Сучасне птахівництво

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Performance, morphological and biochemical parameters of blood in broiler chickens under introduction of the acidifiers to the diet

Abstract. ***Presented indexes of morphological and biochemical composition of blood broiler chickens fed with a diet supplemented with acidifier ("FRA LBB DRY", 3 and 5 kg/ton feed). Additionally this improved morphological and biochemical parameters of blood in broiler chickens, including increased concentration of erythrocytes, hemoglobin and total protein, noticeably increased γ-globulin fraction of protein, decreasing cholesterol and intensified activity of aminotransferase.***

Keywords: *broiler chickens, acidifier, blood parameters*

Chicken broilers of modern crosses are characterized by high intensity of growth, especially in the first weeks of life, increasing initial live weight of 3.5–5 times. This requires extremely careful balancing of feed by the energy and all the essential nutrients and biologically active substances. To meet such requirements with the traditional feeds is problematic. The scientists are constantly searching for new more efficient feed components to replace those that have exhausted their biological potential, or is not desirable in poultry diets, such as antibiotics. Recent alternatives include known probiotics, prebiotics, enzymes, mananooligosaccharides, stimulators, antioxidants, tranquilizers, bacteriostatics etc. [4,6]. This list we you can add Acidifiers which are composed of various acids and their salts to support increased acidity in the stomach, which contributes to the release of stomach juice and pancreatic enzymes. This, in turn, improves digestion and assimilation of nutrients [3,5]. Additionally, the organic acids, contained in the acidifier, exhibit bactericidal effect, resulting in the significantly reduced content of pathogenic bacteria in gastrointestinal tract, increasing the area of absorption of nutrients, and ultimately, increased productivity of animals [7,8]. That's why using acidifiers as a natural stimulants of productivity can be considered as one of the priorities in animal feeding.

The purpose of the study is to investigate the effect of different doses Acidifier "FRA LBB DRY" in the fodder on

morphological and biochemical blood parameters of broiler chickens.

Methods. The experiments were carried out in vivarium of Bila Tserkva National Agrarian University. Three analog groups of broiler chickens cross "Cobb-500" were formed at age of 3 days with 46 birds in each group.

The first (control) group of broilers was fed with balanced complete feed according to the norms corresponding to age periods of growth. Chickens of the 2nd experimental group were fed with full-feed with addition of acidifier "FRA LBB DRY", at a dose of 3 kg/ton of feed, chickens of the 3rd experimental group received full-feed with addition of the acidifier at dose of 5 kg/t of feed.

Birds of all groups had free access to food. Nipple watering system was used to provide drinking water. The duration of daylight was 24 hours, with the light intensity of 5 lux. The room temperature was within the normal range throughout the period of the experiment.

Following data was recorded during the experiment: morphological and biochemical parameters of blood were recorded. Blood was collected and analyzed according to the established protocols [1].

The results were subjected to biometric processing by conventional methods [2].

Results. The results showed that the blood of chickens of experimental groups compared with control counterparts had higher number of red blood cells (Table).

The blood of chickens from the control group to contained 3.83 T/L, the blood of birds 2nd and 3rd research groups, respectively, 11.7 and 11.0% (P <0.05).

These data shows that the difference between the experimental groups in terms of the concentration of red blood groups of broilers was only 0.7%, which gives grounds to assert the similar impact of the Acidifiers at doses of 3 and 5 kg /t of feed.

A similar pattern was characteristic for hemoglobin concentration in the blood, which is a respiratory enzyme and provides oxygen transport from the lungs to the tissues and carbon dioxide from the tissues to the lungs. The chickens of the experimental groups dominated the control peers by this indicator by 7.9–8.4% (P<0.05).

The content of leukocytes in the blood of broilers was almost on the same level in control and experimental groups, indicating the absence of any abnormalities.

One of the important biochemical parameters of blood is the concentration of total protein in serum, which indicates the level of protein accessibility and digestibility. Our results showed that addition of the acidifier to the feed at a dose of 3 kg/t feed resulted in increased concentrations of total protein in the blood of chickens in the 2nd experimental group compared to the control by 7.9%. In the chickens of the 3rd experimental group receiving acidifier at a dose of 5 kg/t feed, the content of total protein in serum exceeded the control by 8.5% (P <0.05).

For the poultry it is very important not only the general level of the protein in the blood, but its fractional composition–albumin and globulins (α, β, and γ). As shown in Table, the studied doses of the acidifier resulted in increased content of albumin in the blood of chickens 2 and 3rd experimental groups compared with the control by 5.6–6.5%.

