State and Prospects of Meat Poultry Farming in Russia

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Abstract: Industrial poultry farming is a science-intensive branch of the agribusiness, which plays an important role in the nutrition of the population and is able to quickly increase the manufacture of meat products in a short time. Against the backdrop of the active development of poultry farming around the world, the level of consumption of this type of meat is also growing. The subject of the study is meat (broiler) poultry farming in the world and in Russia. The purpose of the paper is to analyze the state of the industry, measures and tools to support the development in terms of their adequacy to achieve development goals. The working conditions of poultry enterprises are changing in connection with the start of the implementation of the state subprogram titled "Creation of a domestic competitive meat cross of chickens in order to obtain broilers," which provides for specific measures and support tools. The growing global demand for poultry meat products, the high import dependence of the Russian poultry industry and the challenges to reduce it have determined the relevance of the study. The state of the poultry meat industry in Russia, the dynamics of poultry meat production, including the contribution to global production, are analyzed. The dependence of the Russian poultry meat industry on the import of breeding material is identified. The identified measures of state support for the development of poultry farming in Russia have shown their sufficiency for solving the tasks facing the sub-sector. This study is promising for further continuation in terms of analyzing the effectiveness of the implementation of the subprogram in dynamics.

1 INTRODUCTION

Industrial poultry farming is one of the few highly dedicated branches of the agribusiness, which has emerged as an integrated system that provides all processes starting from poultry reproduction through to manufacturing finished products and their sale (Marinchenko, 2023, Development). Today it is a knowledge-intensive dynamic industry that is able to stabilize the situation on the meat market in a short time and plays an increasing role in the nutrition of the population. Poultry meat accounts for about 45% of the total per capita consumption of meat of all types in Russia. A. Rozhkova notes that the products of poultry farms are of strategic importance for economic development, as there is an increased demand for the food and confectionery industry, feed production, pharmaceuticals for the production of food additives and vitamins (Rozhkova, 2021). G. Athrey emphasizes that the industrial approach to poultry production has created a highly stable and reliable source of food worldwide, however, several problems threaten the long-term sustainability of this model (Athrey, 2020).

Negative economic reforms and subsequent changes in Russia led to the loss of the existing scientific and technical developments, as well as personnel potential, of domestic equipment manufacturers (Korolkova, 2020), which resulted in an increase in the share of imported equipment at poultry enterprises. The same situation has developed with regard to breeding material; many domestic crosses of meat chickens are lost or are in extremely limited quantities (Fisinin, 2017).

The introduction of innovative solutions is the basis for the efficiency of manufacture of competitive products when fabricating any agricultural products. A.R. Kuznetsova says that in the production of

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poultry meat, the dependence of production efficiency on the created conditions of maintenance, including comfort and feeding, is at a high level. In poultry meat production, the dependence of production efficiency on the created housing conditions, including comfort and feeding, is at a high level. At the same time, V.S. Buyarov rightly noted that poultry farming is the most energy-intensive and cost-sensitive industry (Buyarov, 2019). Science objectively assessed the state of poultry farming and its problems by analyzing the technical condition (Kuzmina, 2020, Semin, 2020), key factors (Kuznetsova, 2019, Fisinin, 2017) and development prospects (Rozhkova, 2021, Semin, 2020). A. Rozhkova rightly notes that today, enterprises need to be competitive (Rozhkova, 2021). A.N. Semin assumes the growth of the competitiveness of the industry is expected due to the development of new markets, the use of innovative developments in the field of deep processing of poultry and eggs, the formation of new marketing niches (environmental production), the development of new digital technologies (Semin, 2020). Thus, to achieve this, there are necessary projects. So, V.S. Buyarov has developed priority areas for energy and resource saving in industrial poultry farming and proposed a set of innovative and technological measures that ensure the dynamic development of the industry (Buyarov, 2019). These results confirm the main findings of the paper (Marinchenko, 2023, Development). The intensification of production, including poultry enterprises, provides for their technical and technological upgrading and the use of highly productive poultry crosses (Rozhkova, 2021). A.P. Korolkova indicates the low financial security of agricultural enterprises and insufficient state support among the factors that significantly negatively affect innovation activity in the agribusiness (Korolkova, 2020).

