsky district, which turned out to be geographically away from large-scale construction projects and lost its position as an industrial center. These districts need to form a developed regional agricultural production complex to create a food base. It will consistently provide fresh food to the local population and shift workers. In addition, the active involvement of the agricultural potential of the taiga regions of the Upper Prilenye will significantly strengthen the positions of the agro-industrial complex of the Irkutsk region in ensuring the physical availability of food and, accordingly, the food security of the region.

2 Materials and Methods

- Systematization and characteristics of the historical stages of development and settlement of the territory;
Its natural resource potential for agriculture;

Determining the place and importance of agriculture in the Upper Prilenye regions in solving food security issues of the Irkutsk region as part of Eastern Siberia.

The analysis of the production potential of agricultural production is based on the use of official statistical materials of the State Statistics Committee of Russia, published in open access. Economic and statistical interpretation methods made it possible to generalize and stratify the main directions of industrial specialization and its types in areas geographically confined to the Upper Prilenye. It is essential to use the comparative method of studying economic and geographical phenomena, their concretization, and generalization.

3 Results

Unfavorable natural and climatic conditions hinder the active agricultural development of the Upper Prilenye regions. The territory of the range occupies the most elevated part of the Leno-Angara plateau, with a high dissection of the relief. The climate is sharply continental, with large fluctuations in air temperature, with little precipitation in winter, relatively abundant precipitation in summer, and a short frost-free period. An unfavorable factor for soil fertility is erosion, which manifests itself here in various forms. The total area of eroded and erosion-hazardous farmland is 33%. The share of arable land is 50%. Water erosion affected up to 30%, wind erosion -10%, water and wind erosion -10% of arable land in total.

Widespread permafrost has been noted everywhere. On the mountain slopes, the vertical zoning of the soil and vegetation cover is well expressed. Podzolic and sod-podzolic soils are common in the foothills and flat areas. Areas of black-earth are distinguished in the Kachugsky district. Therefore, the expansion of the agricultural base in the area, and the intensification of the use of land resources imply an increase in soil fertility and anti-erosion measures. The forest cover of the territory is on average 85%. The Kachugsky district is the most developed in agricultural terms (55% of the territory is occupied by agricultural land). The main share of farmland is represented by arable land (more than 61%), fewer hayfields (18%), and pastures (20%). The lowest indicators are typical for the Kazachinsk-Lensky district. Agricultural land accounts for 0.5%. Their specific weight is dominated by hayfields (56%) and pastures (20%). The share of arable land is reduced (24%). The distribution of agricultural land is mainly of a focal nature, along the valley of the Kirenga River.

Current objective reasons (the increase in prices for fuels and lubricants, rising tariffs for electricity, water consumption and sanitation, the long absence of state preferential subsidies, etc.) contributed to a reduction in production volumes and, accordingly, the share of the Upper Prilenye districts in the total volume of the gross agricultural output of the Irkutsk region from 4% to 2% in various product categories. Unfortunately, negative processes can also be traced in the resource base of agriculture. There is a reduction in acreage, especially grain and leguminous crops (Fig. 1), a decrease in the number of cattle and pigs. This contributed to the classification of the Upper Prilenye regions as regions with the worst indicators of food security. Nevertheless, the growth of the number of sheep, goats, and horses, an increase in the sown area of potatoes indicates a possible adjustment of the existing type of agricultural specialization.
Thus, taking into account the peculiarities of the development of the territory, difficult natural and climatic conditions (the zone of risky agriculture), significant land resources, the skills of the indigenous population in traditional nature management, the areas of the Upper Prilenye can and should be considered as promising with a formed agricultural profile—dairy and meat animal husbandry with the cultivation of cereals, vegetables of closed ground, and potatoes.

**4 Discussion**

Current scientific research on the problems and tasks of the development of agricultural potential and its role in ensuring food security is traditionally carried out at the level of the subject—the Irkutsk region or Eastern Siberia. The analysis of indicators of physical and economic accessibility, in comparison with other regions of Siberia, is used. It is argued that the regions of Eastern Siberia are characterized by a general trend of the dominance of

<table>
<thead>
<tr>
<th>Year</th>
<th>Region</th>
<th>Agriculture Potential</th>
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<tbody>
<tr>
<td>2005</td>
<td>Irkutsk</td>
<td>98%</td>
</tr>
<tr>
<td>2015</td>
<td>Upper Prilenye</td>
<td>97%</td>
</tr>
<tr>
<td>2022</td>
<td>Irkutsk</td>
<td>99%</td>
</tr>
<tr>
<td>2022</td>
<td>Upper Prilenye</td>
<td>98%</td>
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Source: Compiled by the authors based on [6].

