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BROILER CHICKENS FEATURES OF GROWTH WITH APPLICATION OF A WATER-SOLUBLE PHYTOBIOTIC GROWTH STIMULATOR ON THE BASIS OF A COMBINATION OF ESSENTIAL OILS

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These observations were conducted to study the effect of the complex phytogenic water-soluble stimulator "VATAGANIMAL", the main active substance of which is essential oils of corn, cumin, sesame, rosemary, garlic, thyme on health, feed consumption, features and nature of growth and development of broilers of different sex, as well as the dynamics of changes in physiological processes in chickens in the in the research process on hematological parameters.

For the experiment, 200 heads of chickens-broilers of "Cobb-500" cross-breed were selected in the age of 1 day, they were divided according to the principle of analogues into 2 groups – control and experimental. The groups were divided by gender into quantitative chick subgroups. In accordance with the annotation, for the experimental bird group was given the above noted phytoadditive added to the water at a dose of 3 g per 10 liters of water during the growing period of 42 days.

All the tested poultry population was kept in the same conditions on deep litter throughout the observation period. The diet for broiler chickens of both groups throughout the growing period was based on complete ration feeds that included starter, growth and fattening periods.

Thanks to better growth energy, preservation of broilers from the experimental group, the 7.7% reduction in feed consumption per unit of growth was observed. Beginning from 7 days of age, experimental chickens had 4.5 g (2.45%) higher live weight (188.5 ± 2.70 g) compared to peers of the control group (184.0 ± 2.88 g). The average pre-slaughter live weight of broilers in the experimental group was 2682,1 ± 39,31 g, whereas in the control group this figure was lower – 2472,2 ± 35,16 g. In the six weeks of observation, the average live weight of chickens from the experimental group was almost 8,5% (P<0.001) higher than in peers of the control group. This tendency was characteristic of all sex subgroups.

Key words: *phytobiotics, essential oils, broiler chickens, growth features, feed costs.*

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The widespread use of antibiotics as growth stimulant in intensive livestock technologies has paved the way for the emergence of persistent bacteria of microorganisms, many of which are pathogenic to humans (Lutsenko et al., 2006; Hao et al., 2014; Windisch et al., 2007). Because of these possible negative effects, their use on productive animals is increasingly restricted by more stringent requirements for food safety and for use in the prevention and treatment of farm animals and poultry diseases (Steiner et al., 2011; Ripon et al., 2019).

But at the same time complete rejection of synthetic antibiotics is impossible. The last decades have been focused on speed, high starting energy, slaughter and meat quality of animals. Highly productive hybrids and crossbreeds have been created, but with reduced overall nonspecific resistance. Unilateral directional breeding and industrial technology have encouraged manufacturers to use antibiotics that would inhibit the development of pathogens during critical growth periods and thus stimulate growth energy and the conservation of young animals.

As a rule, phytobiotics are metabolites of secondary plants. Now they are considered as natural nutraceuticals that provide disease prevention, increase the duration of economic use and are an additional source of antioxidants and other substances, improve digestion and stimulate the metabolism of animals in artificial biocenoses (Windisch et al., 2007).

Unlike feed antibiotics, phytobiotics do not cause bacterial resistance even with prolonged use, do not stimulate dysbacteriosis in animals and birds, do not have a long term of excretion after discontinuation.

During the last two decades there has been an active scientific debate on the mechanism of action of phytobiotic agents. Some researchers have suggested that the effectiveness of feed additives containing phytobiotics is partly related to increased feed intake due to improved taste. There is strong evidence for the assumption of increased antimicrobial activity, which is created by modulation of the intestinal microflora (Zhirnova et al., 2016).

A confirmed factor is that phytogenic drugs have a diverse effect on the entire digestive system. They improve the production of saliva, bile and mucus, as well as digestive enzymes, which maximizes digestion and absorption of nutrients. Moreover, it has been found that these agents have inherent antimicrobial properties, since biologically active compounds are able to penetrate and destroy

bacterial cell membranes. As a consequence, competition for nutrients between the animal and its intestinal microflora is reduced, and therefore the potential for nutrient absorption is increased.

