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**THE MAIN HEMATOLOGICAL, BIOCHEMICAL AND IMMUNOLOGICAL INDICATORS
OF BLOOD OF BROILERS FED WITH BIOLOGICALLY ACTIVE PREPARATIONS**

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**ОСНОВНЫЕ ГЕМАТОЛОГИЧЕСКИЕ, БИОХИМИЧЕСКИЕ И ИММУНОЛОГИЧЕСКИЕ
ПОКАЗАТЕЛИ КРОВИ БРОЙЛЕРОВ С ИСПОЛЬЗОВАНИЕМ БИОЛОГИЧЕСКИ
АКТИВНЫХ ПРЕПАРАТОВ**

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The article presents results of research into the hematological, biochemical and immunological parameters of blood of broiler chickens using various biologically active preparations that help to establish age-related changes in cellular and humoral factors of body protection, normalize immunological processes in the body of young birds by activating factors of natural resistance and synthesis of immunoglobulins.

Key words: broiler chickens, preparations, hematological, biochemical and immunological parameters of blood.

В статье представлены результаты исследований гематологических, биохимических и иммунологических показателей крови цыплят-бройлеров при использовании различных биологически активных препаратов, которые помогают установить возрастные изменения клеточных и гуморальных факторов защиты организма, нормализовать иммунологические процессы в организме молодняка птицы за счет активизации факторов естественной резистентности и синтеза иммуноглобулинов.

Ключевые слова: цыплята-бройлеры, препараты, гематологические, биохимические и иммунологические показатели крови.

Introduction. In the technological scheme of cultivation and operation of a bird for receiving a healthy highly productive bird, non-polluting and qualitative production the regulated application of biologically active additives from daily age, taking into account physiological features of an organism and the critical periods in life of a bird is necessary [1, from. 94].

Source analysis. Cyclic introduction in an organism of biologically active additives allows opening as much as possible physiological possibilities and available reserves of an organism of a bird. On the basis of statistical data the most dangerous periods from the veterinary point of view are defined at cultivation of broilers, it: **3-5 day of life**- in blood the maintenance of leukocytes and lymphocytes at the expense of T-lymphocytes decreases, the quantity of antibodies at the same time decreases. This immune deficiency is connected with the raised expenditure of the protective factors which have arrived from egg, under the influence of intensive anti-gene influence in new living conditions); in **12 – 28-day age** - its development begins with reduction in serum of blood of antibodies, especially IgM, then IgG and to a lesser extent IgA. At the first stage humoral immune insufficiency is compensated by strengthening of cellular factors of protection that is shown by increase in blood of quantity of leukocytes, thymic lymphocytes and phagocytic activity of pseudoosinophils. For the 21st day of life of chickens are noted low level humoral and the beginning of decrease in cellular factors of protection. Immunological deficiency remains to 4-week age. At this time in contents of intestines the quantity lacto-and bifidobacteria decreases. In the subsequent at chickens level of IgA, IgG, IgM, and also leukocytes at the expense of lymphocytes of a thymic and marrowy origin raises; mildly expressed third recession of immunological protection is observed **by the end of 2 months of life**: there is a reduction of the maintenance of antibodies and lysozyme activity of serum of blood. Probably, this immune deficiency is connected with rapid growth and a molt of a bird.

In modern industrial poultry farming for increase in efficiency of a bird and the prevention of many diseases along with special prevention it is necessary to find new ways of strengthening of health and stimulation of the general reactance of an organism of a bird, including by means of biologically active

substances. So research on the use of biologically active preparations for increasing resistance of an organism of broilers is important for veterinary science and practice [2, from. 167].

The aim of the research is to establish age changes of cellular and humoral factors of protection of an organism, morphological and biochemical indicators of blood of a bird under the influence of various groups of biologically active preparations: probiotics «Bioflor», «Biokokteyl-Oil Company» and «Bifidoflorin liquid»; immunostimulator of «Apistimulin-A»; biologically active additives on the basis of «Vigozin» microbiological synthesis, «VITOLAD» and «Bionorm-T» (PBAOT); biologically active additive on the basis of vegetative raw materials - a fodder phospholipid complex on the basis of rapeseed products.

Materials and methods of research. Broilers of cross-country «KOB - 500», the main hematological, biochemical and immunological indicators of blood of broilers for all production cycle of cultivation were object of researches. For the solution of objectives 45000 heads of broilers were used. For working off of efficiency of application of preparations research are carried out on broilers according to the following scheme (table 1).

