Organizational and economic aspects of technical and technological modernization of the poultry farming

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Abstract. The article deals with the problems of development of domestic poultry farming on the basis of technical and technological modernization. The dynamics of the number of new, modernized, and reconstructed poultry facilities was analyzed and the volume of increase in poultry production for slaughter at these enterprises was assessed. Factors constraining the development of modernization processes in the sub-industry are considered. Government support measures for the modernization of the industry have been proposed. According to the author, the implementation of these measures will contribute to the full provision of the domestic market for poultry products and the transformation of the poultry industry into a high-tech sub-industry competitive in the domestic and foreign markets.

1. Introduction

Under the existing macroeconomic conditions of the agrarian economy and the openness of national food markets, poultry farming plays a significant role, as it is able to restore and increase production and increase the average per capita consumption of such products as eggs and poultry meat in a relatively short period of time.

Addressing the issues of raising the level of modernization in all areas (from equipment for production and processing of products to infrastructure facilities and resource support of production processes) is extremely important for maintaining the industry’s leading position in the food market and ensuring the country’s food security. Addressing the issues of improving the technical and technological equipment of production, the safety of poultry products, improving its quality and competitiveness are directly related to the implementation of renovation and modernization projects by producers in the sub-sector.

2. Materials and Methods

The study was conducted using such methods as monographic, economic and statistical, abstract-logical, and design-constructive. The analysis was based on data from the Federal State Statistics Service of the Russian Federation, data from the Russian Poultry Union, reporting data from agricultural organizations, Internet resources, and personal research and observations of the author.

The methodological basis of this study was the works of domestic scientists on the problems of modernization and development of agriculture of the Russian Federation, including poultry farming. Among them are the following works [1], [4], [6], [7], [8].
3. Results

Poultry farming is one of the most dynamically developing branches of the agro-industrial complex, as evidenced by high production growth rates. According to the estimates made by the Rosptitsesoyuz, the production of poultry meat reached 4.98 million tons in the slaughter mass in farms of all categories in 2018, which was 3.05 times (or 3.59 million tons) more than the 2006 level in which it began implementation of the Priority National Project “Development of the Agricultural & Industrial Complex” (Figure 1).

![Figure 1. Dynamics of poultry meat production, thousand tons in a slaughter mass [This is calculated by the author based on materials of Rosptitsesoyuz (2018)]](image)

It should be noted that the contemporary poultry farming is a production based on intensive poultry rearing, which is characterized by a large concentration of livestock in enterprises, and an in-depth on-farm and inter-farm specialization of production units, the rhythm and precision of the technological process of poultry housing and rearing with the help of a wide range of contemporary resource-saving technical equipment.

The data in Figure 1 shows that more than 90% of the production in the poultry meat industry is accounted for by industrial enterprises, about 70% are large integrated formations that ensure the modernization of the technological process throughout the food chain “production-processing-logistics-sales” [7]. The possibilities of such formations in the work on quality and branding of products, promotion in retail chains determined their competitiveness in the domestic and, in some cases, in the external market.

In addition, in world practice, due to a number of reasons, independent farmers can hardly compete with integrated production, which is tied to the production and value chains. And one of the reasons for this is the problem of obtaining the necessary biological materials (bird crosses) with high genetic potential, high-quality feed, available only to those producers who are participants in the production and value chain.

The growth of production in the poultry industry was largely made possible as a result of the successful implementation of government support programs for modernization and restructuring of the industry. Over the past 5 years (2013-2017), 74 new poultry farms were commissioned in Russia, 65 were modernized, more than 1,151.6 thousand tons of poultry meat were additionally produced in them (Table 1).
Table 1. Increase in the poultry meat production for slaughter (in live weight) on the newly built, reconstructed, and modernized farms in the Russian Federation.

