Functional state of quail under the influence of probiotic

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Abstract. The authors conducted research on the effect of the olin probiotic on biochemical and indicators of the natural resistance of the quail of the Pharaoh breed. Changes in the morphological parameters of quail blood were noted (an increase in the number of red blood cells by 5.12-5.76% was observed in the blood, an increase in the amount of hemoglobin was also noted). No changes in the numbers of leukocytes and platelets were detected. The strengthening of humoral factors of natural resistance was facilitated by the introduction of a probiotic in the quail diet (lysozyme activity of blood serum was higher than the control values by 12.72%, bactericidal activity - by 7.27%). When analyzing the results of the studies, it was noted that the indicators of cellular immunity increased, a significant number of indicators significantly increased in the blood serum of quail from the experimental groups. Indicators such as poultry safety increased by 4.00-5.05%. The conducted studies convincingly proved the pronounced positive effect of olin on the functional state of the quail organism.

1. Introduction
The recent increase in poultry meat production by almost three times confirms the need to develop quite new trends in the poultry industry in the Russian Federation - growing quail. Quail eggs are successfully sold in retail. Quail carcasses are still inferior in value to broiler chickens. At the legislative level, measures are being taken to support the development of the agro-industrial complex, and in particular poultry farming. Export deliveries of meat products (including poultry and chicken eggs) to the countries of near and far abroad are growing. An increasing need for a variety of protein sources of animal products in a significant part of the population requires producers to find fairly new types of poultry.

The leading position among the livestock industries is industrial poultry. However, often the technology of keeping and feeding does not fully correspond to the biological characteristics of the bird, which leads to the development of stresses, disruption of metabolic processes, suppression of immunity and decreased productivity [1–7].

In recent years, in veterinary medicine and animal husbandry, medicinal substances of natural origin have been used to correct impaired immunity, improve metabolism, and maximize livestock products [8–14].
From a huge arsenal of biologically active substances, it is necessary to choose and use such preparations and medicinal substances that there is no doubt about their safety, they should not cumulate in the body of animals and birds, be environmentally friendly, and most importantly have a positive impact on the realization of the productive potential of animals [5–7]. Probiotics meet these requirements. They have an antagonistic effect on the pathogenic microflora, stimulate the immunity of the macroorganism, and contribute to the production of environmentally friendly livestock products [15–20].

The purpose of the research is to conduct research on the effect of olin probiotic on the functional state of quail.

Olin is a probiotic preparation containing strains of *Bacillus subtilis* and *Bacillus licheniformis*.

2. Material and methods

The object of research is the quail of the Pharaoh breed.

Three groups of quails of daily age, 100 animals each.

Quail from the control group were grown on a ration accepted on the farm.

The birds of the first experimental group was additionally fed by olin probiotic at a dose of 1 kg per ton of feed for weekly courses.

Quail of the second experimental group used probiotic throughout the growing period.

The duration of the experiment was 42 days.

At 42 days of age, poultry was slaughtered and blood was taken for laboratory tests. We studied humoral (bactericidal, lysozyme, beta-lytic activity of blood serum) and cellular (phagocytic activity and phagocytic leukocyte index) factors of the natural resistance of the quail’s body [9].

The morphological composition of the blood (the number of leukocytes, red blood cells, platelets, hemoglobin) was determined on a PCE-90Vet automatic hematology analyzer. A blood biochemical analysis was carried out on a Stat Fax 190 biochemical analyzer. The contents of calcium and phosphorus, aspartate aminotransferase (AST), alanine aminotransferase (ALT), total protein, glucose, and cholesterol were determined according to the approved standard methods.

A quail safety record was kept daily.

3. Research results

Figure 1 presents the results of the morphological composition of the quail blood. Studies were carried out on 25 quails in each group.

The confidence is $p < 0.05$.

![Figure 1. Morphological composition of quail blood.](image_url)
Under the influence of a probiotic, the quail of the experimental groups showed an increase in the number of red blood cells in the peripheral blood by 5.1-5.8%, and also in hemoglobin by 6.1-7.0%. On the part of the white blood cell and platelet count changes between representatives of the control and experimental groups have not been established (figure 1). The importance of maintaining the homeostasis of animals and birds is given to factors of natural resistance.

The quail of the first experimental group exceeded the birds from the control group in terms of serum lysozyme activity by 12.7% (p <0.05), by bactericidal activity of blood serum by 7.3% (p <0.05), and phagocytic activity of blood leukocytes by 7.7% (p <0.05), leukocyte phagocytic index – by 4.2%. Similar changes were observed in quails of the second experimental group. At the same time, the beta-lactic activity changed insignificantly (figures 2, 3).

In the blood of quail of the control group, the total protein content was 33.2 ± 1.8 g/l, which is 5.5% (p<0.05) less than in the birds of the first experimental group and 8.8% (p <0.01) less than in quail of the second experimental group (figure 4).

There was an increase in glucose in blood of quail, to which a probiotic was used. So, the representatives of the first experimental group had a glucose content of 10.5 ± 0.5 mmol/l, which is...
12.7% (p <0.01) more than that of peers from the control group. The glucose content in the blood of quail of the second experimental group exceeded the control values by 13.9% (p <0.01) (figure 4).

The content of transamination enzymes changed slightly. During the scientific and economic experiment, we observed a significant decrease in the blood of quail of the experimental groups in the amount of cholesterol by 8.3% and 6.5%, respectively (figure 4).

Along with protein and carbohydrate metabolism, the mineral metabolism of experimental birds has also improved. The quail of the first experimental group in terms of the amount of calcium in the blood exceeded representatives from the control group by 4.9%, and the second experimental group by 3.9%. The amount of phosphorus in quail of the first experimental group increased by 7.7% (p <0.05), the second – by 8.5% (p <0.01) (figure 5).

Improving metabolism and increasing indicators of natural resistance led to an increase in the preservation of quails of the experimental groups. So, in the first experimental group the safety of the birds was 98%, which is 5.1% more than in the control, in the second experimental group it is higher by 4.0% (figure 6).
4. Conclusion
The studies carried out during the scientific and economic experience convincingly confirmed the positive effect of olin on the functional state of the body of the quail of the Pharaoh breed. The results of the research indicate that quail of the experimental groups, under the influence of olin, had a significant improvement in the morphological composition of the blood, increase in natural resistance, and normalization of metabolism, which probably contributed to an increase in the safety of the quail population (in these groups) by 4.0–5.1%.

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