The world leaders in breeding poultry farming conduct intensive selection to increase the efficiency of feed consumption, early maturity and other criteria that reduce production costs (Muzalev, 2020, Overview, 2021, Pym, 2008).

V.I. Fisinin emphasizes the importance of the selection and breeding work done, and also reports on the developed process for the integrated DNA assessment, which makes it possible to control the origin of breeding material at the genetic level and assess the potential for productivity and the presence of hereditary anomalies (Fisinin, 2017).

To solve the problems of creating competitive technologies in agriculture, the Decree No. 996 of the Government of the Russian Federation dated August 25, 2017 has approved the Federal Scientific and Technical Program for the Development of Agriculture for 2017-2030 (FSTP), within the framework of which the subprogram titled "Creation of domestic competitive broiler-type meat cross chickens" is being developed, the introduction of which should reduce the level of import dependence of poultry meat on imported breeding products and technologies (Subprogram, Marinchenko, 2023, Development). In this regard, the study of the state of the industry, the identification of key problems and the analysis of support measures from the position of their sufficiency to achieve the tasks facing the industry is relevant and timely.

2 MATERIALS AND METHODS

The subject of the study is the sector of meat (broiler) poultry farming. The purpose of the study is to analyze the state of meat (broiler) poultry farming and identification of development prospects. To achieve this goal, such tasks an analysis of poultry farming in the world and in Russia, as well as measures and tools to support the development of the industry in Russia, and determine their sufficiency to solve the problems facing the industry. The materials used are the results of research conducted by domestic and foreign scientists (Borges, 2020, Kochish, 2006, Kuzmina, 2020), information from foreign and Russian statistical services (Rosstat), scientific organizations of the Russian Academy of Sciences and the Ministry of Agriculture of Russia (Buyarov, 2019, Fisinin, 2017, Semin, 2020), materials from state programs for the development of the agribusiness, and other strategic documents (FAO, 2020, Number of chickens, Subprogram) he following methods were used in the course of the study: monographic (analysis of the results of research by experts in the field of study), comparative (study of average per capita meat consumption in Russia, the global structure of meat consumption, cross-country comparison of poultry meat production), factorial (analysis of the impact of import dependence on genetic material), and logical analysis(identification of individual factors that positively affect the dynamics of poultry meat production, their analysis and synthesis with mental reproduction of the main relationships between them) ones, expert-analytical method of information processing (collection and analysis of data on gross meat production by type of livestock products), as well as mental modeling (representation of the effects of the implementation of measures of state support for development) method. Analysis of the statistical data of the indicators provides a reliable and comprehensive study of the state of the industry in dynamics, reveals the patterns of its development, including those in connection with the existing measures of state support and the ongoing development program, allows identifying the most effective support measures, predicting the final results, identifying the existing imbalances in development and suggesting possible ways to overcome them.

3 RESULTS AND DISCUSSION

Poultry meat, while taking the second place after pork, plays an important role in the nutrition of the population of almost all the countries. Consumption of this meat worldwide, especially in emerging economies, is high (Martinelli, 2020).

In 2021, global meat production, according to the forecast, exceeded 260 million metric tons, while the volume of poultry meat remained approximately at the level of 2020 (table 1) (Kravchenko, 2022).

Table 1: Meat production in the world in slaughter weight, million MT.

Meat type	Year							
						2021		
	2016	2017	2018	2019	2020	fore-cast	to 2016 ratio, %	to 2020 ratio, %
Beef and veal	55.2	56.3	57.7	58.6	57.7	57.8	4.7	0.2
Poultry	89.5	91.1	92.8	97.2	99.1	99.1	10.7	0
Pork	110.3	111.1	111.9	101	95.8	106.1	-3.8	10.8
Total	255	258.5	262.5	256.9	252.5	263	3.1	4.2

Source: Kravchenko V., 2022.

The United States has been the world leader in the production of broiler meat for many years, while China is in second place and starting to increase production at a significant pace, and Brazil is in third place. Russia ranks fourth (excluding the EU as a single state) or fifth (if we count the EU as a single state) with an indicator of more than 4.7 million metric tons annually (table 2) (FAO, 2020).

Table 2: World leaders in broiler meat production, million MT.