The effectiveness of the feed phytogens depends on their composition and the interaction of the components of these natural compounds, dosage, composition of the diet, the genetic characteristics of the bird, animal's environmental conditions, technology of application. In general, modern studies of the efficiency of use of phytogens are aimed at studying the stability and their preservation in feed, the interoperability with other components of feed and the effect on the appetite of the bird, the functioning of the gastrointestinal tract, the level of food compounds digestion, bacterial microflora of the intestinal tract, and the taste properties of the meat and its safe use.

Various phytobiotic agents are available in powdered and microencapsulated form (for the production of compound feeds), as well as in the liquefied form when they are blended with CHF or added to water. Thus, these oral supplements of natural plant origin have the potential to ensure a promising future in animal livestock (Zhirnova et al., 2016; Si et al., 2006).

Some phytogens have some peculiarities: antimicrobial activity, antioxidant and anti-inflammatory activity, etc. Some of the results from the experiments showed the practical and economic feasibility of using them, and some of the research results remained in the laboratories – their results were found to be ineffective, or some of the functions tested were not better than the animals in control group. The commercial supply of phytobiotic agents today is diverse in composition, recommended doses and features of use (Qamar et al., 2015; Saeed et al., 2016; Delaquis et al., 2002).

Therefore, there is still a need for additional scientific and practical research to determine the feasibility of using specific commercial products. This should be done especially with phytobiotics imported from other regions, as the studies conducted before this study could be performed on other genotypes and in other forage conditions. This is especially true of products that are proposed for use in the production of organic products.

In this regard, the study of the effectiveness of the use of feed additive "VATAGANIMAL", Turkey (TUU (Technical Conditions of Ukraine) 10.9-41973380-002: 2018) for farm animals and poultry for broiler chickens is relevant and needs research into the use in domestic poultry. This phytogenic agent has a multicomponent composition, which includes beet molasses 55%, bard 10%, barley flour 10%. Multicomponent microencapsulated composition of vegetable oils (25%) is acting as biologically active ingredient. This composition includes: oil out of corn, cumin, sesame, rosemary, garlic, and thyme.

Considering the fact that this phytobiotic agent is new for Ukraine, and was registered by the State Scientific Research Institute of Veterinary and Feed Supplements of Ukraine in July 2018, we conducted scientific and economic research in the conditions of the Poultry Research Laboratory of the NPC of Sumy National Agrarian University.

Objective of the research. The purpose of the research was to study the effect of the specified phytogenic feed additive "VATAGANIMAL" on health, feed costs, features and nature of growth and development of broiler chickens of different sex, as well as the dynamics of changes of physiological processes in chickens in the course of research based on hematological parameters.

Material and methodology of research. 200 heads of broiler chickens "Cobb-500" at 1 day of age were selected for this experiment, and divided according to the principle of analogues into 2 groups – control and experimental. The groups were divided by gender into subgroups. The number of roosters and hens was the same in all groups, the sex of chicks was determined by the Japanese method (vent-sexing). Each group had 50 hens and 50 roosters. Throughout the observation period, chickens were grown in groups of 50 heads. The distribution of livestock into groups was done on the basis of gender and the use of phytobiotics.

In accordance with the use instructions, phyto-additive "VATAGANIMAL"was added to the water at a dose of 3 g per 10 liters of water throughout the growing period – 42 days for the experimental bird group. The studies were carried out according to the scheme shown in table 1.

All the experimental poultry livestock were held in the same conditions on deep litter throughout the observation period. The conditions of chicks' keeping were responded to the generally accepted technology of floor holding with free access to water and feed. The planting density, feeding line, and access to water in the groups were the same and met the existing zoo-veterinary standards.

The experiments were carried out on healthy livestock in accordance with animal health requirements: all chickens were vaccinated with the same Nobilic vaccine against

Table 1

Scheme of scientific and economic experiment on broiler chickens

Group	Subgroup	number of chickens (n)	Feeding and watering conditions
1 – control	R (roosters)	50	CF (complete feed) of the Ukrainian producer LLC Astarta without adding to drinking water phytonutrient "VATAGANIMAL (joint cultivation of roosters and hens)
	H (hens)	50	
2 – experimental	R (roosters)	50	CF (complete feed) of the Ukrainian producer LLC Astarta with adding to drinking water Phytonutrient "VATAGANIMAL (joint cultivation of roosters and hens)
	H (hens)	50	

Newcastle and Gamborough at the same period. In raising of chickens from the control group, the prevention of bacterial diseases was carried out with a water-soluble antibiotic with the active substance "Enrofloxacin" in the first 3 days of placing, repeated after three weeks. In order to prevent coccidiosis of chickens from this group, a solution Baycox of 2.5% was drunk in 12-14 days. There were no pharmacological agents that were used for chickens of the test group.

