

Ensuring safety in agriculture: challenges, risks and measures to improve efficiency

Yulia Sergeenko^{1*}, *Elena Abanina*¹, *Iuliia Litvinova*², *Yulia Nikitenko*², and *Natalya Bobrakova*²

¹Saratov State Law Academy, 1, Volskaya St., 410056 Saratov, Russia

²Pushkin Leningrad State University, Pushkin, 196605, Russia

Abstract. The article is devoted to the issues of ensuring security in the field of agriculture. The article analyzed the great challenges facing agriculture, the risks arising in the process of agricultural activity, as a result, it was concluded that security in the field of agriculture can be ensured by balanced provision of all types of national security that intersect in this area: labor safety, food, ecological. The article highlights the main external and internal threats facing agriculture, defines the requirements for safe farming, taking into account threats and types of security. In conclusion, the main results of the work are presented and conditions are proposed that allow organizing efficient and safe agriculture.

1 Introduction

In the modern world, economic processes are taking place that affect all spheres of the economy and the economy of each region and each state. Taking into account global food security, the issues of the effective functioning of the sphere of agriculture, which is associated with both external and internal problems, are currently coming to the fore. It is obvious that effectively organized agriculture, which is the basis of the agro-industrial complex, can solve many problems of the state, ranging from providing its own population with high-quality and safe food products and improving the quality of life of the rural population through stable work in the agro-industrial complex, ending with ensuring the food independence of the country.

According to the latest data provided by FAO (Food and Agriculture Organization of the United Nations) in the annual report "The State of Food Security and Nutrition in the World", "The world is moving away from achieving the goals of ending hunger, food insecurity and malnutrition in all its forms, the increasing impact of the main drivers of food insecurity and malnutrition (conflict, climate extremes and economic shocks), the high cost of nutritious foods and rising inequalities will continue to pose challenges to food security and nutrition" [1].

Based on projections that the world population will reach 9.8 billion by 2050, it is clear that food-related demand and consumption will steadily increase. In turn, this process will additionally create a burden on national agro-industrial complexes, lead to an increase in

* Corresponding author: julya.sergeenko@yandex.ru

external threats and internal risks, which will require the development of their solutions in various areas, one way or another related to agriculture and ensuring its security.

In this regard, the purpose of the work that the authors have set for themselves is to study the challenges facing the agriculture of the state in various areas of security; risks arising in the process of agricultural activities and development of proposals for achieving the effectiveness of ensuring security in the field of agriculture, taking into account the balance of all types of security.

2 Materials and methods

The study is based on the understanding of agriculture as a sector of the country's economy that produces agricultural products and provides the needs for food products and raw materials for industry.

In order to develop theoretical provisions and practical recommendations for the development of measures for the greening of public administration, the works of scientists were studied on issues of labor safety [2-6]; the role of environmental safety in the process of sustainable development [7]; the role of employment of workers in agriculture [8, 9], which influenced some of the conclusions of the study.

To ensure a unified approach to the development of measures to ensure all types of security in agriculture, general scientific methods were used: the structural-functional method (to determine the place of each type of security in the overall system of agricultural security), the system analysis method.

3 Results

The security of agriculture can be represented as a state of protection of the sector of the economy that produces agricultural products from external and internal threats, in which the needs of the population for most foodstuffs and raw materials for the corresponding types of industry are met.

Features of ensuring security in the field of agriculture depend on external and internal factors of influence (external challenges and internal threats), and are as follows:

- In all types of agricultural activities there is an impact on the environment (incorrect and aimed only at making profit, crop production depletes land, the use of fertilizers and agrochemicals leads to soil and groundwater pollution, irrational melioration - depletes water resources, animal husbandry - pollution and depletion of land, etc. .d.).
- Agriculture itself is quite strongly influenced by environmental and natural factors (anomalous natural phenomena of a spontaneous nature; low temperature and lack of snow cover in the winter season reduce crop yields; high temperature and lack of rain affect both crop production, also reducing yields, and and livestock, making it difficult to provide animal feed, etc.).
- The maximum use of human resources in the absence of highly qualified specialists and in case of non-compliance with safety rules by employees leads to injury and death of employees.
- The mechanization of agriculture, on the one hand, presents environmental risks, including harmful effects on the soil and atmospheric air, on the other hand, social risks - the rural population loses their jobs and livelihoods as a result of the complete mechanization of agricultural activities.

