

ABSTRACT

of the dissertation work by Nagimova Gaukhar entitled «Veterinary and sanitary assessment of poultry meat using a feed additive – opoka», submitted for the degree of Doctor of Philosophy (PhD) under the educational program 8D09102 – Veterinary sanitation

Relevance of the research topic. In modern poultry farming, various feed additives are widely used to increase production efficiency, ensure food security, and limit the use of antibiotics. In this regard, studies devoted to different types of feed additives, their effects on the poultry organism, mechanisms of action, and influence on production performance are of particular relevance. This topic also remains significant in terms of its impact on human health, product quality, and environmental sustainability.

Poultry farming is one of the most dynamically and rapidly developing sectors of the agricultural industry, ensuring market demand for dietary food products. At present, poultry farming in Kazakhstan is developing at a fast pace, which is accompanied by an increasing demand for poultry products. According to scientists and industry specialists, poultry farming, as the most rapidly developing branch of animal husbandry, should be given priority development, since in the near future it is the only sector capable of providing the population with high-quality and palatable food products.

A deficiency of biologically active compounds in poultry diets leads to a lack of mineral substances in the body of farm birds, resulting in growth retardation, reduced resistance, decreased productivity indicators, deterioration in product quality, and, consequently, negative effects on economic performance. In this regard, various feed additives are incorporated into poultry feed to compensate for deficiencies in macro- and microelements. Of particular interest are silicon-containing additives, as this mineral element plays an important role in growth and development processes, the formation of bone and connective tissues, as well as in the regulation of lipid, protein, and carbohydrate metabolism, and the metabolism of macro- and microelements and vitamins.

In poultry farming, it is well known that the use of mineral feed additives is one of the important approaches to increasing productivity and improving product quality. Currently, widely used mineral additives in this field include zeolite, bentonite, vermiculite, and various phosphorus - calcium salts. However, each of these mineral additives has its own advantages and limitations.

In the Republic of Kazakhstan, animal husbandry and poultry farming have significant reserves of natural, environmentally friendly, and safe raw materials that can be used as feed additives. In this regard, «Opoka» from the Taskala deposit in Western Kazakhstan is of particular interest as a natural and environmentally clean raw material. In geology, «Opoka» is defined as a fine-grained, micro-porous siliceous sedimentary rock composed mainly of opal. Despite the fact that numerous studies have investigated the use of various mineral additives in animal feeding, research focused on the study of «Opoka» remains relatively limited.

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Purpose of the dissertation research. The use of «Opoka» as a mineral feed additive involves studying its mineralogical composition, assessing its toxicological effects on the organism, as well as investigating the impact of incorporating «Opoka» into broiler diets on meat productivity, nutritional and biological value, and the quality of broiler chicken meat.

Research objectives:

- To evaluate the effect of the mineral feed additive «Opoka» on the growth performance and productivity of broilers.
- To study the influence of the mineral feed additive «Opoka» on the hematological and biochemical parameters of broiler blood.
- To investigate the chemical and mineral composition of broiler meat when using the mineral additive «Opoka».
- To analyze the amino acid and fatty acid composition of broiler meat.
- To conduct a veterinary and sanitary assessment of the quality of broiler meat in the control and experimental groups.

Research methods. The methodological basis of the study consisted of the works of domestic and foreign scientists devoted to the use of mineral feed additives with consideration of veterinary and sanitary assessment of poultry products. The research employed generally accepted methods, including veterinary and sanitary examination, biochemical, physiological, histological, and statistical methods.

The scientific research was conducted at the Veterinary Sanitary Examination Laboratory of the Institute of Veterinary Medicine and Agrotechnology of Zhangir Khan West Kazakhstan Agrarian and Technical University, at the clinic of the educational, scientific, and production center «Zhardem-Vet», at the testing laboratory of Nutritest LLP, as well as at a local poultry farm. The research objects were broiler chickens of the ROSS-308 breed, and siliceous rock «Opoka» from the Taskala deposit of the West Kazakhstan region was used as the natural raw material.

Veterinary and sanitary examination of broiler carcasses and internal organs after slaughter was carried out using standard methods in accordance with the Sanitary and Hygienic Requirements for Poultry Slaughter and Primary Processing Enterprises and the standard Processing of Poultry (GOST 52469–2019).

The obtained data were subjected to variation statistical analysis using Microsoft Excel 2019 software. The reliability of the results was evaluated using methods of variation statistics and Student's t-test. Differences between data were considered statistically significant at a significance level of $p \geq 0.05$.

Main provisions submitted for defense:

- The effect of the mineral feed additive «Opoka» on the growth performance and productivity of broilers.
- Hematological and biochemical blood parameters of broilers when using the mineral feed additive «Opoka».

- Veterinary and sanitary assessment of the quality of broiler meat when applying the mineral additive «Opoka».
- Chemical and mineral composition of broiler meat when using the mineral additive «Opoka».
- Amino acid and fatty acid composition of broiler meat when using the mineral feed additive «Opoka».

