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# ON THE USE OF DIHYDROQUERCETIN FLAVIT AND ITS MIXTURE WITH PROBIOTIC IN BROILER GROWING

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Summary. Dihydroquercetin had a positive effect on viability, growth dynamics, development of morphological structures of the intestine, and in combination with a probiotic on microbiocenosis, the level of phagocytosis, had a therapeutic effect in toxic dystrophy in broiler chickens.

Key words: dihydroquercetin, microbiocenosis, probiotic, phagocytosis, morphological structures, toxic dyspepsia.

summary. Dihydroquercetin "Flavio" had a positive impact on the viability, growth dynamics, the development of morphological structures of the intestine and mixed with a probiotic on microbiocenosis, the level of phagocytosis had a heating effect on dystrophy of broiler chickens.

Key words: dihydroquercetin, microbiocenosis, probiotic, phagocytosis, morphological structures, toxic dystrophy.

## INTRODUCTION

Modern premixes for poultry contain antioxidants, enzymes, adsorbents and stimulants of intestinal microflora as part of additional components, which is due to the spread of diarrheal diseases, mycotoxicosis, complicated by free radical pathology.

The development of free radical (peroxide) oxidation in animal tissues disrupts the structure of membranes, reduces the overall resistance of the organism, creating a prepathological state. A decrease in immunoresistance leads to the development of infectious diseases. Free radical pathology according to



A.I. Zhuravleva [1] reduces the activity of vaccine prophylaxis and treatment with antibacterial agents.

R.S. Shemet [6] believes that the cause of free radical pathologies in industrial poultry farming is the feeding of compound feeds with high peroxide values of fat. I.V. Nasonov, B.Ya. Birman et al. [2] experimentally confirmed that feeding highly oxidized fats to poultry causes a decrease in poultry resistance to experimental infection with the IBD virus.

The problem of pathologies in young animals associated with the activation of free radical oxidation processes in the body and, in particular, lipid peroxidation (LPO) is relevant. It is known that microcirculation disorders and vascular pathology play a certain role in the development of inflammation of the digestive organs. Under conditions of oxidative stress, the cytotoxic activity of LPO is activated, which occurs according to A.G. Shakhova [5] in intestinal infectious diseases.

According to A.P. Novitsky [3] during long-term storage of feed and feed mixtures in them, under the influence of air, humidity, heat and light, oxidation processes are intensified, which leads to the destruction of nutrients, especially fats and fat-soluble vitamins. Feeding poor-quality feed to fur-bearing animals leads to a decrease in the reproductive capacity of females, a significant waste of young animals, a slowdown in their growth, and a deterioration in the quality of the skins.

One of the ways to prevent and suppress the process of oxidation in feed is to increase the antioxidant activity by introducing an antioxidant. Currently, in animal husbandry, more and more attention is paid to synthetic antioxidants. According to TU 9296-002-00479592-2000, it is allowed to use the following synthetic oxidizing agents on feed mixtures for enrichment of animal feed: santochin, butylated hydroxytoluene, agidol.

At present, according to the data of domestic scientists V.V. Fateeva [7], A.P. Novitsky [3] and foreign S.Radcheva, V. Sredkova et al. [4], Ruckerbrusch et al.[8], K.Sahin, O.Kucuk [9]; PF Surai, JE Dvorska [10] a leading antioxidant in poultry farming and neutralizing elevated concentrations
animal husbandry tocopherol,
creatinine kinase, formed as a result of stress.

One of the leading antioxidants in the world is dihydroquercetin (DHA), which ensures human vital activity and resistance to various pathologies. In many countries, scientists have developed natural antioxidants from plants (grapes, eucalyptus, Japanese sakura, rose petals). In 2005, a team of scientists patented the technology for the production of DHA Flavit from Siberian pine.

The purpose of the work: to establish the effect of different doses of dehydroquercetin (DHA) mixed with a bifidus-containing probiotic on the growth dynamics of broiler chickens of the Ross cross, hematological parameters, phagocytosis activity, colonic microbial ecology, morphometric

The chickens were fed with mixed fodder of different brands. In the first 10 days of life - "zero", during the second decade - "growth", during the third decade - "finish". Feed conversion was determined by the ratio of feed consumed to chick growth.

The clinical condition of chickens was determined by daily inspection. The effect of DHA and its combined use with a liquid probiotic based on bifidobacteria of the species Bifidobacterium gallinarum strain GB on safety, growth dynamics, and feed conversion was studied on broiler chickens in an unregulated microclimate. Experimental and control groups consisted of 40 chickens.

