

Mini Review

Agriculture in the North and the Arctic of the Russian Federation

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Abstract

Agriculture and trade (fishery, hunting) in the Northern and Arctic territories of the Russian Federation provide the local population with quality and fresh food. The article deals with the socio-economic importance and conditions of agriculture development in those areas. Experience of the organization and management of agriculture in the foreign advanced northern countries is considered through the lens of applying the Scandinavian way of development of the agricultural sector in the Russian Federation. Based on statistical data, the trends in agriculture development in the North and the Arctic over the past fifty years are studied. The results can be used to supplement a strategy for the development of the agro-food sector of the regions forming the North and the Arctic zone of the Russian Federation (Russian Arctic).

Key-words: Agriculture, Development Conditions, Food, Local Population, North, Arctic.

Introduction

The development of agriculture in the Northern and Arctic territories, both in the Russian Federation (Russia) and foreign northern countries, has a long history. Various forms of management have been developed by many generations of indigenous people. Agriculture and fisheries, hunting and other such forms of activity in the Northern and Arctic territories of the Russian Federation play an important role in the food supply of the local population. These sectors of the entire agricultural sector are aimed at providing the population with meat, milk, sea, river and lake fish, eggs, potatoes and greenhouse vegetables, wild plants (cranberries, cloudberries, cranberries, blueberries), the latter being also medicines. The food produced locally is indispensable in the rational nutrition of the inhabitants of the North and the Arctic. Local food directly supports the livelihoods and food security of 10 million people living in the Far North regions and regions equivalent to this status under law. To ensure the sustainable development of Northern agriculture in the Russian Federation, it is of great interest to study the Scandinavian way of

agriculture development (Det danske, 1998; Soumen, 2003).

The purpose of this article is to study the conditions of functioning and development of agriculture in the Northern and Arctic territories of the Russian Federation.

Socio-economic importance of agriculture

Agriculture and fishing and hunting industry of the North trace a long way back in history. It was developing simultaneously with the very development of a territory. The form of specialization has been formed under the influence of natural conditions, geographical location, historical and socio-economic factors, and focused on the production of low-transport and perishable products, as well as products of traditional industries. At the beginning of the XX century the possibility of Northern agriculture was proved by A.V. Zhuravsky, the founder of agricultural science in the European North of Russia. He convincingly argued that "it was not the climate that restrained the Pechora agricultural development, but the conditions that had nothing to

do with the climate" (Zhuravskij, 2007). Usefulness of making agriculture more "north-directed" was argued also by N.I. Vavilov, D.N. Pryanishnikov and other Russian scientists.

The products produced by agricultural enterprises and farms of the North turned out to be more expensive, being unable to compete with similar products imported from abroad or produced and transported from more southern Russian regions. It was due to harsh climatic conditions and underdevelopment of technical and technological base of production. This led the government to begin to pursue a policy of curtailing agricultural production in the Northern territories. The elimination of the Northern village is not only a painful and costly process, but also the one that weakens the national security of the country. Of course, agricultural activity in the North is costly and assume a high level of risk. It is proved that the more "north-located" an agricultural producer is, the higher the cost price of agricultural products. However, it is impossible to judge the competitiveness of agriculture in the North by just one criterion, namely, the cost of production. At the same time, the competitive opportunities of Northern agriculture consist of lots of daylight hours during the growing season, good moisture supply, large amounts of natural meadows in floodplains, possibility of producing environmentally friendly products.

The share of the Northern area in the total population of the Russian Federation is 6.8%, the area of farmland – 2.5, the number of cattle – 4.5%. In the Northern and Arctic territories there are 1605 thousand heads of domestic deer (which is about 75% of their world population).

In 2015 the shares of the North and Arctic territories in the overall production in Russia by type of products were as follows: 3.3% of potatoes, 2.0% of vegetables, 2.3% of milk, 1.4% of meat (slaughter weight). In comparison, in 2000 much larger figures were recorded: 5.9% of potatoes, 4.3% of vegetables, 3.0% of milk, 2.9% of meat (slaughter weight). The share of fish catch of seafood production was 50.6%¹. Those data show a decrease in agricultural production as a share in the total agriculture production of the country.

