

## Scientific support of innovative development of agriculture

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**Abstract.** This article is devoted to the problem of innovative development of agriculture and the identification of the necessary conditions for this. In the course of the study, it was found that insufficient attention is paid to the innovative development of agriculture, although the way out of agriculture from a crisis state, ensuring the competitiveness of domestic food, and its sustainable functioning directly depend on the activation of innovative processes. Therefore, it is currently relevant to develop an optimal approach to the formation of a unified system of innovative development of agriculture. The study showed that one of the ways to solve this problem is to create an effective system of scientific and information support that ensures the rapid introduction of scientific developments into mass production, which will contribute to the formation of favorable conditions for the innovative development of agriculture and the achievement of targets for ensuring the country's food security.

### 1. Introduction

The improvement in the quality and acceleration of the economic growth rates of individual countries over the past decades has been largely due to the unlocking of the potential of innovation activity. An innovative one has replaced the traditional paradigm of extensive use of resources, natural resources, human capital, financial assets, and knowledge. However, in Russia, the current trends in the development of innovation activities do not fully meet the expectations aimed at increasing the competitiveness of products and the quality of life of the population, ensuring dynamic sustainable growth, and forming an innovative economy [1].

The Russian economy has a multistructural character. At the same time, various sectors demonstrate fundamentally different institutional conditions for development and technological level. This does not allow creating a single, universal model of innovative development for all sectors. The specificity of the development of agriculture in various regions and districts of our country makes it necessary to consider it as an independent object of research and management. Therefore, it is necessary to scientifically substantiate the theory, methodology and practice of managing the innovative development of agriculture in the context of large-scale institutional and economic transformations. From these positions, this study, aimed at solving the above problem, is relevant [2].



## 2. Materials and methods

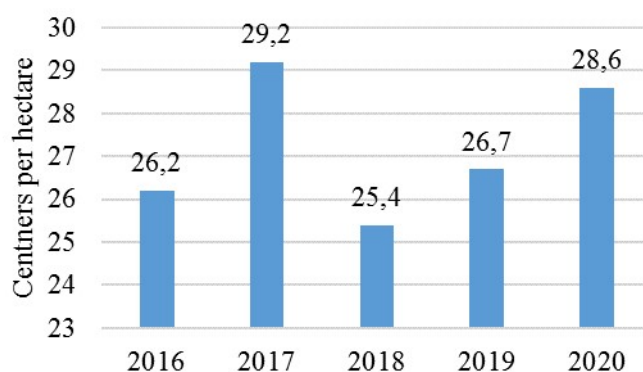
The research materials were the scientific works of domestic and foreign scientists in the field of innovative development of agriculture, sustainable development of rural areas, etc. Such research methods as analysis and synthesis, systematic and logical approaches to the study of trends in the innovative development of agriculture, graphical interpretation of theoretical information and empirical data were used.

## 3. Results

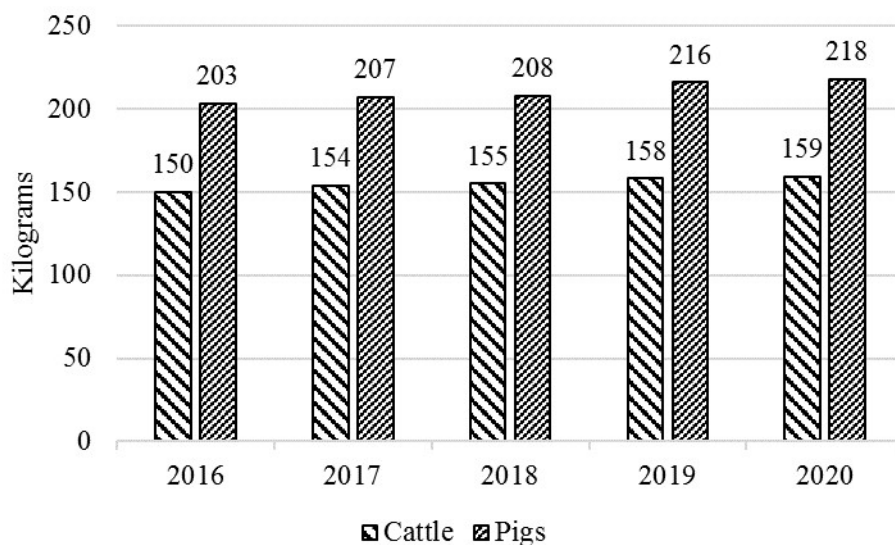
Many authors, in order to change the situation in Russian reality, propose to significantly increase the allocations for domestic science. However, an analysis of the conditions (table 1) that ensure the innovative development of agriculture allows us to conclude that in recent years, allocations for Russian agricultural science have been increasing annually. At the same time, unfortunately, there is no large-scale innovative development of agriculture: crop yields (figure 1) and animal productivity (figure 2) practically do not change [3].

