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# POTASSIUM CHLORIDE SUPPLEMENTATION IN BROILER REARING

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*Изучено влияние хлорида калия кормового на продуктивность бройлеров. Показано, что использование данной минеральной добавки в количестве 1,5 и 3,0 кг на 1 т комбикорма позволяет повысить живую массу 34-дневных цыплят на 3,52 и 1,33%, улучшить конверсию корма на 3,01 и 0,71%. Применение хлорида калия путем выпойки в количестве 1,5 г на 1 л воды обеспечивает повышение данных показателей на 1,12 и 1,35%, соответственно.*

*Ключевые слова: цыплята-бройлеры, хлорид калия, продуктивность, баланс электролитов.*

*The influence of dietary feed-grade potassium chloride on the productive performance in broilers was studied. Supplementation of diets with 1500 and 3000 ppm of this mineral additive improved live bodyweight in broilers at 34 days of age by 3.52 and 1.33%, respectively, feed conversion ratio by 3.01 and 0.71%. Supplementation of drinking water (1.5 g per 1 L) improved these productivity parameters by 1.12 and 1.35%, respectively.*

*Keywords: broiler chicks, potassium chloride, productive performance, electrolyte balance.*

To increase productivity of modern cross-bred poultry it is critically important to ensure appropriate mineral supplementation. However the modern composition of compound poultry feed does not provide an adequate level of macro elements such as calcium, phosphorus and sodium, thus its diet must be supplemented with minerals. This allows formulating balanced compound feeds to meet animal needs.

Compound poultry feeds are hardly ever deficient of potassium, it is added in recipes mainly to maintain electrolyte balance. Potassium sources in diets are soybean meal, nutritional yeast and food processing by-products. Potassium deficient poultry ration results in poor growth rate, muscle weakness, decreased intestinal tonus, and cardiac disorders. With significantly higher levels of potassium thirst develops. It was found

that potassium cations reduce accumulation of free lysine in muscles and liver, increase its concentration in blood plasm and absorption in animals' body, including birds, which benefits protein synthesis [4].

Early studies proved reasonable addition of potassium carbonate of 2-3 kg/t into compound feeds (to improve broiler productivity). The studies established that broiler live weight exceeds the reference by 2.42 and 2.34%, while the cost of feed per kg of weight gain reduced by 1.32%. It was also proved that this mineral supplement can be added to compound broiler feeds to reduce supplementation with synthetic lysine [5, 6, 7]. Furthermore, A.N. Betin's experiments demonstrated improved productivity of pigs when administered potassium carbonate of 1-2 kg/t and better milk quality in lactating cows when administered higher levels - 2-4 kg/t [8, 9].

Our work was focused on studying the effects of another source of potassium in compound broiler feeds, i.e. chemical potassium chloride produced by PJSC "Uralkali" 98.2% min. KCl, equating to 51.5% elemental potassium.

The studies took place in the vivarium of SGC "Zogorskoye EPH" with five groups of Smena 8 cross-bred broiler chickens at 1 to 34 days of age. Broilers in

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## Broiler results

Parameter	Group				
	Control Group	Addition to compound feed		Addition to drinking water	
		1 trial (1.5 kg/t KCl)	2 trial (3 kg/t KCl)	3 trial (3 g/l KCl)	3 trial (3 g/l KCl)
Survival rate, %	100	100	97.14	100	100
Live weight, g, at age, days					
7	141.73 ± 1.32	145.48 ± 5.50	144.28 ± 1.42	144.53 ± 1.52	143.79 ± 1.43
14	399.36 ± 4.55	414.17 ± 6.02	412.66 ± 6.11	409.46 ± 6.20	417.11 ± 6.10
21	796.57 ± 15.12	859.14 ± 13.54	850.12 ± 12.95	831.89 ± 13.03	805.42 ± 11.90
28	1376.62 ± 19.50	1449.12 ± 19.38	1410.65 ± 19.95	1398.26 ± 17.07	1431.47 ± 18.77
Average live weight, g, at age of 34 days including	1915.45	1982.96	1940.94	1929.14	1936.83
cockerels	2022.91 ± 55.99	2121.35 ± 30.00	2063.43 ± 33.62	2024.67 ± 29.20	2061.50 ± 28.03
pullets	1808.00 ± 25.20	1844.56 ± 26.83	1818.45 ± 31.83	1833.60 ± 27.96	1812.16 ± 30.34
Feed consumed per bird, kg	2.86	2.93	2.91	2.87	2.90
Feed intake per kg of live weight gain, kg	1.56	1.51	1.55	1.53	1.54
Daily average gain of live weight, g	56.77	58.82	57.54	57.19	57.42