The diet for broiler chickens of both groups throughout the growing period were complete feed mix, which included starter, growth and fattening periods. The composition of compound feeds are shown in table 2.

Feed consumption was defined as the difference between the amount of feed normalized and the amount left in feeders. Daily feed consumption was calculated by dividing the feed consumed to the actual total number of birds. The feed conversion

Table 2

Composition and nutritional characteristics of compound feeds for broiler chickens produced by Astarta LLC

primary product	CF (complete feed) -5-3	CF (complete feed) -5-3	CF (complete feed) -5-3
	prestarter	starter	finisher
Corn (8%)	35. 000	35.000	35.000
Soybean meal (32%)	35.000	35.000	22.023
Wheat (11%)	20.978	20.363	28.546
Sunflower cake (32%)	2.643	5.226	10.709
Dry blood cell	3.033	1.096	-
Defluorinated phosphate	1.390	1.367	1.076
Chalk	0.874	0.866	1.442
Tekro VMP P Bs 0,5%	0.500	0.500	0.500
Format	0.200	0.200	-
Methionine 99	0.170	0.132	0.145
Lysine 98	-	-	0.198
Table salt sodium chloride	0.052	0.090	0.300
Phytase	0.010	0.010	0.010
Total amount	100.000	100.000	100.000
Nutrient content			
Exchange energy, kcal	310.10	307.73	307.62
Crude fiber,%	4.00	4.50	5.00
Crude protein,%	22.00	21.00	18.00
Linoleic acid,%	1.76	1.79	1.52
Methionine,%	0.46	0.42	0.42
Methionine + cystine,%	0.75	0.72	0.70
Lysine,%	1.27	1.13	1.00
Tryptophan,%	0.31	0.30	0.26
Calcium,%	0.9	0.9	1.00
Phosphorus (light),%	0.35	0.35	0.30
Sodium,%	0.15	0.15	0.21
Vitamin A, thousand IU	12.00	12.00	9.60
Vitamin B_2, mg	42.79	42.71	35.8
Vitamin D_3, тис МО	4.00	4.00	3.20
Vitamin K, mg	3.20	3.20	2.40
Vitamin B_1, mg	4.42	4.39	2.71
Vitamin B_2, mg	6.63	6.62	5.11
Vitamin B_3, mg	23.92	23.59	24.73
Vitamin B_5, mg	40.00	40.00	32.00
Vitamin B_6, mg	5.05	5.02	4.63
Vitamin B_{12}, mg	0.02	0.02	0.02
Vitamin H (biotin), mg	0.18	0.18	0.16
Manganese ($MnSO_4$), mg	121.04	120.78	124.15
Zinc, mg	80.89	80.64	83.91
Iron, mg	99.20	98.90	102.99
Copper, mg	9.05	9.03	9.22
Iodine, mg	0.97	0.97	0.98
Cobalt, mg	0.02	0.02	0.03
Selenium, mg	0.18	0.18	0.18

rate was calculated by dividing feed costs to body weight increase.

During the experiment the growth and development of chickens, their sustainability, and feed costs were studied. The growth rate of broiler chickens was described by their live weight in different age periods (1; 7; 14; 21; 27; 35 and 42 days old). Weighing of young was carried out individually on electronic scales up to 1 g. Statistical processing of experimental data was performed using MS Excel, according to the method of Plokhinsky (1967) (table 3).

In the experimental group, the cost of compound feeds during the observation period per head was 7.7% higher for roosters and hens of the control group. However, due to better growth energy and sustainability of broilers from the experimental group, a better conversion of feed was observed, which caused increasing energy growth.

