

Prospects for the development of the agro-industrial complex in the arctic territories: domestic and foreign experience

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Abstract. Currently, the political, military and economic interests in the territories belonging to the Arctic zone are at the peak of the interests of many states. For individual countries adjacent to the Arctic and being members of the Arctic Five or located partially in the Arctic territories (Finland), these Arctic territories are the dominant triggers of domestic and foreign policy. As for the Russian Federation, we can say that the basis of its economy in the Arctic territories is a certain diversity. Among the segments of the economy, the leading place is occupied by the agro-industrial complex as the basis of the state's social policy in these inaccessible remote territories. The range of interests of legal experts and agrarians includes the study and analysis of sectoral features of agriculture in the Arctic lands. Since the development of agriculture in the Arctic is impossible without substantial state support, the authors of this work attempt to identify the main vectors of dynamic development of the Arctic agro-industrial complex in conjunction with regional policy in order to meet the needs of the resident population for socially significant food products.

1 Introduction

Agro-industrial production and traditional types of commercial farming can be identified as the basis for providing food to the population living in hard-to-reach and remote territories of the Arctic [9; 4]. Northern agricultural products, together with the so-called "wild plants" (various types of berries and mushrooms) and types of traditional livestock farming and fishing, constitute a category called food products for residents of the Far North and the Arctic from among the permanently residing population, indigenous and small peoples, migrant workers, military personnel and their families included in the Polar Group of Forces of the Russian Federation [7].

Northern agriculture is practically traditional, has specific historically established features and is of great socio-economic importance for the development of the Arctic territories of both Russian and individual foreign countries. Russian scientists identify the qualifying features of the northern agro-industrial complex, namely, in the historical and legal aspect, agriculture in the North developed in parallel with the expansion and development of the

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Arctic territories by Russia. The established types (according to the specializations of the Arctic agro-industrial complex) were formed depending on scientific knowledge and practical activities, that is, geographical location, natural and climatic conditions, historical, national and socio-economic prerequisites [5; 6]. The expediency of agriculture in the northern and arctic territories of Russia was proven by the great Russian agricultural scientists A.V. Zhuravsky, N.I. Vavilov, D.N. Pryanishnikov and others. Thus, by order of the Department of Agriculture of the Russian Empire, dating back to 1911, the Pechora Agricultural Station began to operate in one of the most ancient villages of the European north, Ust-Tsilma, which is located in a temperate continental climate and, in terms of temperature background, is indicative of the entire Komi Republic. The main industries are logging, agriculture and food processing. The national composition of the population is Russians, the Samoyedic peoples (a group of indigenous Siberian peoples: Nenets, Enets, Nganasans, Selkup and Sayan Samoyeds), as well as Komi-Zyryans (one of the Ural peoples belonging to the Finno-Ugric language group).

In accordance with Federal Law No. 193-FZ dated July 13, 2020 "On State Support for Entrepreneurial Activity in the Arctic Zone of the Russian Federation", the regions of the Arctic zone fully include the Yamalo-Nenets, Nenets, Chukotka Autonomous Okrugs, the Murmansk Region and partially the Republic of Sakha (Yakutia), the Republic of Karelia, the Komi Republic, the Krasnoyarsk Territory, the Arkhangelsk region. More than half of the world's Arctic population (2.6 million people) lives here.

28% of the territory of the Russian Federation is occupied by Arctic territories, the area of which is 4.8 million km². 2.6 million people live here, more than half of the world's Arctic population.

2 Research methodology

The purpose of the article is to identify the features of the application of the development of the agro-industrial complex in the Arctic territories in the context of climate change. The variability of legal support for agriculture, depending on the development of the legislative framework at the Russian level and the experience of legal regulation of individual countries, is undoubtedly included in the range of scientific interests of the team of authors. The methodological basis of the research should include the general scientific method and special methods of cognition, such as comparative legal, environmental legal, statistical and empirical. The development of legal regulation of scientific, technical and environmental justification for the mechanisms of legal support for the agro-industrial complex of the Arctic Russian Federation has been studied. The degree of correlation between the norms of land and environmental law and the scientific achievements of agricultural and natural sciences has been studied. The problems of creating a competitive environment in the development of modern agricultural methods in individual countries of the Arctic Five and Northern Europe have been analyzed [4; 3].