Characteristics of the main research results. The mineral feed additive «Opoka», obtained from local raw materials, was for the first time introduced into the basic diet of ROSS-308 broiler chickens. The research results demonstrated that the feed additive has a positive effect on the growth and development of poultry. In particular, an increase in flock survivability, live weight gain, and improved feed efficiency were established.

In addition, the use of the «Opoka» additive contributed to enhanced productivity indicators of broilers and improved qualitative characteristics of the meat. The physicochemical properties and sanitary-hygienic indicators of the meat met regulatory requirements, while an increase in its biological value was observed.

Furthermore, birds in the experimental group showed a positive trend in physiological and biochemical parameters, indicating improved overall body resistance and metabolic processes. The obtained results scientifically substantiate the effectiveness of using the mineral feed additive «Opoka» in broiler poultry production.

Justification of the novelty and significance of the obtained results. The theoretical significance of the study lies in substantiating the possibility of obtaining and using a siliceous mineral additive – «Opoka» - as well as in expanding scientific knowledge about its effect on the meat productivity of broilers and the quality of poultry meat. The effectiveness of using the siliceous mineral additive «Opoka» at various dosages on live weight indicators and hematological parameters of poultry has been demonstrated. A positive influence of «Opoka» on the veterinary and sanitary as well as functional and technological characteristics of poultry meat has been established.

Practical significance of the research. The practical significance of the study consists in the development and implementation of «Opoka» as an effective feed additive in poultry farming, contributing to increased broiler productivity and improved meat quality. The obtained data on the effect of «Opoka» on live body weight, organoleptic and physicochemical properties of meat, as well as on the content of beneficial microelements and vitamins, can be applied in practical broiler feeding. This makes it possible to optimize poultry diets, accelerate bird growth, improve product quality, and reduce feed costs, thereby enhancing the economic performance of poultry enterprises. In addition, the possibility of using «Opoka» as a safe and effective feed additive has important practical value, contributing to improved animal health without the risk of toxic effects.

Relationship of the work with research programs. The studies were carried out in accordance with the plans of scientific research within the framework of the initiative project entitled: «AP26198945 Development of mineral sorbents and evaluation of their therapeutic effect in cases of intoxication with mold toxins in

birds» 2025–2027. State Registration No. 0125RK00585.

Description of the doctoral candidate's contribution to the preparation of each publication

Based on the dissertation materials, 6 scientific publications have been published. In all presented works, the doctoral candidate Nagimova Gauhar Khairatovna is the main initiator of the research, directly participated in all stages of the study, and made a significant personal contribution, as described below.

1 article published in a high-impact international journal (Scopus-indexed):

Effect of opoka use on meat productivity, nutritional, biological value and quality of broiler meat. International Journal of Veterinary Science, 14(3): 440–448. <https://doi.org/10.47278/journal.ijvs/2024.271> (CiteScore 3.2, percentile – 76)

3 articles published in journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan:

Nagimova G.Kh., Montaeva N.S., Merzhakypova G.B. Veterinary and sanitary assessment of broiler meat when using the mineral feed additive opoka. Science and Education, 2024, No. 4-1 (77), pp. 155–162. <https://doi.org/10.52578/2305-9397-2024-4-1-155-162>

Nagimova G.Kh., Montaeva N.S., Kushmukhanova Zh. Influence of mineral feed additive opoka on sanitary-microbiological and chemical indicators of broiler chicken meat. Science and Education, 2025, No. 1-1 (78), pp. 289–296. <https://doi.org/10.52578/2305-9397-2025-1-1-289-296>

Nagimova G.Kh., Montaeva N.S., Nurgaliev B., Kushmukhanov Zh., Tolegen A.I. Amino acid composition of broiler meat when applying the additive opoka. Science and Education, 2025, No. 3-2 (80), pp. 276–284. <https://doi.org/10.52578/2305-9397-2025-3-2-276-284>

2 articles published in the proceedings of international scientific and practical conferences:

Nagimova G.Kh. Assessment of the chemical, mineralogical, and biological composition of siliceous rock opoka from the West Kazakhstan region for its use as a mineral additive. Proceedings of the International Scientific and Practical Conference dedicated to the 130th anniversary of S. Seifullin, Part I, Astana, 2024, pp. 13–16.

Nagimova G.Kh. Slaughter qualities of broiler chickens when using a mineral feed additive. Proceedings of the National Scientific and Practical Conference with International Participation dedicated to the 95th anniversary of the Faculty of Veterinary Medicine, Orenburg, 2025, pp. 437–439.

Based on the results of the dissertation research, an author's certificate was obtained for the following utility product: “Method for improving the productivity and quality of broiler meat,” No. 111327.

One recommendation was developed and published: «Guidelines for the use of the mineral feed additive «Opoka» to improve the productivity of broiler chickens.” Uralsk: Zhangir Khan West Kazakhstan Agrarian-Technical University, Ministry of Agriculture of the Republic of Kazakhstan, 2025. – 21 p.

Structure and scope of the dissertation. The dissertation consists of the

following sections: introduction, literature review, materials and research methods, results of original research, conclusion, recommendations for production, list of references, and appendices. The work is presented on 121 pages of computer-typed text and includes 23 tables and 17 figures. The list of references comprises 175 sources.