**Table 1.** The main conditions that ensure the innovative development of Russian agriculture (according to the data of the Federal State Statistics Service).

Indicator	2010	2015	2016	2017	2018	2019	2020
Researchers performing research and development, pers.	12734	11296	11066	10343	9575	9459	9551
including: doctor	1542	1551	1487	1384	1243	1214	1197
PhDs	5004	4592	4483	4183	3940	3925	3936
Internal costs for research and development, million rubles	12090.8	20507.9	19839.9	22158.8	24651.3	26468.2	30140.8



**Figure 1.** Yields of grain and leguminous crops by years (according to the data of the Federal State Statistics Service).



**Figure 2.** Growing products (offspring, growth, weight gain) of livestock per head by years (according to the Federal State Statistics Service).

Consequently, the amount of funding for agricultural science is not a problem at present. The mechanism of organization of financing and the system of dissemination and communication to commodity producers of the obtained scientific results are ineffective. Therefore, it is necessary to change the organization of science financing, to create a system of information, consulting and training support for agricultural enterprises, ensuring the large-scale dissemination of innovations among at least 25-33% of business organizations and farmers.

Thus, one of the reasons for the low rates of development of the Russian agrarian economy is the inability of commodity producers to independently perceive a scientific product, as well as the poor development of their own knowledge transfer centers in the scientific community. This problem is not new. Links between science and industry have traditionally been weak since Soviet times. On the one hand, the scientific complex exists almost autonomously from industry, and is highly dependent on government funding; on the other hand, industry shows little receptivity to new technologies and has low incentives to use the results of research and development. All this led to a paradoxical situation. Russia has a significant scientific potential, in recent years it has been spending significant resources on the development of science and technology, but at the same time it lags behind the technological level of most industries not only from developed countries, but also from many developing countries [4-5].

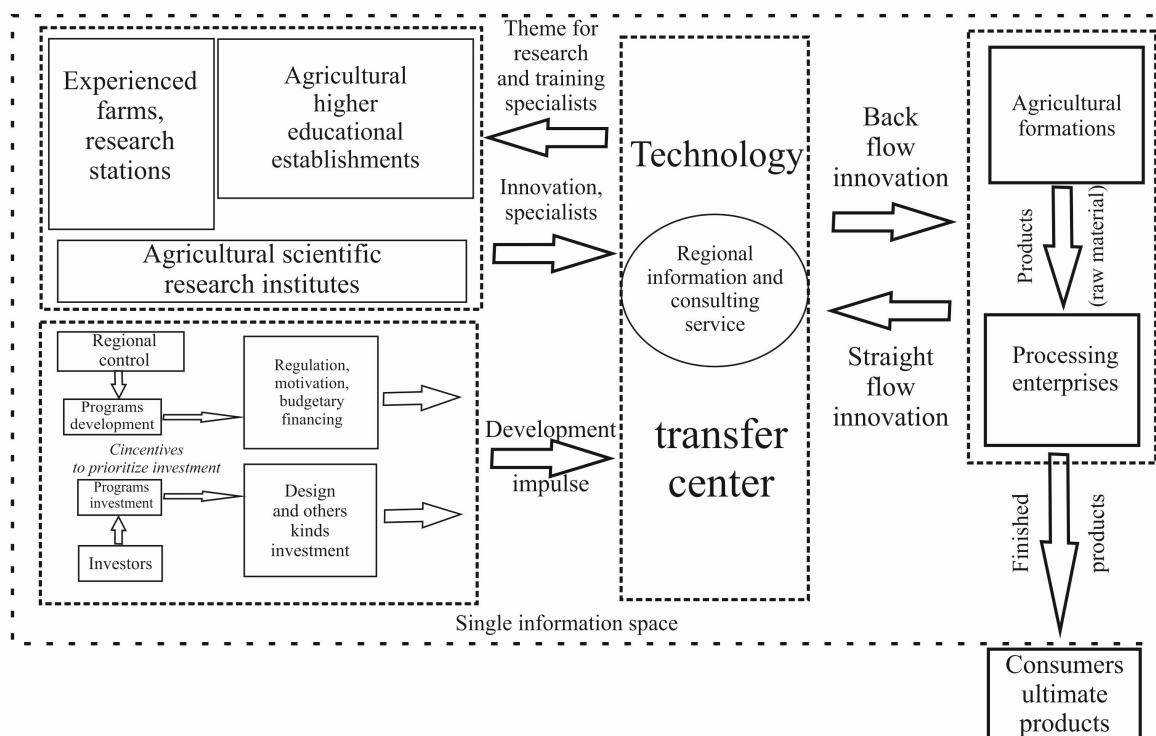
This problem is not specific to Russia. This situation can be seen almost all over the world, but in other countries, there is an environment that is a transmission link [6]. Implementation business in our country, unfortunately, is just beginning to take shape. At present, it is necessary to direct efforts to create an environment for the mass and effective development of scientific, innovative business. Such an environment for our country is the information and consulting service. It allows you to combine the experience of information support that existed earlier in the Soviet era, foreign experience in information and consulting services and, most importantly, take into account the specifics, traditions and information level of the culture of the domestic agricultural producer [7].