| Indicators                                      | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2008, % |
|------------------------------------------------|------|------|------|------|------|------|------|------|------|------|---------|
| The number of objects, including:              |      |      |      |      |      |      |      |      |      |      |         |
| new                                            | 22   | 17   | 18   | 9    | 7    | 10   | 19   | 13   | 14   | 18   | 81.82   |
| reconstructed and modernized                   | 63   | 44   | 43   | 30   | 19   | 21   | 11   | 13   | 6    | 14   | 22.22   |
| Poultry production for slaughter (live weight) at the commissioned facilities, thousand tons | 91.7 | 75.7 | 81.2 | 49.2 | 20.4 | 100.3| 178.6| 191  | 238.8 | 313.4 | 341.77  |
| Poultry production for slaughter (in live weight) due to reconstruction and modernization of facilities, thousand tons | 128.3| 49.9 | 100.7| 64.9 | 41.5 | 53.9 | 16   | 41   | 12.7  | 5.9  | 4.60    |
| Poultry production for slaughter (in live weight), obtained through the introduction of new, reconstruction, and modernization of existing facilities, thousand tons | 220.1| 125.6| 181.9| 114.1| 61.9 | 154.2| 194.6| 232  | 251.5 | 319.3 | 145.07  |
| The share of additional poultry production for slaughter at the constructed, reconstructed, and modernized facilities in the total volume of poultry production for slaughter (in live weight), % | 7.3  | 3.6  | 4.7  | 2.6  | 1.3  | 3    | 3.5  | 3.9  | 4.1  | 4.8  | -2.50 p.p. |

Source: Data calculated by the author according to the FS SS RF (2018).

During this period, the share of products manufactured using innovative technologies increased to 18.4%, which made it possible to increase its competitiveness [3].

Despite some success, the poultry enterprises are experiencing the need for further modernization and renewal of basic production assets. In some poultry farms, equipment wear is 50% or more, production technology is also obsolete.

On the example of poultry farms in the Krasnodar region, we calculated indicators of the efficiency of using fixed assets, analysis of which showed that capital productivity is low even per 100 rubles of the value of funds (Table 2).

The highest capital productivity in “Novomyshastovskaya Poultry Farm” LLC is 1.5 kopecks per 1 rub. funds (2016). At the same factory, the coefficient of renewal of fixed assets was 1.5 in 2016 against 0.003 in 2013.

Modernization has affected the growth of production performance, which affected the capital productivity. Capital-labor ratio in farms is high. In PF “Belorechenskaya” LLC, it is 2.11 million rubles / person. The profitability of the use of funds is the highest in “Rassvet” CJSC, it is 71.67%.

In our opinion, in conditions when the degree of depreciation of fixed production assets already exceeds 60%, the enterprises need higher rates of their renewal and higher “thresholds” of profitability, therefore.
The main limiting factor of scientific and technological development based on high-tech technologies in animal husbandry in general and in poultry farming is the disparity of prices (Fig. 1), the statistical values of which have been steadily increasing for 25 years [8].

The most important factor in the growth of the cost of poultry products is feed. Now, the situation for poultry farmers is not as good as an increase in grain prices, which has a negative impact on the profitability of poultry enterprises, since the share of feed is about 70% in the cost structure of poultry meat production (Table 3).

So, in the period 2015-2018, the cost of feed increased by an average of 20-25%, and the cost of production grew by 20%. At the same time, an average selling price for the industry has changed only by 1.78% for poultry meat, and for eggs has decreased by 6.12%.

