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RATIONALIZATION OF AGRICULTURAL PRODUCTION (ON
THE EXAMPLE OF THE NOVGOROD REGION)

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Abstract

The article studies the problems of specialization and location of agricultural enterprises at regional level. Calculations were carried out to determine the level of specialization, directions of production by types of products in agriculture on the example of the Novgorod region. Specialization of production in agriculture is directly related to its location. These are interdependent forms of the social division of labor. Differences are observed in the aspects of consideration of the nature of origin. Specialization is influenced by factors contributing to its deepening and containment, which were identified during the study. The efficiency of agricultural sector is directly related to the rational specialization of economic entities, district and region. The most effective specialization makes it is possible to produce the maximum quantity of products with minimum costs with other things being equal. Rational specialization allows more efficient use of land, labor and material resources. Reasonable specialization allows providing the population with food and strengthening the food security of the country and self-sufficiency of the region. The article identifies the main types of products produced in the region, which include grain, potatoes, vegetables, livestock and poultry, milk and eggs. Specialized production has both positive and negative sides. The division of labor often cannot occur deeply and clearly in agriculture. However, it is possible to distinguish completely independent highly specialized enterprises in the industry, but their number is small. As a result, problems of the development of industries were identified and suggestions were given to change the situation in agricultural production.

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Keywords: Agriculture, commercial products, government support, level of security, location, specialization.



1. Introduction

Specialization of production in agriculture is directly related to its location. These are interdependent forms of the social division of labor. Differences are observed in their nature of origin. Location characterizes the quantitative aspect of the social division of labor, that is, it shows which products are produced, in what amounts and where. Specialization, on the other hand, describes the qualitative side, namely, it establishes what kind of production prevails in a given territory. The definition of effective specialization allows choosing the resultant form of organization of agricultural production, as it provides an opportunity to concentrate the production of the most prospective products for individual territories and economic entities, thus, to get the best result of production activities.

There are positive and negative sides to specialization. The following can be listed as positive:

- specialization contributes to the development of mechanization and automation;
- specialization promotes the introduction of new equipment and technology, as well as their more efficient use;
- thanks to specialization, the quality of products is improved;
- specialization allows to reduce production costs due to a higher level of mechanization and automation of labor, the use of more skilled labor, concentration of production;
- the development of specialization necessitates the objective development of standardization and unification of production.

The following disadvantages should be noted along with the advantages of specialized production:

- specialization implies the monotony of work, therefore, it is necessary to reduce the negative impact of this phenomenon on an employee;
- a high degree of dependence on customers and suppliers;
- a high degree of dependence on customers and suppliers;
- as a rule, lack of communication with the end user;
- specialized production is subject to small market fluctuations.

In modern conditions, fewer and fewer business entities are solely owned, that is, the organization of labor is not based on the principle of self-sufficiency, as it was previously observed. The correct choice of industries and their combination often affects the overall economic situation not only of the organization, but of the region (Klyuev, 2017). Thus, specialization is not a local phenomenon typical of individual enterprises and regions. It has a more massive character. A tendency to deepen the specialization of agricultural production at all levels of its organization has been observed for many years in global scale agriculture (Nefedova & Pallot, 2002).

Specialization of agricultural production has its own distinctive features due to the nature of the industry, which include the relationship of biological and economic laws, seasonality and territorial limitations of production, terms of receipt and specificity of storage of products, uniform consumption of

products and many others. The above features have a direct impact on the forms, rates and, in general, the whole process of production specialization.

The division of labor in agriculture cannot occur as deeply and clearly as, for example, in industry, where, together with the division of labor for the production of certain types of products, division occurs according to technological processes, the manufacture of individual parts and items. However, it is possible to identify completely independent highly specialized enterprises in agriculture it is possible, but their number is small. Such enterprises include poultry farms, greenhouses, livestock feed complexes for the production of pork and beef, horticultural farms and some others.

2. Problem Statement

The following tasks are set in the article:

- consider the factors that influence the specialization;
- analyze the location and specialization of agricultural production and determine the main types of products produced in the territory of the Novgorod region;
- calculate the level of provision with main types of products per capita in the region and draw appropriate conclusions;
- determine the required volume of commodity products to meet the needs of the population; identify problems and draft proposals for the development of agricultural sectors of the Novgorod region.