In addition, external threats include: high inflation, a decrease in the investment attractiveness of agriculture, the spread of diseases and plant pests, etc.

The above threats and risks for agriculture predetermine the subject of discussion - the question of choosing the best measures, the use of which will help ensure the safety of agriculture in all directions and make it effective in modern conditions. The authors are aware that ensuring all spheres of security requires organizational, economic, informational and political measures, however, given the specialization of the team of authors, we will talk about legal measures.

4 Discussion

A. When solving the problems of the impact of agricultural activities on the environment and thus ensuring the environmental safety of agriculture, it is necessary to pay attention to the following. The objects of potential harm in this case are the soil as a fertile layer of the earth, the lands themselves as a spatial basis, water bodies and resources, and wildlife. Given the state of these facilities, in our opinion, the following measures should now be strengthened.

- Thus, there are frequent cases of death of animals living near crop objects (fields, meadows), from chemicals used in agriculture, a strict rule in agriculture should be the preservation of the habitat of wildlife objects. It is necessary to prohibit the use of pesticides, fertilizers, chemical reagents, fuels and lubricants and other materials hazardous to wildlife and their habitats without taking measures to guarantee the prevention of diseases and death of wildlife, deterioration of their habitat.
- In connection with the pollution of water resources with waste from livestock farms, leading to eutrophication of water bodies and, as a result, leading to the death of fish, it is necessary to tighten measures to establish rules for determining the places of wastewater discharge from such objects. In addition, water used in crop production ends up in groundwater (in some cases it is discharged into water bodies), which contains hazardous organic substances. Currently, Russian legislation prohibits the discharge of wastewater, the content of pesticides and agrochemicals in which exceeds the standards for permissible impact on water bodies into water bodies and within the boundaries of water protection zones. However, given the intensification of agriculture in the southern regions of the state, aimed at increasing the number of harvests per season, associated with an increase in the use of chemicals, a complete ban on the discharge of such untreated waters into water bodies is necessary.

B. When addressing food security issues, attention should be paid to the following aspects. One may get the impression that in this area it is necessary to take measures that are opposite in terms of the impact goals given above (in the field of ensuring environmental safety). Since, on the one hand, the tightening of environmental requirements for agricultural activities and their strict implementation may lead to a decrease in the efficiency of agricultural production, but, on the other hand, given the environmental crisis, it is necessary to find a balance between environmental requirements and the need to ensure the main goal of agriculture - stable food production. This balance can be achieved through the use of resource-saving machine technologies in agriculture, which ensure minimal environmental impact. The mere indication of this in the law will not be enough, the main measure will be the financial support of the state, which is aware of the priorities of both food and environmental policy.

C. When solving problems of safety in the sphere of work, there are problems with the interest of young professionals to work and develop the agricultural sector after receiving education. For this, the state should develop and use in labor relations increased aspects of labor safety of agricultural workers, consisting in decent wages, working hours established by law and rest time, with the help of which the health of workers is preserved, training related to the specifics of the work performed, performance of work in the absence of

harmful working conditions. This motivates young specialists to work in this direction, since labor protection is the foundation for the progressive development of agriculture. Therefore, at present, in addition to obtaining higher education, it is systematically required to improve their skills for agricultural workers. The modern development of the technical side of the agricultural industry requires the simultaneous training of the staff of the complexes involved in providing people with vital products. The employee is in a state of labor security, having and receiving a versatile education in the agricultural sector.