3 Results

It should be noted that, due to its specific characteristics, agriculture in the Arctic zone tends to the social sphere. Indeed, the Arctic agro-industrial complex is unlikely to be able to fully develop without government support. As experience shows, without government participation, northern and Arctic agricultural enterprises and peasant farms will be forced to cease production activities. This is a disastrous scenario, since the problem of employment of indigenous ethnic groups will require colossal funding, immeasurably greater than the commensurate support for the already established agricultural sector of the Arctic territories.

In this context, it is necessary to focus on solving the issues of food sovereignty of the Russian Federation. In this regard, the authors propose to consider aspects of the current state and prospects for the development of agriculture in the above-mentioned Arctic regions of the country.

According to the authors, the Yamalo-Nenets Autonomous Okrug (hereinafter referred to as the YNAO) is the most indicative, since it is entirely located in the Arctic zone of the Russian Federation. The socio-economic formation of the Yamalo-Nenets Autonomous Okrug should be considered in a certain retrospective, presented in Table 1.

Table 1. The place of the agro-industrial complex of the Yamalo-Nenets Autonomous Okrug in the real sector of the economy (from the 1960s of the 20th century to the present).

Main types of agricultural production in these years	
Real sector of economy 1964-1972	Current driver industries
The agricultural economy is in the first place: - reindeer husbandry, fishing - in the tundra (YNAO); - agriculture and animal husbandry – in the south of the Tyumen region in the forest-steppe	Agriculture is in 6th place in this ranking and consists of: - production of grain, vegetables, meat, milk and eggs; - agrochemistry, fertilizer production; - processing of agricultural products; - agricultural machinery

The data in Table 1 proposes to consider an analysis of priority works in the agro-industrial complex of the YNAO and to carry out scientific systematization of information in the organization of agricultural production as a real sector of the economy in settlements of the Arctic region. The clearest data can be traced through a critical examination of the real nodes of the economy, that is, in specific settlements, as well as in the settlement network, but not in the form of simple arithmetic for individual settlements over a vast territory. In this regard, significant changes should be noted in the municipal government of the YNAO in connection with the adoption of Federal Law No. 131-FZ dated October 6, 2003 (as amended on February 14, 2024) “On General Principles of Organization of Local Self-Government in the Russian Federation.” If reindeer herding settlements of indigenous peoples, settlements with fishing specialization, administrative logistics centers, as well as modern technological hubs operate within the boundaries of the municipal district on the territory of the YNAO, then strategic planning for the development of the agro-industrial complex should take place in three stages, which receive mandatory status at the regional level, and are presented in table 2.

Table 2. Development of a regional strategy for the development of the agro-industrial complex of the Yamalo-Nenets Autonomous Okrug.

Organizational stages of the development of a regional strategy for the development of the agro-industrial complex of the Yamalo-Nenets Autonomous Okrug		
Stage I	Stage II	Stage III
The first stage It consists of three organizational actions: - collection of information about all settlements located in a given territorial location; - processing of data on economic activities in the studied settlements; - systematic research of the collected data (over 10	The second stage is characterized by the need to map lands, taking into account economic distributions across the territory of the okrug. The economic distribution of land includes such categories as pastures, meadows, hayfields, wetlands, etc. These works are carried out as landscape plans adopted in the European Union to determine the	The third stage includes: - development and adoption of a regional agricultural development strategy; - a clear definition of regional food consumption in terms of quantity, quality, and seasonality; - distribution of options for interaction with various southern regions of the Russian Federation in order