### Table 2. The effectiveness of the using the funds in poultry farms of the Krasnodar region.

| Enterprice | 2013 | 2016 |
|------------|------|------|
| PF “Belorechenskaya” LLC | 2761224 | 395 | 0.24 | 0.41 | 14.16 | 2113180 | 0.30 | 0.33 | 2.28 |
| “Harvest XXI century” LLC | 740261 | 0.00 | 0.58 | 31.10 | 1003740 | 0.02 | 0.46 | 61.71 |
| “Druzhba Poultry Farm” JSC | 543075 | 0.53 | 0.19 | 122.52 | 522476 | 0.65 | 0.15 | 27.27 |
| “Agrocomplex” named N. I. Tkachev JSC | 1261553 | 0.02 | 1.00 | 13.04 | 1363616 | 0.03 | 0.69 | 9.49 |
| “Yugmelprodukt” LLC | 714389 | 0.44 | 0.23 | 52.43 | 441674 | 0.75 | 0.13 | 33.47 |
| PF “Yubileinoye” LLC | 232303 | 0.36 | 0.27 | -151.03 | 478616 | 0.17 | 0.32 | 6.24 |
| PPF “Caucasus” CJSC | 694782 | 0.13 | 0.43 | 5.56 | 1233065 | 0.28 | 0.28 | 5.27 |
| “Novomyshastovskaya Poultry Farm” LLC | 293813 | 1.11 | 0.09 | -701.01 | 127219 | 1.53 | 0.06 | 58.97 |
| OPH “Slava Kubani” LLC | 3347686 | 0.00 | 0.22 | 101.18 | 914063 | 0.00 | 0.49 | 14.96 |
| “PPZ “Labinsky” JSC | 398083 | 0.60 | 0.17 | 92.96 | 487355 | 0.40 | 0.25 | 63.25 |
| “Pervomayskaya IPS” LLC | 331186 | 0.33 | 0.30 | 39.18 | 748587 | 0.35 | 0.28 | 56.76 |
| “Rassvet” CJSC | 666296 | 0.04 | 0.47 | 43.75 | 1349813 | 0.03 | 0.47 | 71.67 |
| “Poultry Farm “Primorskaya” LLC | 6235938 | 0.27 | 0.37 | 3.25 | 750357 | 0.46 | 0.21 | 17.37 |
| “PPF Timashevskaya” CJSC | 2456995 | 0.15 | 0.67 | 13.82 | 2108478 | 0.20 | 0.49 | 12.38 |

Source: Data calculated by the author according to the FS SS RF (2018).
Table 3. Dynamics of prices for consumed resources and poultry products.

| Indicator                                                      | 2015  | 2016  | 2017  | 2018  | 2018 vs 2015, % |
|----------------------------------------------------------------|-------|-------|-------|-------|-----------------|
| An average producer price for poultry meat per year, rub / kg ** | 96.55 | 98.57 | 93.37 | 98.27 | 101.78          |
| An average producer egg price per year, rub / kg **              | 41.5  | 41.7  | 35.7  | 38.96 | 93.88           |
| An average price to purchase the following resources for the year, rubles / kg: |
| - wheat                                                        | 9.56  | 9.73  | 8.04  | 9.25  | 96.76           |
| - corn                                                         | 9.15  | 10.01 | 8.27  | 9.49  | 103.72          |
| - barley                                                       | 8.27  | 9.04  | 7.7   | 8.82  | 106.65          |
| - premixes of domestic producers                                | 112.33| 129.58| 112.68| 134.0 | 119.29          |
| - soybean meal                                                 | 32.2  | 36.63 | 33.7  | 40.0  | 124.22          |
| - sunflower cake                                               | 12.91 | 17.41 | 13.87 | 17.00 | 131.68          |

Source: Data calculated by the author according to the Federal State Statistics Service of the Russian Federation (2018), prices do not include VAT and logistics costs.

The functioning of the sub-industry in such conditions led to a decrease in the profitability of enterprises (on average, the profitability decreased 2-2.5 times) and the lack of working capital. In the face of rising costs and limited opportunities to raise prices for the sale of products, manufacturers face financial problems and a number of them, including market leaders, will be forced to reduce production.

It is known that there are certain threshold values of the industry profitability during reproduction, below which even simple reproduction is impossible. The slowdown in the reconstruction of enterprises and the renewal of basic production assets become a consequence, and the industry is starting to deteriorate. However, the level of profitability depends not only on the level of costs for the production and sale of products, but also on its prices. It should be noted here that the purchasing power of the population in poultry products is growing, but its growth rates are lower than the growth rates of poultry meat production. This circumstance does not allow to increase consumption and to raise prices. In Russia, an average per capita consumption of poultry meat exceeds 30 kg per capita. In the near future, this indicator is to grow, because we do not observe an increase in real incomes of the population. Accordingly, domestic demand for products will not increase [6].