Agriculture and hunting and fishing in the North and the Arctic is a way of life for indigenous peoples. In the pre-reform period, more than 62% of the entire population of all the small-sized local groups were employed in agriculture and similar activities (Seleznev and Uvarov, 2002). In some rural municipalities of the Nenets Autonomous Okrug, the share ranged from 79 to even 90% (Ivanov et al., 1991). Data of the 2006 all-Russian agricultural census show that in large and medium-sized agricultural organizations engaged in reindeer, herd horse breeding, fishing, 15% of employees belonged to small nationalities. Entrepreneurs engaged in hunting reported 10%, those processing of products of traditional and other industries – 15%. In small agricultural enterprises, the figures were 16.35 and 20%, respectively (IIC, 2008).

Growth of agricultural production is in the closest way associated with the social development of a northern village. Northern agriculture not only provides the population with fresh nutritious food, but also stimulates the development of food industry, stabilizes employment, prevents monopolization of local food markets, restrains price of food imported from outside the region, underscore the traditional way of life of rural population, contributes to the preservation of spirituality of indigenous peoples, their culture, morality. Furthermore, it improves the demographic situation, the system of resettlement of people, preservation of environment and natural landscape. Agriculture is at the same time both a provider of irreplaceable material goods and a sphere of human activity. The elimination of agricultural production means a change of residence or even a lifestyle.

Due to its specificity and peculiarities of its relation with market, agriculture tends to be closely associated with the social sphere and can develop only with a state (governmental) support. Especially important is the participation of the government in the development of Northern agriculture. Without such a support, agricultural enterprises and farms would be forced to minimize or reduce the production of

¹ Calculations based on: 1. Economic and social indicators of the Far North and similar areas in 2008-2014 / Rosstat. Moscow, 2016. Available at:

http://www.gks.ru/bgd/regl/b14_22/vain.htm). 2. Regions of Russia. Socio-economic indicators. 2001. Moscow, Rosstat, 2001.

environmental-friendly, perishable but unprofitable goods and products. Without state financial support, indigenous ethnic groups could be forced away from work which would eventually incur disproportionately more amount of budget spending to take local population back to normal life and providing them with other types of labor activities than otherwise.

The need for agricultural development in the North is also justified by the concept of food sovereignty of the country. Now fully own-sourced and also exceeding the rational norm of consumption are only the consumption of potatoes and eggs. The figure for milk is only 57%, vegetables and melons – 79%, meat products – 89%².

Agriculture development: other countries' experience

Let us turn to the experience of Northern and Arctic territories of Scandinavia, Canada and Alaska which can be useful for the organization of agricultural production in the North and the Arctic of the Russian Federation. General economic theories such as Marxism or Liberalism, as argued by the well-known researcher of agriculture in Finland and the European North of Russia Pekka Kauppala, have no prospects for the Northern and Arctic models of agricultural development (Pekka Kauppala, 2007). Development of agriculture in the Northern and Arctic territories should be based on centuries-old agricultural traditions that take into account the extreme harsh natural conditions and authentic agricultural features.

Dealing with problems and finding rational ways of agricultural development in the North and the Arctic zone of the Russian Federation (the Russian Arctic), the models of agriculture in Northern Europe are of primary interest. A distinctive feature of the European development is the diversification of agricultural production, based on a combination of crop and livestock. It ensures the sustainability of agriculture. Here the principle of importance of agricultural production and rural society has been formed. It states that agricultural production be considered effective only if it creates positive impact in terms of rural area development (Polbicyń, 2015). It is the principle of combination of agricultural

production, Northern agriculture and rural development that can form the basis of methods and forms of agriculture in the Russian North.

According to Pekka Kauppala, for the development to be successful, the European North and the Komi Republic should follow the path of Finland. Unlike Canada, where agricultural production has never functioned in the coniferous forest zone, it is Finland's model that is shaped in this zone, as well as in the tundra areas (Pekka Kauppala, 2007).