3. Research Questions

3.1. The role of specialization and location of agricultural production.

3.2. Factors affecting specialization.

3.3. Analysis of the location and specialization of agricultural production in the territory of the Novgorod region.

3.4. Provision with main types of products in the Novgorod region.

3.5. Required volume of core products to meet the needs of the population of the Novgorod region.

3.6. Problem analysis and proposal development.

4. Purpose of the Study

The aim of the work is to identify ways to improve the specialization in agricultural production based on an analysis of the level of food self-sufficiency in the region and identify the necessary volume of domestic marketable production to meet the needs of the population of the region.

5. Research Methods

It is of great importance to consider a set of possible factors that influence the effectiveness of specialization to fulfill the goal and objectives of the study. The development of specialization is influenced by many factors (Figure 01). They can deepen or restrain it.

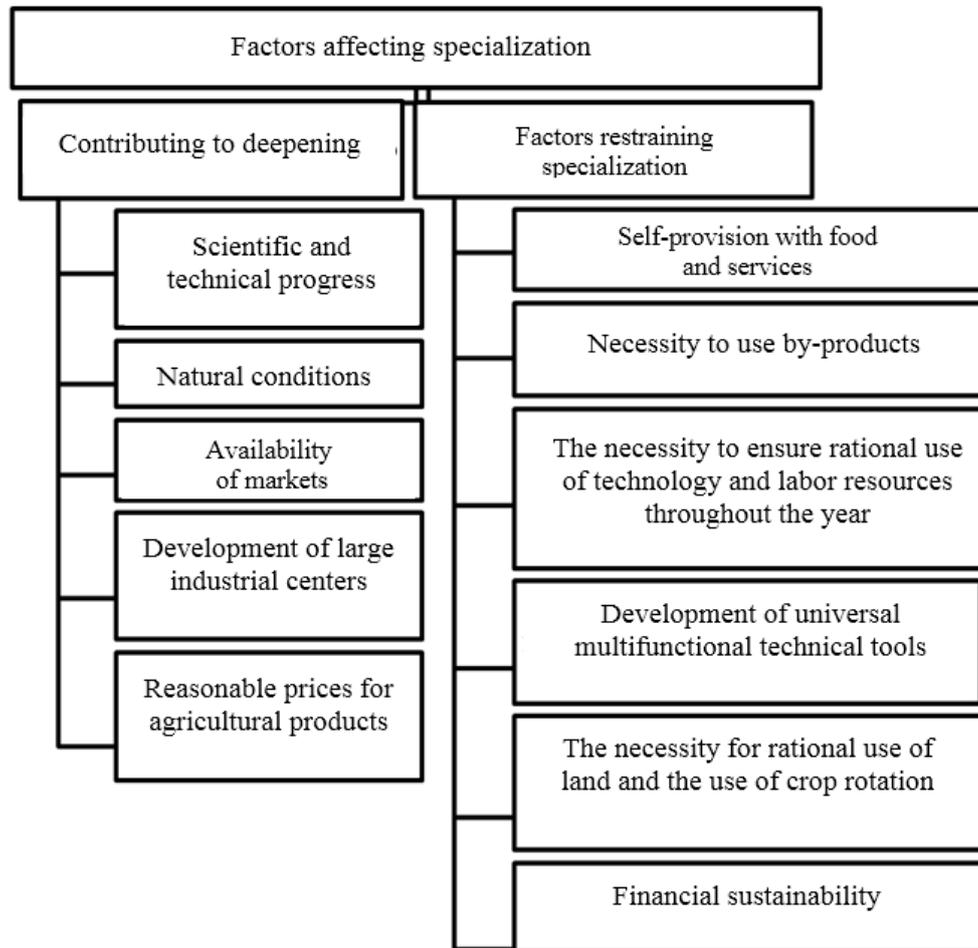


Figure 01. Factors affecting specialization

Scientific and technical progress directly affects the specialization. This can well be seen in the field of agricultural engineering. The introduction of complex machines causes the need for a reasonable level of production specialization.

The need for mechanization of labor-intensive processes contributes to the development of multi-operational, combined machines and units that can perform several procedures simultaneously. The introduction of highly specialized and high-performance equipment, for example, a forage harvester, contributes to the deepening of specialization.

Natural conditions (soil, terrain, and climate) also influence the specialization positively. This factor should be considered in conjunction with other factors, especially transport. If there is a well-established transport connection, good roads in areas with high natural fertility and favorable climatic conditions, the concentration of agricultural production increases significantly.