The experimental groups of the second and third DHA were prescribed at a dose of 1 and 0.5 mg/kg of body weight once a day with drinking water. The fourth group received a probiotic with drinking water 0.1 g per head and DHA at a dose of 1 mg per 1 kg of live weight. The fifth group received a probiotic and DHA at a dose of 0.5 mg/kg of body weight. Chickens of the sixth group were prescribed only a probiotic.



The first group consisted of intact chickens, they received the main food.
diet. DHA and probiotic were administered to chickens in the first decade of life.

At the age of 10, 20, 30 days, the chickens were weighed, the safety was noted.

At the age of 35 days, blood was taken from the chickens of the experimental and control groups by heart puncture, stabilized with heparin, and the number of leukocytes, erythrocytes, hemoglobin, total protein, erythrocyte sedimentation rate, hematocrit, percentage of lymphocytes, pseudoeosinophils were determined by conventional methods.

The level of phagocytosis in experimental and control chickens was studied in the opsonophagocytic parameters of the esophagus, goiter, muscular, glandular stomachs, different parts of the intestine, and the therapeutic efficacy of DHA in toxic dystrophy.

## MATERIALS AND RESEARCH METHODS

Morphometric studies included the determination of the mass, length and diameter of the esophagus, including goiter, muscular, glandular stomachs, duodenum, jejunum, ileum, caecum, rectum.

The state of colonic microbiocenosis was studied by determining the structure and amount of indigenous and facultative microflora, by inoculating different dilutions of the contents on elective media for the isolation of bifidobacteria, lactic acid
streptococci and rods, escherichia, enterococci, hemolytic staphylococci and putrefactive bacilli, opportunistic enterobacteria, fungi.

All digital data obtained as a result of the experiments were processed statistically in order to determine the criterion for the reliability of arithmetic averages.

Research results and discussion. In conditions of unregulated microclimate during the period of drinking drugs, indicators of the growth dynamics of chickens

experimental and control groups were the same, the established advantage in the live weight of the experimental chickens of the third, fourth and fifth and sixth groups was not statistically confirmed. All chickens were clinically healthy, actively consumed feed, and the safety was 100%. Feed conversion in intact and chickens of the second, fourth experimental groups was the highest 1.31, and in the third, fifth and sixth was 1.29.

The increase in live weight in the experimental groups should have had a positive effect on the growth dynamics of chickens in the future. Table 1 - Scheme of experience

| Groups Experience Conditions | Number of heads | |
|---|---|---|
| 1 intact OR | 40 40 40 | |
| 2 OR + DHA at a dose of 1 mg per 1 kg of live weight | 40 40 40 | |
| 3 OR + DHA at a dose of 0.5 mg per 1 kg of live weight | | |
| 4 OR + probiotic + DHA at a dose of 1 mg per 1 kg of body weight | | |
| 5 OR + probiotic at a dose of 0.5 mg per 1 kg of live weight | | |
| | | OP + probiotic. |

6 In the second decade of life, DHA was not used for chickens, however, the body weight of broilers of the third group, which received DHA at a dose of 0.5 mg/kg in the first decade, exceeded the control values, which was confirmed statistically. The percentage of live weight increase compared to control was 7.6, and the average daily gain was 9.5.

Positive growth dynamics: an increase in live weight by 9.3%, an increase in average daily gain by 12.95%, which was statistically confirmed, was noted in the fourth group, which received probiotic and DHA at a dose of 1 mg/kg in a mixture with a probiotic in the first decade, which formed necessary parameter of homeostasis - intestinal microbiocenosis and neutralized peroxide compounds. The growth rates of chickens of the fifth group corresponded to the parameters of the third group and statistically significantly exceeded the growth rates of the control group. Drinking the probiotic also provided positive growth dynamics, the percentage of live weight increase was 3.7, and the average daily gain was 4.8.



The best results of the growth dynamics of experimental chickens of the third, fourth and fifth groups can be justified by the inhibition of peroxide compounds in response to stress in chickens against the background of an unregulated microclimate. The safety of the experimental and control chickens was unchanged and amounted to 100%.

The active growth of chickens was during the third decade, indicating the stimulating effect of DHA at a dose of 0.5 mg per 1 kg of live weight, a probiotic and a mixture of DHA with a probiotic. The percentage of increase in live weight to control in these groups (third, fifth and sixth) ranged from 8.4 to 9.8%, which was confirmed statistically. The percentage increase in the average daily gain from 6.03 to 10.02. The best indicators of growth dynamics over the period of experience were established in the group that received the probiotic. The growth activity of chickens under the influence of DHA at a dose of 1 mg per 1 kg of live weight and mixed with a probiotic has not been statistically confirmed.

