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The level of erythrocytes, hemoglobin and the rate of their clotting did not differ significantly between groups and had no significant changes.

Conclusions

1. Enzyme preparation alphasad application increases the growth rate of quails of the breed Pharaoh by 5.5% for females and 8.0% for males.

2. The slaughter indicators and edible parts weight increase under the action of the enzyme preparation. The meat quality has improved containing more protein.

3. The introduction of a new feed factor did not have a negative impact on hematological parameters.

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THE EFFECTIVENESS OF FEED WITH MANGANESE CHELATE COMPLEX APPLICATION FOR BROILER CHICKEN NUTRITION

Abstract.

According to the research results, the application of Multigain compound feed with chelate form of manganese at the rate of 0.2 kg per ton of compound feed, increases the live weight of broiler chickens by 7.9%. It was also found that the average daily gains increased by an average of 8.95% since the third week of rearing. The absolute increase also increased by 8.1%. The intensity of growth had a positive effect on slaughter rates. The weight of ungutted carcass increased by 7.6%, and gutted carcass by 3.8%.

Keywords: broiler chickens, organic manganese, growth, live weight, slaughter rates.

Nowadays, enzymes, probiotics, prebiotics, phytobiotics, and pollinators have become widespread among modern feed additives.

However, chelated micronutrients are attracting more and more attention in poultry farming. They are known as fundamentally new chemical compounds in which the inorganic component of the metal and the amino acid are combined. Such compounds are fundamentally different from chlorides and oxides considering their biological properties. Thus, chelates are stable in acidic and alkaline environment, have good solubility and easily digestible form.

The inorganic metal salts application was ineffective in many cases. Scientists claim that the best effect can be achieved by using complex compounds of metals with amino acids [1, 2].

Manganese is one of the most important microelements ensuring the normal functioning of the animal body. It takes an active part in redox processes and tissue respiration in animals, bone formation, affects the growth, reproduction of animals and hematopoiesis, regulates the function of endocrine organs, enhances the action of vitamins, is part of enzymes and is their activator [3, 5, 6, 7].

Manganese is obtained from food and partly from water [1-5]. However, the inorganic form of mineral compounds is relatively difficult to digest in animals, and increasing dose to achieve the optimal level of assimilation in the body causes toxicosis in animals. That's why, the search for the possibility of introducing biogenic metals into the diet of farm animals, including manganese in an easily digestible form, becomes of great practical importance [4].

The biological activity of a metal with amino acids increases hundreds of times [4]. However, the chelated forms of manganese application in animal feed requires comprehensive research.

It is known that the main functions of manganese in animals are multifaceted. The main ones are related to redox reactions, effects on growth, hematopoiesis, and endocrine function. It is also known that it normalizes nitrogen and calcium-phosphorus metabolism [1].

According to scientists, birds need more manganese than mammals. The higher level of metabolism is caused by manganese participation in the oxidative phosphorylation processes [2].

Thus, the aim of the research was to establish the organic manganese effect on productivity and basic hematological parameters.

The aim of these studies was to research the negligent form of manganese on the productivity and metabolism of broiler chickens.

Research methodology. Studies on manganese chelate complex effect were conducted at a research farm of Vinnytsia National Agrarian University. Two groups of experimental chickens cross Ross-308 were formed according to the principle of analogues; each group includes 20 heads in a group (Table 1). The experimental group was additionally fed by a chelated

complex of manganese at the rate of 0.2 kg per ton of feed. The complete feed of the trademark Multigain was used in the experiment. According to the results of research, the intensity of growth of chickens was determined by their absolute, relative and average daily gains every 7 days.

Analysis of the main hematological parameters was performed according to the generally accepted methods. Statistical processing of the obtained material was carried out by the M.O. Plokhinskyi method.

Table 1

Group	Period duration, days		Number of chickens, heads	Feeding features
	equalization	basic		
I - control	7	37	20	BD (complete feed)
II - experimental	7	37	20	BD+ (0.2 kg of manganese per ton of feed)

Research results. As a result, it was found that the manganese chelate complex has a positive effect on the growth of broilers (Table 2).