Also, specialization is promoted by the presence of markets, the creation of large industrial centers, reasonable prices for agricultural products (Stepanov, 2013).

The factors restraining specialization are of adverse character.

One of these factors is crop rotation. Due to the fact that it is necessary to use arable land effectively, it is required to apply crop rotation systems. Crop rotations also help fight pests, diseases and weeds. Consequently, the use of crop rotations is often necessary and economically justified, but it limits the deepening of specialization in the crop industry. Of course, the use of large doses of mineral and organic fertilizers affects the fertility and environmental safety of products. Reducing the number of industries is also hampered by the use of waste from one industry to another. For example, waste from the crop industry is used for feeding purposes, and livestock waste is used as an organic fertilizer.

The next limiting factor is the need to optimize the use of equipment and labor resources throughout the year. It is possible to increase the overall annual productivity of machinery and labor resources, reduce the unit cost of production, reach a more even cash flow and eliminate many other negative aspects of the seasonality of agricultural production with a rational combination of industries. Also, a different complex of industries can serve as a kind of safety net at crop failure and guarantee greater economic stability of business entities. Thus, this factor has led to the fact that there are a lot of diversified agricultural enterprises in the Russian Federation.

The development of universal multifunctional technical means can also become a reason for restraining specialization. Modern machinery is capable of performing many operations and cultivating several crops. One of the factors in the presence of several industries in the economy is crop rotation, which allows improving soil fertility without additional costs (Kirkorova & Lipnitskiy, 2016).

The most important factor is the possibility of self-sufficiency in various food products with a sufficient number of industries in the public sector in current conditions and situation in the world. The need for self-sufficiency in basic food products of the population is manifested both in the country and at the regional level. This leads to a change in the existing system of territorial specialization of production in agriculture. This factor served as a prerequisite for further research.

Thus, due to the influence of various factors on the development of specialization, it is necessary to determine the direction of activity accurately for the effective functioning of agriculture. Therefore, in the course of the study, the authors calculated the coefficients and determined the level of production specialization in the agrarian sector in the context of the municipal districts of the studied region. In addition, the necessary volume of marketable products was determined to meet the needs of the population and proposals were developed to optimize the location of agricultural production based on the results.

6. Findings

The most relevant indicator in current conditions is defined when considering the theoretical data on the specialization of agricultural production and factors contributing to the deepening or restrain: the possibility of self-sufficiency in various food products of the population of the region with a sufficient number of industries.

It is necessary to determine the level and coefficient of specialization to justify the chosen research strategy.

The level of specialization is characterized by the specific share of individual industries in the structure of marketable products. The coefficient of specialization allows identifying those types of products with which the economic entity enters the social division of labor.

The generalizing indicator characterizing the level of specialization is the coefficient of specialization of agricultural production:

$$C_s = \frac{100}{\sum Y_m \times (2H-1)}$$

where C_s – coefficient of specialization;

Y_m – share of individual industries in marketable products, %;

H – serial number of the industry by the share of each product in the ranked row (Minakov, 2014).

If the coefficient of specialization is less than 0.2, then the level is considered low, from 0.2 to 0.4 is medium, from 0.4 to 0.6 is high, above 0.6 is very high (advanced specialization). Areas producing one type of commodity products have a coefficient of specialization equal to one (Kovalenko, 2018).

The results of calculations and directions of production are presented in a summary table 01.

Table 01. Directions of agricultural production in farms of all categories of municipal areas and in the average in the Novgorod region

| District | Coefficient of specialization | | Level of specialization | | Main product | |
|-----------------|-------------------------------|------|-------------------------|----------|--------------------------|--------------------------------|
| | 2000 | 2016 | 2000 | 2016 | 2000 | 2016 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Novgorod region | 0.39 | 0.48 | Medium | High | Cattle and poultry, milk | Cattle and poultry, vegetables |
| Batetsky | 0.53 | 0.64 | High | Advanced | Milk, cattle and poultry | Milk |
| Borovichsky | 0.30 | 0.38 | Medium | Medium | Cattle and poultry, eggs | Milk, vegetables |
| Valdai | 0.46 | 0.66 | High | Advanced | Cattle and poultry, milk | Cattle and poultry |
| Volotovskiy | 0.45 | 0.77 | High | Advanced | Milk, cattle and poultry | Milk |
| Demyansky | 0.52 | 0.66 | High | Advanced | Cattle and poultry, milk | Milk |
| Krestetsky | 0.43 | 0.97 | High | Advanced | Cattle and poultry, milk | Cattle and poultry |
| Lyubyntsky | 0.52 | 0.51 | High | High | Cattle and poultry, milk | Vegetables, potatoes |
| Malovishersky | 0.47 | 0.69 | High | Advanced | Cattle and poultry, milk | Milk |
| Marevsky | 0.55 | x* | High | x* | Cattle and poultry, milk | x* |
| Moshenskoy | 0.50 | 0.54 | High | High | Cattle and poultry, milk | Milk, cattle and poultry |

