Effect of a lithium-containing pharmacological agent on the biochemical blood parameters of broiler chickens during the development of technological stress

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Abstract. The article analyzes the results of the effect of the anti-stress feed additive PIK-antistress on the biochemical composition of the blood serum of broiler chickens during slaughter. The obtained results showed that the used feed additive did not have a negative effect on metabolism and energy, such as - protein, carbohydrate, mineral; the total amount of protein in the blood serum increases by 5.3-7.5%, mainly due to an increase in globulin fractions; the amount of total calcium and inorganic phosphorus increases by 19.3% and 5.0-5.8%, respectively, while the level of alkaline phosphatase becomes lower - by 18.0%.

1. Introduction

V.I. Fisinin et al. note that "... in the process of industrial keeping of birds, various stresses arise, which play a negative role in reducing productivity and cause the development of a number of diseases ... " [1-2]. According to S.I. Plyaschenko, V.T. Sidorova, A.Sh. Kavtarashvili, T.N. Kolokolnikova "... the intensification of agricultural production is associated with the effect on the body of various stress factors, which, depending on the strength and duration of stress, the nature, type and purpose of animals, their physiological state, can lead to negative consequences ...". K.S. Ostrenko, V.P. Galochkina, V.A. Galochkin note that "... the bird's organism responds to the negative influence of exogenous factors with a natural reaction, which is called stress or adaptation syndrome. Such a reaction is needed to ensure the coordinated work of all physiological systems and the mobilization of the body's protective properties, and in turn, this reaction is short-lived and can lead to exhaustion and loss of productivity ... " [4]. In addition, it is practically impossible to completely eliminate the impact of stressors in industrial conditions, therefore, recently, the development of methods for preventing stress is relevant [5-6]. One of the methods of stress prevention is pharmacological prophylaxis, which allows the poultry organism to be prepared for the effects of exogenous factors, which further contributes to an increase in poultry resistance and productivity [5]. In this regard, for pharmacological prophylaxis, an anti-stress feed additive was used, which is a complex of components that provide a high stress-protective, antioxidant effect and influence on the metabolic processes of the body under industrial stress. Against the background of the use of the feed additive PIK-antistress, an analysis of the biochemical composition of the blood serum of broiler chickens during the slaughter process was carried out.
2. Materials and methods
The study was carried out in an industrial type poultry farm in an experimental building with floor broilers. According to the technological cycle, the feeding time for broilers is 38 days. For the experiment, 3 groups of clinically healthy broiler chickens of the final hybrid of the Arbor Acres [8] cross were formed, 6,000 heads each: the first group was the control, the second group was 1 experimental, the third group was 2 experimental. The first group - the control group, received a complete feed, the second - the experimental group received a complete feed additive with a feed additive PIK - antistress at a dose of 1269 g per 1 ton of feed 5 days before slaughter (1 experimental), the third - an experimental group, received a feed additive PIK - antistress and L - carnitine at a dosage of 1693 g per 1 ton of feed 5 days before slaughter (2 experimental). In a feed mill, the feed additive was included in the final compound feed. On the 38th day, broiler chickens were slaughtered.

3. Results
During the experiment, an analysis of the biochemical composition of blood serum was carried out (figure 1).

![Figure 1. Biochemical composition of blood serum of broiler chickens of the studied groups, in relation to control, %.

