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Comparative Analysis Efficacy Selenium-Containing Vitamin Complexes to Growing Broilers.

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ABSTRACT

The aim of the present work was study efficacy of complex "Ekstraselen-Vit" which contain vitamins, minerals and selenium to the body and productivity of broiler chickens cross "Ross-308". As a comparative drug was select analogue "Solvimin Selenium" («KRKA d.d., Novo mesto», Slovenia). Chickens were divide in three groups, and contained the same conditions. Group 1 served as a control. Broilers Group 2 received by drinking water developed biologically active vitamin-mineral preparation in a dose 0.1 ml per 1 liter of water continuously from 15 to 20 days of growing. Broiler chicks of group 3 was apply drug "Solvimin Selenium" by drinking water in a dose of 30 g per 100 liters drinking water continuously from 15 to 20 days of growing. It was establish that use complex, which contains vitamins, minerals, and selenium improves productivity: increased weight gain of Broilers average 8.46 % improvement in feed conversion by an average of 3.1%.

Keywords: broilers, medication, selenium, vitamins, productivity, conversion.

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INTRODUCTION

In recent years, the most rapidly growing sector of agriculture in many countries is poultry [6]. This fact explained by several reasons: the short-term poultry rearing to slaughter standard indicators, the quality of the food product, fast return on investment, the price attractive to the consumer.

Today, many scientists and leading poultry enterprises conducted research to find new means and methods of maximum disclosure of the biological potential poultry without harm to her health and getting the ultimate quality of the product [2, 3, 5, 8 - 12, 15 - 18, 20, 21, 24, 26].

We had developed a biologically active vitamin-mineral complex new generation of "Ekstraselen-Vit" based on selenium particles with a size 20-60 nm lipophilic complex (A, E, D, K) and hydrophilic (S, B1, B3, B5, B6) vitamins [11, 14, 15].

The composition of the drug due to synergistic components.

Just 60 years ago, the main component of the developed preparation - selenium, considered only as an element that has a pronounced toxic effect. However, studies Schwartz and Foltz, conducted in 1957 opened a new stage in the history selenium: it found that the lack of this trace element in the diet of animals leads to disastrous consequences - liver cirrhosis, cardiomyopathy and muscular dystrophy. Today it is known that selenium is involved in many metabolic reactions the human body and animals are part of enzymes and co-enzymes, it has severe essential, antitumor and radio protective effects, is a powerful antioxidant and, in addition, a synergist of fat-soluble vitamins [3, 8, 19, 22 23]. In particular, as a synergist of vitamin E, it increases its antioxidant activity. According with P.V. Evdokimov is known, that a selenium atom can be replaced by 700 to 1,000 molecules of vitamin E. Tocopherol and selenium are essential components of the mechanism, in which vitamin E - a kind of probe, capable to outputted from the membrane to the surface, have been subjected to peroxidation molecule phospholipid for destruction peroxide or hydroperoxide glutathione peroxidase fragment. However, selenium, participating in the normal functioning of the pancreas, and thus development of enzymes regulates flow and absorption of lipophilic vitamins. In turn, retinol, included in the integrated product is not only a powerful element of antioxidant defense systems, but also a structural component of cell membranes. With insufficient content of vitamin A in the diet for poultry, develop various epithelial lesions, developing xerophthalmia and day-blindness, as well as a decrease in immune function. Tocopherol, as a synergist of vitamin A, contributes to safe retinol in the active form and it provides the most complete absorption in the intestine. For example, papers Rebel et al. is noted, that addition vitamins A and E to basic diet for poultry with syndrome malabsorption of intestinal, helps to stimulate the immune system, namely, elevated leukocyte activity, as well as shorten the healing of the affected intestine [20]. Vitamin D, or cholecalciferol, is an indispensable component of the diet of poultry not only because it is involved in the immune response, but also because of its impact on the intestinal mucosa increased bioavailability of iron, magnesium, zinc, cobalt, vitamins of group B. Thiamine, constituting 0.1% components of the developed the drug, as and selenium, has essential effect - when its deficiency, is developing protein degeneration of the liver. The share of vitamin B5 is about 0.9% of composition drug. Pantothenic acid is a member kodegidrogenaz - coenzymes NAD and NADP and with apoenzyme are catalysis reactions cell metabolism processes involved in glycolysis, Krebs cycle, biosynthesis of fatty acids. Vitamin B6 in the component ratio is in equal proportion with thiamine. He is involved in many aspects of the metabolism macronutrients, the synthesis neurotransmitters, catecholamines, histamine. In addition, aware of the stimulating effect of pyridoxine on hematopoiesis system: initiates gemopoez, is responsible for the synthesis and function of hemoglobin. Lack vitamin B6 will inevitably lead to a profound disruption nitrogen metabolism [11, 14, 16, 17, 25, 26].