Table 1. Scheme of experiments in the use of preparations in broiler rations

Groups	Number of heads	Feeding conditions, preparations, dosages
1 (control)	500	OR (the main diet) PK-5B - during the first period of cultivation; PK-6B - in the second
2	500	OR + the Probiotic «Bioflor» with drinking water in a dose of 0,1 ml/h. since daily age once a day during the first 5 days in 4 cycles with an interval of 7 days till the end of the cultivation period
3	500	OR + a «Biokokteyl-Oil Company» Probiotics in an optimum dose 0,1 - 0,2 ml/h (10,0 - 20,0 million microbic bodies) since daily age during the first 5 days in 4 cycles with an interval of 7 days till the end of the cultivation period
4	500	OR + the Probiotic «Bifidoflorin liquid» with drinking water in a dose of 10 ml on the 100 h. broilers once a day till the end of the cultivation period
5	500	OR + Immunostimulyator «Apistimulin-A» with drinking water in a dose of 1,0 mg / h. daily till the end of the cultivation period
6	500	OR + BAA «Vigozin» with drinking water in a dose of 1 ml on 11 waters in 2 cycles with an interval of 8 days: in 1-3 days of life (the I cycle), in 12-13 days (the II cycle)
7	500	OR + BAA «VITOLAD» with drinking water in a dose of 0,1 ml/h. since daily age during the first 5 days in 4 cycles with an interval of 7 days till the end of the cultivation period
8	500	OR + BAA «Bionorm-T» with drinking water since daily age in a dose of 1,0 ml/h daily till the end of the cultivation period
9	500	OR + BAA «FLK» of 0,3 g/kg of compound feed

Research results and discussion. Probiotic «Bioflor» represents a suspension of live intestinal sticks of E.coli (the strain «M-17») which concentration makes 1×10^8 in 1 ml, biologically active substances of the cultivation environment, extracts from a soya and vegetables [2, from. 168]. The preparation possesses antagonistic activity concerning a wide range of pathogenic and opportunistic microorganisms. The mechanism of action of a preparation «Bioflor» is in suppression of activity of pathogenic and opportunistic microorganisms, linkage, neutralization and removal from an organism of toxic products of activity of putrefactive and other bacteria, products of an incomplete exchange that provides antiallergic action. The preparation promotes metabolism normalization, rendering a positive effect at anemias, violations of a mineral exchange (calcium, phosphorus, iron, magnesium, etc.) and other conditions caused by violations of functioning of a gastroenteric path.

The probiotic of «Biokokteyl-NK» represents a mix of live intestinal sticks, biologically active substances of the environment of cultivation and propolis (bee-glue), is the multiple-factor treatment-and-prophylactic means, possessing antagonistic activity concerning a wide range of pathogenic and opportunistic microorganisms, including a salmonella, Proteidae, staphylococcus, Klebsiella and other types and, thereby, normalizing intestines microflora [4, from. 78].

The probiotic «Bifidoflorin liquid» represents liquid microbic mass of the bifidobacteria being a natural protective factor of a human body and animals which stabilizes a quantitative ratio anaerobic and aerobic autoflora of mucous membranes of a gastrointestinal tract. Bifidobacteria, producing acetic and dairy acids, create the sour environment, promote absorption of calcium, iron, vitamin D, synthesize group B and K vitamins, normalize peristalsis of intestine, interfere with quantitative increase in pathogenic, putrefactive and gas-forming microflora. The preparation possesses high antagonistic activity, and by efficiency of action does not concede to some antibiotics and chemotherapeutic means. Besides it does not render pernicious action on normal microflora of a digestive path, does not pollute livestock products, i.e. is a non-polluting preparation.

The immunostimulator of «Apistimulin-A» represents the preparation made from bee ambrosia, contains a complex of biologically active substances including in ambrosia. «Apistimulin-A» possesses immunostimulating properties, has all-stimulating effect on an organism of animals. It makes active T-system of lymphocytes, phagocytic activity of neutrophils and monocytes of peripheral blood, stimulates nonspecific humoral immunity. It promotes restoration of oppressed links of cellular, humoral immunity and a metabolism at sick animals to level of the healthy. It possesses adaptogenic properties at technological stresses.