years) in order to apply modern information and digital technologies to identify the most promising areas of agriculture.	investment attractiveness of the studied area.	to ensure the nutritional well-being of the population of the YNAO all year round.
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As can be seen from Table 2, in order to implement these stages of strategic planning for the development of the agro-industrial complex and to overcome other difficulties in the development of agriculture in the YNAO, a regional legal framework is being created, consisting of a sufficient number of regulatory legal acts of this subject of the Russian Federation. The bulk of the Government Decrees of the Yamalo-Nenets Autonomous Okrug were adopted in 2022. Let's list some of them: Decree of the Government of the Yamalo-Nenets Autonomous Okrug dated March 3, 2021 No. 150-P “On approval of the Procedure for providing subsidies for the reimbursement of part of the costs to agricultural consumer cooperatives”; Decree of the Government of the Yamalo-Nenets Autonomous Okrug dated February 4, 2022 No. 92-P “On approval of the Procedure for providing subsidies for financial support of part of the costs of production (processing) of fish food products for the purpose of their subsequent sale and amendments to the Procedure for providing state support to the agro-industrial complex of the Yamalo-Nenets Autonomous Okrug”; Order of the Department of Agro-Industrial Complex of the Yamalo-Nenets Autonomous Okrug dated February 4, 2022 No. 25-OD “On approval of the procedure and criteria for selecting agricultural producers, fishing organizations, communities of indigenous peoples of the North engaged in fishing (catching), selling and processing fish products in the Autonomous Okrug, for concluding agreements on increasing the efficiency of the fishing industry”; Decree of the Government of the Yamalo-Nenets Autonomous Okrug dated October 1, 2021 No. 861-P “On approval of the procedure for providing grants for the development of small businesses in the Yamalo-Nenets Autonomous Okrug”; Order of the Department of Agro-Industrial Complex of the Yamalo-Nenets Autonomous Okrug dated February 4, 2022 No. 25-OD «On approval of the procedure and criteria for selecting agricultural producers, fishing organizations, communities of indigenous peoples of the North engaged in fishing (catching), selling and processing fish products in the Autonomous Okrug, for concluding agreements on increasing the efficiency of the fishing industry» and others.

The identified features of farming in the Arctic zone of the Russian Federation are presented in Table 3.

Table 3. Key factors determining the specifics of the agro-industrial complex in the Arctic zone of the Russian Federation.

Types of Arctic agriculture features and their content	
Specialization	<ul style="list-style-type: none"> - production of products based on traditional industries; - production of products unsuitable for long-distance transportation; - production of perishable products
Geographical and climatic conditions that negatively affect crop production	<ul style="list-style-type: none"> - very short growing season; - a large amount of precipitation, which determines high air humidity; - low temperatures and almost year-round frosts; - low quality of soil composition [1; 3; 11];
Economic prerequisites that determine the weak competitiveness of Arctic agriculture	<ul style="list-style-type: none"> - very high energy costs in the agro-industrial complex; - very high first cost of agricultural products
Small percentage of development of rural areas	<ul style="list-style-type: none"> - low population density; - poor degree of involvement of land resources, which determines the low level of plowing

Continuation of Table 3.

Investment policy	- infrastructure of rural areas; - degradation of rural settlements; - low efficiency of investments in the agro-industrial complex of the Arctic zone
Budget costs	- climatic and sectoral features of Arctic agriculture dictate the need for significant budgetary injections from the state

As can be seen from Table 3, the most important commercial sector of Arctic agriculture is crop production in the form of greenhouse vegetable growing. Nevertheless, experts suggest the development of alternative types of activity. Among these types, the most profitable from an economic point of view are rural eco-tourism, the revival of folk crafts, and harvesting and processing of highly scarce wild-growing natural raw materials.

In the context of this work, Russian legislators and practitioners will be interested in the experience of farming in European countries located in the Arctic territories, as well as Canada and the United States of America (Alaska) [10].

The most interesting country for Russian northern and Arctic agricultural producers is, of course, Finland. It should be noted that agricultural production in Finland is located in an area characterized by the presence of coniferous forests and tundra landscape. A characteristic geographical and climatic feature of Finland is the recognition of the country as the northernmost country in Scandinavia. It should be noted that when analyzing statistical data, it turns out that the distribution of the permanent population in its Arctic zone is almost identical to the figures for the distribution of the permanent population in the Far North and the territory of the Arctic zone of the Russian Federation. Moreover, from 1809 to 1917, Finland was part of the Russian Empire. Undoubtedly, there are centuries-old traditions of farming, taking into account the extreme natural conditions of agricultural characteristics, determined by the northern Arctic features, characteristic of both Russia and Finland. In Finland, the agro-industrial complex demonstrates a successful combination of agriculture and forestry. Finnish legislators have secured through relevant regulations the right of peasants to use forests. As a result, Finnish peasants receive significant income from the sale of wood. This money is used by peasants to modernize agriculture. The trend in northern agriculture is practically the industrial production of ecological food products. The focused attention of the Finnish Government to this issue has resulted in Finnish northern agricultural products meeting strict European Union standards. Moreover, the EU Central Fund is currently providing increased subsidies to Finland. However, experts note that Finland has certain organizational problems in northern agriculture. For example, economists note that most of the income is concentrated in a small part of the northern Arctic population, and this, in turn, becomes the most important limitation for the development of the domestic market. Since there is a low purchasing power of the Finnish population living in the northern Arctic territories of Finland.