Finland is not only the northernmost of all the Scandinavian countries, but also similar to the Russian North in terms of population distribution. In Finland, agriculture and forestry are connected, peasants are legally authorized to use forests. They gain significant revenues from the wood sale which subsequently used to modernize agriculture. The integration of agriculture and various forestry activities is particularly relevant for the area of Northern taiga of Russia in the pursue of generating additional income and increasing the employment.

Finnish farmers successfully use the advantages of the Northern economy to produce environmental food. Finland declared agriculture as environmental industry, producing only ecological products according to the standards of the European Union (EU). The EU Central Fund, for its part, allocates increased subsidies there (Poshkus, 2011).

The Russian Federation in its North actually has much more opportunities than the Scandinavian countries to increase the production of environment-friendly products and to work out the technology of organic farming. The production of eco-friendly products in the vast Northern territories becomes the main competitive advantage. Here one can expect to receive a kind of rental income from a sale of such products. In the future, as the domestic market is filled, Russia may well become a major exporter of environmental food.

The Scandinavian way of agriculture development can serve as a good example for Russia also because there is a small concentration of ownership and income in Scandinavia. Too much concentration of income in a small part of population is a constraint to the domestic market development as

² Rational norms of food consumption are approved by the order of the Ministry of health and social development of

the Russian Federation as of August 2, 2010, № 593n. Calculations based on "Russian statistical collection".

a result of the low purchasing power of the population.

Agriculture in Canada began to actively develop by farmers who emigrated from Europe at the time of the so-called "gold rush", when there was a high demand for food from gold miners. It was actually auxiliary agriculture, represented by small-scale vegetable and livestock farms run by miners mainly for their own domestic consumption. The indigenous population was not engaged in agriculture (Polbicy, 2015). In Canada, farmers are not established in unfavorable conditions. Profit from production in the southern regions (including delivery) is higher than food production in the Northern territories. The Canadian model of agricultural development is hardly applicable for the Russian North as it is designed for sparsely populated areas (Russian regions are much more densely populated). Nevertheless, if this model is taken as a basis, perhaps it would mean a huge reduction in the number of inhabitants of the Northern and Arctic territories in Russia (Pekka Kauppala, 2007). Currently, 10 million people live permanently in the North of Russia, compared to 11.1 million people in 2000. The population of the Russian Arctic federal district ("okrug") is more than 2.5 million people, which exceeds half of the total population of the Arctic (Sinica, 2016). In the Far North and areas equivalent to this status under law, the share of urban population is 79%, in the Arctic zone - 88%.

A practical interest for Russian economy is attracted by a model of Arctic microeconomics, designed for the villages of Alaska by American scientists. It is based on a clear distinction between the three sectors – traditional, public and market. There is drawn awareness of their specificity and close ties with each other in the model (Sinica, Pilyasov, 1996).

Opportunities and constraints of agriculture development

The geographical location and large territory of the Russian North in the latitudinal perspective, on the one hand, determine a significant severity, and on the other – present significant differences in the bioclimatic and economic conditions of agricultural production. A significant part of the territory is located above the Arctic circle, i.e. in the permafrost, at the same time capturing the tundra and forest

tundra, and the Central and southern parts are located in the zone of the Northern and middle taiga.

Natural conditions and, above all, the climate, soil quality, growing season constrain the development of agriculture. Especially unfavorable conditions for agriculture are in the Far North, with the predominant tundra soils and extremely limited thermal resources. Here frosts are possible throughout the growing season. The polar regions are characterized by a short vegetation period, low temperatures of air and soil, poor development of soil processes, limited activity of soil microorganisms, increased acidic reaction, low humus and phosphorus content, as well as other nutrients, available to plants, low permeability of underlying rocks and, as a result, extensive waterlogging. Due to the harsh climatic conditions, agriculture is local there. In tundra only vegetable growing in the closed ground is possible, with the production of feed for dairy cattle by tinning the mainland tundra and the use of bottoms of lowered thermokarst lakes.

