Priority areas for stimulating innovation and technological development of the poultry industry

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Abstract. The innovative development of the poultry industry is currently at a stagnation stage. To increase the competitiveness of enterprises, it is necessary to stimulate the innovative potential of the industry through the development of those areas that are used in world practice, but in the Russian Federation are absent or underdeveloped. Therefore, a more careful study of all existing types of incentives for innovation and technological development of the poultry industry is necessary, which indicates the relevance of this article. The article describes all the main problems of innovation development, ways to stimulate the technological development of production, as well as proposals for increasing the competitiveness of the poultry industry.

The purpose of the article is to consider the types of incentives for innovation in the poultry industry to identify the most priority of them. Within the framework of this goal, such tasks were set as providing a description of the main problems of innovative development of the poultry industry, consideration of the main ways of stimulating this development, as well as comparing the promotion of innovation in Russia and the world.

The main methodology of the article is the use of statistical data analysis methods, a graphical method, and a comparison method.

As a result of the study, it was revealed that in order to increase the competitiveness of poultry enterprises, it is necessary to more actively introduce technological innovations into the cultivation, housing and feeding of poultry, a more detailed study of the creation of a poultry cluster, as well as the development of a network of technoparks that currently do not have are competitive.

1. Key points

1. Poultry farming has a significant innovative potential, but it requires strengthening the investment attractiveness of the industry for its further development.

2. At present, some measures are being implemented in Russia to stimulate innovation, but they are insufficient compared with those implemented in other developed countries.

3. In order to increase the competitiveness of products, it is necessary to increase the attention of the state to innovation policy in order to introduce new and develop existing methods of stimulating innovative technological development.
2. Introduction
At present, in the face of growing competition in the global market, the most acute question has arisen of ensuring the country's food security. The key role here is played by the development of the agricultural sector, in particular, the poultry industry. To this end, the State Program for the Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food for 2013-2020 was adopted. This program is intended to improve the agro-industrial complex as a whole. An important role in this can be played by innovation as a factor in accelerating the development of the industry. Therefore, this article is relevant.

The purpose of this article is to consider the promotion of innovation in the poultry industry and to identify the most priority of them. To achieve this goal the following tasks were set:

− provide a description of the main problems of innovative development of the poultry industry;
− describe the main ways to stimulate innovation development;
− produce a comparative description of the main directions of stimulating innovation in Russia and abroad;
− propose solutions to the problems of innovation potential.

3. Methods
To study this topic, we used such methods as a method of comparison, analysis of statistical data, as well as a graphical method of presenting information.

4. Research Results
The poultry industry has great potential, new methods in breeding and breeding work, technology of poultry keeping, growing and feeding, as well as recycling of production waste have been developed and tested. However, the further development of this trend requires significant investment. One of the opportunities to attract investments in the industry is to increase the innovative potential of enterprises, which in turn helps to increase the investment attractiveness.

Analysis of ways to stimulate innovation by the state are presented in Figure 1.

Currently in Russia, some of these methods are used, the rest are only in the initial stage of development. And many of them do not affect the agricultural sector, and in particular, the poultry industry.

The main documents in the field of innovation, which determine the country's policy in this direction, are the Strategy for Innovative Development of the Russian Federation for the period up to 2020, as well as the State Program for the Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food for 2013-2020.

According to the Strategy for Innovative Development of the Russian Federation, by 2020 the share of organizations implementing technological innovations should increase to 25%, while in 2010 this figure was at the level of 4.9% and the share of exports of Russian high-tech goods in total global exports should increase to 2%, compared with 0.25% in 2008. At the same time, domestic expenditure on research and development will amount to 2.5-3% of GDP. In 2010, these costs accounted for 1.3% of GDP [9].

It is assumed that innovative development will provide an additional 0.8% of annual economic growth over the standard path of development starting from 2015.

The State Program for the Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food Markets provides for the following subsidy payments:

− to promote the achievement of targets for regional programs of development of the agro-industrial complex;
− to reimburse part of the interest rate on investment loans;
– to grant support to local initiatives of citizens living in rural areas;
– to improve the living conditions of citizens living in rural areas, young families and young professionals [7].

**Figure 1.** The main ways to stimulate innovation.

In total, the total amount of funding for the implementation of this program from the federal budget is 2.1 trillion rubles [12].

According to the magazine “Agroinvestor”, in 2017, the 25 largest investment projects worth a total of 464.5 billion rubles began to be implemented. Other projects announced in 2017 were estimated at 50 billion rubles overall result. The total amount of investments aimed at the development of the agro-industrial complex in 2016 amounted to 300 billion rubles. [10].

