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INFLUENCE OF L- LYSINE SULFATE ON CONTAINING OF VITAMINS AND MINERALS IN THE BODY OF BROILER CHICKENS

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Abstract. Experimental researches have shown that the L-lysine sulfate (the product of microbiological synthesis) has a positive effect on metabolism of vitamins A, E, C in the liver and minerals calcium and phosphorus in the blood and bones of broiler chickens. The dose of L-lysine sulfate of 800 mg·kg⁻¹ and 1000 mg·kg⁻¹ weight body has influence on increasing vitamins level in the liver. Was observed, that indexes of calcium and phosphorus are increased in the blood but it's decreased in the bones of broiler chickens. This results are necessary for Veterinary Pharmacology Consults and official practically using in agricultural sectors of Russian Federation.

Key words: L-lysine sulfate, broiler chickens, blood, liver, bones, concentration of vitamins A, E, C, calcium and phosphorus .

Introduction. L-Lysine Sulfate – feed additive used for enrichment and balance the rations of agricultural animals. Along with lysine in a preparation there are other substances that enhance its nutritional value: carbohydrates, mineral salts, organic acids, more than 10% of other amino acids [1]. L-Lysine Sulfate has greater exchange energy than lysine in hydrochloride form. The use of L-Lysine Sulfate in mixed feed production is economically viable and environmentally sound, and increase economic efficiency of production [3].

Vitamins and minerals play important role in the metabolism, growth and health in the body of animals. Vitamin A has multiple functions: it is important for growth and development, for the maintenance of the immune system and good vision [3]. Vitamin A is needed by the retina of the eye in the form of retinal, which combines with protein opsin to form rhodopsin, the light-absorbing molecule necessary for both low-light (scotopic vision) and color vision [5].

Vitamins E and C have antioxidant functions. Vitamin C acts as an electron donor for

important enzymes [6], acting to lessen oxidative stress and an enzyme cofactor for the biosynthesis of many important biochemical [7]. As antioxidant, vitamin E acts in cell membranes where prevents the propagation of free radical reactions, although it has been also shown to have pro-oxidant activity. Non-radical oxidation products are formed by the reaction between alpha-tocopheryl radical and other free radicals, which are conjugated to glucuronic acid and excreted through the bile or urine. Vitamin E is transported in plasma lipoproteins. After its intestinal absorption vitamin E is packaged into chylomicrons, which along the lymphatic pathway are secreted into the systemic circulation [8].

Minerals perform four broad types of function in animals: structural, physiological, catalytic and regulatory. One of the most important microelements are calcium and phosphorus. It can form structural components of body organs and tissues (bones, teeth and cartilages) [9].

Minerals and vitamins are usually transported from the serosal side of the mucosa to the liver in free or bound forms via the portal blood stream, but they can get 'stuck' in the mucosa. From the liver, they are

transported by the peripheral bloodstream to be taken up by different organs and tissues at rates determined by local transporter mechanisms in cell membranes and organelles to meet intracellular needs. [10].

Minerals follow labyrinthine pathways through the animal once ingested and Fig. 1.1 gives

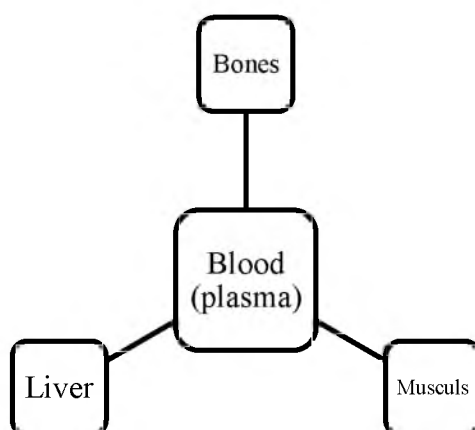


Figure 1. An illustration of ways flows of mineral between pools calcium and phosphorus in animal body (Braithwaite, 1983) [10].

Metabolism of calcium and phosphorus binds with processes of protein synthesis in the body as increasing mass muscles. Some experiments show, that chickens are able to adapt to early dietary changes in P and Ca through improvement of digestive efficiency in a later phase, and the extent of the compensation in terms of growth performance and bone mineralization depends on the P and Ca levels in the subsequent diet [12].

Thus, amino acid diet can influence on changes concentration minerals and vitamins in different organs and tissues in the organism broiler chickens.

