

Economic formats for the development of a new paradigm in the agricultural sector of the economy

*L. N. Dulepinskih**, and *A. G. Svetlakov*

Federal State Budgetary Educational Institution of Higher Education «Perm State Agro-Technological University named after Academician D.N. Pryanishnikov», Perm, Russia

Abstract. With the arrival of the coronavirus, life will not return to its usual course. Some industries are under threat of existence. With each new wave of morbidity of the population, most of the business loses its achievements, some stop their entrepreneurial activities, losing resources not only for development, but also for current activities. The advantage of the agro-industrial complex of the country is that it is a producer of basic foodstuffs for the population. Therefore, the pandemic crisis affected the agricultural sector less painfully. However, as the current analysis shows, the agricultural sector of the economy continues to develop with dignity. People will always need protein food, and the agro-industrial complex will provide this need, while becoming less vulnerable. It should be noted that the agricultural sector is characterized by continuity of production.

1 Introduction

But the forced isolation of cities, countries, and enterprises led to the collapse of inter-economic ties, the weakening of the ruble, the rise in the price of spare parts, machinery, raw materials, packaging, seed, and fertilizers, and the risk of international trade interruption.

Many people, in order to avoid illness and preserve the health of the family, were forced to switch to a remote work mode. Some professions have lost their relevance in these conditions.

There is a situation in which there are double standards and contradictions in the development of agriculture in the country.

2 Materials and methods of research

Today, in the face of the unpredictability of modern challenges, the world community has a significant problem of population reduction. Changes in the quality standards of finished products, food production using cheap raw materials of poor quality affect the health,

* Corresponding author: dulepinskih.liudmila@yandex.ru

lifestyle, and life quality of consumers. In this regard, many questions arise in ensuring the country's food security.

Analyzing the main production resources and the production of agricultural products, we used mathematical-statistical and economic-statistical research methods, identified the main indicators and considered the factors affecting the development of agricultural business in the context of crisis phenomena. The empirical base of the study was made up of data from the Federal State Statistics Service for 2010-2020. An integrated approach to the further development of the agricultural sector of the country's economy was also used.

3 Results

Shortcomings, faults, and contradictions in the organization of agricultural production, its management, and its financing from the state budget lead to huge losses of an economic nature – resources.

Analyzing the main production resources over the last decade, we observe a steady decline in the number of cattle at all levels (Table 1). In the Perm Region, this indicator decreased by 15.5%. The Volga Federal District (hereinafter VFD) occupies the 1st place in the country in terms of cattle keeping, but even here there is a decrease in livestock by 1228.9 thousand heads. The reduction in the number of pigs in the region is due to multiple reorganizations and the difficult financial situation of Perm Pig-breeding Complex JSC. A huge credit burden, high energy costs, rising prices for raw materials for animal feed affect the efficiency of production. Pigs do not receive a full ration, therefore there are no planned weight gain and products made [1].

Table 1. Main production resources

Indicators	2010	2015	2016	2017	2018	2019	2020	The ratio of 2020 to 2010 in %
the Russian Federation								
Cattle, thousand heads	19793.9	18620.9	18346.1	18294.2	18151.4	18122.3	18027.2	91.1
Pigs, thousand heads	17251.4	21405.5	21924.6	23075.5	23726.6	25163.2	25850.1	149.8
Poultry, million heads	449.7	547.0	550.2	555.8	541.5	544.7	518.7	115.3
Total acreage, thousand hectares	74861.4	78634.8	79312.0	80049.0	79633.7	79880.3	79948.0	106.8
Including under grain crops, thousand hectares	43203.0	46608.7	47100.2	77705.3	46339.4	46660.4	47899.8	110.9
Area under potato, thousand hectares	1948.3	1561.7	1441.1	1350.2	1324.6	1254.7	1188.2	60.9