This list includes three projects for the development of the poultry industry, of which 2 are for broiler farming, for a total of 26.3 billion rubles, and 1 for turkey for a total of 15.5 billion rubles.

Obviously, there are very few new projects for the development of the industry. Currently, the company is considering the possibility of building a new poultry complex in the Far East by Rusagro with a capacity of up to 80-100 thousand tons / year.

The construction of this poultry complex is planned to allocate approximately 20 billion rubles. Also, in the Voronezh region planned to build 32 new broiler poultry houses. About 2 billion rubles are allocated for their construction. In the Tyumen region is also planned to build a complex for growing and processing broilers, the total investment will be about 6 billion rubles [10].

It should be noted that investment in new technologies of poultry farming can significantly increase the annual economic effect of enterprises. So, David Speller, owner of a poultry farm in Derbyshire, England, with a population of 180 thousand broilers, from 2011 to 2017 invested more than 2.8 million euros in new technologies. At the same time, the effect of the introduction of innovations averaged 40-46 thousand euros per year [1].

To maintain and improve the competitiveness of the poultry industry, it is necessary to direct the main flow of investments for the reconstruction and modernization of production, and first of all, by
increasing the cost of technological innovation. So, in 2016, technological innovation in agriculture was spent 15 billion rubles, of which 9 billion rubles. - at the expense of the organization's own funds, and only 0.05 billion rubles. - at the expense of the federal budget. At the same time, the livestock sub-sector accounts for about 5.7 billion rubles, or 37.8% of the total costs [15].

It is necessary to say that of all the enterprises of the agro-industrial complex, only 10.7% are implementing technological innovations in their production [15]. One of the factors influencing the level of technological innovation is the resource supply of enterprises, which, in turn, is influenced by the financial component, as well as the level of investment [11].

The structure of the cost of technological innovation of enterprises of the agro-industrial complex by types of innovation activities can be represented in Figure 2.

![The proportion of costs in individual areas of innovation, %](image)

**Figure 2.** The cost structure in some areas of innovation of agricultural enterprises.

As can be seen from this diagram, agricultural enterprises are primarily interested in the modernization of production, 60.2% of the costs are directed to the purchase of machinery and equipment, 35.8% - to new research and development in the field of production technology. In addition, the acquisition of new software tools that automate the production process is of great importance. 24.6% of total expenses are allocated for their development.

Currently, innovations based on resource-saving and energy-saving technologies are priorities [22]. It is known that the main attention of foreign enterprises is focused on innovations, which make it possible to reduce labor costs, automate the process of growing birds and maximize the robotization of the entire poultry meat production complex. This topic was discussed at the International Forum on Innovation in Agriculture in the Netherlands. It was discussed that with the help of automation of individual growing processes it is possible to increase the conditions of poultry keeping, while reducing labor and resource costs. For example, in the UK, surveillance cameras are installed in poultry houses that allow monitoring of the condition of the bird. With them, you can carry out both a visual inspection of the bird, and monitor the temperature in the room, as well as measure the noise level [5].

Also addressed the issue of intelligent lighting. With the help of a digital control panel, manufacturers can control lighting cycles that are as close to natural as possible [5]. In Russia, the issue of intermittent lighting is also relevant, in particular with the use of LED technology [27].
question was also covered in the framework of the 19th International Conference "World and Russian trends in the development of the poultry industry: realities and challenges of the future", which was held in May 2018 in Sergiyev Posad [25].

It is necessary to say that in Russia today a sufficiently large number of innovative technologies have been created that can be applied in the poultry industry. Such technologies include, for example, the use of recovery technology, the introduction of linear infrared heaters on natural gas, the technology of growing broilers on heated floors, the use of bactericidal irradiators based on ultraviolet amalgam lamps [18].

However, many of them have not yet been introduced into production at most poultry farms. So, back in 2010, an automatic poultry weighing system was proposed, which can record the number of weighings, deviations from the average live weight, and the uniformity of weighings. This system can produce up to 10 thousand weighings and distribute data across farms, herds, poultry houses and days of cultivation [19].

Another interesting innovation that allows for improved egg collection is the introduction of a robot that identifies and collects the missing eggs. As a result of the introduction, the economic effect is 1000 euros per year [4].

There are a lot of problems in breeding, which is one of the main areas involved in import substitution. Thus, the tendency towards an increase in the import of incubation eggs manifests itself due to the concentration of high-tech technologies among individual world producers of pedigree products, as well as the limited capacity of domestic reproducers of the first and second order [26]. Changing this trend also requires investments that are extremely difficult to attract [17]. But there are also positive moments - due to the introduction of new breeds and cross-breeds of birds into the production, there is a tendency to reduce the import of breeding material [26].