Objective

To study the effectiveness of developed vitamin and mineral selenium-containing complex "Ekstraselen-Vit" to body and productivity of broiler chickens cross "Ross-308" in comparison with the control and drug-analogue. As a control was selected "Solvimin Selenium" (organization-developer «KRKA d.d., Novo mesto», Slovenia). According to instructions, Solvimin Selenium contains 100g of active ingredients: vitamin A - 2000000 ME; vitamin B₁- 150 mg; Vitamin B₂ - 250 mg; Vitamin B₆ - 200 mg; vitamin B₁₂ - 1 mg; Vitamin C - 2000 mg; Vitamin D₃ - 100000 ME; vitamin E - 550 mg; Ks vitamin - 200 mg; vitamin B₅ - 650 mg; nicotinamide -

1800 mg; -3 mg Se and adjuvants - anhydrous Aerosil 0.3%, anise, apple flavor 0.16% to 100% sorbitol. In appearance is a pale orange powder with a characteristic odor. Solvimin Selenium is used for the prevention (during the period of stress, vaccination, unbalanced feeding, high productivity) and treatment of hypovitaminosis and diseases caused by selenium deficiency in the feed, as well as an aid in helminth infections treatment, bacterial and viral diseases in cattle and small cattle, horses, pigs, rabbits and poultry.

MATERIALS AND METHODS

Research conducted in the vivarium of Faculty of Technology Management, Research and diagnostic and treatment veterinary center "Stavropol State Agrarian University," according to the recommendations VNITIP poultry technology [4, 7, 15, 21]. The object of the study were clinically healthy broilers of cross-country "Ross-308" at the age of 15 days in the amount of 45 goals, which were divided on the principle analogues for three groups by 15 animals each. Group 1 served as a control. Broilers of group 2 were receive with drinking water the developed biologically active vitamin-mineral preparation in a dose 0.1 ml per 1 liter of water continuously from 15 to 20 days of growing. Broiler chicks of group 3 was feed drug "Solvimin Selenium" with drinking water in a dose of 30 g per 100 liters drinking water continuously from 15 to 20 days of cultivation. The experimental setup is show in Table 1.

Every 7 days the experimental chickens were subject to weighing, clinical examination to determine the overall condition of body (body temperature, pulse, respiration), changes in behavioral responses to external stimuli (extraneous sounds, movements, etc.).

On day 42 the chicks were euthanized by a concussion (ie strong and accurate blow to the head, causing severe brain damage) in accordance with Directive 2010/63 / EU OF THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION on the protection of animals used for scientific purposes. Sampling was performed and the study on days 7, 14, 21, 28 days after start of the experiment. Determination of blood biochemical parameters were carrying out on an automatic biochemical analyzer ChemWell + by means of commercial reagent kits [1]. Hematological parameters were determine by conventional routine methods [13].

RESULTS AND DISCUSSION

In clinical studies of three group chickens, overall health and behavioral responses ranged within the physiological norm. Many scientists such as Rajashree, Haug, Downs notes that addition selenium in the diet is the poultry improves productivity, feed conversion, and increases the concentration of selenium in poultry meat [3, 8, 19].

When studying the effect of the additional introduction in the diet of birds of vitamin-mineral complexes on productivity indicators we have found that in a group of 2 live weight of birds was 9.98% higher feed intake higher by 8.85% and feed conversion improved by 1.04% in comparison with the control group 1 (Table 2).