The development of agriculture in Canada is characterized by completely different historical and legal aspects than in Finland. The innovators of the development of agricultural production in the northern latitudes of Canada were farmers from among European emigrants who came to Canada during the Gold Rush. The increasing number of gold hunters has initiated a great demand for food. Satisfying these needs fell on the shoulders of farmers from among these same emigrants. These were mainly small agricultural entities with the status of subsidiary farms or small-scale farms. The specializations of these agricultural entities were animal husbandry and crop production. The owners of these farms were mining workers. Gold miners were engaged in small-scale agricultural production exclusively for intrafamily consumption. It should be noted that in the northern regions of Canada, the indigenous population of Canada has never engaged in agriculture in historical retrospect. Currently, the Canadian northern Arctic territories are characterized as sparsely populated. In the economic doctrine of Canada, there is a still unrefuted opinion that agriculture in these regions is

commercially unprofitable. At one time, the Government of Canada initiated the development of logistics links, which influenced the active production of food in Southern Canada and its transportation towards the Arctic zone. Currently, on the recommendation of economists, public and private agricultural enterprises do not have a location in the Arctic zone of Canada. The theory and practice of agricultural production in the northern territories is unprofitable. Food products produced in the Southern regions of Canada are much more profitable in terms of transportation costs.

Unlike Canada, the population in the Far North and the Arctic zone of the Russian Federation is larger and its distribution density as a percentage is higher. For example, in the northern Arctic zone of Russia, the population is about 12 million people. A characteristic feature of Russia is the statistics on the share of the urban population in the Far North:

- the urban population makes up 88% of the total population;

- that is why such large agglomerations as Arkhangelsk, Magadan, Murmansk, Norilsk and Yakutsk are located here. In this regard, the model developed by American scientists for rural settlements in Alaska is justified for the regions of the Far North and the Arctic. US economists have clearly distinguished three sectors of the economy, which, in their opinion, are the most promising for these areas. These include the sector of traditional agriculture, state agriculture, and agriculture for the market. Data from specialists revealed their close connection and specificity. The point of view of economists is that these territories with their climatic features do not allow agriculture to be sustainable and profitable. The public sector is characterized by rather weak market mechanisms, which are provoked by high production costs, low competitiveness in the labor market of the indigenous population, remoteness, small size of settlements, high costs and low attractiveness for private investment.

4 Discussion

The team of authors believe that the development of agriculture to provide food for the population of the Russian Federation in the Arctic territories will be based on the rich historical experience of Russia and the experience of Finland as a northern European country, whose territory is partially located in the Arctic. For illustration, the data of the analysis are presented in the form of analytical table 4.

Table 4. Proposals for the possibility of implementing legal norms of foreign countries into Russian legislation.

Countries		
Canada	USA	Finland
Not suitable for use in implementing legal norms: - sparsely populated areas; - economic theory about the commercial unsuitability of agriculture in the northern Arctic territory; - logistics links for the import of products from the southern regions	Not suitable for use in implementing legal norms: - the traditional agriculture sector cannot independently support the rural economy; - the state agriculture sector is characterized by weak market mechanisms and low competitiveness in the labor market; - the market agriculture sector is unattractive for private investment	Suitable for use in implementing legal norms: - the process of integration of agriculture and forestry; - ecological products from the Arctic regions of Finland comply with EU standards.

From the data in Table 4, it becomes clear to the interested reader that the symmetrical experience of Finland is suitable for developing and determining the vector of development of the agro-industrial complex of the Arctic zone of the Russian Federation.

The experience of Canada and the United States of America, based on the complete northern import of food products from the southern regions of these countries, suits us to a small extent. In our opinion, we should study the logistics of commercially profitable imports, exclusively related to those food products that can be produced only in the southern regions and which are necessary to ensure adequate nutrition for the permanent resident population and migrant workers who will work in the Far North and in the Arctic zone of the Russian Federation on a rotational basis. This population should also include the contingent of military personnel belonging to the units of the Polar Group of Russian Forces and members of their families.