| Parameter                  | Control | 1 Experienced | 2 Experienced |
|----------------------------|---------|---------------|---------------|
| Total protein, g/l         | 32.14   | 34.74         | 33.94         |
| Albumin, %                 | 41.01   | 47.37         |               |
| α-globulins, %             | 9.59    | 11.46         | 9.08          |
| β-globulins, %             | 14.01   | 13.69         | 13.02         |
| γ-globulins, %             | 30.59   | 33.82 **      | 30.51         |
| Urea, mmol/l               | 2.38    | 2.18          | 1.7 **        |
| AsAT, Mmol/l/hour          | 2.62    | 2.96          | 2.58          |
| Creatinine, μmol/l         | 20.68   | 22.64         | 25.12 **      |
When analyzing the collected data characterizing protein metabolism, it was revealed that the inclusion of an anti-stress feed additive in the final compound feed of chickens from the experimental groups led to an increase in the concentration of total protein in the blood serum by -5.3 ... 7.5%, when analyzing protein fractions, in the 1st experimental group there was a significant decrease in albumin by - 10.4%, in the 2nd experimental group this indicator increased by 3.4%, the content of γ-globulins increased by - 0.3 ... 9.6%, α-globulins by - 5 ... 16.3%, and β-globulins in the experimental groups had a tendency to decrease by - 2.3 ... 7.1%. The serum content of the AST enzyme in the 1st experimental group increases by 11.4%, while in the 2nd experimental group it decreases by 1.5%. The main end product of protein breakdown is urea. Studies of this indicator indicated its significant decrease in the experimental groups by - 8.4 ... 28.6%, which may indicate some liver damage. Creatinine, like urea, belongs to decay products, its study revealed an increase in the value of the indicator in the experimental groups by - 8.7 ... 17.7%, this indicates that renal function is not impaired (figure 2).

![Figure 2](image-url)

**Figure 2.** Biochemical parameters of blood serum of broiler chickens of the studied groups, characterizing carbohydrate and lipid metabolism, in relation to control, %.

The study of biochemical indicators, such as glucose, cholesterol, which characterize metabolism - carbohydrate, lipid, showed the following: glucose in the experimental groups decreased by 3.7 ... 11.0%, which indicates a decrease in energy metabolism, cholesterol levels, and had a tendency to decrease and amounted to 17.3%, which indicates the normal course of processes in the liver.

Indicators of mineral metabolism in experimental groups of chickens indicate a significant increase in the amount of total calcium by 19.3%, the amount of inorganic phosphorus in relation to the control, also tended to increase by 5.0 ... 5.8%. The growth of calcium and phosphorus indicates the normal course of processes in the musculoskeletal system. At the same time, the level of alkaline phosphatase in the chickens of the experimental groups was reduced by 18.0% in relation to the control.

**4. Discussion**

Analysis of the biochemical composition of the blood serum of the chickens of the experimental groups when using the PIK-antistress feed additive in the final compound feed showed that an increase
in the concentration of total protein occurs mainly due to an increase in globulin fractions, which indicates an increase in the protective properties of the body and is a sign of better transport of lipids and hormones, minerals to tissues and organs. The analysis of the composition of globulins in the blood serum revealed a pattern of increasing $\gamma$-globulins, $\alpha$-globulins and a decrease in $\beta$-globulins. An increase in experimental group 1 and a decrease in experimental group 2 of the AST enzyme involved in protein synthesis is consistent with the total protein content in blood serum. The final product of protein breakdown is urea, a significant decrease in this indicator in the experimental groups by - 8.4 ... 28.6 %, may indicate some liver damage. Creatinine, like urea, belongs to decay products, its study revealed an increase in the value of the indicator in the experimental groups by - 8.7 ... 17.7%, this indicates that renal function is not impaired.

The study of biochemical parameters of blood serum, characterizing carbohydrate and lipid metabolism, showed that the glucose level in the experimental groups is lower than in the control, which, in our opinion, is associated with the stress-protective and antioxidant effects of the PIK-antistress feed additive [7].

Changes in the values characterizing mineral metabolism indicate a normal course of processes in the musculoskeletal system, while a decrease in the level of alkaline phosphatase indicates a normal course of calcium-phosphorus metabolism in chickens from the experimental groups.

5. Conclusion

Based on the analysis of the data obtained during the experiment, the following conclusions were made:

- The use of an anti-stress feed additive in the final compound feed does not have a negative effect on the course of metabolism, such as protein, carbohydrate, mineral, which is confirmed by the analysis of the biochemical composition of blood serum;
- The total amount of protein in the blood serum increases by 5.3-7.5%, mainly due to an increase in globulin fractions; the amount of total calcium and inorganic phosphorus increases by 19.3% and 5.0%, respectively, while the level of alkaline phosphatase becomes lower - by 18.0%;
- Data from the analysis of the biochemical composition of blood serum vary within the framework of the physiological norm, and indicates that no pathological changes occur in the systems and apparatus of the organs of broiler chickens.

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