The aim of this study was evaluate the capacity concentrations vitamins A,E,C in the liver and P and

thebarest of introductions. The entrance of some amino acids can enhance or constrain the proportions of ingested minerals that are absorbed from the diet and occasionally change the forms in which they are absorbed [10, 11].

Ca in the blood and bones of broiler chickens with using diet from L- lysine sulfate.

Methods and materials of research.

The experiments were on the broiler chickens of cross "Hubbard" in period age since 1 before 39 days. All animals was separated on five groups by 10 individuals in each. Birds of control and experimental groups had diet from main ration (MR) with balanced nutritionally and biologically active substances feed. Chickens experimental groups along with the basic diet received a daily dose supplements of lysine sulfate in accordance with Table. 1. Daily delivery and delivery of feed to chickens were carried out according to the recommendations of the manufacturer of cross-country "Hubbard".

Table 1.

Experience scheme.

Groups of broiler chicken	Number of broiler chicken	Scheme of feeding	Dose of L-lysine sulfate, mg·kg ⁻¹ weight body	Frequency of feeding
I (control)	10	main ration (MR)	–	every day
II (experimental)	10	MR + lysine sulfate	700	every day
III(experimental)	10	MR + lysine sulfate	800	every day
IV(experimental)	10	MR + lysine sulfate	900	every day
V(experimental)	10	MR + lysine sulfate	1000	every day

It was organized by the outdoor maintenance of broiler chickens with free access to food and water. Light, temperature and other climate parameters comply with the established veterinary standards and norms [13]. Temperature, lighting and ventilation was held in the room where the birds were kept. A soft bed of fresh dry sawdust was

changed every five days or added as needed. Daily weighing of feed was conducted in accordance with the biological bird demand for nutrients. Live weight of chickens was measured to an accuracy of 1 g to morning feeding every five days during the period of experience.

At the end of the experience produced poultry slaughtered by decapitation and took tissue samples and organs for laboratory testing. Vitamins A and E were determined with method of spectral analysis; vitamin C – titrimetric method with using solution of 2,6-dichlorophenol.

Calcium was research with trilonometric method in the bones and titrimetric by de Waard in the blood. Phosphorus was determined with

method of colorimetric by vanadate-molybdenum reagent in the bones and in the blood.

The resulting material was digitally processed using mathematical methods of mathematical statistics, taken in Biology and Medicine (Microsoft Excel 2007 application).

Results and discussion.

Indexes of the vitamins A, E, C was found in the liver of broiler chickens. Results of testing are shown in the table 2.

Table 2.

The quantity of vitamins in the liver (M±m).

Index	Groups				
	I (control)	II	III	IV	V
Vitamin A, mg/kg	82,22±1,16	70,66±4,22*	95,93±2,03 *	90,79±3,48	95,93±0,78 *
Vitamin E, mg/kg	236,40±4,37	234,90±13,60	248,10±1,12*	296,90±14,01*	303,60±9,89*
Vitamin C, mg/kg	281,60±8,97	295,70±15,63	316,80±7,12*	295,70±8,80	288,60±11,00

* reliably difference between control and experimental index, p<0,05

The heightened level of vitamin A was in the liver of animals which take diet from MR and lysine sulfate in dose of lysine sulfate 800 and 1000 mg·kg⁻¹ weight body. Concentration of vitamin C is increased with dose of lysine sulfate more than 800 mg·kg⁻¹ weight body. Index of vitamin E was reliably higher in third group in contrast with control.

As far as, ration of chickens did not contain other sources of vitamins, that we extrapolate

positive effect entering lysine sulfate in nutrition of broiler chickens.

Calcium and phosphorus are accumulated in the bones and it takes part in functioning of different biosynthesis process in the blood [9]. Therefore we described to check levels of these microelements in the blood and in the bones.

Indexes of calcium and phosphorus have trend to increase concentration of this microelements in accordance with dose of lysine sulfate in the blood of birds (fig. 2).