In the North, among favorable conditions and competitive opportunities for agriculture are the following. As part of the farmland there are natural hayfields and pastures. In the Komi Republic taken as an example, per hectare of arable land there are 3 hectares of forage land, which allows one to successfully develop cattle breeding. Large areas of floodplain meadows with the potential exceeding 150 thousand tons of feed, bear a special value. To improve the food supply, there are significant fish resources and opportunities to increase the collection and processing of wild plants.

Almost around-the-clock natural lighting in the subarctic zone and enough moisture during the growing season ensure rapid growth and allow plants to accumulate a large supply of organic substances in a short period of time. Due to the long light day, the herbs grow there with increased intensity, which allows accumulating the amount of green mass for 70-80 growing days equivalent to the same amount of mass obtained for 180 days in the southern regions. In early spring the average daily herbs growth is from 3 to 9 cm on favorable days (Gagiev and Chernov, 1981).

North Areas have good opportunities to produce fodder yeast, mineral and vitamin feed for livestock and poultry. The use of thermal waste of gas compressor stations could present favorable conditions for the development of vegetable

production in protected soil and on industrial basis. The heat of such stations can also be used for artificial drying and briquetting of herbs.

The North also has opportunities to produce organic (ecological) products. In addition to organic agricultural products, wild plants (mushrooms, berries, birch juice, wild honey, medicinal herbs) can be harvested in large ecological areas. Ecological production is viewed as a strategic goal of agricultural development. Products of traditional industries (reindeer husbandry, fishing, hunting, wild mushrooms and berries) are competitive not only in the regional but also national and international markets.

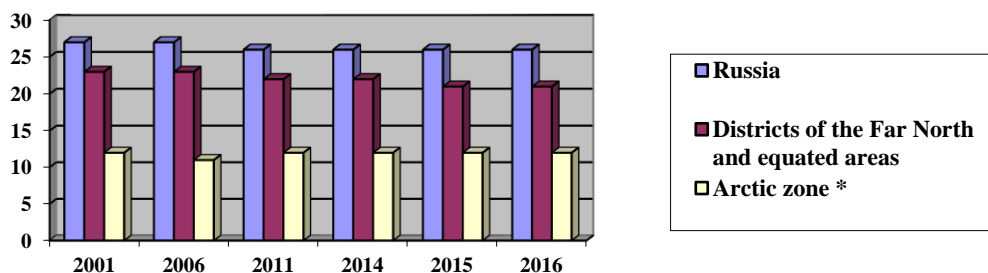
The main barriers of technical, technological and socio-economic development of agriculture in the Northern and Arctic territories consist of low biological resources, poor condition of the material and technical base, low-qualified and small personnel with poor quality of life, unfavorable environment, inefficient mechanisms of state support, inaccessibility of financial resources, unstable market of agricultural products.

When trying to solve the problem of food self-sufficiency of the population of the Northern and Arctic territories, it is necessary to take into consideration these specific features: low food self-sufficiency due to limited possibilities of production in extreme climatic conditions and the dependence on imported food; underdevelopment of the agricultural sector and rural infrastructure; small number of the rural population and poor provision of agricultural resources; the lack of strong links with the areas of food production being imported to the Arctic and subarctic regions; focal nature of settlement and seasonal delivery of food in the inland areas.

Local agricultural production is unable to provide the population with the local food due to unfavorable extreme climatic conditions. The basis of food supply to the population of the North and the Arctic is the imported food from other regions of the country and from abroad. Analysis of food imports in the Komi Republic shows that in 2014 46.6 thousand tons of meat and meat products were transported to the region, which amounts to 228% of the local production; 173,5 thousand tons of milk and dairy products (307%), 117,2 million of eggs (94%), 58,2 thousand of vegetables and melons (300%). Now the share of animal-origin food import in an amount of own-produced considerably exceeds the figures on 1990.