In group 3 on body weight was 6.94% higher in comparison with the control group, but lower than 2.76% in comparison with the group №2. Feed consumption to compare with control group 1.43% above but in comparison with the experimental group at below 6.82%. Conversion rate improved by comparison with the control group to 5.15%, compared with the group №2 - 4.15% (Table 2).

Evaluation of the morphological composition of the blood of broiler chickens showed that the number of red blood cells in the three experimental groups did not go beyond the limits of the physiological norm, but the content of red blood cells in group 2 was on average 15.3% higher than in the controls, and in the group 3 7.8 % higher than in the group 1 and 7.5% lower than in group 2 (Table. 3). However, it is important to note that while hemoglobin content was higher in Group 2 5.18%, and group 3 at 3.82% in comparison with the control group (Table. 3). The results indicate a moderately pronounced stimulation of hematopoiesis in groups 2 and 3, due to the presence of B vitamins used in the composition of the complexes.

Indicators of protein metabolism, namely, total protein and albumin, were higher in group 2 at 8,9% and 6,9% for group 3 and 11.0% and 8.1% in comparison with the group 1, respectively, indicating a more

update the active protein of poultry experimental groups (tab. 4). The data obtained are confirm including growth rates intensity.

During the experiment studied aminotransferases activity in blood serum of all groups of poultry. We found that content alanine aminotransferase is higher Group 2 and Group 3 of 10% compared to control (Table 4). In turn, the concentration of the enzyme aspartate aminotransferase was lower in comparison with the group 1: group 2 - 9.4%; Group 3 - 11.25% (Table 4.). The received data is not beyond physiological limits, indicate that supplementation of the diet with vitamin-mineral supplement increases the synthesis of amino acids, and improves the speed and quality of protein metabolism.

Table 1: Experimental Design

Group	Group 1	Group 2	Group 3
Number of poultry, head	15	15	15
The applied drug	-	"Ekstraselen-Vit»	"Solvimin Selenium"

Table 2: Comparative efficacy of developed vitamin and mineral complex "Ekstraselen-Vit" and "Solvimin Selenium" product, (n = 15)

Day	Live weight, g	Feed intake, g / week	Feed conversion, kg / LW	EPEF
Group 1 (control)				
15	286 ± 3,7	-	-	
22	597 ± 5,1	545	0,913	297,22
29	1024 ± 4,8	761	1,275	276,83
36	1630 ± 7,0	1044	1,442	314,06
43	1974 ± 5,2	870	1,631	281,44
Group 2 (Ekstraselen-Vit)				
15	271 ± 2,9			
22	614 ± 5,4	532	0,866	322,27
29	1152 ± 5,7	861	1,209	328,48
36	1773 ± 8,0	1034	1,369	359,78
43	2171 ± 4,2	1078	1,614	312,73
Group 3 (Solvimin Selenium)				
15	302 ± 3,3	-	-	
22	563 ± 4,9	495	0,879	291,14
29	1063 ± 4,7	752	1,173	312,46
36	1680 ± 5,9	877	1,264	369,15
43	2111 ± 5,5	1142	1,547	317,30

Table 3: Hematologic blood parameters of broiler chickens (n = 15)

Indicators	Group 1	Group 2	Group3
	7 days after the start of the experiment		
Erythrocytes, 10 ¹² / l	2,51 ± 0,03	2,87 ± 0,01	2,79 ± 0,01
Hemoglobin, g / l	105,34 ± 1,12	113,00 ± 0,97	109,40 ± 0,99
14 days after the start of the experiment			
Erythrocytes, 10 ¹² / l	2,19 ± 0,02	2,37 ± 0,02	2,25 ± 0,02
Hemoglobin, g / l	101,2 ± 0,84	104,52 ± 0,86	104,30 ± 0,79
21 days after the start of the experiment			
Erythrocytes, 10 ¹² / l	3,02 ± 0,02	3,51 ± 0,02	3,15 ± 0,02
Hemoglobin, g / l	68,9 ± 0,50	71,5 ± 0,53	70,9 ± 0,61
28 days after the start of the experiment			
Erythrocytes, 10 ¹² / l	3,42 ± 0,01	4,20 ± 0,02	3,87 ± 0,01
Hemoglobin, g / l	67,4 ± 0,31	71,7 ± 0,47	71,1 ± 0,20