In table 4 the average values of the live weight of males and females of the control and experimental groups of poultry during cultivating are presented. Because roosters and hens in both groups were in equal quantities (50 males and 50 females), the effect of broiler sex on group averages of pre-slaughtered live weight in the control and experiment groups was the same.

Analysis of the dynamics of live weight of broilers showed that starting with the 7th day of age the experimental chicks had 4.5 g (2.45%) higher live weight (188.5 ± 2.70 g) compared with peers in the control group (184 , 0 ± 2.88 g). But already at the age of 14 days and to the end of raising, the prevalence of broilers receiving phytopreparation becomes more substantial and statistically significant (P<0.05-0.001). Thus, the average pre-slaughter live weight of broilers of the experimental group was 2682,1 ± 39,31 g, whereas in the control group this level was lower – 2472,2 ± 35,16 g. The difference was 209,9 g (8,49%) and was highly reliable (P<0.001).

Broilers of both groups were characterized by a high level of sexual dimorphism by live weight (Table 5). During the whole growing period this indicator was gradually increasing and before slaughter it reached of 205.9 g (7.98%) in chickens of the experimental group, while among the peers of the control group the sex differences in live weight were lower – 154.2 g (6.44%). Therefore, the herbal product VATAGANIMAL had a positive effect not only for the growing energy of chickens of both sexes, but also for the level of their sexual dimorphism by live weight, first of all increasing the growing energy of males.

For the six weeks of observation, the average live weight of chickens from the study group was 8.49% higher than the same of the control group. Analysis of the growth dynamics showed that despite the starting similarity of the experimental birds in almost all age periods, chickens consuming phytobiotics with water were more quickly gaining live weight. In our opinion, this is explained by the starting stimulating effect of the constituent elements of the phytobiotic supplement. The maximum difference in live weight was observed at 42 days of age, and was about 210 g and was reliable (P<0.01). This tendency was characteristic of all sex subgroups.

Thus, the results obtained indicate a substantially indirect effect of increasing feeding intake and the adaptive

Table 3

Actual average consumption of feed by broiler chickens during the experiment, g / goal

Indicators	Group	
	1 control	2 experimental
	rosters and hens	roosters and hens
for the whole period together	4,415	4,758
including prestarter for ages 1 – 10 days	0,194	0,205
Starter for ages 11 – 30 days	1,910	2,010
Finisher for ages 31 – 42 days	2,311	2,543
Feed costs, kg / kg gain	1,786	1,774

Table 4

Dynamics of live weight of broilers

Group	Subgroup	Age periods, days						
		1	7	14	21	28	35	42
1 – control	R (roosters)	42,5 ± 0,62	187,6 ±4,06	421,8 ±7,63	837,0 ±13,16	1346,0 ±28,51	1956,2 ±40,22	2549,3 ±43,91
	H (hens)	42,3 ± 0,65	181,3 ±3,92	406,6 ±7,34	807,0 ±13,07	1294,0 ±26,75	1852,1 ±37,86	2395,1 ±43,96
	on average	42,4 ± 0,45	184,0 ±2,88	414,2 ±5,51	822,0 ±9,76	1320,0 ±20,32	1904,1 ±29,76	2472,2 ±35,16
2 – experimental	R (roosters)	42,6 ± 0,65	191,7 ±3,70	442,1 ±9,57	882,9 ±16,71	1444,9 ±26,52	2085,9 ±37,10	2785,1 ±45,00
	H (hens)	41,8 ±0,65	185,3 ±3,69	425,4 ±9,11	849,6 ±17,40	1372,9 ±27,28	1962,0 ±37,28	2579,2 ±46,25
	on average	42,2 ± 0,46	188,5 ±2,70	433,8 ±6,84	866,2 ±12,58	1408,9 ±20,51	2023,0 ±29,43	2682,1 ±39,31

Table 5

Dynamics of the cross-group difference and sexual dimorphism by live weight of broilers (in g and %)

Group	Measurement units	Age periods, day						
		1	7	14	21	28	35	42
The difference between the experimental and control group	g	- 0,2	4,5	19,6*	44,2**	88,9**	118,9**	209,9***
	%	0,47	2,45	4,44	5,38	6,73	6,24	8,49
The difference between roosters and hens 1 – control	g	0,2	6,3	15,2	30,0	52,0	104,1	154,2*
	%	0,47	3,47	3,74	3,72	4,02	5,62	6,44
The difference between roosters and hens 2 – experimental	g	0,8	6,4	16,7	33,3	72,0	123,9*	205,9**
	%	1,91	3,45	3,93	3,92	5,24	6,31	7,98