Biologically active additive on the basis of «Vigozin» microbiological synthesis being a combination of natural components, optimizes physiological functions and energy consumption at all animal species and a bird. The main Vigozin component - a carnitine - participates in splitting of excess of fat acids, plays a direct role in transport acetyl-coenzyme A in mitochondria. It increases use of energy sources of cell and influences a power metabolism of animals that helps in recovery, stimulates appetite and absorption in intestines, increasing pancreas secretion.

Biologically active additive of «VITOLAD» received as a result of cultivation of a mushroom of *Fusarium sambucinum* - nutraceutical for restoration of the broken functions of an organism, influences intestines microflora, possesses hepatoprotective, immunomodulatory, adaptogenic properties. The composition of «VITOLAD» BAA carbohydrates includes chitin cellulose, sorbing toxins and the slags, clearing and toning the intestines, raising its motility (so-called «sweeper» for intestines), and also biologically active polysaccharides (glycans: glucans and galactomannans) regulating work of immune system.

Biologically active additive of «Bionorm-T» receive a method of special processing of peat of 1-2 % water solution of ammonia. BAA stimulates immune system of an organism of animals (bactericidal activity, lysozyme activity, phagocytosis, T and In - lymphocytes, the general protein, an antibody, erythrocytes, hemoglobin, neutrophils), raises resistance of an organism to respiratory and gastrointestinal diseases, stimulates growth and development of animals and birds, normalizes digestive and biochemical processes, possesses enveloping property [3, from. 60]. The preparation also accelerates regeneration and an epithelialization of the damaged tissues.

Biologically active additive on the basis of vegetative raw materials - a fodder phospholipid complex (PLC) on the basis of products of processing of rapeseed (substance) with an optimum set micro - macronutrients stimulates growth and development of animals and birds, normalizes digestive and biochemical processes, allows to raise indicators of humoral immunity, makes active immune system, activity of indicators of cellular immunity. In the general clinical analysis of blood and definition of some factors of natural resistance at broilers (table 2) it is established that studied biologically active additives stimulate adequately in the applied dose factors of natural resistance and immune reactance, make positive impact on hematological indicators. The data presented in the table testify that introduction in a diet BAA raises level of hemoglobin, quantities of erythrocytes and leukocytes. Processing of chickens by studied preparations allows activating hematopoiesis.

Conclusion

It is established, and scientifically proved that under the influence of preparations investigated by us biosynthesis of protein which is the main reserve of an organism becomes more active. Increase of concentration of the general protein of serum of blood is caused by concentration increase albumins and globulins. As, the obtained data testify that at the chickens who are grown up on traditional technology, level of antibodies on an extent of 28 days is lower than initial indicators that confirms absence of biosynthesis of own antibodies, and immune protection follows the account of transovarial globulins. But use of an immunostimulator conducts to earlier biosynthesis of globulins and increase of immune protection of an organism of a chicken. As hyperalbuminemia in an organism practically does not meet, level increase of albumin in blood of chickens of experimental groups is connected, most likely, by that under the influence of preparations BAA becomes more active a catabolism of proteins in intestines. As confirmation it is served also by results of other biochemical analyses. Enzyme system of an organism of chickens, especially alanine aminotransferase and aspartate aminotransferase show conditions of a liver and a cardiac muscle. The results received at studying of activity of enzymes of blood - alanine aminotransferase and aspartate aminotransferase and alkaline phosphatase show that at chickens of control groups they are higher than norm for 10–25 %. It testifies that at intensive technology the defeat of a liver caused by existence in different sterns of toxic substances is noted. Use of biologically active immunostimulators promotes decrease in activity of enzymes, i.e. decrease in toxic impact on an organism and on a liver of arriving making forages is

noted. Activity of these aminotransferases considerably, several times, increases at hepatitis (including. sharp, chronic, infectious), obesity of a liver and its toxic damage, defeats of muscles. Such it is not noted at experimental chickens while at control there are separate moments of predisposition to emergence of these pathological conditions.