The best feed digestibility was in the group that received the probiotic (conversion 2.01), in the other experimental groups it was almost the same (conversion - 2.06). In the control group, the digestibility of the feed was lower, the conversion was 2.14.

In order to confirm the mechanism of the growth-stimulating action of the tested preparations, we conducted a comprehensive analysis of the main parameters of homeostasis: hematological parameters, the level of phagocytosis, the state of the microbial ecology of the caecum of experimental and control chickens.

Hematological parameters of experimental and control chickens at the age of 35 days had no significant differences. The hematocrit index did not correspond to the norm and was characterized by low values. Below the norm was the amount of protein in the blood plasma of chickens of the third group. The amount of hemoglobin, leukocytes, erythrocytes

corresponded to the low norms. ESR in the control chickens and in the experimental second and sixth groups was slow, but within the normative limits.

The effect of DHA on immunological reactivity was studied at the level of phagocytosis indices. According to the phagocytic index of blood, the experimental chickens were superior to the control ones, but the differences in these indicators were not significant. The reliability of differences in the phagocytic number was not confirmed statistically.

Table 2 - Indicators of phagocytosis of experimental and control chickens (M ± m)

| Group | FI, % | HF | Absolute number of phagocytes. pseudoeos., thousand 109 l | Bactericidal blood capacity, thousand |
|---|---|---|---|---|
| | 30.97±4.68 2.04±0.64 35.6±1.24; | | 2.63±0.31 | 5.51±2.16 109 l |
| 12 | ÿ>0.1 1.57±0.26; ÿ>0.1 36.1±2.16; | | 2.83±0.32; ÿ>0.1 4.6±1.25; ÿ>0.1 | |
| 3 | ÿ>0.1 2.45±0.09; ÿ>0.1 36.1±1.96; | | 3.45±0.61; ÿ>0.1 8.54±1.77; ÿ>0.1 | |
| 4 | ÿ>0.1 3.02±0.23; ÿ>0.1 34.03±1.09; | | 4.54±0.24; ÿ<0.05 13.77±1.72; p<0.05 | |
| 5 | ÿ>0.1 2.61±0.16; ÿ>0.1 36.6±1.4; ÿ>0.1 | | 3.47±0.32; ÿ<0.05 14.02±0.87; P<0.05 | |
| 6 | 2.13±0.4; ÿ>0.1 | | 3.6±0.05; ÿ<0.05 7.72±1.44; ÿ>0.1 | |

The indicators of the absolute number of phagocytic pseudoeosinophils, bactericidal blood capacity in chickens of the fourth and fifth groups treated with DHA mixed with a probiotic significantly exceeded those of control chickens, which corresponds to the position on the advisability of using antioxidants to increase the immunogenicity of biological preparations [5].

Despite the growth-stimulating and protective effect of the probiotic, its effect on phagocytosis was to increase the absolute number of phagocytic pseudoeosinophils, which exceeded the statistical control indicators. The combined use of the probiotic with DHA, both at a dose of 0.5 mg/kg and 1 mg/kg, activated the bactericidal capacity of the blood, providing a protective effect.



Intestinal microbiocenosis in control and experimental chickens was not formed according to the component of indigenous microflora due to the lack of the proper quantitative level of lactobacilli, therefore, an increased
the number of fungi from the genus Candida (6.17±0.91; P<0.05), statistically confirmed, and hemolytic putrefactive bacilli, which indicated the possible development of dysbacteriosis.

Indigenous microbiocenosis of the group that received DHA at a dose of 1 mg/kg was represented only by Escherichia, the proper amount of lactobacilli and bifidobacteria was not established, so their growth dynamics did not differ from the control indicators. In the structure of the obligate microflora of the group that received DHA at a dose of 0.5 mg/kg, there was no proper density of lactobacilli, however, an undigenic microbiocenosis was formed by the component of Escherichia and bifidobacteria, and therefore this group had an active growth dynamics.

A complete microbiocenosis, the main indicator of homeostasis of young birds, was formed in groups fed with a probiotic and a mixture of a probiotic and DHA, which ensured 100% safety, phagocytosis activity, and a growth-stimulating effect.

Morphometric studies included determining the mass, length and diameter of the esophagus, including goiter, muscular, glandular stomachs, duodenum, jejunum, ileum, caecum, rectum.

Drinking DHA and in combination with a probiotic did not affect the morphometric parameters of the esophagus, goiter, muscular and glandular stomachs. The established difference in the mass of these organs, their length and diameter was not confirmed.

statistically.