1. Indicators of broiler chickens blood at the end of the experiment (n = 4)

Indicator	Group		
	I (control)	II (experimental)	III (experimental)
Erythrocytes, T/L	3.83±0.10	4.28±0.09*	4.25±0.11*
Hemoglobin, g / L	84.10±1.1	90.76±1.6*	91.14± 1.1*
Leukocytes, g /L	29.32±0.52	28.82±0.65	29.01±0.44
Total protein, g/L	45.29±0.6	48.87±0.9*	49.13±1.2*
Albumin, g/L	21.42±1,2	22.63±1.1	22.82±0.7
Globulin g/L	23.87±1.2	26.24±0.9	26.31±1,1
α-globulins, g/L	7.68±0.5	7.87±0.4	8.06±0.6
β-globulins, g/L	6.16±1.0	6.37±0,8	6.29±0.7
γ-globulins, g/l	10.03±0.4	12.0±0.5*	11.96±0.5*
Glucose, mM/L	4.75±0,4	4.87±0.3	4.76±0.06
Calcium, mM/L	3.18±0.4	3.23±0.6	3.25±0.4
Inorganic phosphorus mM/L	2.17±0.11	2,22±0.27	2.21±0.19
Reserve alkalinity, vol.% CO2	49.7 ±1.1	52.5±1.5	51.9±0.8
Uric acid, mM/L	0.157±0.001	0.165±0.002*	0.169±0.001**
Creatinine, μM/ L	53.77±1,3	55.69±1.5	56.01±1.2
Cholesterol, mM / L	5.37±0.09	4.,87±0.05**	4.66±0.04**
AlAT, mM / h / L	0.289±0.02	0.306±0.08	0.313±0.03
AsAT, mM / h / L	0.97±0.02	1.11±0.03*	1.09±0.02*

*Note: * – P<0.05, ** – P<0.01*

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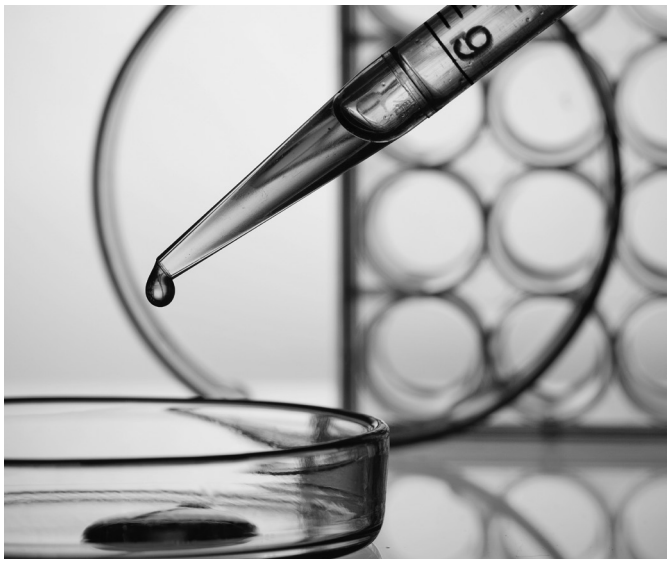
The same is true for globulin content in blood serum which did not demonstrated dependency on the dose of the acidifiers in the fodder, however in birds of experimental groups it was higher than in the control at 2.37–2.44 g/L or by 9.9–10.2%. As for the individual fractions of globulins, their levels in blood of broilers from experimental groups compared with control peers changed inadequately to the doses of acidifier. For example, the concentration of α-globulins in blood of chickens in the 2 and 3rd experimental groups differed from the control upward by only by 2.5-4.9%. As for the β-globulin, their content in the blood of chickens 2 and 3rd experimental group was higher than control by 3.4 and 2.1%. However, the acidifier clearly had positive impact on content in their blood γ-globulin. The content of γ-globulin in the chicken's serum in 2nd and 3rd research groups was significantly ($P<0.05$) higher than in the control, respectively, 19.6 and 19.5%. Because γ-globulins contain the bulk of antibodies (immunoglobulin) that provide humoral defenses their content in the serum describes morphological and functional maturity usefulness immunoreactive system chickens.

Given the fact that the main source of energy along with fats in the body of the bird are carbohydrates that are transformed into glucose, we investigated its level in the blood serum of experimental chickens. As it turned out, the introduction of the acidifiers to feed at different doses did not significantly affect blood levels of glucose.

