

A Study of the Pharmacodynamic Effects of a Complex Hepatoprotector on Broiler Chickens

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Abstract

Studies on the pharmacological activity of a complex hepatoprotective preparation on day-old broiler chickens have been carried out. The positive effect of the preparation on the clinical condition, safety and weight gain of the experimental poultry was determined. Pharmacodynamics of the preparation is characterized by a complex of biological effects, manifested by activation of protein-synthesizing, energy and enzyme-forming functions of liver, strengthening metabolic processes and improving the homeostasis of blood of broiler chickens.

Keywords: broiler chickens, hepatoprotector, pharmacodynamics, blood, biochemistry, liver

INTRODUCTION

In modern conditions of development of cattle breeding and poultry farming, great attention is paid to the possibilities of increasing of agricultural production while improving the technology of feeding and keeping animals and poultry [1,2].

However, as the productivity of animals and the intensity of their use increase, the risk of a mismatch between the physiological capabilities of the organism and the actual conditions of their life-support function increases, which leads to disruption of metabolic processes and to development of negative consequences in the functional activity of animal organs and systems. Such metabolic disorders become a trigger mechanism for the emergence of a number of diseases, one of which is a disease of the hepatobiliary system [3,4].

There is a large number of etiological factors and conditions for the emergence of hepatopathies, however, the mechanisms of the appearance and development of pathological processes in it, as a rule, are the same and lead to changes in the morphofunctional properties of liver cells and to a decrease in the processes of biological synthesis [5,6].

In industrial poultry farming with a high load on the poultry organism even minor disturbances in metabolic processes lead to persistent, sometimes irreversible, disruptions in the functional activity of liver cells.

The solution of this problem can be complex polyfunctional preparations that improve metabolic processes in the liver, increase its resistance to pathogenic influences, contribute to the restoration of the body's homeostasis, and also stimulate the reparative and regenerative processes in hepatocytes of the liver [7-9].

An important feature of modern therapeutic means is their ability to exhibit a wide range of pharmacological activity, which is measured by dynamic changes in a body.

In this connection, the aim of the research was to study the pharmacodynamic effects of a new preparation, which includes natural aluminosilicate minerals from the montmorillonite group, detoxifying sulfur-containing mean and a bioflavonoid from the Rosaceae family (*Rosaceae*).

METHODOLOGY OF RESEARCH

Pharmacological activity of the preparation was studied on one-day intact broiler chickens of cross ROSS 308, formed into three groups of 100 chickens in each with an initial body weight of 35 ± 2 g. According to the experiment, the first group of chickens was fed with the main diet. Chickens of the second and third groups on the background of the ration used on the farm, daily received the study preparation in a dose of 1% and 2% of the weight of the feed.

The physiological condition of the chickens was evaluated by a dynamic change in the biochemical parameters of the

blood, including the determination of total protein, glucose, calcium and phosphorus. The functional activity of the liver was evaluated by the dynamics of changes in transaminases (AST and ALT). The growth intensity was evaluated by the weight characteristics of the body weight of broilers by comparing the weight of the entire number of experimental chickens with an interval of 7 days. Monitoring of the health of the experimental chickens was carried out by daily clinical observations. Biochemical tests were carried out on an automated analyzer Vitalab Flexor Junior with the help of ELITech Clinical Systems kits.

RESULTS

The average daily consumption of feed by the chickens, both in the control group and in the experimental group, was the same for the entire experiment. However, the inclusion in the diet of chickens of experimental group of the preparation in the studied dosages had a stimulating effect on their growth and development, revealing at the same time a certain dose-dependent dynamics of changes in body weight (the concept of "dose-effect").

Thus, the weight gain between the chickens of the first test group and the control analogs did not differ significantly throughout the experiment, on the basis of which it was concluded that the preparation at a dose of 1% to the weight of the feed had virtually no effect on the growth characteristics of experimental poultry. While in the second experimental group an increase in the average daily body weight gain of chickens by 2,3% was observed a week after the hepatoprotector was used. Then, starting from the 21st day, in the second experimental group there was a stable positive dynamics of the increase in body weight of the chickens, which lasts until the end of the fattening period and exceeds the control chickens index by 5,4%. So, the introduction of the preparation in a 2% dosage contributed to an increase in the elimination of nutrients from the feed into the intestines of the poultry due to the sorption properties of the latter, allowing to identify additional reserves for their growth and development.