The Northern zone, especially the Arctic territories, is characterized by small rural population. If in Russia as a whole the share of rural population is 26%, in the Far North and areas equivalent to this status under law it is 21, and in the Arctic zone – only 12% (Figure 1). Now with a small proportion of the rural population, the subjects of Russia fully within the zone of the North saw the absolute figure of rural inhabitants decreased by 461.6 thousand people in 1990-2015.

In the North and the Arctic there is a low supply of biological resources in comparison with the entire Russian Federation. These are the unfavorable conditions for agriculture constraining the local food self-sufficiency. Given the complexity of agricultural production in the Arctic and Arctic zone and to establish a functioning model of agriculture in the future, it is necessary to focus on the municipalities of the southern and Central regions of the North with more favorable climatic conditions. One of the priorities is the formation of rear food bases located in the adjacent regions.



**Data on Murmansk region, Nenets, Chukotsky and Yamal-Nenets Autonomous districts, the territories of which are entirely part of the Russian Arctic.

Compiled based on: 1. Russian statistical yearbook. 2016. Moscow, Rosstat, 2016.

2. Economic and social indicators of the Far North and areas equivalent to this status under law in 2000-2015 [Electronic resource]. Moscow, Rosstat, 2016. Available at: http://www.gks.ru/bgd/regl/b14_22/vain.htm

Fig. 1. Share of rural population as of January 1, 2001-2016, %.

Analyzing the current and future state of food self-sufficiency in the North and the Arctic, it is necessary, firstly, to proceed from their natural and resource potential. Here, compared to Russia as a

whole, the availability of biological resources is significantly lower, except for the number of deer per capita (Table 1).

Table 1. Availability of agricultural resources per 100 people in 2015.

| Country, region | Sown area, ha | | | Cattle | Including cows | Pigs | Reindeer |
|--|---------------|----------|------------|--------|----------------|------|----------|
| | cereals | potatoes | vegetables | | | | |
| Russia | 31,9 | 1,5 | 0,5 | 13,0 | 5,7 | 14,7 | 1,1 |
| Districts of the Far North and equated areas | 0,8 | 0,8 | 0,2 | 8,7 | 3,8 | 2,4 | 16,1 |
| Arctic zone | - | 0,07 | 0,0 | 0,7 | 0,3 | 0,8 | 80,5 |

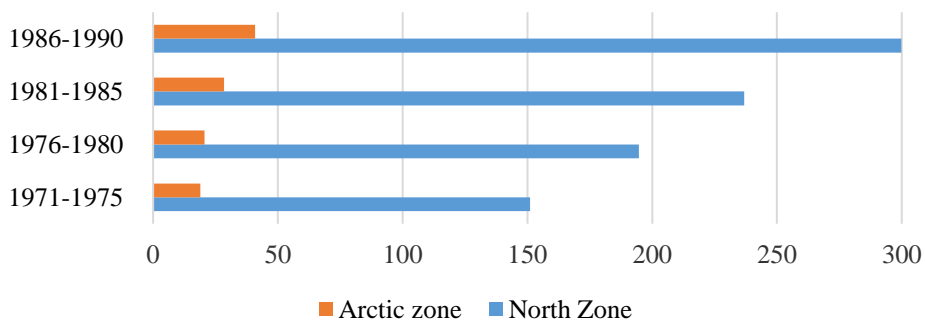
Compiled based on: 1. Russian statistical yearbook. 2016. Moscow, Rosstat, 2016.
 2. Economic and social indicators of the Far North and areas equivalent to this status under law in 2000-2015 [Electronic resource]. Moscow, Rosstat, 2016. Available at: http://www.gks.ru/bgd/regl/b14_22/vain.htm