*Note: in this and the following tables * – P<0,05; ** –<0.01; *** –<0.001; the difference is statistically possible (reliable) compared to the control group and between roosters and hens.*

capacity of broilers. In the monitoring process it was found that the chickens raised with the use of a complex water-soluble phytobiotic preparation had a better viability. Thus, in the control group, the poultry mortality was 2 heads (96.0% preservation) in the experimental group, whereas only one rooster (98.0% preservation) had died in the experimental group, Table 6.

It was found that herbal medicine contributed to the better consumption of chickens' feed in the second experimental group (+ 7.0%), which had a positive effect on their average daily gain for the entire observation period. In broiler chickens from the experimental group the growth rate was 9.2% higher than that of the control peers, and feed consumption per kg was lower by 2.0%. Thus, there is a significant advantage in the main zootechnical indicators in favor of the chicks of the experimental group.

Discussion. An important task of modern organic production of poultry products is to use plant extracts that could provide a bactericidal, antioxidant, immunomodulatory and adaptogenic effects on the poultry, and could become an effective replacement of antibiotics and without the decreasing the quality of products.

The results of zootechnical and hematological studies have shown the effectiveness of the use in the technology of growing broiler chickens of composite water-soluble phytobiotic agent "VATAGANIMAL", the main active component of which is a complex of essential oils. The assumption of using them as an alternative to antibiotics and other synthetic growth factor has been confirmed confirmed (Knobloch et al., 1989; Mathe, 2007; Benchaar et al., 2007).

The vast majority of phytogenic feed additives (PFAs) are classified in accordance with Regulation (EC) #1831/2003 of the European Parliament and of the Council in the category of sensor additives (Steiner et al., 2011) and belong to the functional group of aromatic flavoring substances. But our additive, which is used together with water in vitro, with the same diet in broilers not only accelerated the growth of chickens cross "Koob 500", but also positively influenced the hemolytic properties and metabolic processes in the organism of the birds.

The influence of phytogenic substances on the growth process of chickens is independent of the nutritional characteristics of VATAGANIMAL, because consumption is carried out with water and at a minimum concentration. The properties of each phytobiotic agent depend on their composition and ratio, and production technology. Therefore, each biogenic agent is unique in its action, and they have antiatherosclerotic, antimicrobial and immunomodulating potential.

The microencapsulated composition of the complex of oils of the phytogenic agent does not so much affect to smell and taste of the feed, but also because it is used

Table 6

Growing indicators of broiler chickens during the experiment

Indicators	1 group		2 group	
	R (roosters)	H (hens)	R (roosters)	H (hens)
Loss(Died), heds	2	-	1	-
Survivability,%	96,0	100,0	98,0	100,0
live weight at the beginning of the experiment, g	42,5	42,3	42,6	41,8
live weight at the end of the experiment, g	2549,3	2395,1	2785,1	2579,2
Average daily live weight gain, g	59,69	56,02	65,30	60,41
Feed costs per head, kg	4,415		4,758	
Average daily feed intake, g	105,119		113,286	
Feed costs per 1 kg of live weight gain, kg	1,786		1,774	

with water, simulates and accelerates some processes in the organism of the animal, such as the metabolizing and absorption of components of the feed. Its biological action is the catalysis of the physiological and biochemical processes of an animal's organism thanks to the carefully selected components, mainly essential oils of plants.

Feed conversion is one of the main factors that influence the cost of growth. Despite conflicting data from some authors about the insufficient influence of phytobiotics on broiler feed intake, our observations determine a stimulating effect of phytobiotic water-soluble feed consumption (Ocak et al., 2008; Banjo, 2012; Gadzirayi et al., 2012; Qamar et al., 2015).

