Development of the agricultural industry in the conditions of food security

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Abstract. The article presents an attempt to develop an organizational mechanism for the development of the agricultural industry in the context of food security. The purpose and subject of the study is to build a logically consistent methodology for the formation of an organizational mechanism for the development of the agricultural industry. Methodically, the article is based on a systematic approach to assessing the current state and identifying problems in the development of agricultural enterprises and conducting a comparative analysis of management principles and applied technologies in the agricultural industry of Russia using the example of animal husbandry enterprises. The article provides an algorithm for effective interaction between the state and agricultural enterprises using a wide range of methods of dialectical logic, statistical groupings, comparative and abstract logical analysis. Conclusions: animal husbandry enterprises are showing increasing interest in the development of domestic enterprises of the agro-industrial complex, as the main reserve of domestic raw materials for their own stable development; The proposed organizational mechanism for the formation and development of agricultural enterprises within the framework of state support for the management of structural transformations of the industry makes it possible to implement the reconstruction of the socio-economic situation in the agricultural industry and improve food security.

1. Introduction

One of the most important conditions for ensuring sustainable socio-economic development of the country, the basis for strengthening national security and resource and economic potential is government support for the innovative rise of the manufacturing sector [1-4]. As a result, in just a few years, the institutional structure of the Russian food complex has undergone very significant changes. As a result, at the present stage, a clear system of the new institutional structure of the food complex has not been formed, and the old one has been destroyed by modern realities.

In the present conditions of increasing economic pressure of foreign countries on the Russian economy and the aggravation of the global geopolitical situation, it is obvious that the role and need for state support in the innovative development of the agricultural sector is very important and necessary. At various levels of government, it is necessary to create conditions for the use of existing instruments in support of import substitution, as well as to act as an investment locomotive in innovative directions for the development of agricultural enterprises, indicating directions for private capital in the creation of innovative products. In particular, one of the directions is the development of
an organizational and economic mechanism for the innovative development of the industry in order to obtain the most effective objects of innovative activity.

The import substitution program is the main basis for the development of the domestic economy and is aimed at protecting national interests and diversifying production, which requires significant efforts through the formation of institutional measures to support agriculture [5-10]. It should be noted that the development of the agricultural sector in the context of the import substitution policy is much better and more stable than in other sectors of the economy. This is also because, in response to foreign sanctions, the Russian government imposed a ban on certain products supplied from the United States and EU countries. The list of prohibited products includes meat of cattle, poultry and pork, as well as fish, cheeses, sausages, fruits and vegetables.

2. Materials and methods
In the current conditions for the implementation of the import substitution policy, it can be assumed that big business will want to cooperate with small companies in the form of cooperation and integration. However, if you look at reality, then in the small and medium-sized agribusiness sector there is a low labor productivity, insignificant volumes of production, as well as the quality of manufactured products does not always meet the requirements and standards. The methodological basis of the research is based on such methods of scientific research as: methods of classification, generalization, comparative analysis and synthesis, logical-structural, analytical, mathematical-statistical, dynamic (discounted) methods, data interpretation, methods of system analysis, graphic. However, there are practically no comprehensive works on innovative development in the agricultural sector, and the question of creating conditions for enhancing the innovative development of this industry has not been adequately studied. Therefore, based on a well-developed organizational and economic mechanism, it is possible to solve the identified problematic issues to create favorable conditions for the growth of small and medium-sized agribusiness enterprises.

3. Results and Discussion
The main most critical industries that need to carry out a policy of import substitution today is not only the agricultural, but also the food industry (60-80%). It should be borne in mind that a threat to the technological and economic security of the state arises if the share of imports of strategically important goods is more than 25%. "Last year, the increase in pork was almost 10%, and 13% in industrial pig breeding. In absolute terms, it is 300 thousand tons in carcass weight. This is the largest increase in history with an already high base". Due to the fact that wholesale prices began to decline in 2016 and this trend will continue in the medium term, this will contribute to an increase in consumption. In 2016, when consumption did not increase or decreased for all other meat items such as beef and poultry, pork consumption increased by almost 7%. In the first quarter of 2017, this trend continues, showing an increase of 6%. Pork today is the main driver of increasing meat consumption (figure 1)

![Figure 2. Production of all types of meat in the world.](image-url)
The Ministry of Industry and Trade of Russia has developed several measures for tax incentives for agricultural industries. For example, capital investment offset to reduce income tax. It is assumed that when this tax mechanism is launched in ten years, the increase in income tax on profit will 4 times exceed the lost budget revenues. In addition, it is proposed to introduce tax holidays for newly created industrial enterprises, for high-tech equipment at new enterprises - accelerated depreciation of two types of taxes: on profit and on property, as well as a decrease in insurance premium rates for engineering organizations and companies engaged in industrial design.