Area under field vegetables, thousand hectares	602.6	563.1	553.9	535.1	525.9	517.5	511.8	84.9
Volga Federal District								
Cattle, thousand heads	6131.1	5293.0	5166.0	5133.7	5024.8	4957.9	4902.2	79.9
Pigs, thousand heads	4171.2	3758.9	3591.6	3562.4	3642.7	3981.7	3963.5	95.0
Total acreage, thousand hectares	23133.7	23629.0	23819.2	23906.6	23922.9	23950.7	24018.7	103.8
Including under grain crops, thousand hectares	12949.0	12927.2	13011.8	13096.4	13039.0	12871.5	13390.7	103.4
Area under potato, thousand hectares	534.6	395.0	363.5	337.3	329.6	311.9	294.4	55.1
Area under field vegetables, thousand hectares	114.9	111.3	101.0	97.7	94.9	93.0	92.8	80.8
Perm Region								
Cattle, thousand heads	280.5	249.1	240.5	239.4	242.9	239.6	237.1	84.5
Pigs, thousand heads	211.8	195.6	148.5	137.2	133.8	135.7	129.6	61.2
Poultry, thousand heads	5870.4	7445.7	8020.9	8117.9	8252.1	8329.7	8249.5	140.5
Total acreage, thousand hectares	795.2	757.2	742.2	753.6	754.5	739.5	733.3	92.2
Including under grain crops, thousand hectares	285.3	248.3	247.5	250.4	236.9	231.0	231.1	81.0
Area under potato, thousand hectares	41.2	42.2	21.9	19.9	19.7	19.5	18.5	44.9
Area under field	7.2	8.1	5.1	4.9	4.9	5.2	4.8	66.7

vegetables, thousand hectares								
-------------------------------------	--	--	--	--	--	--	--	--

*the table is compiled by the authors according to the data of the Federal State Statistics Service [2, 3]

In addition, a further reduction of this population is expected in 2021 due to the identification of several foci of African plague in the Perm Region.

The number of pigs in the VFD decreased by 5%, the district ranks 2nd in the number of pigs in Russia. But countrywide, the livestock in the pig industry increased by 49.8% (+8.5 thousand heads).

Poultry farming is successfully developing at all levels. It is worth noting that the number of poultry in the region has increased by 40.5%. Egg production is also increasing by 53%. Perm Region in 2020 ranks 11th in the country according to this indicator [4].

In Russia and in the district, the acreage grew slightly, including under grain crops – 10.9% and 3.4%, respectively. The areas under potato and field vegetables are being reduced at all levels, in the province, district, and country.

In the region, there was a decrease in the acreage under cereals by 19%, potato – 55.1%, vegetables – 33.3%, more than 60% of the acreage is occupied by forage crops. Basically, small forms of farming in the region are engaged in growing field vegetables. A stable decline in vegetable production is influenced by a whole range of factors: zone of risky farming, low technical equipment of farms, shortage of workers during the harvesting season, lack of storage systems, and clear mechanism for state support of vegetable cultivation.

The integral system of the economy creates conditions for achieving certain results of the agrarian economy, and it is often considered economically easier to get most of the raw materials and food than to create conditions for its production. But in our opinion, such an approach to ensuring food security is not always correct. Eating cheap substitutes leads to negative consequences not only in the development of people, but also animals.

The agro-industrial complex of Russia is able to increase the production volume of the main types of products, although there is dependence on imports in a number of positions [5]. Thus, in 2020, the production of agricultural products per capita increased by 10.6% in the country, by 13.8% in the Volga Federal District, and by 14% in the Perm Region (Fig.1).