| | | | | | | |
|--------------|------|------|----------|----------|--------------------------|--------------------------------|
| Novgorod | 0.42 | 0.42 | High | High | Cattle and poultry, eggs | Cattle and poultry, vegetables |
| Okulovsky | 0.50 | 0.62 | High | Advanced | Cattle and poultry, milk | Cattle and poultry |
| Parfinsky | 0.43 | 0.56 | High | High | Cattle and poultry, milk | Milk, cattle and poultry |
| Pestovsky | 0.51 | 0.64 | High | Advanced | Cattle and poultry, milk | Milk |
| Poddorsky | 0.51 | 0.77 | High | Advanced | Cattle and poultry, milk | Milk |
| Soletsky | 0.48 | 0.55 | High | High | Cattle and poultry, milk | Milk, cattle and poultry |
| Starorusskiy | 0.36 | 0.62 | Medium | Advanced | Cattle and poultry, milk | Milk |
| Khvoinsky | 0.41 | 0.72 | High | Advanced | Milk, cattle and poultry | Milk |
| Kholmnsky | 0.72 | x* | Advanced | x* | Cattle and poultry | x* |
| Chudovsky | 0.51 | 0.78 | High | Advanced | Cattle and poultry, milk | Vegetables |
| Shimsky | 0.39 | 0.52 | Medium | High | Cattle and poultry, milk | Milk, potatoes |

*Note: – no data

The calculations are based on the source (Annual statistical report of the Novgorod region, 2017).

Table 01 shows that the specialization of agricultural production in most parts of the Novgorod region is advanced, since the coefficient of specialization is above 0.6. However, this does not indicate a proper and rational level of specialization. This situation may indicate not only an advanced specialization, but also a reduction in production volumes due to a decrease in the number of business entities.

Further, table 02 presents the grouping of municipal districts according to the types of agricultural products in which they specialize. The districts can specialize in different areas.

Table 02. Distribution of municipal districts by agricultural production in 2016.

| Production | District |
|--------------------|---|
| Milk | Batetsky, Borovichsky, Volotovskiy, Demyansky, Malovishersky, Moshenskoy, Parfinsky, Pestovsky, Poddorsky, Soletsky, Starorusskiy, Khvoinsky, Shimsky |
| Cattle and poultry | Valdai, Krestetsky, Moshenskoy, Novgorod, Okulovsky, Parfinsky, Soletsky |
| Vegetables | Borovichsky, Lyubytinsky, Novgorod, Chudovsky |
| Potatoes | Lyubytinsky, Shimsky |

The main types of products that are produced by economic entities were identified in the analysis of location and specialization of agricultural production in the territory of the Novgorod region, namely: grain, potatoes, vegetables, cattle and poultry, milk and eggs.

The most important factor influencing the specialization is the level of provision of the population with food. It is calculated by dividing the volume of production of basic agricultural products per capita in the Novgorod region by the volume of consumption of basic foodstuffs per capita. The level of provision with the main types of products per capita in the Novgorod region is presented in the table 03.

Table 03. Level of provision with main types of products per capita in the Novgorod region, %

| Product | 1990 | 2000 | 2012 | 2013 | 2014 | 2015 | 2016 | 2016 compared to 1990, (+,-) |
|--|-------|-------|-------|-------|-------|-------|-------|------------------------------|
| Cattle and poultry for slaughter (carcass weight equivalent) | 170.8 | 69.2 | 189.2 | 217.6 | 222.2 | 190.5 | 208.0 | 37.2 |
| Milk | 188.2 | 107.2 | 62.0 | 59.7 | 57.8 | 52.0 | 55.4 | -132.8 |
| Eggs, pcs | 181.6 | 80.2 | 92.2 | 102.4 | 123.4 | 111.4 | 129.3 | -52.3 |
| Grain | 204.5 | 30.0 | 20.9 | 39.8 | 39.5 | 33.9 | 72.7 | -131.8 |
| Potatoes | 112.9 | 277.1 | 259.1 | 349.6 | 378.1 | 319.5 | 386.7 | 273.8 |
| Vegetables | 53.7 | 131.3 | 116.8 | 125.7 | 125.0 | 123.7 | 136.8 | 83.1 |

Note: The calculations are based on the source (Annual statistical report of the Novgorod region, 2017).