Important areas of activity within the framework of the import substitution program is the development of small and medium-sized businesses - this is carrying out systematic work with the specialized business community, providing a set of incentives, organizing processes aimed at providing financial assistance to enterprises and organizations, preventing administrative barriers and organizing monitoring of industry processes.

With regard to investments, special attention is paid to the direction of public-private partnership. In order to support small and medium-sized businesses in the agricultural sector in areas with high scientific and technical potential, additional motivation is created for private investors in organizing competitive high-tech production.

“Our main export of meat is concentrated in the near abroad, and in far abroad we send parts that, in general, should not be taken into account in the balance sheet (for example, chicken legs). Therefore, now it is rather risky to increase production with the expectation that our export will develop”.

However, in order to saturate the Russian market with domestic high-tech equipment in the medium term, it is necessary to overcome dependence on imports at the level of finished products.

Today, in terms of basic indicators of our country, gross domestic product and gross domestic product per capita are the lowest in comparison with the leading countries of the world. Modernization is a priority and the state invests in innovation and knowledge. The Russian Federation invests more than 1.6% of GDP in the reproduction of knowledge, which is insufficient, while in the countries of the Organization for Economic Cooperation and Development - 5%. This question is being raised in a timely manner for Russia, which is on the list of outsiders in terms of scientific and technological development. The share of the state in total expenditures on research and development in different countries is in India - 75%, Brazil - 50%, the European Union is 33%, the USA - 28%, China - 25%.

The government always plays a leading role for the innovative attractiveness and activity of business, defining the “rules of the game” for it and the conditions for increasing the efficiency of investments in high-tech lines and products, using tax and financial instruments.

For many years, the United States has been the leader in the World Intellectual Property Organization (WIPO) in terms of the volume of international patent applications, which accounts for almost 30% of all applications. In particular, for comparison, in 2015, more than 57 thousand applications were registered in the United States and 792 applications were received from Russia. It can be said that this indicator lags more than 72 times. At the same time, the average age of scientists in Russia is 56 years, and in the United States, the average is no more than 45 years. In addition, the United States spends 8 times more on funding for science than in the Russian Federation. Such indicators have become the reason for the massive "brain drain from Russia" over the past decades, while there is an increase in scientific activity in other countries.

It should be noted that the Russian economy, due to the lack of effective interaction between the three subjects of innovation and technological development - the state, science, business, which are the "locomotives" of the country's innovative development, largely uses imported technologies. The interaction of the above three subjects should be provided in the following areas [2]:

- Provision of legal and economic conditions conducive to the development of innovative and entrepreneurial activities in the country;
Direct participation of the state in the formation and development of innovative infrastructure, financing and stimulation of scientific research and technological development in the field of high-tech products;

Determination of priority technologies, on the basis of which it is possible to form the main directions of scientific and technological development for science, education and business.

Innovative and investment projects aimed at the import substitution program, in particular in the agricultural industry and agro-industrial production, will require large financial long-term investments, in which the state acts as a guarantor in accordance with the conditions for ensuring food security and national economic security in general, will be able to stimulate the policy of import substitution of production, using the instrument of issuing available long-term credit funds to industrial enterprises, as well as involving the mechanisms of public-private partnership (figure 1) [1].

It should be noted the issue of staffing, since it is one of the most important tools in the implementation of any government programs for the development of the manufacturing sector of the economy [4]. In modern conditions, it is possible to speak convincingly about the lag in the level of training in high-tech specialties in the country, and this is very necessary to solve using the tools of Russia's integration into the international infrastructure in the direction of training and stimulating personnel and training personnel on the development of professional competencies in accordance with world standards.