Trends in agriculture development

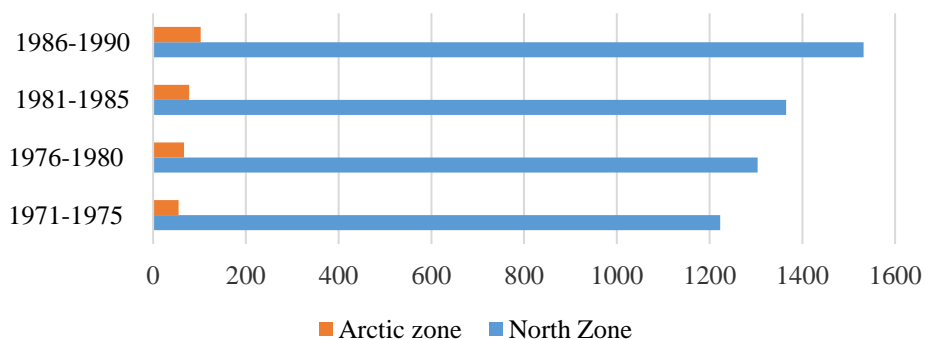
In the history of agriculture of the Northern and Arctic territories of Russia, one could claim the 1960-1980s to have been most favorable. The agricultural policy in this period, aimed at accelerating the pace

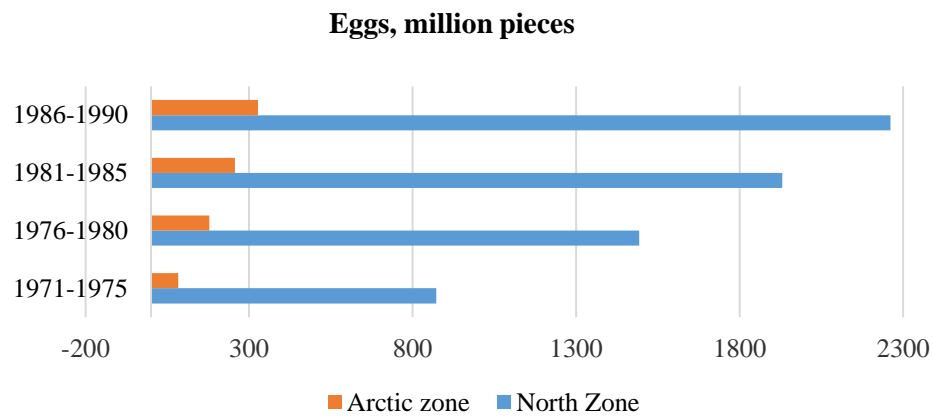
of intensification and industrialization of production, improving the standard of living, contributed to the increase in the volume of meat, milk and eggs produced. Moreover, those indicators in the Russian Arctic were higher than in the North (Figure 2).