Table 2. Results of the general clinical, biochemical and immunological analysis of blood at broilers control and experimental groups in age dynamics (M±m, n=10)

Indicators	Biologically active additives								
	1 group control	2nd - experimental probiotic "Bioflor"	3rd - experimental "Biokokteyl-NK" probiotic	4th - experimental probiotic «Bifidoflorin liquid»	5th - experimental immuno-stimulator "Apidistimulin-A"	6th – experimental BAA "Vigozin"	7th – experimental BAA «VITOLAD»	8th - experimental BAA "Bionorm-T"	9th - experimental phospholipid complex
Age, 28 days									
Hemoglobin, g/l	91,0±3,68	102,1±3,11	112,1±3,11	98,0±6,25	97,5±7,12	106,3±5,50	96,0±8,28	97,5±5,51	96,0±8,28
Erythrocytes, 10 ¹² /l	3,0±0,23	4,4±0,39	4,6±0,39	3,4±0,34	3,2±0,22	35,0±4,18	3,3±0,21	3,7±0,28	3,3±0,21
Leukocytes, 10 ⁹ /l	31,5±2,00	37,2±2,43	37,2±2,43	36,7±1,22	34,9±2,67	58,9±6,20	35,1±1,36	34,0±3,07	35,1±1,36
General protein, g/l	20,6±0,99	22,0±1,23	22,0±1,23	29,2±0,82*	27,7±1,12*	22,2±1,05	28,2±0,85*	27,8±1,05	28,2±0,85*
Albumins, g/l	11,1±0,88	10,8±0,17	11,2±0,33	13,6±0,22	13,1±0,54	11,1±0,48	12,6±0,42	10,8±0,13	12,6±0,42
Globulins, g/l	10,0±0,79	4,2±0,19	4,2±0,19	15,7±1,20*	14,6±0,96*	11,1±0,42	14,6±1,22*	12,7±0,42	14,6±1,22*
Albumin-globulin ratio	1,11±0,05	0,27±0,06	0,32±0,09	0,84±0,01*	0,90±0,15	1,00±0,09	0,86±0,03*	0,77±0,05*	0,86±0,03*
ALAT, мккат/л	0,30±0,05	0,43±0,04	0,41±0,04	0,28±0,04	0,28±0,03	0,33±0,03	0,27±0,04	0,28±0,03	0,28±0,04
AsAT, мккат/л	0,46±0,02	0,45±0,03	0,45±0,03	0,36±0,01*	0,37±0,02*	0,46±0,02	0,37±0,01*	0,36±0,02	0,36±0,01*
APF, мккат / l	10,00±1,55	14,56±1,32	14,32±0,55	11,11±0,88	10,01±0,99	14,25±1,21	12,65±1,22	10,62±1,21	11,11±0,88
Age, 42 days									
Hemoglobin, g/l	91,3±4,12	103,2±3,22	93,2±3,22	89,2±2,29	94,0±5,62	96,4±3,77	96,7±4,82	91,0±4,86	96,7±4,82
Erythrocytes, 10 ¹² /l	3,5±0,16	4,5±0,02	4,5±0,02	4,1±0,03	3,3±0,13	3,5±0,12	3,4±0,09	3,5±0,11	3,4±0,09
Leukocytes, 10 ⁹ /l	29,7±1,75	36,9±3,24	36,9±3,24	35,6±3,11	34,5±2,09	33,7±3,60	28,5±1,68	31,3±3,00	28,5±1,68
General protein, g/l	29,6±1,45	24,0±1,09	24,0±1,09	23,0±1,43	38,3±1,09*	25,4±1,82	32,2±1,85	31,8±1,23	37,3±2,24*
Albumins, g/l	12,2±1,88	15,4±0,29	17,2±0,24	18,9±0,20	18,3±0,52*	12,6±0,27	15,2±1,25	16,7±1,29	16,0±0,76
Globulins, g/l	17,4±0,45	5,5±0,08	5,5±0,08	6,3±0,07	20,0±1,00*	12,8±0,62	16,6±1,24	18,3±1,01	21,3±0,75*
Albumin-globulin ratio	0,70±0,06	0,82±0,02	0,87±0,01	0,75±0,08	0,92±0,04	0,98±0,05	0,92±0,05	0,57±0,04	0,75±0,04
ALAT, мккат/л	0,28±0,01	0,39±0,06	0,39±0,06	0,35±0,05	0,24±0,02*	0,34±0,06	0,18±0,01*	0,30±0,08	0,25±0,02*
AsAT, мккат/л	0,34±0,03	0,47±0,06	0,44±0,06	0,41±0,07	0,31±0,05	0,45±0,03	0,22±0,01*	0,23±0,05	0,28±0,04
APF, мккат / l	11,31±0,68	13,00±0,79	12,90±0,59	11,93±0,64	12,00±1,88	13,30±1,57	9,62±0,15	10,56±0,93	12,10±1,24

* – distinctions authentic statistically at R <0,05.

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