ATLANTIS PRESS

Advances in Economics, Business and Management Research, volume 105

1st International Scientific and Practical Conference on Digital Economy (ISCDE 2019)

Challenges in implementing digitalization in the poultry subcomplex

Karkh D.A.
Ural State University of Economics
Yekaterinburg, Russia
dkarh@usue.ru

Kondratenko I.S
Ural State University of Economics
Yekaterinburg, Russia
tk-men@mail.ru

Fadeeva T.I.
Ural State University of Economics
Yekaterinburg, Russia
fadeevat.i@mail.ru

***Abstract* — This article identifies the problems of digitalization in the poultry product complex. The poultry subcomplex is one of the key subsystems of the agricultural sector of Russia. We have come a long way in the development of the domestic poultry subcomplex over the 2000s. Negative dynamics have been observed in the last two years: low purchase prices with rising costs, problems with the feed supply, low demand for poultry products, and a decrease in competitiveness in some areas. Less than half of Russian manufacturers use digitalization capabilities. Digitalization opens up prospects for the development of the poultry product subcomplex, improves the quality of products, and increases the efficiency of production, processing, and storage.**

Keywords — digital technologies, poultry subcomplex, statistics of poultry subcomplex, digitalization of poultry subcomplex, digital technologies in poultry subcomplex

I. INTRODUCTION

The poultry subcomplex is one of the key subsystems of the agricultural sector of Russia. Demand for poultry meat is constantly growing, and this is not only an all-Russian or regional trend but also a global one. According to academic V.I. Fisinina, experts planned an increase in world meat production over for 40 years by 28-59% for different types of meat, and specifically for poultry meat - 2.2 times [2, p. 4]. Such forecasts are based on existing trends: world poultry meat production increased from 18.6 million tons (17% of the total meat production) in 1975 to 118.1 million tons (37% of the total meat produced) in 2017 [6, p. 4].

However, moving forward is impossible without the use of new modern technologies including digitalization. In our country, it is used by more than half of the economic entities of the poultry product subcomplex. Despite negative opinions about the implementation of digital technology, the facts speak for themselves. A significant number of decisions made by business entities in the poultry product subcomplex can be calculated and implemented using digitalization tools.

However, the costs of information and communication technologies in agriculture are extremely low: 0.34% in 2015 and only 0.20% in 2017. Therefore, Russia has developed the program "Digitalization of Agriculture" aimed at providing the agricultural sector and subcomplexes with the broadband Internet; long-range wireless energy-efficient LPWAN (Low-power Wide-area Network) communication, which is capable of transmitting small amounts of information; information technology (eg, management platforms) [7].

II. RESEARCH METHOD

To assess the possible contribution of digital technology to the development of the poultry product complex in Russia, it is necessary to analyze the current, “before digital” situation in the industry. The diagram in Figure 1 shows the change in poultry stock in Russia in 1975-2018 (before 1991 - data on the RSFSR, after 1992 - on the Russian Federation). An increase in the number of birds by 1.5 times was noted from 1975 to 1990. The next 10 years - in the 1990s and early 2000s, there was a sharp reduction in the number of poultry at domestic poultry enterprises. The minimum occurred in 2000 when the livestock was halved compared to the 1990s - to 341 million heads.

The start of growth was not easy because it was easier to open it to foreign manufacturers than to return the market to domestic producers. But in the end, the need for own production of poultry meat was realized, and more attention was paid to the poultry-food subcomplex. Improvement of the situation is reflected in the graph: from 2005 to 2018, the number of poultry increased by 54%, although it has not yet reached the level of 1985-1990.

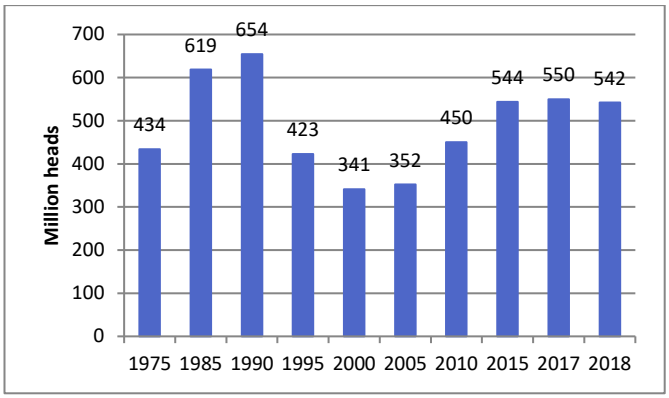

Fig. 1. Dynamics of poultry stock in the RSFSR and the Russian Federation in 1975-2018 (by [8])

This direction of animal husbandry is very promising because poultry is quickly reproduced, and investments are bringing in a return especially at the stage of the unsaturated market. The development of the poultry product subcomplex is important because of the nutritional properties of poultry meat, in particular, the high-protein - the basis for the normal functioning of the human body. Also, it is indispensable in diet and baby food.