It should be noted that the solution to the issue of the lack of highly professional personnel is possible only on the basis of an integrated approach (for example, according to the WorldSkills methodology), the basis of which is the connection of specialized educational institutions with production, the modern world level of industrialization and the latest high-tech equipment in accordance with the measures determined by the government subprogram "Development engineering activities and industrial design". Thus, due to Western European sanctions against Russia, an import substitution program was approved in 2014 and a plan of measures in the agricultural sector for 2014-2015 was proposed, aimed at ensuring food security; development of agricultural production; ensuring the sale of agricultural products; improvement of the material base; ensuring the effective operation of public authorities and strengthening the state's oversight function over activities in the agricultural sector, etc. In order to implement these areas, the state is implementing a number of subprograms: "Development of the sub-sector of crop production, processing and sale of crop products"; "Development of the sub-sector of animal husbandry, processing and sale of livestock products"; "Technical and technological modernization, innovative development", FTP "Sustainable development of rural areas for 2014–2017 and for the period up to 2020" and others. In addition, more than 450 projects were developed and approved, which cover agricultural sectors: crop production, poultry farming, pig breeding, horticulture and others. The results of the projects show that compared to 2014, meat imports decreased by an average of 37% (30% for frozen meat, 44% for pork), poultry imports - by 52%, fish - by 40%, and a favorable trend is also noted. reduction of imports of dairy products by an average of 20-30% [3]. Continuing the implementation of import substitution policy measures, it is possible to predict by 2020 a decrease in meat imports by another 67.8%, dairy products - by 29.9%, vegetable products - by 70.3% [4]. However, despite the comforting forecasts for the development of the agricultural sector, there are a number of unresolved issues in the food market: insufficient volumes of seed production, non-repayment of debts, difficulties in recruiting highly qualified personnel, insufficiently developed material base.

Practical and theoretical experience of domestic science in various branches of the agricultural industry suggests that the successful implementation of the proposed measures will contribute to the agricultural industry not only to overcome the crisis, but also to increase its investment attractiveness [5].

The modern feature of the pig breeding industry, like other branches of agricultural production, is that the country has undergone profound socio-economic transformations. The foundations of a diversified economy have been created; the right to choose forms of management, to independently
dispose of manufactured products has been legislatively enshrined. Pork meat is the most energetic group of food products, which allows you to accelerate the increase in the daily calorie content of food consumed [11]. In the global production of meat, the share of pork takes the leading place and accounts for almost 40%. In Denmark, Germany, Holland and some other countries, it exceeds 55%. Today, one of the most profitable areas in animal husbandry is pig breeding (table 1).

Table 1. Dynamics of world meat production, million tons [7].

| Years | All kinds of meat | Pork | Bird | World population |
|-------|------------------|------|------|------------------|
| 2010  | 296,107          | 109,370 | 99,050 | 6,842,923 |
| 2015  | 310,656          | 115,090 | 110,513 | 7,284,296 |
| 2020  | 337,341          | 123,740 | 124,961 | 7,656,528 |
| 2030  | 398,342          | 143,606 | 158,236 | 8,321,380 |
| 2040  | 456,759          | 160,842 | 191,756 | 8,874,041 |
| 2050  | 505,438          | 174,183 | 220,358 | 9,306,128 |

Experts estimate the profitability of this business at about 27-30%, but with the right approach and use of modern technologies, even more significant results can be achieved. The pig population in the region at the beginning of 2021 amounted to 85 thousand heads. An increase in pork production is planned both through the reconstruction and modernization of old pig-breeding premises in LLC Agrosoyuz, OJSC SPH Smolmyaso and LLC Rudnyansky Livestock Complex, and through the construction of modern pig-breeding complexes in Roslavl (LLC Roslavl Myaso) and Pochinkovsky (LLC Smolenskoe Pole) areas. This will increase the production of pork by more than 12.5 thousand tons. Agriculture is an important branch of the economy of the Smolensk region. In the gross regional product, the share of agricultural products is 10.5%. The main issue for the formation of agricultural sectors in the Smolensk region is the extensive growth of production, the lack of social infrastructure due to the low activity of life in the countryside, employment conditions [6]. The basic reasons for this development of agriculture are:

- The need for a complete structural and technological modernization of production for most of the region's agricultural enterprises;
- Instability of agricultural markets, raw materials and food markets, insufficient investment in the industry;
- A constant shortage of qualified personnel caused by the low level and quality of life in rural areas;

Disparity of prices for agricultural products and industrial products used in the production of agricultural products. About 1 billion rubles are annually withdrawn from agricultural production in the Smolensk Region through the price system. In the Smolensk region, animal husbandry is the basis of agriculture. Of these, the main and constantly operating lever should be budgetary support for the development of pig production in order to develop state food security. Budgetary support can be in the form of investment loans, subsidies and subventions. State subsidies and cost compensation also play an important role, taking into account ensuring the profitability of the work of pig breeding organizations. Table 2 presents the main representatives of pork producers [14].