Table 2

Age of chickens, days	Live body weight of broiler chickens, g	
	I - control	II - experimental
1	42.4 ± 0.56	42.5 ± 0.32
8	171.2 ± 2.48	174.8 ± 2.41
15	418.6 ± 5.64	425.6 ± 7.45
22	824.2 ± 8.55	858.2 ± 10.12*
29	1262.4 ± 12.24	1320.2 ± 14.76**
36	1856.8 ± 22.32	1965.4 ± 18.11***
42	2452 ± 32.41	2648 ± 17.86***

The live weight has been increasing since the 22nd day of growth. The predominance of chickens in the experimental group was 7.9% on the 42nd day.

The average daily chicken gains of the 2nd group exceeded their peers by 6.7% on the 22nd day of rearing, by 6.0% on the 29th day, by 8.5% on the 36th day, and by 14.7% at the end (Table 3).

Table 3

Age of chickens, days	Average daily increase in chicken live weight, g	
	I - control	II - experimental
8	18.4 ± 0.12	18.9 ± 0.33
15	35.3 ± 0.61	35.8 ± 0.45
22	57.9 ± 0.45	61.8 ± 0.78***
29	62.6 ± 0.74	66.4 ± 0.92**
36	84.9 ± 1.02	92.2 ± 0.64***
42	85.0 ± 1.44	97.5 ± 2.21***

It was also found that chickens of the experimental group consumed by 3 kg more, but per 1 kg of growth such costs were lower by 0.08 kg or 4.39% (Table 4).

Table 4

Indicator	Indicators of feed consumption by experimental poultry		
	Units of measurement	I - control	II - experimental
Feed consumption:			
- during experiment in group	kg	88	91
- per head	kg	4.4	4.55
- per 1 kg of growth	kg	1.82	1.74

The control slaughter showed a positive effect of the researched form of manganese on the studied indicators at the end of the experiment.

The pre-slaughter weight increase by 8.2% had a positive effect on the weight of the ungutted carcass, which increased by 7.6% the experimental group.

Table 5

Slaughter rates of broiler chickens, g

Indicator	Group	
	I - control	II - experimental
Pre-slaughter live weight	2,452 ± 67.42	2,655 ± 46.54*
Ungutted carcass weight	2,316.5 ± 41.32	2,492.8 ± 32.25*
Semi-gutted carcass weight	2,184.1 ± 30.17	2,236.7 ± 22.72
Gutted carcass weight	1,895.6 ± 50.32	1,967.8 ± 26.14
Slaughter output	77.3	74.1

There were no significant changes in the internal organs weight of the experimental poultry (Table 6).

Table 6

Internal organs weight of the experimental poultry, g

Indicator	Group	
	I - control	II - experimental
Liver	48.4 ± 4.82	50.5 ± 2.31
Pancreas	5.6 ± 2.41	5.8 ± 1.62
Spleen	2.5 ± 0.12	2.8 ± 0.24
Kidneys	12.8 ± 1.29	13.4 ± 1.34
Heart	15.6 ± 1.19	15.8 ± 1.23
Lungs	15.4 ± 1.28	16.4 ± 1.18

A slight increase in the digestive organs weight can be associated with better anabolic processes in chickens of the experimental group (Table 7).

Table 7

Digestive organs weight of broiler chickens, g (M ± m, n = 4)

Digestive organ	Group		
	I - control	II – experimental	
Esophagus	8.2 ± 0.62	8.4 ± 0.81	
Glandular stomach	7.6 ± 0.55	7.9 ± 0.48	
Gizzard	29.2 ± 1.14	30.6 ± 0.24	
Small intestine:	duodenum	11.6 ± 1.06	12.5 ± 2.32
	jejunum	31.2 ± 2.14	32.4 ± 4.39
	ileum	28.4 ± 3.65	30.2 ± 2.26
Large intestine:	right cecum	9.8 ± 1.49	10.4 ± 2.64
	left cecum	7.4 ± 1.16	8.2 ± 0.85
	rectum	2.1 ± 0.42	2.3 ± 0.26

Conclusions: 1. Introduction of chelated manganese complex at the rate of 0.2 kg per ton to the feed increases the live weight of broiler chickens by 7.9%, while the absolute increase increases by 8.1%, and feed costs are reduced by 4.3%.

2. It was found that manganese with the amino acid did not have a significant effect on the development of internal organs and their weight and improved slaughter indicators.

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