Meat of cattle and poultry in carcass weight, thousand tons



Milk, thousand tons



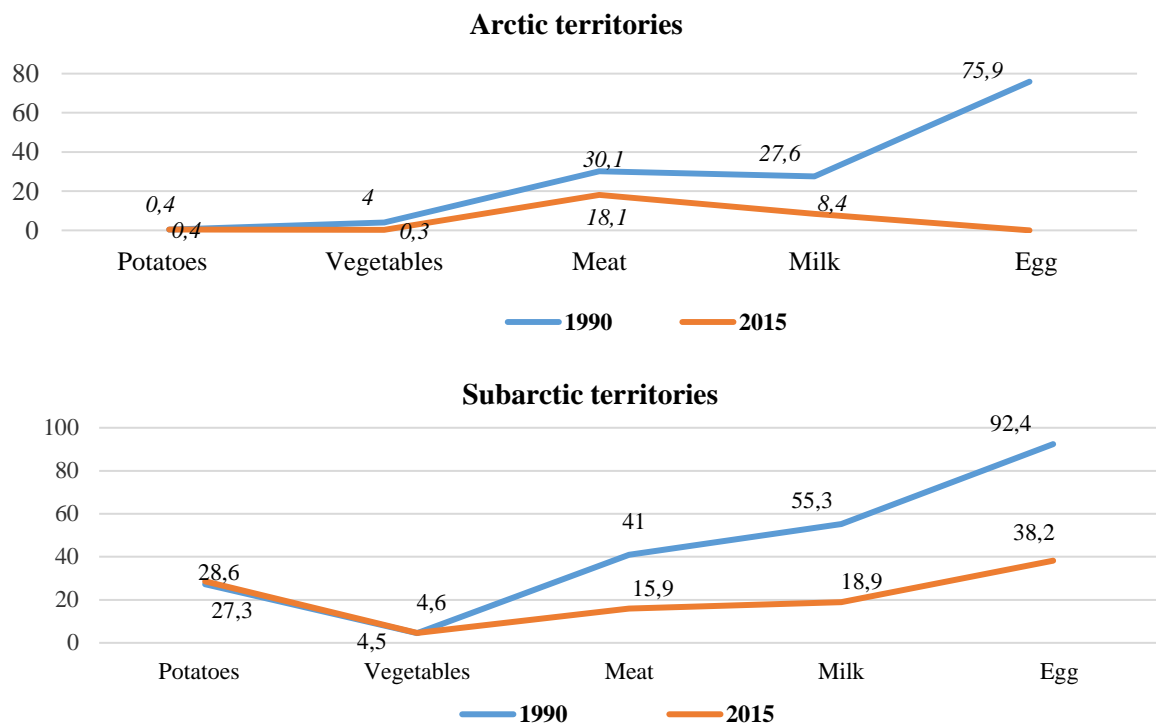


Based on: Statistical Yearbook for 1972-1995.

Fig. 2. Livestock products in farms of all categories in the regions whose territories are fully included in the North and the Russian Arctic

The reforms undertaken without considering the extreme natural conditions and numerous agricultural features were accompanied by the destruction of the material base, a sharp reduction in the size of cultivated land, amount of livestock, the number of workers with deterioration of their professional level along with quality of life, and, ultimately, the fall of agricultural production. The highest rates of production reduction were observed in the Arctic zone.

The decline in agricultural production led to a decline in the availability of local food. The ratio of own food consumption per capita to the rational norms of consumption (the example of the Arctic and Arctic territories of the European North-East) saw a decrease in the period of reforms for meat, milk, egg and vegetables. Especially significant reduction was observed in Vorkuta – the Arctic zone of the Komi Republic (Figure 3).



Source: author's calculations.

Fig. 3. Share of own consumption of agricultural products per capita in rational consumption norms in the Arctic and sub-Arctic territories of the Russian Federation, %.

There are still necessary conditions for the social and economic development of agriculture in the Russian North and Arctic. However, success depends on the ability of the state to enable innovative modernization, suspend outflow of skilled workers from the industry and territory, promote sustainable distribution of agricultural products, halt monopoly in procurement, trading and processing.

Conclusion

The study of organization and development of agriculture in the Northern and Arctic territories of the Russian Federation offer the following conclusions and recommendations.

Development of agriculture, fishery, hunting and other such forms of activity in the North and the Arctic of the Russian Federation provide the local population with fresh and biologically full-fledged food. It also serves employment for indigenous ethnic groups, ensuring preservation of historical way of life, holding back rising prices for imported food, developing rural areas, upholding food sovereignty of the country. Realization of the social function of agricultural entrepreneurship in areas with unfavorable climatic conditions requires disproportionately less public spending than creation of new jobs and similar measures would have required otherwise.

Russia should follow the successful experience of agriculture development of the Scandinavian countries and Finland, while also relying on its own rich historical experience. The latter is justified by the fact that there was good dynamics of production and an increase in the coefficient of food self-sufficiency in the pre-reform period. The market reforms were accompanied by destruction of material base, sharp reduction in size of cultivated land, livestock, decrease in the number, professional level and quality of life of workers, fall in the agricultural production.

The geographical location and vast territory of the Russian North determine significant differences in the agriculture development. Natural conditions, especially in the Arctic zone, constrain the development, but also present favorable conditions and competitive opportunities such as long daylight hours during the growing season, good provision of moisture; large tracts of forage, including floodplain meadows; labor resources; opportunities for organic production in ecologically clean areas.

In the future achieving the level of local food self-sufficiency in the North and the Arctic of the Russian Federation similar to the pre-reform period is a reasonable task. The state's attention should be paid to the modernization and promotion of agriculture in the Northern and Arctic territories of the Russian Federation.

Conflict of interest: All authors declare no conflict of interest.

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