The diagram in Figure 1 shows the peak in the 21st century in 2017, but 2018 was a difficult year for poultry enterprises: the livestock decreased by 1.5% to 542 million heads, and large poultry farms were closed. Experts name several reasons for the wave of bankruptcies: the spread of avian influenza, a significant increase in feed costs and problems with the feed base, outdated equipment, lack of funds for the introduction of innovative methods of poultry growing, processing, and storage of raw materials. There are also problems with the quality of products, their biosafety, and lower selling prices with rising costs. The latter is shown in the diagram.

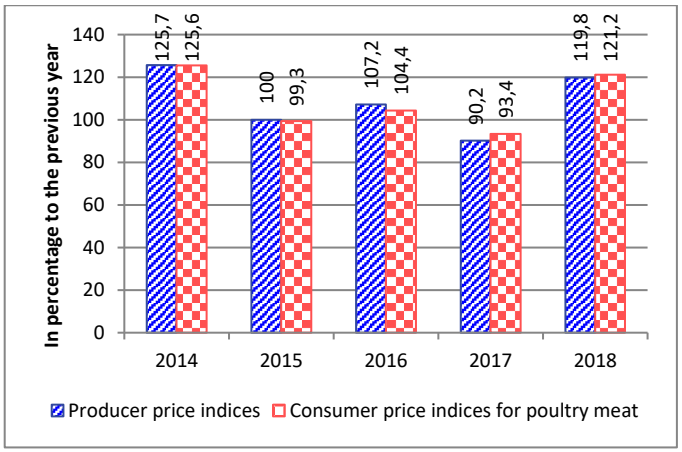

Fig. 2. Price indices for poultry meat in 2014-2018 in the Russian Federation as a whole (built by [3, p. 12, 79])

Low selling prices for poultry meat in Russia in 2015-2017 led to problems in 2017-2018 when the number of livestock decreased and poultry farms began to close.

Despite the existing difficulties, a comparison of poultry meat consumption in the world (diagram in Figure 3) shows that the volumes characteristic of Russia cannot be a limit. The domestic poultry market has reserves of growth - and they are significant.

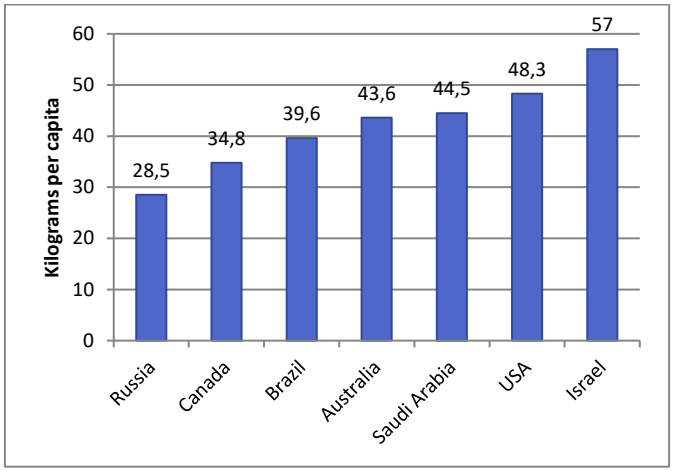

Fig. 3. Russia and countries with the maximum consumption of poultry meat in 2016 [6, p.7]

Figure 3 shows the first place in the consumption of poultry meat - Israel with 57 kg per capita, which is two times higher than in Russia. Countries with a consumption of more than 40 kg are Australia, Saudi Arabia, and the USA. They are 1.5-1.7 times ahead of our country. Russia has every chance to reach similar indicators. At the same time, we must focus on the intensive development of the industry in the future. It is impossible to solve this problem without digital technologies. It is necessary to change the approach to organizing the interaction between elements within business entities and subsystems that are part of the poultry product subcomplex. Only then domestic products will be of high quality, competitive, and bring good profits.

The experience of Kazakhstan farmers can be cited as an example. They achieved growth in labor productivity, an increase in production volumes by almost five times because of the introduction of digital technologies [4].