Table 4: Biochemical blood parameters of broiler chickens (n = 15)

Indicators	Group 1	Group 2	Group3
	7 days after the start of the experiment		
Total protein, g / l	20,07 ± 0,51	23,65 ± 0,67	23,10 ± 0,65
Albumin, g / l	12,1 ± 0,15	12,3 ± 0,09	12,5 ± 0,09
AST, mkkat / l	0,61 ± 0,02	0,58 ± 0,02	0,59 ± 0,04
ALT, mkkat / l	0,43 ± 0,03	0,42 ± 0,02	0,43 ± 0,03
Catalase, H ₂ O ₂ mol / L · min · 103	47,1 ± 1,1	49,0 ± 0,9	50,2 ± 1,0
MDA, mmol / l	0,93 ± 0,05	0,90 ± 0,05	0,90 ± 0,02
14 days after the start of the experiment			
Total protein, g / l	26,68 ± 0,33	27,78 ± 0,41	29,15 ± 0,35
Albumin, g / l	12,5 ± 0,09	13,5 ± 0,09	13,5 ± 0,07
AST, mkkat / l	0,59 ± 0,02	0,55 ± 0,02	0,52 ± 0,02
ALT, mkkat / l	0,42 ± 0,02	0,46 ± 0,04	0,46 ± 0,03
Catalase, H ₂ O ₂ mol / L · min · 103	48,9 ± 0,87	49,8 ± 0,74	52,4 ± 0,80
MDA, mmol / l	1,12 ± 0,03	0,93 ± 0,03	0,91 ± 0,02
21 days after the start of the experiment			
Total protein, g / l	30,8 ± 0,27	34,13 ± 0,30	34,44 ± 0,30
Albumin, g / l	13,0 ± 0,10	14,0 ± 0,05	14,2 ± 0,05
AST, mkkat / l	0,61 ± 0,01	0,53 ± 0,02	0,52 ± 0,01
ALT, mkkat / l	0,44 ± 0,02	0,48 ± 0,02	0,48 ± 0,02
Catalase, H ₂ O ₂ mol / L · min · 103	47,5 ± 0,82	54,6 ± 0,75	57,1 ± 0,50
MDA, mmol / l	1,24 ± 0,02	0,99 ± 0,02	1,03 ± 0,01
28 days after the start of the experiment			
Total protein, g / l	34,13 ± 0,30	35,21 ± 0,25	36,85 ± 0,30
Albumin, g / l	13,3 ± 0,05	14,7 ± 0,05	14,9 ± 0,05
AST, mkkat / l	0,61 ± 0,02	0,53 ± 0,01	0,52 ± 0,01
ALT, mkkat / l	0,43 ± 0,01	0,48 ± 0,01	0,48 ± 0,01
Catalase, H ₂ O ₂ mol / L · min · 103	46,8 ± 0,77	59,0 ± 0,81	59,1 ± 0,52
MDA, mmol / l	1,38 ± 0,01	1,07 ± 0,01	1,05 ± 0,02

Markers lipid peroxidation in the body of animals and poultry are indicators concentration of blood serum catalase and malon dialdehyde [13]. In works Rajashree, Haug, Downs has information that an additional introduction to basic diet for poultry selenium, improves antioxidant status of the organism [3, 8, 19]. The results obtained in the experiment results confirm that position. It was established that group 2 showed an increase of catalase concentration of 15.7% and a decrease of malon dialdehyde by 15.6% in comparison with the group 1; Group 3 also showed an increase of catalase concentration by 15% and reduce the concentration of malon dialdehyde by 15.6% (table 4).

CONCLUSION

The results confirm the data that the intensification of poultry breeding technologies leads to an increase in the nutrient requirements of broilers, which are vitamins, macro- and microelements. Moreover, despite the balanced diet, supplementation of complex vitamin and mineral supplements contributes to the broiler genetic potential, as evidenced by the authentic weight gain, improvement in feed conversion. Proven vitamin-mineral selenium-containing complex preparation "Ekstraselen-Vit» is an efficient and competitive in comparison with existing analogues.

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