

The Probiotics Genesis Effect on the Productive Health of Laying Hens



Letkin A., Mungin V., Gibalkina N.

Abstract: *The article presents research results of the food additive Genesis effect on laying hens health. Experiments were conducted in 2 stages. During the first stage of experiments the acute toxicity of the food additive Genesis was studied on white rats of the Standard variety. Criteria for assessing the acute toxicity of the food additive Genesis were indicators of animals' clinical and hematological status. Observation of the experimental rats for 14 days made it possible to establish that after intragastric administration of an aqueous solution of the food additive Genesis there are no toxic effects in the form of immediate and delayed-type hypersensitivity. This is confirmed by the results of the clinical examination of laboratory animals and the morphological study of blood. During the second stage of experiments the effect of Genesis on the organism of laying hens was studied. The condition of laying hens was assessed by the results of a clinical examination, an assessment of the biochemical composition of blood serum, as well as change in their productive qualities. The biochemical parameters of the blood serum of laying hens were identified: inorganic calcium, phosphorus, calcium-phosphorus ratio, alkaline phosphatase, urea, creatinine, creatine Kinase, cholesterol, total protein, glucose. It was established that the food additive Genesis has a positive effect on the clinical, biochemical parameters of the blood serum of laying hens as well as on the morphological parameters of chicken eggs. In addition, when using the Genesis, the efficiency of feed utilization increases.*

Key words: eggs, blood, acute toxicity, egg production.

I INTRODUCTION

The key to maintaining the productive health of animals and birds is to provide the needs of animals in natural bioregulators - biologically active substances. The use of natural bioregulators allows us to correct many biological processes of a living creature. The variety of natural bioregulators contributes to their application to enhance productive qualities and to correct some pathological and physiological conditions of animals and birds organism.

At present there is a constant demand for highly effective and inexpensive feed supplements and preparations based on natural bioregulators. Nowadays new bioregulators are being searched and combinations of existing biologically active substances are being studied.

Revised Manuscript Received on February 28, 2020.

* Correspondence Author

Letkin Alexander Ilyich*, Associate Professor, Department of Morphology, Physiology and Veterinary Pathology of Mordovian National Research State University, N. P. Ogarev. E-mail: vetagro2003@mail.ru.

Mungin Vladimir Victorovich, Professor, Department of Zootechny, S. A. Lapshin of Mordovian National Research State University, N. P. Ogarev. E-mail: kafedra_zoo@agro.mrsu.ru.

Gibalkina Nadejda Ivanovna, Associate Professor, Department of Zootechny, S. A. Lapshin of Mordovian National Research State University, N. P. Ogarev. E-mail: kafedra_zoo@agro.mrsu.ru.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

The purpose of our research is to assess the safety of food additive Genesis, as well as its effect on the body of chickens.

II METHODOLOGY

The work is done in two series of experiments based on the National Research Mordovia State University Veterinary Clinic. In the first series of experiments we studied the acute toxicity of Genesis, and in the second series of experiments, the effect of this preparation on the body of chickens.

In the experiments on the acute toxicity of Genesis, 27 white rats of the Standard variety were used. All experimental groups of animals were selected on the basis of analogues, taking into account gender, age, live weight and breed. Animals of 1 experimental group intravenously daily injected 1 ml of 10% aqueous solution of the preparation Genesis, the second group - 1 ml of 20% solution of the preparation Genesis. Experimental animals were kept under identical conditions under normal light and temperature conditions and had free access to water and feed. The condition of experimental animals was assessed by changing the clinical signs and morphological parameters of the blood. The studies were conducted in accordance with the Methodological Recommendations for the Study of the Total Toxic Effects of Pharmacological Substances. The obtained digital material was statistically processed using commonly used parametric methods, and the degree of reliability was determined by Student's t-criterion with the STAT3 program.

The drug Genesis is a complex of specially selected natural anaerobic and aerobic microorganisms of various types, which have strong enzymatic properties: lactic acid, photosynthetic, nitrogen fixing and other types of bacteria, yeasts, actinomycetes, fungi, as well as products of their vital activity. In total there are more than 80 species and races in the preparation: they were selected taking into account the requirements of the trophic chain and form a symbiotic complex. The drug contains lactic acid bacteria such as *Lactococcus lactis*, *Lactobacillus delbrueckii* subsp. *Bulgaricus*, *L. brevis*, *L. Plantarum*, *L. Fermenti*, *Oenococcus oeni* and other homo-enzymatic and heterofermentative species. It also contains such ascosymbiotic and basidiomycetes yeasts such as *Saccharomycotina*, *Taphrinomycotina*, *Schizosaccharomycetes*, *Pucciniomycetes*, *Sporidiales*, *Cryptococcus*, and others.