The current situation in the industry is expected to lead to a decrease in the level of profitability from the sale of poultry meat and eggs (Fig. 2).

Thus, the main challenge that poultry enterprises facing in the coming years is a gradual decrease in the profitability of production and sales of products.
Figure 2. The level of profitability from the sale of poultry meat and eggs, % [Calculated by the author according to the FSSS RF (2018)].

In the face of declining profitability, enterprises are experiencing difficulties with the implementation of the modernization of production. In this regard, as a number of authors rightly point out, “... from January 1, 2015, the cessation of subsidies to new investment projects under the State Program for the Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food Markets for 2013-2020 will significantly complicate the update and modernization of material and technical bases of poultry enterprises” [4].

The most serious problem hampering the development of the poultry sub-sector is the current state of breeding, which is characterized by a catastrophic shortage of poultry baselines. At the beginning of 2017, the share of foreign producers accounted for more than 95% of the total required volume of hatching eggs. The only Russian supplier of incubation eggs was the FGBU SGC “Smena”. Over the past five years, according to the Institute for Agricultural Market Studies (IKAR), the volume of imports of hatching eggs more than doubled (from 300-330 million units/year to 700 million units in 2015) [2]. It is obvious that the need to expand and modernize the domestic breeding base has matured at a fairly high rate of increase in domestic broiler production.

4. Discussion

Continuing investment in the sub-industry with the use of reconstruction activities and modernization of the existing poultry farms with a simultaneous increase in technical and technological support allows us to predict a further increase in production volume, which would also contribute to the replacement of imported products with domestic production. At the same time, a distinctive feature of the current stage of development is the saturation of the poultry market and the danger of an overproduction crisis. In the future, the Russian poultry meat market will face serious intra-industry competition; therefore, producers are interested in export development. At the same time, the exacerbation of the situation in accessing export markets is possible, which is associated with stringent quality control requirements and veterinary documentation, and with epizootic situations that arise.

Risks and threats to the further development of the sub-industry are associated with the unsatisfactory financial and economic condition of enterprises in the industry, insufficient investment and the unacceptably low level of its state support, which is several times lower than in the West. Thus, in the European Union, an aggregate authorized support for agriculture from the national and general budgets is about $ 100 billion, 39.6 billion in Japan, 19.1 billion in the United States. Based on 1 hectare of arable land, the state support in the EU is about 250 euros, and it is 434 rubles in Russia (5-6 euros at the current rate) [1].
The high level of imports of not only tribal, but also material resources creates serious risks for the competitiveness of the domestic agriculture. Unfortunately, the share of imported veterinary drugs, vitamins, microelements, amino acids, probiotics, vaccines, as well as corn and soybean meal remains significant, which exceed 50% of the need.

5. Conclusion
In the future, the development of the poultry industry should ensure the achievement of the main goal. It consists in the formation of competitive, efficient and stably developing production that meets international standards. This necessitates the implementation of a complex of organizational and economic measures provided by significant investments from both the state and private business.

In 2019, the main priority issues for the development of the industry and for the future include the following:

- Extension of interest rate subsidies for loans attracted for the construction, reconstruction, and modernization of poultry facilities;
- An elimination of disparity of prices for the resources used and prices for finished products;
- Support for the development, creation, and reconstruction of breeding and genetic centers for poultry farming;
- An improving the infrastructure of commodity markets and pricing in the food market;
- Changes in foreign economic policy that would ensure the formation of quotas for the import of poultry meat on the basis of the annual balance of production and consumption;
- Stimulation of measures to ensure environmental safety, processing and disposal of poultry waste;
- Creating plants for the production of biologically active substances (vitamins, microelements, amino acids, probiotics, vaccines, diagnostics, etc.);
- Creating the Russian state reserve of feed grain;
- Developing the mechanisms for the export of agricultural products;
- An availability and cost of credit resources.

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