The level of acid-base balance (the ratio of hydrogen and hydroxyl ions) in the body of broilers was estimated by the blood alkaline reserve of its plasma. The analysis demonstrated that the alkaline reserve of blood in experimental chickens of all groups, regardless of dose Acidifiers in feed was within the physiological norm — about 49.7% CO_2 in control against about 51,9-52,5% CO_2 in broilers of experimental groups

We analyzed the blood plasma of test chickens for the presence of uric acid, which accounts for 70% of total nitrogen urine. The analyses have shown that the concentration of uric acid in the blood of chickens from experimental groups clearly increased with the addition of the acidifiers to the feed. The blood from birds in control group contained 0.157 mmol/L of uric acid, in chickens of 2nd experimental group by 5.1% ($P <0.05$) more, and 3rd by 7.6% ($P <0.01$) more.



Creatine, which is synthesized primarily in the liver is known to plays an important role in the energy metabolism in muscle and other tissues of broiler. Getting in muscle tissue, creatine is phosphorylated to creatinine, which is involved in the transport of energy in the cell between mitochondria and myofibrils. In our studies the metabolism of creatine was judged in terms of the concentration of creatinine in serum, which is the end product of creatine splitting. The results show that investigated levels of the acidifier contributed to the increase of creatinine concentration in blood of broilers 2nd and 3rd experimental groups compared with control, respectively by 3.6 and 4.2%, indicating a better supply of muscle tissue with the energy.

Cholesterol is one of the metabolites of fat metabolism in the body of the bird. An increased level of cholesterol in poultry products is of concern to people because it is associated with atherosclerosis. Our analysis has shown that introducing of the acidifier to feed led to the reduction of the concentration of cholesterol in the blood of chickens adequate to the doses of the acidifier. The blood levels of cholesterol in control birds was 5.37 mmol/L, in experimental groups it was lower by 10.3 and 15.2% ($P <0.01$) in 2nd and 3rd group accordingly.

We determined alanine aminotransferase (ALT) and aspartate aminotransferase (AST). Somewhat higher enzyme activity occurred at higher doses of the acidifier in the fodder — 5 kg/t.

Therefore, the analysis of the morphological and biochemical parameters of blood indicates mainly positive impact of the acidifier on protein, carbohydrate, fat and mineral metabolism and some enzyme the status of the body of broiler chickens. This in turn contributed to increasing their productivity. Out of two investigated doses of the acidifier (3 and 5 kg /t of feed) the higher dose did not provide significantly

higher benefits, so the suggested dose of the acidifier "FRA LBB DRY" for broiler chickens can be considered 3 kg/t of feed.

Conclusions

1. The use of the acidifier in compound feed improved morphological and biochemical blood parameters of broiler chickens, in particular, significantly increases the concentration of red blood cells, hemoglobin and total protein, significantly increases γ-globulin fraction, decreases cholesterol and increases aminotransferase activity.

2. According to current assessment of the results, the optimal dose of the acidifier "FRA LBB DRY" for broiler chickens can be considered 3 kg/t of feed.

3. Prospects for future research is to study the impact of using Acidifiers "FRA LBB DRY" the performance of broiler chickens. ■

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Морфологічні і біохімічні показники крові курчат-бройлерів за згодовування підкислювача

Анотація. ***Наведено морфологічні і біохімічні показники крові курчат-бройлерів за згодовування підкислювача ("FRA LBB DRY" у кількості 3 і 5 кг/т комбікорму). Встановлено, що за використання підкислювача поліпшувалися морфологічні і біохімічні показники крові курчат-бройлерів, зокрема, вірогідно збільшувалася концентрація еритроцитів, гемоглобіну і загального білка, помітно зростала γ-глобулінова фракція білка, зменшувався вміст холестерину та посилювалася амінотрансферазна активність.***

Ключові слова: *курчата-бройлери, підкислювач, показники крові*

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Морфологические и биохимические показатели крови цыплят-бройлеров при скармливании подкислителя

Аннотация. ***Приведены морфологические и биохимические показатели крови цыплят-бройлеров при скармливании подкислителя ("FRA LBB DRY", 3 и 5 кг/т комбикорма). Показано, что при использовании подкислителя улучшались морфологические и биохимические показатели крови цыплят-бройлеров, в частности, достоверно увеличивалась концентрация эритроцитов, гемоглобина и общего белка, заметно возрастала γ-глобулиновая фракция белка, снижалось содержание холестерина и усиливалась аминотрансферазная активность.***

Ключевые слова: *цыплята-бройлеры, подкислитель, показатели крови*

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