It should be noted that Russian manufacturers located in various regions of the Russian Federation are engaged in scientific activities and commercial implementation of their developments in the field of biotechnology for agriculture, including in the Arctic zone of the Russian Federation. For example, Bioamid Joint Stock Company (Saratov Region) has the status of a participant in the Skolkovo Innovation Center project. Their project "Complex microelement additive to feed based on organic compounds of iron, manganese, zinc, copper, cobalt, iodine, selenium - OMEK-7M" has become very famous. In 2017, the Bioamid company received a Skolkovo grant for the development of this project (22.7 million rubles). In the same year, Bioamid JSC, Sibbiopharm Production Association LLC, National Research Center "Kurchatov Institute" and GosNIIGenetics formed a consortium. This consortium, with the financial support of the Ministry of Education and Science, became the executor of the federal target program "Research and development in priority areas of development of the scientific and technological complex of Russia for 2014-2020". The Bioamid Company has implemented the project "Production of a feed enzyme preparation phytase based on a recombinant yeast producer". All work was carried out under the guidance of the candidate of chemical sciences, the head of the company, Voronin S.P., who is a three-time winner of the Russian Government Prize in the field of science and technology. Thus, for the first time in the Russian Federation, industrial biotechnology for the production of acrylamide was introduced for water treatment and purification, the oil industry, coal mining, the mining, chemical and metallurgical industries, the pulp and paper and wood-processing industries, energy, biology, medicine, pharmacology and agriculture. Feed additives for silage and hay production produced by Bioamid can be successfully used in the agro-industrial complex of the Arctic zone of the Russian Federation, which is confirmed by the receipt of the Russian Government Prize in the field of science and technology for innovative work in 2022 (development of effective biotechnology for the production and large-scale use of organic microelement complex in industrial poultry farming).

5 Conclusions

Taken together, the experience of our northern neighbors (Finland) and domestic modern methods will guarantee a competitive advantage in the development of agriculture in the Arctic territories. Thus, such a vector of development becomes an incentive to saturate the domestic market with high-quality food within the framework of the requirements of national food security and national security in general, which will allow the Russian Federation with its enormous northern territories to enter the world market as the largest exporter of organic food products. Developed Arctic agriculture will be one of the most important factors of economic and social stability in the Russian Arctic territories, as it will solve three problems at once:

- opening of new jobs, providing employment for the local population;
- involvement of representatives of indigenous peoples of the Far North and Siberia in the work of the Arctic complex, because with the introduction of innovative technologies,

- traditional management methods will be preserved and developed, which will attract ecological tourists;
- providing the permanent population and migrant workers with access to quality food at an affordable price will guarantee a high quality of life and optimal health in harsh climatic conditions.

References

1. M. Andrachuk, M. Marschke, Ch. Hings, D. Armitage, *Biological Conservation* **237**, 430-442 (2019)
2. A. Bancheva, *Polar Science* **21**, 233-237 (2019)
3. M. de Witt, H. Stefánsson, Á. Valfells, J. N. Larsen, *Renewable Energy* **169**, 144-156 (2021)
4. A. Jamshed, J. Birkmann, D. Feldmeyer, I. Rana, *Sustain* **12(7)**, 1-25 (2020)
5. V. Kovshov, M. Lukyanova, Z. Zalilova, O. Frolova, Z. Galin, *Heliyon* **10(1)**, e23795 (2024)
6. K. Looi, *International Journal of Business and Globalisation* **27(1)**, 92-112 (2021)
7. A. Naumov, D. Sidorova, R. Goncharov, *Regional Science Policy & Practice* **14(1)**, 174-187 (2022)
8. F. Platjouw, E. Steindal, T. Borch, *Review of Law and Politics* **9**, 226-243 (2018)
9. R. S. Suárez, G. Méndez, A. Germán, S. Lópe, *Heliyon* **9(7)**, e17555 (2023).
10. P. A. M. Van Lange, A. L. Huckelba, *Current Opinion in Psychology* **42**, 49-53 (2021)
11. V. Vinogradova, T. Titkova, A. Zolotokrylin, *Science* 100652 (2021)