Our observation for the trend results are identical to those of Natasha Glamoclija and others [20]. Similar results were obtained by other researchers, but the nature and features of phytobiotic agents depend both on the composition of plant stimulants and on the selected dose. (Abou-Elkhair et al., 2011; El Tazi et al., 2014). Addition of various phytobiotics, such as garlic, black pepper, thyme or echinacea to broiler feeds leads to better absorption of feed (Khan et al., 2012; Rahimi et al., 2011).

Based on the experiment results the use of our water-soluble phytobiotic product lead to increase in feed intake of 7.7%, as well as a decrease in feed conversion of 0.7%, with a simultaneous increase in the average daily gain of 8.6. In the experimental group the death rate was less than it was in the control group during the period of 42 days of study. It should be noted that the data on the consumption of fodder under the influence of phytobiotics are tendentious because they are not statistically confirmed. The assumption that this agent affects the organoleptic properties of the feed is eliminated because it was present in drinking water.

In our opinion, which coincides with the analyzes of experiments on pigs and poultry, (Jamroz et al., 2005), essential oils of water-soluble biogenic agent had a positive effect on the gastrointestinal tract and stimulation of metabolic processes. The high preservation of chickens in the experimental group testifies to the antimicrobial and antibiotic action of a complex set of vegetable oil extracts that are included in VATAGANIMAL.

The antimicrobial action of essential oils and their practical effectiveness in broiler production has been known for a long time. It had been proven that essential oil exhibits antifungal activity even at low concentrations. Each of the biologically active essential oil components of the Turkish phytobiotic feed agent has its own unique properties. Rosemary, caraway, thyme have bactericidal and antiviral properties.

In addition to the above-mentioned fungicidal properties, cumin oil can be used as a hepatoprotector, garlic as an antidepressant, and sesame can be used to stimulate hematopoiesis, in particular platelet elevation. Corn oil is not only a filler and solvent for essential oils, it also has anti-sclerotic properties. In the complex, in low concentrations, they have antioxidant and sedative properties. The physiological effect of these oils intensifies the pancreatic action, stimulates the secretion of digestive juices and enzymes in the gastrointestinal tract.

The stimulation of the activation of nutrient transport mechanisms contributes not only to improved feed conversion but also to the inhibition of oxidation processes in intermediate metabolism, such as amino acids, which partly explains the accelerated accumulation of muscle tissue during broiler growth (Chrubasik et al., 2005; Jamroz et al., 2003; Jamroz et al., 2005; Mitsch et al., 2004). In our opinion, the results of our experiments tend to coincide with those of Gabert VM and Sauer WC and Roth FX and Kirchgessner M, which indicate that some essential oils have hydrophobic properties similar to those of organic acids.

They penetrate cell membranes and create the preconditions for ion penetration. In addition to their direct action on the intestinal morphological functions, they create a more favorable environment for banal microflora and are an antagonist for pathogens (Namkung et al., 2004; Jamroz et al., 2006; Oetting et al., 2006). Perhaps the specific effect of the phytobiotics studied is aimed at the production of specific intestinal mucus, which promotes the adhesion of pathogenic microorganisms. But this hypothesis needs further study.

During the observation process, the viability of chickens in the experimental group was found to be better. Exclusion from the technology of growing applications of chemotherapeutic agents commonly used for antibacterial purposes or as coccidiostats did not increase the mortality of chickens. In our opinion, which is the same as the opinion of colleagues (Manzanilla et al., 2006), the use of natural stimulants not only promotes the consumption of feed due to aromatic properties, but also promotes the stabilization of banal microflora in the gastrointestinal tract, which can stimulate the peristatic and fermentation activity, reduces the risk of inflammatory processes in the intestinal epithelium.

The dynamics of growth, as indicated by the studied hematological indices of the processes, occurred in the chick-analogues almost synchronously, regardless of the sex of the chickens, both in the roosters and the hens, during observations up to 42 days. The average values of the morphological parameters of blood and total protein, its fractions, indicate that they were in chickens within normal limits during the experiment. Studies with the essential oils of thyme and lavender (Attia et al., 2018; Mokhtar et al., 2018) also indicate the stability of the overall health of broilers during their use. The results of this study showed that phytobiotics' additives contain several ingredients that can control the body's protective functions, and finally improve the survival rates of chickens in the process from growing to slaughter. During the studies no case was detected in the control group and, in our opinion, it is possible to speak of an immunostimulatory effect of "VATAGANIMAL" when growing broiler chickens on the floor.