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*Fig. 1* The share of the Upper Prilenye by sown areas of grain and leguminous crops.
Meanwhile, considering the need for economic development of new territories of Siberia, the industrial profile of which is formed by the extractive industries of the oil and gas complex and improving the level and quality of life of the population, the disproportion between the needs for agricultural products and its production should be reduced. This task can be solved either by intensive means, increasing the volume of capital investments per 1 ha of agricultural land, or by extensive - by involving new or previously withdrawn areas in agricultural development. This requires research at a lower territorial taxonomic rank - municipal areas that form specific agricultural areas, which are poorly studied in the region to date.

Most authors, dealing with the development of the agro-food sector of the Irkutsk Region’s economy, note that the regions of Eastern Siberia and specifically the Irkutsk Region cannot fully provide the population with their own food resources. In addition, regional processing enterprises are dependent on the market conditions of agricultural raw materials in other regions with a more developed raw material base. There are two ways to ensure the food security of the region:

- Development of local agricultural production, through which it is possible to provide the population with affordable products, and additional food supplies from other regions;
- Improving the living standards of the population [1].

Therefore, regional researches are directed to these areas. Some authors pay great attention to the issues of sectoral stratification of agricultural production in the Irkutsk region, the problems of the development of individual industries, including animal husbandry and the meat processing complex. For example, in the works of D. S. Matusevich, L. A. Kalinina, and A. A. Lushchik, the assessment of the physical and economic availability of livestock products of the population of the region is carried out [8; 9]. There is a general decrease in purchasing power in the dairy and meat food segments. In addition, the problem of providing and consuming vegetable products by the population attracts attention. V. K. Bolshedvorskaya indicates that personal consumption of vegetables and food of gourds is 82 kg per capita in the Irkutsk region, at the medical norm of 120 kg. The coefficient of self-sustainment of the products is 78%. Due to natural and climatic conditions, not all types of vegetables are fully cultivated in the region. Thus, 50–70 thousand tons of vegetables are imported to the region annually. It is 22% of the total consumption [10]. In the diet of the population of the Irkutsk region, there is a lack of milk and dairy products, fish and fish products, eggs, fruits and vegetables, meat and meat products, as well as an excess of potatoes, bread products, and sugar [11; 12].

The authors agree that the current agriculture in the Irkutsk region has developed in the process of general economic development of territories. The geography of economic areas changed under the influence of the growth of industrial development and transport infrastructure, in combination with the natural conditions of the districts. The growth rate of industrial production (the wave of new industrialization) is currently significantly higher than the growth rate of agricultural production. The change of socio-economic conditions for the development of agriculture occurred much faster than it could adapt to the emerging new economic conditions of production. This is the reason that almost everywhere, agriculture in Eastern Siberia, its specialization, does not fully meet the requirements of the criteria for ensuring physical accessibility of food security. The authors are convinced that, in the future, the solution of this problem can be implemented, including through more intensive use of the agricultural potential of the taiga regions of the Upper Prilenye. Among the recommended directions, the authors will highlight the main ones: (1) the development of land, within the areas of agricultural enterprises, intended to provide the population of emerging industrial hubs with a minimum set of food products from local producers; (2) the maximum use of natural feed resources of taiga areas for the development of pasture cattle breeding, and an increase in the number of dairy herds; (3) rationalization of forestry.
5 Conclusion

The scientific novelty of the research is the choice of the taxonomic level and geographical location of the object under research - the area of the municipal districts of the Upper Prilenye of the Irkutsk region. The research of which allows assessing the current agricultural development from the point of the prospects for further involvement of natural and economic potential in solving food security issues of one of the main gas and oil-producing regions of Eastern Siberia.

The peculiarities of the agricultural production appearance of the districts indicate a close correlation between the processes of gradual economic development of the territories of Zhigalovsky, Kachugsky, and Kazachinsk-Lensky districts, and natural and geographical factors. The result of which is the leading direction of production specialization - dairy and meat animal husbandry with the cultivation of grain crops and potatoes, vegetables of closed soil. With the general unity of the main direction, there is an internal stratification of the area into subtypes of production activity. That is, a pronounced focus on the production of specific types of products in each of the districts of the Upper Prilenye. So the Kachugsky district, having a more productive agricultural potential, is more focused on the cultivation of grain crops and dairy farming. The Kazachinsk-Lensky is more specialized in the development of beef cattle breeding and forestry. The agricultural profile of the Zhigalovsky district is characterized by the development of the meat and dairy direction in animal husbandry, the cultivation of potatoes and vegetables in the closed ground. Despite the presence of a huge land fund, the areas of the Upper Prilenye are very limited in land resources, suitable for agriculture, and crop production development, since most of the land belongs to the forest fund. But at the same time, the districts have significant natural forage lands for the development of pasture cattle breeding and forage harvesting. Therefore, the agricultural potential of the Upper Prilenye should be considered as very promising for the development of dairy and meat animal husbandry, with elements of traditional nature management. In the regions of active industrial development, the formation of a stable food base is one of the trends of regional economic development, which simultaneously solves several key tasks. Among them, the food security of the region and the socio-economic development of rural areas is of principal importance.

References


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