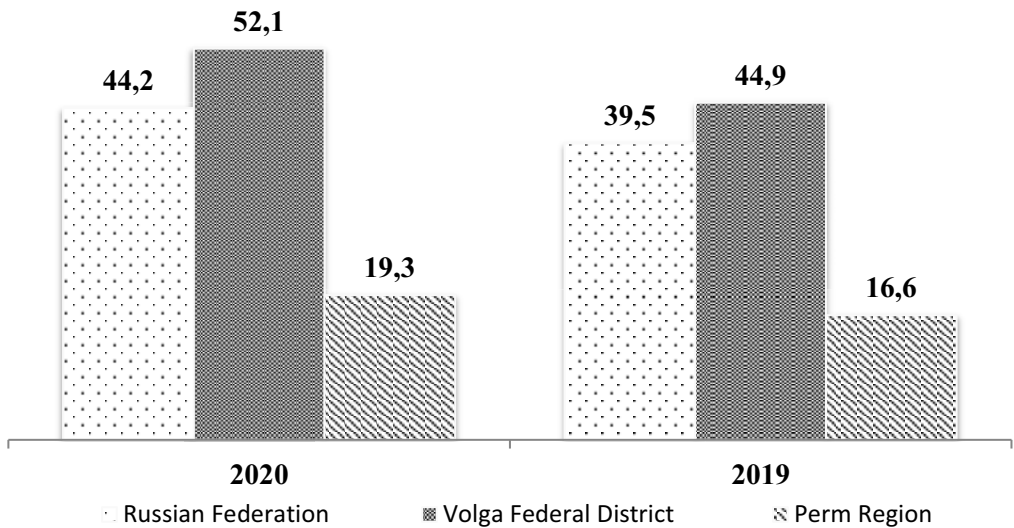


Fig. 1. Production of agricultural products per capita (in actual prices; thousand rubles)

But there are many obstacles to the successful development of agricultural business. The consequences of the pandemic-related crisis, one way or another, have an impact on agricultural production. The rise in the cost of spare parts, special equipment, packaging, grain seeds, veterinary drugs, feed, plant protection products produced abroad will lead to an increase in the cost of manufactured products [6].

Unfortunately, the work of livestock breeders in the modern world is unpopular and often elderly women of retirement and pre-retirement age work as machine milking operators, in the maternity ward, in the calf house. The fear of elderly workers to get sick with a coronavirus infection due to an age-related decrease in the body's resistance, the presence of occupational diseases encourages them to limit contacts and refuse to go to work. As a result, there is a previously relevant personnel shortage. Due to the specifics of production, people work replacing colleagues, increasing the production load, thereby also undermining their health. Young people are not in a hurry for agricultural production, they dream of living in megacities, in comfortable conditions and receiving a decent salary.

The specificity of the agro-industrial complex is the use of animals and organisms in the production. The participation of the human factor is important in certain production processes. And thoughtless exclusion of some professions will lead to chaotic processes. For example, it is impossible to replace the veterinary service with digital technologies. Although modern equipment helps to identify cows in hunting and diseases such as leg disease, cow udder mastitis. An operator of a livestock farm, a technician for artificial insemination of animals, a beekeeper are also important in production. Young people who are currently receiving the profession of "veterinarian", unfortunately, most of them dream of working in private veterinary clinics, where, accordingly, wages are higher. There are not enough technologists at the processing enterprises, precisely those specialists on whom the quality and safety of the products depends.

All of the above negative factors make us think that it's time to break old stereotypes and create new economic formats, a paradigm for the development of the agricultural sector of the economy. We believe that the new economic format of development is a platform of relations arising in the process of meeting the needs of the population for food products and services between customers and government agencies, limited by time, potential, and resources. New economic formats will develop a different attitude to working issues,

dictate production conditions in the agricultural sector of the economy, and the lack of workers will push manufacturers to switch to automated technologies, despite their high cost. A new economic policy in the system of development of new digital technologies can be formed and presented in the format of the application of new technologies and automation in vegetable growing, crop production, feed production, animal husbandry, and processing in general.

Some specialties will be excluded in the further development of agricultural production. Automation of management, production, bookkeeping, tax, trade, and other types of accounting by agricultural producers of all types of ownership and organizational and legal forms, regardless of the applicable taxation regime, will allow to attract vacated employees in other fields of activity.

For example, the provision of accounting services to enterprises. The accountant's work is facilitated by the use of specialized computer programs (1C, AdeptIS: Agrocomplex 3.0, etc.). The use of appropriate programs will allow to reduce the staff of accounting departments in organizations, carry out the process of optimizing the professional category. In addition, very often enterprises now have begun to use accounting outsource services.

There are also other technologies that help to conduct business in modern times. The blockchain technology used in the banking sector can also be used in the agricultural sector to obtain information on the production, transportation, and storage, of finished products. Due to this, logistics costs will be reduced and the delivery time of perishable products will be reduced [7].

In the field of crop production, due to modern technologies, acreage is used more efficiently, fertilizers are applied, crops are treated against diseases and pests, control over the execution of tasks by machine operators is carried out. Thanks to modern large-format technology, it was possible to increase the rate of processing areas. Most of the work on crop cultivation is automated and carried out without human intervention. Satellite data from space allows to get more information about weather and climatic conditions, more accurately analyze the state of acreage, compile maps for crops [8].