#### 4. Discussion

Thus, in order to implement a set of technological improvements in agribusiness, it is necessary to create an effective system of scientific and information support. The solution to this problem is

possible by creating an effective innovation transfer system in the agricultural sector, which will ensure the prompt introduction of scientific developments into mass production [8]. Consequently, one of the mechanisms for improving the efficiency of the functioning of agriculture can be the formation of an innovation cluster.

An innovation cluster is a set of separate organizations and enterprises that have a common scientific base and form infrastructural, technological and logistics chains. In this case, the advantages of the simultaneous operation of such market mechanisms as competition and cooperation will be used, this is a greeting to the rapid and efficient creation and dissemination of new technologies and knowledge (figure 3).



**Figure 3.** Scheme of functioning of the innovation cluster.

The core of the innovation cluster will be large enterprises: agricultural formations (large agricultural enterprises, personal subsidiary plots, peasant farms, etc.) and processing enterprises that are connected by a technological chain. Each enterprise in its environment will have a group of small production and implementation firms (inter-district and district information and consulting centers), which will direct their activities to support various stages of innovation and production processes. Cooperation processes will become the basis of this interaction.

There will be competitive relations between individual manufacturers and suppliers. However, interrelated and/or similar production technologies will lead to a combination of different elements of the cluster (for example, in the field of training (regional agricultural university) and scientific research (agricultural research institutes)). The technology transfer center (for example, a regional information and consulting service) will serve enterprises and firms of the cluster and link science and production.

A single information space within the innovation cluster will be formed on the basis of the constant interaction of its subjects. This will contribute to the rapid dissemination of knowledge, as well as to reduce the transaction costs of cluster entities.

Effective functioning is possible in the presence of two main streams of innovation: direct and reverse. New needs in the economy, taking into account the growing demands of consumers in the

field of quality and range of products, global technological development trends will lead to the emergence of a direct flow, which will contribute to the growth of innovation in processing enterprises.

This will automatically increase the requirements for the quality of the supplied raw materials; therefore, a wave of innovations will be transferred to agricultural enterprises. Therefore, the direct flow of innovation is the result of the needs of production. It allows you to create orders for research work. The reverse flow of innovations, respectively, acts in the opposite direction and appears in the form of finished innovative developments, ready for implementation in production.

Support from the regional authorities by direct and indirect methods will contribute to the development of the cluster, which will provide an additional impetus for development [9]. We are talking not only about direct financing of the development of the cluster, but also about the development of appropriate targeted development programs, the introduction of incentive measures to attract foreign and domestic investors, etc. [10].

Thus, a working model of an innovation cluster in agriculture should be built taking into account the assumption that the dynamics of the development of an innovation system is determined by the effectiveness of interconnections (and, of course, mutual influence) between technologically advanced and more traditional sectors.

## 5. Conclusion

Summarizing the above, we can conclude that at present it is necessary to develop standard requirements for the market infrastructure for innovative activities in the agricultural sector. At the same time, it is important to remember about increasing the responsibility of the regional administration for the formation of a regional innovation environment. This is possible by integrating research and development organizations into a single scientific and industrial structure; formation of modern institutional structures with the participation of small businesses (science parks, innovation and technology centers (technoparks), business incubators) on the basis of higher educational institutions and institutes of the Russian Academy of Sciences that are actively involved in innovation; creation of information infrastructure for the market of scientific and technical products. Therefore, at present it is important to ensure an innovative partnership of science, education, government and business with the participation of civil society.

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