The main factors holding back Russian investments in innovations include the transition in 2017 to a new scheme of subsidizing interest rates on investment loans, reducing the purchasing power of the population, as well as lower prices for products.

The program of subsidizing interest rates on investment loans is one of the ways to stimulate innovation. This program is covered by investment loans concluded until December 31, 2016, aimed at the development of the livestock, crop, dairy and meat industries.

In 2017, within the framework of this program, 32,606 investment loans totaling 1,544.8 billion rubles were subsidized, while for poultry farming - in the amount of 316.6 billion rubles [14].

In addition, from January 1, 2017, the organizations of the agro-industrial complex are entitled to receive in one of the banks authorized by the Ministry of Agriculture of Russia a short-term or investment loan at a rate of not more than 5%. Reimbursement of a credit organization of lost revenue directly from the federal budget in the amount of the Bank of Russia key rate [8].

With regard to tax incentives, in Russia there are approximately 15 types of benefits that can be attributed to stimulating innovative activity [28]. So, for example, when calculating the income tax paid, taxable income does not take into account the value of the property received and used in the framework of targeted financing (including grants), investments received as a result of investment tenders, as well as funds received from the Foundation for Basic Research, the Industry Development Fund, the Foundation for Assistance to the Development of Small Enterprises in the Scientific and Technical Sphere [6].

Another tax break is the exemption of income from research and development, including on the basis of business contracts, from the payment of value added tax (VAT) [21].

Also, the tax legislation of Russia provides for a special tax system that allows reducing the administrative burden of enterprises - the unified agricultural tax (UAT). The main advantage of UAT is the exemption of taxpayers from the calculation and payment of VAT, property tax of organizations / individuals, as well as tax on income / income of individuals. In addition, the order of accounting and tax accounting has also been simplified [20].

It should be noted that the Russian innovation support system has not yet reached the level of development that is supported in most countries. So, state support is primarily used by enterprises with
state participation. There are still no measures to support small and medium-sized enterprises, which are considered an important segment of the innovation economy worldwide [16].

It is necessary to take into account the experience of European countries and the United States, which widely use measures of state support for production, including in stimulating innovation in agriculture. [13]. In some sources, there is an opinion that while state policy in the field of economic development should be focused not so much on the monetary system, as on the national innovation system (NIS) as the main tool [3].

Thus, in the USA, a set of measures has been developed to regulate the level of innovative potential in the agricultural sector. The main method of regulation is financial and credit support. The mechanism for the implementation of such support is the launch of a number of targeted programs, some of which are aimed at providing scientific and information support for innovations, and some of them are aimed at increasing the income of enterprises. The costs of these programs range from a third to half of all federal budget expenditures on agriculture [13].

For a comparative analysis, the level of compensation and subsidies is customarily calculated as the ratio of the amount of support to the price of sales of products. So, in the EU and North America this ratio is more than 43%, and in countries such as Switzerland or Norway, it can reach 82%. In Russia, this figure is no more than 10% [13].

One of the newest practices of stimulating innovation in the world is the system of clusterization of the country's economy. From an economic point of view, a cluster is a group of organizations, manufacturers and suppliers of products, research and educational organizations, financial institutions located on the same territory and interconnected with each other. This relationship allows you to enhance the competitiveness of all participants in the cluster, as well as the cluster as a whole.

Currently, about 2,100 clusters are operating in European countries, of which approximately 11.5% operate in the agro-industrial complex. As for developing countries, for example, in India or Brazil, they have more than 400 clusters. As a result of the well-established joint work of small and medium-sized enterprises of these countries with research centers, the number of innovations introduced into production increases, which allows these countries to enter global markets with their products [23].

To date, 137 clusters have been created in Russia in 52 regions of Russia, 25 of which have the status of pilot regional innovation clusters. It should also be emphasized that only 12 clusters are among the existing ones. At the same time, the specifics of these clusters are the production and processing of crop and livestock products (for example, in the Tambov region), dairy production (Vologda and Rostov regions), and agricultural engineering (Altai Krai, Rostov and Novosibirsk regions). Also, in some regions, the so-called agro-industrial clusters related to agriculture in general (Novgorod and Kemerovo regions, Stavropol Territory) were created [29].

The practice of creating clusters in Russia leads to the creation of innovative infrastructure organizations in the region, such as technology parks, business incubators, venture funds, investment funds, and others. This contributes to a more intensive generation of ideas, the creation of new technologies, which, due to the close proximity, are more seamlessly introduced into production, which contributes to improving the competitiveness of enterprises in the market.