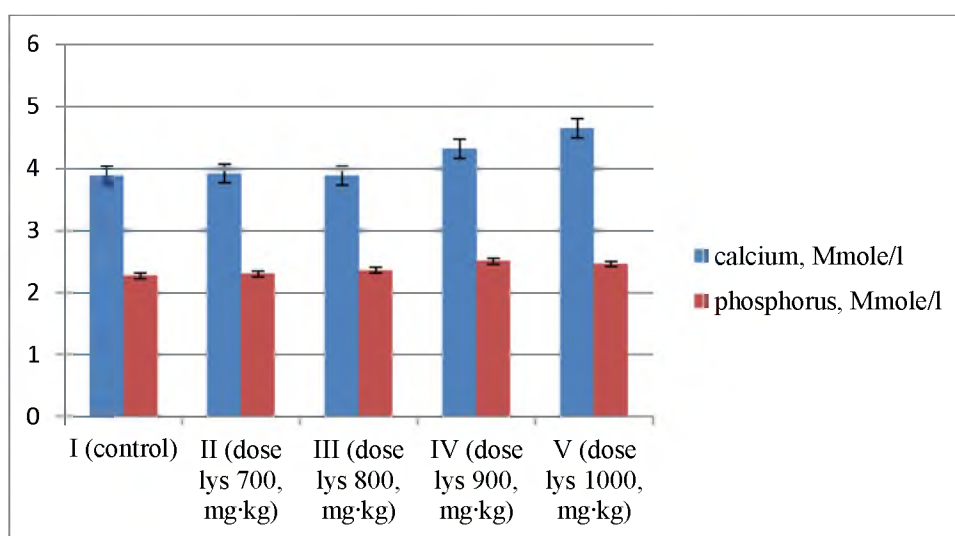


Figure 2. Change indexes of calcium and phosphorus in accordance with dose of lysine sulfate in the blood of the broiler chickens.

Change of concentrations calcium and phosphorus have trend to decrease this indexes in the bones of animals (fig. 3).

This aspect demonstrates as calcium and phosphorus increases in the blood in the reason of its extraction from the bones for future of protein synthesis.

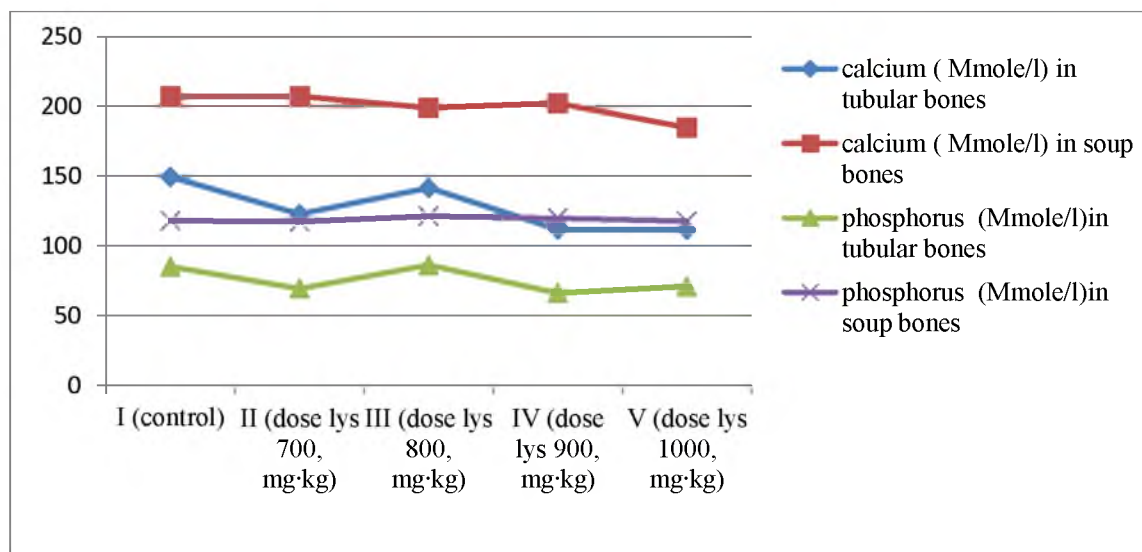


Figure 3. Change indexes of calcium and phosphorus in accordance with dose of lysine sulfate in the bones of the broiler chickens.

Conclusions.

Using of lysine sulfate in daily ration broiler chickens make possible increase vitamin A on 17% in the liver in dose 800 mg·kg⁻¹ and 1000 mg·kg⁻¹ weight body. Concentration of vitamin E can increased before 30% with using lysine in diet. The level of vitamin C also was heightened in dose 800 mg·kg⁻¹ weight body. Economic profitably use L-lysine sulfate in dose 800 mg·kg⁻¹ weight body.

Trend indexes of calcium and phosphorus are increased in the blood but it's decreased in the bones of broiler chickens with entering L-lysine sulfate. Calcium/phosphorus ratio is demonstrated in physiologically norm.

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