Country	2016	2017	2018	2019	2020	2021
USA	18.51	18.94	19.36	19.94	20.24	20.47
China	12.45	11.60	11.70	13.75	14.60	15.30
Brazil	13.52	13.61	13.36	13.69	13.88	14.18
EU	11.56	11.91	12.26	12.56	12.20	12.60
Russia	4.33	4.68	4.68	4.67	4.72	4.71
India	3.46	3.76	4.06	4.35	4.00	4.20
Mexico	3.28	3.40	3.49	3.60	3.70	3.78
Thailand	2.81	2.99	3.17	3.30	3.25	3.34
Argentina	2.12	2.15	2.07	2.17	2.19	2.22

Source: FAO, 2020, Number of chickens.

Poultry meat accounts for about 45% in the structure of the total production of main meat types produced in Russia in 2021 (Kravchenko, 2022). Against the background of a general slight increase in the production of meat of all types, poultry meat is expected to show a slight decrease, which is associated with an unfavorable epizootic situation at the beginning of 2021, difficulties with the import of hatching eggs and other reasons (table 3).

Table 3: Meat production in Russia in slaughter weight, million MT.

Meat type	Year							
						2021		
	2016	2017	2018	2019	2020	fore-cast	to 2016 ratio, %	to 2020 ratio, %
Beef and veal	1.59	1.57	1.61	1.63	1.63	1.64	3.2	0.4
Poultry	4.62	4.94	4.98	5.01	5.02	5	8.2	-0.3
Pork	3.36	3.52	3.74	3.94	4.28	4.35	29.7	1.6
Total	9.57	10.03	10.33	10.58	10.93	10.99	14.9	0.5

Source: Rosstat.

In the context of a general increase in meat consumption in Russia, which reached 76 kg per person annually in 2021, poultry meat consumption reached 34 kg, i.e. there is an increase of almost 10 kg over 10 years (from 24.7 kg) (figure 1). Today, it is just poultry meat that is the main source of animal protein for Russians, including that through reducing the consumption of beef due to its high cost. At the same time, we note that broiler meat is about 92% and turkey meat is about 6%in the total production of poultry meat (Consumption).

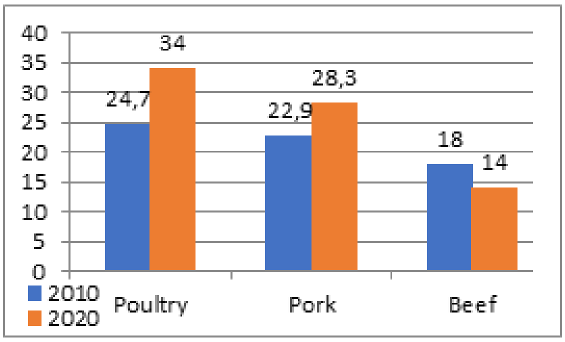

Figure 1: Dynamics of per capita meat consumption, kg/year (Kuznetsova, 2019).

In order to achieve such results, the meat poultry industry in Russia has come a long way in recent years as part of the formation of a modern and competitive sector of the meat subcomplex of the domestic agribusiness. Thanks to the state support provided and measures to regulate the domestic market focused on protecting Russian manufacturers and developing a competitive environment, it has been possible to carry out a comprehensive engineering and technological upgrading and reach a qualitatively new production level (Kuzmin, 2021). This, in turn, made it possible to completely get away from dependence on imported supplies of poultry meat and ensure food security for this category of products.

The main goal of the development of the poultry industry in the Russian Federation is the creation competitive poultry products and raw materials, which will increase the level of self-sufficiency in the main types of poultry products and raw materials. This goal can be achieved by introducing innovations in the poultry industry (Kuznetsova, 2019, Muzalev, 2020).

At the same time, the high level of development of broiler production, which determines the leading position of poultry farming among other livestock sub-sectors, is based on dependence on imported breeding material. Currently, imported crosses of chickens having high productivity of the parent stock and broilers are used for the production of poultry meat in Russia. The genetically determined productivity of modern meat poultry crosses features high productivity rates, for example, the average live weight of 35-day-old broilers reaches 2.1 kg with a feed consumption of 1.55-1.60 kg per 1 kg of growth, however, the poultry genetic potential is not limited to these indicators (Kochish, 2006).