the control group consumed loose all-in-one feed varieties with nutritional values as recommended by the All-Russian Scientific Research and Technology Institute for Poultry Industry (VNITIP) [1]. 1.5 and 3 kg/t of potassium chloride was added in the feed for chickens in groups 1 and 2. Young birds in groups 3 and 4 were supplied with drinking water supplemented with 3 and 1.5 g/l of this mineral additive, respectively. The groups were assigned using a matching method, the birds were fed *ad libitum*, the feeds were distributed by hand. The broilers were kept in P-15 type cages gender-inclusive, 35 birds in each group, in compliance with requirements for cage density, trough and watering space, and length and intensity of light.

The experiment results shown in the table prove that addition of potassium chloride of 1.5 and 3 kg/t to compound feeds for chicks in trial groups 1 and 2 helped increase their live weight by 2.65-1.80% and 3.71-3.33% at 7 d and 14 d of age as compared to the control group. A higher growth rate was observed in chicks that received less potassium chloride - 1.5 kg/t.

When comparing efficiency of addition to feeds and drinking water it was found that it would be more reasonable to use potassium chloride in an aqueous solution than in feeds at early ages. So, potassium chloride solution in 1.5 g/l water when drunk increased live weight of broilers by 0.71% in the trial group 4 at 14 d of age as compared to chicks in trial group 1 that received potassium chloride in the equal amount in dry feed. However, at an older age birds in trial groups 1 and 2 gained better than birds in groups 3 and 4.

Broilers' live weight in the first two groups was credibly higher by 7.85 and 6.72% ( $P \leq 0.01$ ) at 21 d of age and by 5.27 ( $P \leq 0.01$ ) and 2.47% at 28 d of age compared to the control group. Broilers in trial groups 3 and 4 at the same age exceeded by weight the control group by 4.44 and 1.11%; 1.57 and 3.98% ( $P \leq 0.05$ ).

In their finishing period broilers in trial groups 1, 2, 3 and 4 that were supplemented with potassium salt had better productivity compared to the control group. Their live weight in the former was higher by 3.52; 1.33; 0.71 and 1.12%; with less feed intake per kg of live weight gain by 3.01; 0.71; 1.67 and 1.35%, respectively. This outcome that potassium chloride has the same growth promotion potential as its carbonate form [6, 7] improves feed conversion.

Overall potassium chloride used during broiler rearing in the amount of 1.5 and 3 kg/t of feed does not affect negatively survival of experimental birds and does not influence their water intake and, therefore, moisture of droppings – 60.0-70.0% virtually identical in all groups.

Assays for ash, calcium, phosphorus, and potassium in the broilers' tibia did not found significant differences in mineral storage between the control and trial groups. Thus, the studies demonstrated good results and advisability of potassium chloride added to broilers' rearing. The optimal serving added to compound feeds is 1.5 kg/t of feed or 1.5 kg for 1000 l of water. Addition of potassium chloride in the amount of 1.5 and 3 kg/t of feed boosts live weight gain of broilers at 34 days of age by 3.52 and 1.33% with lower feed consumption per kg of live weight by 3.01 and 0.71%.

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