In addition, in the issue of staffing the agricultural sector with highly qualified specialists, it is necessary to pay attention to quality education both in the field of agricultural sectors of all employees, and subject to the need to ensure a balance of all types of security, additional “training of heads of organizations to ensure organizations have sufficient the level of protection of workers, both in the field of labor protection and in the field of environmental safety” [10]. Preserving the health of people dedicated to their profession is the goal of such leadership training. A healthy team is the dynamic development of the state's agriculture.

5 Conclusion

Ensuring security in the field of agriculture is not only related to domestic goals on the need to improve the quality of life of citizens through sufficient food supply; development of agricultural production that meets the established environmental and other requirements; ensuring in the process of agricultural production compliance with the requirements for preserving the life and health of workers, but also with international goals set at the UN level. In particular, rising global consumer prices for food, increasing frequency and severity of extreme climate events, environmental damage caused by agricultural production, and damage to small producers and rural residents make it difficult for states to achieve sustainable development goals in their economic, environmental and social relationships. All this requires a revision of the attitude to agriculture as not just a branch of the national economy that provides the country with food, but as a single ecosystem that mutually influences economic, environmental and social processes.

As a result of the study, we came to the conclusion that the security of agriculture is ensured, among other things, by increasing the efficiency of all types of security that “intersect” in this area:

- Environmental safety - as a response to potential threats from agricultural activities to the environment and its natural resources.
- Food security - as a response to external challenges related to hunger, lack of products, non-competitiveness of this industry in the new economic conditions.
- Social security or security in the sphere of labor - as a response to internal threats associated with emergency situations in the country, entailing financial instability, which affects the process of fulfilling duties in the work of agriculture.

Only by ensuring a balance of compliance with all requirements in the field of environmental protection, agricultural mechanization, labor safety and a number of others presented in the work, we can speak in general about ensuring the safety of agriculture.

References

1. FAO, IFAD, UNICEF, WFP and WHO, The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable. Rome, FAO (2022)

2. O.V. Tikhonova, E.T. Kitova, M.O. Zikina, IOP Conf. Ser.: Earth Environ. Sci., **720**, 012048 (2021)
3. Yulia Setiani, Muhd Zaimi Abd Majid, IOP Conf. Ser.: Mater. Sci. Eng., **620**, 012075 (2019)
4. S. Mundigl, C. Blackburn, M. Pinak, T. Colgan, Ch. Clement, Th. Otto, M. Voytchev, Sh. Niu, R. Coates, B. Le Guen, A. Rannou, E. Lazo, J. Garnier-Laplace, P. Jimenez, B. Batandjieva-Metcalf, F. Shannoun, M. Del Rosario Pérez, J. Radiol. Prot., **41**, 1381 (2021)
5. V.S. Serdyuk, V.V. Kuleshov, N.O. Kovalkovskaya, IOP Conf. Ser.: Earth Environ. Sci., **408**, 012025 (2020)
6. O.P. Sidelnikova, A I Evtushenko, V.N. Azarov, IOP Conf. Ser.: Mater. Sci. Eng., **451**, 012187 (2018)
7. I.A. Dmitrieva, L.P. Mileshko, O.N. Sakharova, L.V. Gordienko, IOP Conference Series: Earth and Environmental Science, **421**, 072013 (2020)
8. O.Ya. Frolova, Zh.N. Shmeleva, IOP Conf. Ser.: Earth Environ. Sci., **839**, 022014 (2021)
9. C.H. Umehruo, O.A. Owolabi, B. Aderounmu, M.O. Rotimi, E.S. Osabuohien, IOP Conf. Ser.: Earth Environ. Sci., **993**, 012006 (2022)
10. E. Abanina, Yu. Sergeenko, I. Litvinova, Yu. Nikitenko, N. Bobrakova, SHS Web of Conferences, **93**, 02017 (2021)