In addition to the high dependence on breeding material in Russian poultry farms, there is a discrepancy between the indicators for growing broilers and the standard productivity indicators, as a result of which poultry farms receive significantly less production. So, the Orlovskaya Niva (Orel, Russia) broiler farm has the broiler live weight indicators at the end of growth being 15-17% lower than the standard indicators for the Ross-308 and Hubbard crosses and feed costs per unit of production being higher by 8-9% (Kuzmina, 2020). The reason for this can be both an imbalance in diets for nutrients, non-compliance with zoo hygienic standards for keeping and veterinary and sanitary rules, and the use of outdated processes and equipment for growing poultry (Fisinin, 2017). By solving the issue of ensuring the creation of the necessary conditions for achieving standard productivity indicators, it is necessary to provide poultry with balanced diets and upgrade poultry enterprises while providing poultry with optimal housing conditions and compliance with all process parameters.

In the conditions of market competition, the development of poultry farming should be based on the introduction of innovative solutions that ensure not catching up, but advancing development. At the present stage, the improvement of existing processes and equipment used for growing meat poultry is also relevant for new domestic highly productive meat crosses of broiler chickens. There is a need for technical and technological upgrading of poultry facilities and the construction of new high-performance enterprises. The government provides support for such activities through compensating up to 20% of the cost of upgrading or construction of the facility (Buyarov, 2019, Muzalev, 2020).

To ensure the planned volume of commercial production of broiler meat, it is necessary that the grandparent and parent breeding stock meet the needs of commercial poultry farming. The paperы (Kuzmina, 2020, Marinchenko, 2023) has identified that the ratio of the number of parent flocks available in the Russian Federation to the needs of commercial enterprises is not enough to meet the needs of poultry farms, as a result of which hatching eggs of the final hybrid are annually imported in the amount of 10-15% of the total demand for hatching eggs of commercial poultry farming in order to produce broiler meat (Kochish, 2006, Marinchenko, 2023).

The breeding base of domestic poultry meat for the acquisition of parent flocks is represented by two first-order reproducers at the present stage. The total need for day old chickens of parental forms of meat crosses is 22.0 million heads per year in accordance with statistical data.

According to experts of the Ministry of Agriculture of the Russian Federation, in order to produce 4.55 million metric tons of broiler meat per year, about 4 billion broiler hatching eggs or 3.2 billion day-old chickens are needed with a safety of 94.0% and hatching of 80.0%. Such a number of day-old chicks can be obtained from 25 million heads of hens of parental forms (with 135 chickens per initial laying hen of parental forms and 95.0% safety of hens of parental forms). The difference between the statistical (22 million heads) and estimated (25 million heads) data can be explained by possible errors in accounting for the produced broiler meat and the amount of hatching eggs imported into the Russian Federation. The need for the number of ancestral hens is approximately 610,000 heads with 55 chickens per initial laying hen on the maternal line (Kuzmina, 2020).

To ensure the planned volume of commercial production of broiler meat, it is necessary that the grandparent and parent breeding stock meet the needs of commercial poultry farming (Borges, 2020). The ratio of the number of parent flocks available in the Russian Federation to the needs of commercial enterprises is not enough to meet the needs of poultry farms, as a result of which, in order to produce broiler meat, hatching eggs of the final hybrid are annually imported in the amount of 10-15% of the total need for hatching eggs of commercial poultry farming (Fisinin, 2017).

To solve this problem, in accordance with the minutes of the meeting of the Presidium of the Council for the implementation of the Federal Scientific and Technical Program for the Development of Agriculture for 2017-2025, a subprogram titled "Creation of a domestic competitive meat cross of broiler-type chickens" is being developed, the purpose of which is to create a domestic competitive meat cross of broiler-type chickens that feature high productivity and viability based on the use of new high-tech domestic developments, which include elements of a full integrated scientific and engineering cycle (Subprogram).

The implementation period of the subprogram is 2019-2025. The implementation of the subprogram is provided in two stages.