According to experts, as a result of the implementation of IT tools in the next decade, there will be an increase in the level of digitalization of agriculture in general by 3-4 times. The indicator of the poultry product complex will be even higher. This will lead to a quarter cost reduction [5]. For individual regions (even within the same federal district), the growth in efficiency will vary.

At present, the poultry-food subcomplex as a part of the meat sector of animal husbandry in the Urals Federal District is also developing unevenly. Its share is significant and varies depending on the region (Figure 4).

The diagram in Figure 4 shows the first place of the Chelyabinsk region in the structure of livestock and poultry production. There are several reasons for this: climatic conditions, the national composition of the region, and demand in the local consumer market.

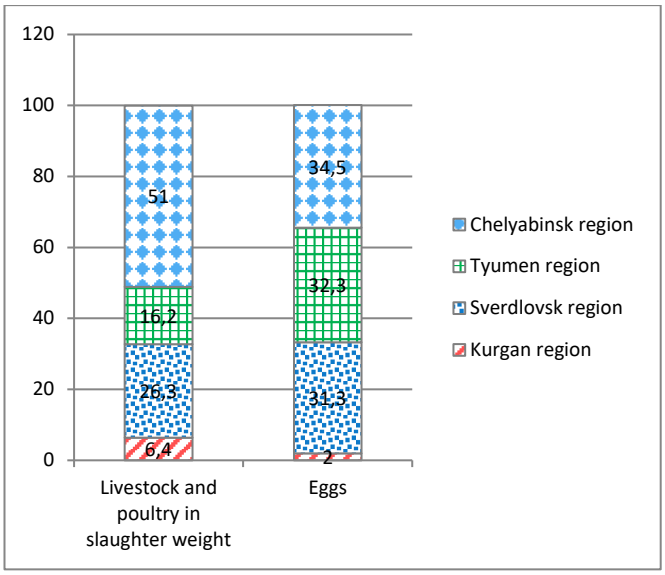

Fig. 4. Structure of production of livestock and poultry, eggs in farms of all categories in 2017 (as a percentage of the total production of the corresponding type of product in the Ural Federal District) [9]

Sverdlovsk region ranks second in the production of livestock and poultry for slaughter, and the poultry product direction is an undoubted leader. The share of the Kurgan region is only 6.4%. In our opinion, this is unreasonably small since the region has the potential for the development of the industry.

There are three leaders in the direction of egg production in the Ural Federal District - Chelyabinsk, Tyumen, Sverdlovsk Regions. Kurgan region should also develop egg production.

Let us turn to the production of the main types of livestock products in farms of all categories of the Sverdlovsk region in 2017. Table 1 shows the structure and dynamics of the volumes of livestock and poultry produced for slaughter in live weight. [10]

Table 1 shows that livestock and poultry production grew at a slow pace. The situation in Yekaterinburg is better than in the region, but this is mainly due to specialization - egg production and sale of straight run chicks.

TABLE I. DYNAMICS AND STRUCTURE OF LIVESTOCK AND POULTRY PRODUCTION FOR SLAUGHTER IN LIVE WEIGHT (ALL CATEGORIES OF FARMS) [11]

	2013	**2014**	**2015**	**2016**	**2017**
Total in the Sverdlovsk region, thousand tons	251,8	261,4	268,7	270,5	270,1
including:					
Yekaterinburg, thousand tons	3,98	4,28	4,17	3,87	4,03
share in the overall structure,%	1,58	1,64	1,55	1,43	1,49
Dynamics,% to the previous year					
Sverdlovsk region	103,8	102,8	100,7	99,9	103,8
Yekaterinburg	107,5	97,4	92,8	104,1	107,5

At the same time, the Yekaterinburg sector accounted for only 1.43-1.64%, from 2014 to 2016 there was a decrease, and only in 2018 was an increase in the share observed.