Table 3 - Morphometric parameters of the jejunum of experimental and control chickens (M ± m, P)

| Groups | Weight, g | Length (L), cm | Diameter (D), cm |
|---|---|---|---|

| | | | |
|---|---|---|---|
| | 17±2.6 96.3±6.43 21±2.9; ÿ>0.5 | | 0.6±0.04 |
| 1 | 123.2±7.9; ÿ<0.05 19±2.1 109.3±6.54; ÿ<0.05 | | 1.1±0.7; ÿ>0.5 |
| 2 | 20±2.6; ÿ>0.5 104±12.6; ÿ>0.05 126±2.13.7; | | 0.9±0.05; ÿ>0.5 |
| 3 | ÿ>0.5 22±1.6; ÿ<0.05 107.6±10.5; ÿ>0.05 | | 1±0.06; ÿ>0.1 |
| 4 | morphometric parameters of the duodenum, | jejunum, ileum, | 0.9±0.07; ÿ>0.5 |
| 5 6 | caecum, rectum indicated a statistically | significant increase | 1±0.08; ÿ>0.5 |

in the mass and length of the jejunum in some groups of experimental chickens. There were no significant differences in the diameter of the jejunum in chickens from the control and experimental groups. The use of the probiotic contributed to a significant increase in the mass and length of the jejunum. The use of a mixture with DHA at a dose of 0.5 mg/kg and a probiotic contributed to a significant increase in the mass of the jejunum. A significant increase in the length of the jejunum was found in groups of chickens treated with DHA.

A comprehensive analysis of the leading parameters of homeostasis in chickens under the influence of DHA testified to the expediency of testing its therapeutic efficacy in toxic dystrophy in chickens. R.S. Shemet [6] noted the therapeutic effect of vitamin E as an antioxidant in toxic dystrophy in young and adult chickens, as well as the use of ascorbic acid and sorbents.

The therapeutic efficacy of DHA at a dose of 0.5 mg/kg of live weight and its mixture with a probiotic was studied in three groups of chickens, 20 heads each, from batches in which toxic dystrophy was the cause of death. The first group of sick chickens was given ascorbic acid to drink, a sorbent, polysorb, was added to the feed (control group). The second was DHA, the third was a mixture of DHA and a probiotic. The duration of treatment was 5 days, the patients were followed up for another 5 days. Table 4 - Results of treatment of toxic dystrophy in chickens



| Periods | Groups, number of dead | | |
|---|---|---|---|
| | Control Second, | DHA Third, DHA and Probiotic | |
| Therapeutic | ten | | 4 |
| Observations | | 6 | 0 |
| % of deaths | 5 | 0 | 20 |
| Survival, % | 75 25 | 30 70 | 80 |

Drinking DHA at a dose of 0.5 mg/kg for five days had a therapeutic effect. The number of deaths during the treatment period was 30%, and the effectiveness of treatment was 70%. With the combined use of DHA and a probiotic, the death toll is 20%, the effectiveness of treatment is 80%. Whereas the use of polysorb and ascorbic acid for 5 days protected only 25% of sick chickens from death, and the death toll was 75%. Positive results of treatment indicate the important etiological significance of free radical oxidation and the possibility of its inhibition by DHA. The combined drinking of DHA and a probiotic enhanced the therapeutic effect by suppressing the facultative microflora and relieving inflammation of the gastrointestinal mucosa.

## FINDINGS

The use of DHA at a dose of 0.5 mg/kg of live weight during the first decade of life significantly stimulated the growth of chickens, the percentage of increase in live weight compared to the control was 8.4, the average daily gain was 8.6, and ensured 100% safety. Drinking DHA did not affect hematological parameters, the level of phagocytosis, did not prevent the formation of microbiocenosis, contributed to a significant increase in the length of the jejunum, which increased the absorption of nutrients and reduced feed conversion. The use of DHA was inferior to the growth-stimulating activity of the bifid-containing probiotic, which forms a complete microbiocenosis according to the bifidobacteria component, which activates the growth of the jejunum.

The combined use of DHA and a probiotic at a dose of 0.5 mg/kg stimulated the growth of broilers, the percentage of increase in live weight compared to the control was 8.7, and the average daily gain -8.8, did not have a negative effect on hematological parameters, activated the bactericidal capacity of the blood, the structure and the quantitative composition of the intestinal microbiocenosis, contributed to a significant increase in the mass of the jejunum.

Drinking DHA at a dose of 0.5 mg/kg for 5 days in chickens with toxic dystrophy had a therapeutic effect, the effectiveness of which was 70%, and when combined with a probiotic, 80%. BIBLIOGRAPHY

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