Innovative systems in indoor vegetable growing take care of plants by controlling the temperature, lighting in the greenhouse, supply of nutrient solutions, treatment against pests. At the same time, the need for workers is significantly reduced.

The use of hydroponics in the USA and Europe makes it possible to grow tomatoes, watermelons, melons, strawberries within the city boundaries, which significantly reduces the cost of product transportation [9].

Thanks to genetic engineering, the maturation periods of agricultural crops have been significantly reduced, the yield of soybean, corn, and wheat has increased. Artificially created strains of microorganisms in the soil help to increase crop productivity and more sustainably tolerate drought and disease [10].

The use of biometric collars helps to monitor the health of animals, their behavior and movement.

The development of online sales, electronic trading platforms makes it possible for every consumer to buy environmentally friendly products directly from the manufacturer without cheating sales representatives.

4 Conclusions

For the production of environmentally friendly food, it is necessary not only to establish its production, but also to ensure the development of rural areas, infrastructure, the solution of social issues, improvement of the production quality, and decent level of quality of life for villagers. The creation of these conditions will prompt the promising development of

agricultural enterprises, segment of entrepreneurship in the provision of services, and production of goods of a different profile.

In our country, all agricultural educational institutions are state-owned, managed by the Ministry of Agriculture of the Russian Federation. It is necessary to think about the training of future specialists capable of carrying out the activities of agricultural enterprises with a high level of automation and innovation. It may be necessary to revise the areas of training, the amount of funding for certain specialties and to strengthen the interaction of schools, colleges, universities, agribusiness, and the processing industry. It is also necessary to oblige graduates of higher educational institutions who have received a profession at the expense of budgetary funds to work for a certain period of time in direct production line in the specialty.

It is necessary to understand that the absence of a state plan, the created modern conditions for producers, the lack of competitive advantages in the quality of manufactured goods, depending on the compliance with certain norms and rules of production prescribed in GOST, will lead to a state of insecurity of the agricultural sector of the country's economy.

Thanks to the use of innovations in Russia and paradigm adjustments, agricultural producers will be able to optimize costs, save resources, solve the problem of personnel shortage by mechanizing labor-intensive processes and to automate the decision-making process as much as possible.

Based on the above, attention should be paid to the strategic provisions of the development of the agricultural sector of the economy with regard to the new economic policy, creating favorable conditions for the development of the domestic agricultural sector of the economy.

References

1. News of Perm and the Perm Region, The main news for today, You can find the whole herd at the Perm Pig Farm. What awaits employees and the Maysky settlement URL: <https://properm.ru/news/society/197329/?> (data of reference: 01.02.2022) (In Russian)
2. Territorial body of the Federal State Statistics Service for the Perm region URL: <http://permstat.gks.ru> (data of reference: 03.02.2022) (In Russian)
3. Federal State Statistics Service URL: <https://rosstat.gov.ru/> (data of reference: 03.02.2022) (In Russian)
4. T.M. Yarkova, Food Policy and Security, **8(4)**, 399–410 (2021) doi: 10.18334/ppib.8.4.113811
5. Yu.P. Bondarenko, Economics of agricultural and processing enterprises, **8**, 55-61 (2020)
6. I.S. Ivanenko, Problems of Territory's Development, **25(3)**, 89-106 (2021) DOI: 10.15838/ptd.2021.3.113.6.
7. I. Shkarnikova, Beginners in the fields Top 10 most advanced technologies that make the agro-industrial complex unrecognizable URL: <http://agrodigital.rbc.ru/> (data of reference: 01.02.2022) (In Russian)
8. A.S. Shcherbakova, Economics of agricultural and processing enterprises, **9**, 41-46 (2020)
9. L. Arata, E. Fabrizi, P. Sckokai, Economic Modelling, **90**, 190-208 (2020) DOI: 10.1016/j.econmod.2020.05.006.
10. W. Zhou, F. Duan, Journal of Integrative Agriculture, **20 (2)**, 343-348 (2021) DOI: 10.1016/S2095-3119(20)63580-8.