Conclusion. Water soluble phytobiotic complex "VATAGANIMAL" can be considered as a natural non-antibiotic stimulator of broiler growth. The use of this complex in accordance with the recommendations in the technology of growing broiler chickens Cobb-500 is safe and does not change clinical and hematological parameters, contributing to a significant increase in such indicators as live weight, average daily growth and safety of broiler chicks

regardless of sex. Components of the biogenic stimulant and their specific combination are capable of stimulating the enhancement of immunity and, accordingly, the health of birds without marked pathological conditions and changes in blood.

The phytobiotic complex should be used to improve the rates of broiler chickens – growth energy by the end of 42 days of growth and feed conversion, without impairing their viability. The phytobiotic additive fed to broiler chickens is safe in the producer's recommended doses and duration of use. The refusal of the use of artificial chemotherapeutic and prophylactic means in the treatment and feeding of farm poultry in production technologies will allow to approximate the obtained products to the standards of "Eco product".

To further accumulate scientific data on the specificity of the action of the product based on the complex of essential oils, studies of the properties of broiler meat and experiments on other species of farm animals and poultry are conducted.

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Вплив фітобіотичної кормової добавки на енергію росту курчат-бройлерів залежно від статі та динаміки змін гематологічних показників й імунної реакції

Ці спостереження були проведені з метою вивчення впливу комплексного фітогенного водорозчинного стимулятора «VATAGANIMAL», основною діючою речовиною якого є ефірні олії кукурудзи, кмину, кунжуту, розмарину, часнику, чебрецю на стан здоров'я, витрати корму, особливості і характер росту і розвитку курчат-бройлерів різної статі, а також динаміку змін фізіологічних процесів у курчат в процесі досліджень за гематологічними показниками. Для досліду відібрали 200 голів курчат-бройлерів кросу "Кобб-500" в добовому віці, яких розділили за принципом аналогів на 2 групи – контрольну і дослідну. Групи були поділені за статтю на рівні по кількісні курчат підгрупи. У відповідності до настанови застосування, для дослідної птиці додавали у воду фітодобавку

«VATAGANIMAL», у дозі 3 г на 10 літрів води протягом всього періоду вирощування – 42 дн. Все піддослідне поголів'я птиці протягом всього часу спостережень утримувалось в однакових умовах, на глибокій підстилці. Основою раціону для курчат-бройлерів обох груп протягом всього періоду вирощування служили повнораціонні комбікорми які включали стартерний, ростовий та відгодівельний періоди. За рахунок кращої енергії росту, збереженості у бройлерів з дослідної групи спостерігалося зменшення витрат корму на одиницю приросту на 7,7%. Починаючи з 7-добового віку, дослідні курчата мали на 4,5 г (2,45%) вищу живу масу (188,5 ± 2,70г) порівняно з ровесниками із контрольної групи (184,0 ± 2,88г). Середня передзабійна жива маса бройлерів дослідної групи склала 2682,1 ± 39,31 г, тоді як у контрольній групі цей показник був меншим – 2472,2 ± 35,16 г. За шість тижнів спостереження середня жива маса курчат з дослідної групи майже на 8,5% (P<0,001) була вищою, ніж у ровесників з контрольної групи. Зазначена тенденція була характерна для всіх статевих підгруп.

Бройлери обох груп характеризувалися високим рівнем статевого диморфізму за живою масою. Протягом всього періоду показник рівня статевого диморфізму збільшувався і перед забоєм досяг у курчат дослідної групи 205,9г (7,98%), тоді як у ровесників контрольної групи статеві відмінності в живій масі були меншими – 154,2г (6,44%).

Проведені гематологічні спостереження не виявили значних міжгрупових відмінностей (P<0,05). Вміст вивчених морфологічних та біохімічних показників у крові всіх курчат знаходився в межах фізіологічних норм. Міжгрупові відмінності по більшості випадків незначні, в межах похибки, та можуть використовуватися тільки для тенденційних висновків.

***Ключові слова:** фітобіотики, ефірні масла, курчата-бройлери, особливості росту, статевий деморфізм, гематологічні показники.*