At the same time, the studied preparation had a positive effect on the safety of the poultry, which is one of the important zootechnical parameters in poultry farming. The safety data show that on the 1st and 12th days of life two chickens died in the control group. The death of two more chickens was recorded on the 25th and 34th days. In the experimental groups the percentage of surviving chickens exceeded the control broilers by 2% for each group by the end of the test period, accounting 98% versus 96% of control (in the first group the mortality was noted on the 10th and 28th days of life, in the second group it was noted on the 1st and 18th days of life).

Analysis of the results of a biochemical study of blood serum found out that feeding the preparation to broiler chickens had a significant effect on a number of indicators. The level of protein metabolism showed a positive dynamics of increase in the

concentration of total protein in the blood serum of all chickens with a significant advantage in the experimental groups.

Thus, in the control group the level of total protein during the experiment increased by 32,9% relative to background values. While in the experimental groups this indicator reached the level of 59,1% (I experimental group) and 55,9% (II experimental group). However, it should be noted that the dynamic changes in the protein exchange of poultry occurred unevenly. In the first two weeks of the fattening period the maximum concentrations of total protein were detected in the control group of chickens and amounted to 11,0% of the initial (background) indices. While in the experimental groups the level of protein metabolism was less pronounced, increasing to 4,0% and 8,3% to the background.

But by the end of the research the picture has changed significantly. From the third week of life, the protein metabolism index of the poultry receiving the preparation was noticeably higher, reaching an increase in the total protein concentration in the first test group by 52,7%, in the second test group an increase by 44,0% vs. 19,8% of the values of control chickens ($P \leq 0.05$) with a priority of 32,9% and 24,2% of control, respectively. Thus, the use of the preparation promoted the activation of the protein exchange of chickens, which was confirmed by the more dynamic development of the poultry in the experimental groups relative to the control analogs.

On the level of glucose the noted picture was different from the dynamics of protein metabolism. At the beginning of the research the experimental chickens of all groups had a high level of energy supply with a tendency for dynamic growth. However, by the end of the experiment, the concentration of glucose in the blood of chickens decreased significantly, having manifested itself the most pronounced in control. The decrease was 34,6%, against 21,3% and 22,4% in the experimental groups. So, the introduction of the preparation into the rations of the chickens promoted more efficient and careful expenditure of the organism's energy expenditures on the life support of the poultry. In addition, a similar effect may indicate the improvement in the functional activity of liver cells and activation of synthesis-forming processes in it.

In mineral metabolism in the second experimental group by the end of the study was set at an unreliable increase in calcium and phosphorus (at the trend level) on average by 3,8% relative to the chickens of the control group and the first test group. And, if according to the level of total calcium, biochemical indicators in all groups were in reference values throughout the life of the chickens, the concentration of phosphorus in the blood serum

of chickens was within the norm only for the period of background studies.

Certain changes in the biochemical homeostasis of the blood of the experimental chickens were also revealed by the level of enzymatic activity of aspartate aminotransferase. AST in the control group increased by 9,1% by the 15th day of the study, and increased by 11,3% by the 39th day. While in the experimental groups the following regularity manifested itself: an increase in enzyme activity by two weeks on 9,5% and 12,7%, followed by a dynamic decrease on 12,8% and 21,1%, respectively. In the parameters of alanine aminotransferase, no significant changes were noted.

CONCLUSION

Thus, conducted studies have shown that the complex hepatoprotective preparation has a pronounced pharmacological activity, having a significant effect on the growth energy of broiler chickens and their safety, as well as biochemical blood indices. Its use helps to improve the liver function and reduce the toxic load on hepatocytes, which is manifested by increased metabolic processes in the body of the poultry.

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