From 2013 to 2017, the average estimated growth rate in the Sverdlovsk region was 102.18%, in Yekaterinburg 101.69%:

$$T\%(\text{Sverdlovsk Region}) = \sqrt[5]{(1{,}038 * 1{,}028 * 1{,}007 * 0{,}999 * 1{,}038)} = 102{,}18\ \% \quad (1)$$

$$T\%(\text{Yekaterinburg}) = \sqrt[5]{(1{,}075 * 0{,}974 * 0{,}928 * 1{,}041 * 1{,}075)} = 101{,}69\%. \quad (2)$$

Without the introduction of digital technologies in the Sverdlovsk Region, livestock and poultry production for slaughter will increase by 2.18% annually, reaching 335.1 thousand tons by 2027 (against 270.1 thousand tons in 2017): an increase of 24.1 % for 10 years. The use of digital technologies will increase production by at least 3 times - up to 810.3 thousand tons. If we take the share of poultry meat in the overall structure of production as 55% (and this is a pessimistic forecast), then the volume in physical terms will reach 445.7 thousand tons only in the Sverdlovsk region, which per capita will be approximately 90-100 kg (if the number population will change slightly). This is not such a large value on the scale of our country, especially if we take into account the future slight increase in consumption of cattle meat and a decrease in some countries.

III. RESULTS AND DISCUSSION

An analysis of the statistics and opinions of poultry practitioners provides some fundamental conclusions. The massive implementation of digital technology will solve the main problems of poultry subcomplex.

The formation of the domestic feed base is primarily associated with high-quality planning of feed requirements in quantitative and qualitative terms, and the selection of the optimal set of agricultural technologies. All this can be solved with the help of special programs running on single digital platforms. Planning processes in the USSR were carried out without taking into account many factors. There were no innovative and technical means of forecasting and planning, so the overall result was unsatisfactory and led to a deficit. Modern IT tools can make forecasts and plans with high accuracy and minimal effort.

The availability of loans will be facilitated by automatic borrower assessment systems based on an analysis of a large amount of source data (financial condition, other indicators of a particular enterprise, and environmental factors).

Robotization will play an important role: maintaining the microclimate in the premises of poultry farms based on processing data from sensors, making organizational decisions as a result of computer processing of data by artificial intelligence. This will significantly increase the efficiency of the poultry subcomplex.

References

[1] The Great Russian Encyclopedia: 30 tons. / Chairman Scientific. - Ed. Council Yu. S. Osipov. Ed. ed. S.L. Kravets. T. "Russia". - M .: Great Russian Encyclopedia, 2004. - P. 535.

[2] Great Soviet Encyclopedia / Chief ed. A.M. Prokhorov: In 30 volumes. - 3rd edition. - T. 1. –M. Ow. encyclopedia, 1969. - 608 p.

[3] The Great Soviet Encyclopedia / Ed. S.I. Vavilova: 2nd edition. In 30 volumes. - T. 1. - M .: State Scientific Publishing House "Big Soviet Encyclopedia", 1949. - 640 p.

[4] Nefedova V.N., Mayorova S.V. Poultry in 2018. Problems and prospects // Economics and business: theory and practice. - 2018.- №1. - p. 65-67.

[5] Pakhomova A.A. The development of poultry products subcomplex AIC. - Abstract of Diss. doctor econ. Sciences .. - M .: 2013.

[6] Semin A.N., Karkh D.A., Kondratenko I.S. The poultry products subcomplex in the system of the Agro-industrial complex: digitalization capabilities. 1st International Scientific Conference "Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth" (MTDE 2019)

[7] Raizberg B.A., Lozovsky L.Sh., Starodubtseva Ye.B. Modern economic dictionary. - M .: Infra-M, 2017. - 512 p.

[8] T. Z.Kh. Problems and directions of increasing the efficiency of the poultry product subcomplex of the region // News of the State Pedagogical University named after A.I. Herzen - 2008. - № 65 [Electronic resource]. - Access mode: https://cyberleninka.ru/article/n/problemy-i-napravleniya-povysheniya-effektivnosti-ptitseproduktovogo-podkompleksa-regiona.

[9] Uskova TV, Selimenkov R.Yu., Chekavinsky A.N. The agro-industrial complex of the region: state, trends, prospects. - Vologda: ISEDT RAS, 2013.

[10] Bauerly B. The Agrarian Seeds of Empire: The Political Economy of Agriculture in US State Building. – Leiden: BRILL, 2016. – P.3 (322 p.).

[11] Pustuev A.L., Kondratenko I.S., Pustuev A.A. Poultry products subcomplex: the possibility of interregional cooperation in terms of import substitution / Agrarian Bulletin. - 2017

[12] Matveeva A.I., Sarapultseva A.V., Nazarov A.D. (2019). Analysis of spiritual socialization and personal adaptation in the period of digitalization of the economy. Proceedings of the 1st international scientific conference modern management trends and the digital economy: from regional development to global economic growth (MTDE 2019). Inst Int Relat, Yekaterinburg, Russia, vol. 87, pp. 463-467