The lack of modern equipment has a very negative impact on the quality and competitiveness of domestic food products. Even with a very high level of quality of the raw material base in the world, due to the low level of processing quality, prices for domestic products are 30-40% lower than the world average, and the average age of industrial equipment is 25 years, today only 10% of fixed assets can be considered modern. Therefore, in modern conditions for the agro-industrial complex, one should consider such a mechanism for attracting investments as public-private partnership.

The main conditions for the technological growth of agricultural production are precision farming and genetic engineering biotechnology, which include information technology, biosensors and satellite
navigation [12]. The study of the composition of soils, as well as satellite monitoring, make it possible to optimally use it. The introduction of Big Data technologies for studying the composition of the soil makes it possible to process a fairly large amount of information and contributes to the modernization of production in agriculture, and can also increase the yield of agricultural crops [13]. Successful practice in this direction is present in the USA, Australia, Canada.

Table 2. TOP-10 of the most pork producer in the Russian Federation at the end of 2019.

| No | The name of the company                               | Production of pork for slaughter in live weight in 2019, thousand tons | Share in the total volume of industrial pork production in the Russian Federation |
|----|-------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1. | Agro-industrial holding MIRATORG                       | 426.57                                                                | 9.70%                                                                         |
| 2. | Group of companies Cherkizovo                         | 286.2                                                                 | 6.50%                                                                         |
| 3. | LLC Velikolukskiy pig-breeding complex                | 267                                                                   | 6.00%                                                                         |
| 4. | RusAgro Group of Companies                            | 243.36                                                                | 5.50%                                                                         |
| 5. | Agrarian Group JSC                                    | 242.06                                                                | 5.50%                                                                         |
| 6. | LLC GK Agro-Belogorye                                 | 238.6                                                                 | 5.40%                                                                         |
| 7. | LLC Agropromkomplektatsiya                           | 201.4                                                                 | 4.60%                                                                         |
| 8. | Group of companies AGROEKO                            | 162.1                                                                 | 3.70%                                                                         |
| 9. | APK DON LLC                                          | 109.86                                                                | 2.50%                                                                         |
| 10. | RBPI Management Company LLC and SPF                   | 98.21                                                                 | 2.20%                                                                         |
|     | Total 20 largest enterprises                          | 3 009.21                                                              | 68.2%                                                                         |

At present, in Russia, an urgent solution to the issue is the growth of labor productivity based on stimulating innovations, which are a kind of "engine" of business. Therefore, on the part of the state, represented by the Ministry of Agriculture of the Russian Federation and the Fund for Infrastructure and Educational Programs of OJSC RUSNANO, they have formed a Catalog of innovative products recommended for implementation in the work of agro-industrial enterprises and enterprises of the agricultural industry, which in turn contributes to the improvement of energy efficiency, resource conservation, environmental friendliness and safety [9]. As experience shows, nanotechnological products, which are used in agricultural production and products of its processing, are beginning to gain the widest distribution in Russia.

4. Conclusion

The main objective of the food security policy is the production, processing of agricultural products and the efficient use of agricultural land. Increasing the investment attractiveness of the agricultural industry presupposes decisions from the state policy towards continuing lobbying for the development and implementation of investment projects in order to create conditions for the availability of loans, as well as the introduction of financing mechanisms for projects to expand the domestic market of the agricultural industry and the export potential of agricultural products [8]. The state should support fundamental and applied research and development work in the agricultural sector. Practical development is necessary for the integration models of the development of agricultural science and education, the creation of joint research laboratories and centers, scientific, educational and industrial clusters, research projects of young scientists and teams, contributes to the innovative development of the agricultural industry.

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