Stage I (2019-2020):

- Implementation of research and development work on poultry breeding aimed at creating a domestic highly productive cross of meat chickens with an autosex parental form using the methods of classical breeding by phenotype, as well as the inclusion of a block of genetic studies in order to more accurately select individuals with given productive traits
- Construction of new farms to accommodate breeding stock (replacement farm, two adult breeding poultry farms, parental test farm, broiler test farm, quarantine farm, hatchery)
- Creation of a selection and genetic laboratory for the development of new scientific methods for assessing and selecting poultry according to productive parameters specified.

Stage II (2021-2025):

- State registration of Smena, a new domestic highly productive cross of meat chickens
- Commercialization of the project by attracting partners to create first-order reproducers for the production of breeding products (parental forms). Provision of commercial broiler poultry farms with domestic breeding material (Federal scientific and technical program, Subprogram).

The scientific basis for the creation of a domestic competitive meat cross of broiler-type chickens is determined by the All-Russian Research and Technological Institute of Poultry Federal Scientific Center of the Russian Academy of Sciences and Smena Selection and Genetic Center, in which valuable genetic material is preserved in the form of initial lines of domestic meat cross of broiler chickens called "Smena 8". In addition, a scientific breeding program has been developed to create a competitive domestic meat cross of chickens (Materials of parliamentary hearings).

The problems of increasing the efficiency of broiler production through the use of innovative technologies have been solved in many studies. Priority areas of energy and resource saving in industrial poultry farming have been developed in the field of lighting (Buyarov, 2019), heating (Marinchenko, 2023. Development), development in the field of technical and technological re-equipment and improvement of highly productive poultry crosses (Rozhkova, 2021). All these innovations make the manufacture of products more efficient. They can unlock the genetic potential of productivity by creating optimal conditions of keeping. We agree with V.I. Fisinin, who emphasizes, that a lot of work has been performed to develop a comprehensive DNA assessment that allows monitoring of lineage and assessing the potential for productivity and the presence of hereditary anomalies (Fisinin, 2017). We believe that the influence of the quality factor of the breeding stock and the final hybrid will have a strong impact on the efficiency of enterprises.

Since enterprises have low financial security, the state support for breeding poultry farms and plants will stimulate the modernization process and increase interest in investing in the industry. State compensation for the upgrading of facilities will contribute to the modernization of breeding farms in combination with other support measures to ensure optimal conditions for livestock. The implementation of the subprogram will help reduce dependence on imported equipment, technologies and breeding as well.

4 CONCLUSIONS

The high level of development of broiler production in the Russian Federation, which determines the leading position of poultry farming among other livestock sub-sectors, is based on dependence on imported breeding material, equipment and technologies. Currently, in order to produce poultry meat, imported crosses of chickens with high productivity of the parent flock and the final hybrid are used. To reduce the level of import dependence of broiler poultry farming, the subprogram titled “Creation of domestic competitive broiler-type meat cross chickens” of the Federal Scientific and Technical Program is being implemented, within the framework of which it is planned to conduct fundamental, exploratory and other scientific research to create and test highly productive broiler-type meat crosses and develop domestic technologies for their housing.

It is possible to fully use the genetically embedded information of a highly productive livestock with maximum economic efficiency subject to the use of innovative engineering and production process methods, which must be scientifically substantiated at each stage of growing meat poultry and ensure high productivity, safety and optimal feed conversion at rational terms for its growth. The government provides measures to support enterprises for the introduction of technical and technological innovations and highly productive crosses, which will stimulate enterprises to upgrade production and introduce highly productive competitive breeding products, which will contribute to the growth of the competitiveness of domestic poultry products.

An analysis of meat poultry farming in the world and in Russia has revealed factors that negatively affect the development of the industry. Some of them are typical for agriculture in general, for example, the lack of free financial resources among agricultural producers, which does not allow upgrading production in accordance with the latest scientific achievements, others are specific to the poultry industry, for example, high dependence on foreign equipment and breeding material.

The identified measures and tools to support the development of the industry in Russia, in particular, within the framework of the subprogram titled "Creation of domestic competitive meat cross-country broiler chickens" show their systemic nature and sufficiency to ensure the solution of the tasks facing the sub-industry. This study is of scientific and practical interest, both for industry theorists and practitioners, and is promising for further continuation from the standpoint of analyzing the effectiveness of existing support measures and tools, adjusting them in a timely manner if necessary, as well as identifying the results of the implementation of the subprogram and its expediency for its further implementation.

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