The important role played by the development of clusters from the state. Thus, according to the Association of Clusters and Technoparks, subsidies to industrial cluster members for reimbursement of expenses in connection with the implementation of joint projects for import substitution, subsidies to reimburse part of research and development costs in priority areas of the civil industry, and reimbursement subsidies to pay interest on loans for the implementation of complex investment projects [29].

As for the creation of the poultry cluster, the authors propose to schematically depict it as follows (Figure 3).

To date, the poultry subsector is a member of only a few clusters, along with other subsectors of agriculture. No separate cluster has been created for this sub-sector in any region, which is an undoubted gap in the policy of innovative development of the poultry industry and enhancing the competitiveness of poultry enterprises.
Another global practice of stimulating innovative development is the creation of technology parks. In most developed countries, technology parks are one of the key elements of economic development.

Figure 3. Schematic representation of the poultry cluster.

The objectives of creating technology parks are to eliminate disproportions in the level of the country's socio-economic development, improve the quality of life of people in depressed areas, and also provide innovative companies with the necessary infrastructure and scientific personnel.

In the US, the first technology parks originated in the mid-60s. 20th century, in Europe, they received their development only in the mid 80s.

Today, there are about 2500 technology parks in the world, of which 300 are in the US, more than 600 are in EU countries, and more than half - 360 technology parks are located in Germany [30].

About 100 technoparks are located in Japan, 83 - in China. In Russia, the number of technology parks today is 125 units.

In most countries, there are special preferential terms for enterprises located on the territory of technoparks. Thus, the total tax deduction for a research park in North Carolina is only 0.1% of the total revenue [30].
For technoparks in France, the level of rent is significantly reduced compared with the level of the real estate market. In addition, residents of French technology parks also enjoy other support measures (research tax credit, VAT exemption, regional financial incentives).

Based on international experience, the average payback period for technology parks is 10-12 years. At the same time, based on the data of the Association of Clusters and Technoparks, technoparks created in the Russian Federation have not yet reached the point of recoupment, despite the fact that they began to be created in the 1990s. The reasons for this is the lack of a coherent government strategy regarding the creation and development of technology parks, a weak material and financial base [30-34].

The legal basis for the work of technology parks began to take shape only in 2014, and to this day is in the development stage.

Thus, it is obvious that, despite the total number of technoparks created, this method of encouraging an increase in innovative potential is also in its infancy. In the case of the further development of a network of technoparks, it would be possible to create several companies engaged in innovative technologies in the agro-industrial complex on the territory of agricultural and poultry farms.

5. Conclusions
Summing up the above, it is necessary to conclude that Russia's innovation policy still contains a sufficient number of problems that need to be solved. Considering that one of the key tasks in the coming years is to solve the problem of the country's food security in the face of increasing competition, this can be solved only by increasing attention to the innovative development of agriculture, in particular, the poultry industry.

As for the current foreign economic situation, in 2017, imports of poultry meat decreased to 231.5 thousand tons, which is the lowest annual indicator, since 2001, while the level of export has reached 164, 9 thousand tons, increasing by 48.7 % compared to the level of 2016 (110.9 thousand tons) [24]. These figures indicate an increase in the competitiveness of poultry meat in the global market, including by strengthening innovation policy.

According to data for April 2018, the volume of exports in monetary terms amounted to 10.8 billion rubles. By 2020, according to the results of the implementation of the State Program for the Support of Agriculture, should exceed 25.4 billion rubles. It is planned to export products to Asian countries, including China, Japan, South Korea, as well as African countries, including the Congo, South Africa and Nigeria. It is also planned to develop exports to neighboring countries, such as Azerbaijan and Mongolia [2].

Thus, the already implemented methods of stimulating the economy are fiscal benefits for innovative enterprises, the creation of a program of subsidies and subsidies, a reduction in rates on investment loans. A cluster network and a network of technoparks are developing. However, before reaching the global level of development of Russia, much more effort is required.

This article proposes the creation of not just agro-industrial clusters, but clusters with a clearer division into sub-sectors. In particular, the proposed model of creating a poultry cluster, which would allow to accelerate the development of enterprises, to achieve the investment attractiveness of the industry, thereby increasing the competitiveness of products and increasing exports.

Also, the support of existing and creation of new technology parks can also help to enhance the investment attractiveness of the industry, as well as attract new scientific personnel, which will help increase the number of new ideas, reduce the cost of innovation and strengthen the agricultural sector in general.

It is also necessary to introduce a greater number of technological innovations in the processes of housing, raising and feeding of poultry, as well as the processing of production wastes. To date, an extremely small number of enterprises are introducing certain innovations, compared with their
foreign counterparts. Thus, it is necessary to further study this issue to achieve the planned export results and increase competitiveness on the world stage.

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