Table 03 shows that the consumption of milk and grain exceeds their production in the Novgorod region in 2016, since the provision with these types of products is only 55.4% and 72.7%, respectively. The highest level of security is observed for potatoes (386.7%), livestock and poultry (208.0%). Consequently, it is necessary for the economic entities of the Novgorod region to specialize in the production of milk and grain in order to fully provide themselves with the domestic products.

The analysis proved that there is insufficient production of milk and grain crops in the Novgorod region. Therefore, it is necessary to calculate the volume of missing products per capita and for the region. The results of the calculations are presented in table 04.

Table 04. Estimation of the required increase in the volume of commercial products in the Novgorod region, 2016

| Kind of product | Per capita, kg | | | Total, tons | | |
|-----------------|----------------|-------------|------------------------------|-------------|-------------|------------------------------|
| | production | consumption | deficient volume of products | production | consumption | deficient volume of products |
| Milk | 129.0 | 234.0 | 105.0 | 79800.0 | 144071.9 | 64271.9 |
| Grain | 83.0 | 115.0 | 32.0 | 51500.0 | 70804.6 | 19304.0 |

Note: The calculations are based on the source (Annual statistical report of the Novgorod region, 2017).

Table 04 proves the deficiency of production.

The analysis of the location and specialization of agricultural production in the territory of the Novgorod region shown that most of the districts of the Novgorod region specialize in milk production. Borovich, Lyubytinsky, Novgorod and Chudovsky districts are engaged in the production of vegetables. Only two districts (Lyubytinsky, Shimsky) are mainly engaged in potato production.

7. Conclusion

Most districts of the Novgorod region specialize in milk production; therefore, it is necessary to develop the production of these products in these municipalities. It is also necessary to stimulate the production of grain for feed purposes.

It is possible to achieve an increase in milk production in the region through the introduction of new scientific technologies, the acquisition of highly productive breeding cattle, modernization and construction of dairy complexes, workshops for the primary processing of milk.

A significant increase in grain production in the Novgorod region can be achieved by increasing the acreage and yields, introducing modern technologies, and building grain processing facilities.

It is impossible to meet the challenges of increasing agricultural production without state support and investor assistance. The government of the Novgorod region adopted a resolution No. 271 on the state program of the Novgorod region “Development of the agro-industrial complex in the Novgorod region for 2014-2020” on October 17, 2013 with this purpose, which presents the implementation of seven sub-programs, including “Development of the livestock, processing and sales of livestock products” and “Development of the crop production sub-sector, processing and marketing of crop production” (State program of the Novgorod region “Development of agro-industrial complex in the Novgorod region for 2014-2020”, 2013).

This Decree requires to increase milk production to 90 thousand tons and the gross yield of grain and leguminous crops to 75 thousand tons by 2020. This will significantly increase the production of these types of products but will not allow the region to fully provide its food supply.

The deepening of production specialization in agriculture of the Novgorod region in this case does not lead to positive consequences, but only indicates the pinpoint nature of the development of industries in some municipal areas, which leads to a reduction in agricultural production in other areas.

It is necessary to improve areas of specialization in agricultural production for the rational and optimal development of agricultural sectors in the region. In this regard, the authors propose the following solutions:

- To develop production in agricultural organizations and farm households, that is, to increase production volumes, introduce all agricultural land, and especially arable land into circulation. This is due to the fact that, unlike the households of the population, these categories produce marketable products, that is, the bulk of gross output is sold, and ultimately comes to the consumer.
- An increase in the production of milk and grain crops, and, therefore, a deeper specialization of economic entities is required. The increase in the production of these types of products will allow achieving full satisfaction of the needs of the local population of the region with their own food.
- Novgorod region provide favorable conditions for the production of fiber flax, honey, as well as the development of rabbit breeding, farming, horse breeding, fishing and fish farming. It is necessary to consider these fields when planning activities of organizations and farm

households, as well as the management bodies of the agricultural sector in the allocation of state support.

- Improving the system of state regulation of the development of industries in the agricultural sector and the agro-industrial complex as a whole, in the country and regions.

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