III. RESULT AND DISCUSSION

Observations of experimental animals were conducted for 14 days. In the first days of the study, they continuously monitored the general condition of the experimental rats.



The Probiotics Genesis Effect on the Productive Health of Laying Hens

Subsequently, intermediate indicators were taken weekly. In the evaluation of clinical signs of laboratory animals, during the first day, minor changes in their behavioral reactions were established.

Thus, in all experienced rats, rapid breathing and reduced motor activity were observed. Animals for half an hour were sedentary, were torn together. There was a decrease in tactile and pain sensitivity. The described condition was observed in rats once at the first giving of the drug Genesis.

To assess the effect of Genesis on the morphological composition of rat blood, indicators such as the content of erythrocytes, leukocytes, platelets, hemoglobin, and the av-

erage volume of erythrocytes, as well as hematocrit have been detected. Blood selection was performed from the venous plexus of the ocular bottom with retrobulbar puncture. The dynamics of hematological parameters of rats at the application of the preparation Genesis is presented in Table 1. Analysis of the morphological composition of blood rats indicates the multi-directional effect of the drug Genesis on the content of shaped elements. Thus, the level of erythrocytes had a tendency to increase in the experimental and control groups of animals until the end of the experiments.

Table I: - Dynamics of hematological indices of rats

Indicators	Duration of research	Norm	Animal groups		
			Experienced 1	Experienced 2	Control
RBC, 10 ¹² /l	To experiences	6,1-9	7,34±0,71	8,71±0,21	8,44±0,69
	On the 7th day	10 ¹² /l	6,87±0,44	6,94±2,12	7,11±2,88
	On the 14th day		8,56±1,57	9,23±1,03	7,25±1,11
WBC, 10 ¹² /l	To experiences	6-20	17,77±1,92	17,60±5,35	16,07±4,92
	On the 7th day	10 ¹² /l	18,27±3,32	18,30±3,73	17,10±0,81
	On the 14th day		17,23±1,56	16,96±2,51	16,23±1,87
PLT, 10 ⁹ /l	To experiences	200-450 10 ⁹ /l	405,11±31,48	436,13±61,06	352,67±19,45
	On the 7th day		265,33±13,87	281,01±17,09	328,01±61,03
	On the 14th day		376,18±15,31	426,84±12,11	289,17±48,23
LYM#, 10 ⁹ /l	To experiences	1,5-2,78	8,41±0,51	8,63±2,5	8,10±3,75
	On the 7th day	10 ⁹ /l	1,77±1,07	2,71±0,89	4,07±1,88
	On the 14th day		2,44±0,36	2,81±0,59	4,97±1,13
GR#, 10 ⁹ /l	To experiences	2-8	4,41±1,11	7,93±2,13	4,76±1,52
	On the 7th day	10 ⁹ /l	2,53±1,64	3,21±1,47	3,01±1,99
	On the 14th day		3,41±1,02	4,23±1,17	3,11±0,03

On the basis of the study of the dynamics of clinical and hematological parameters of sub-experimental rats with the use of Genesis, their oscillations are established within the limits of the physiological norm, and the preparation

Genesis in the studied doses does not exhibit toxic properties. We also studied the effect of Genesis on the erythrocyte indices of laboratory animals. The specified data is summarized in Table 2.

Table II: - Erythrocyte indices in rats.

Indicators	Duration of research	Norm	Animal groups		
			Experienced 1	Experienced 2	Control
HGB, g/l	To experiences	120-156	91,1±12,9	96,6±10,1	71,2±7,5
	On the 7th day	g/l	44,3±8,5	53,6±32,5	59,6±5,3
	On the 14th day		98,2±6,7	110,5±12,3	105,3±9,14
MCHC, g/l	To experiences	350-389	301,6±13,5	217,1±12,3	164,1±27,2
	On the 7th day	g/l	126,7±20,4	171,2±18,6	198,2±9,8
	On the 14th day		300,3±15,4	330,8±13,7	328,8±13,3
MCV, fl	To experiences	50-55 fl	49,3±1,7	49,6±1,8	49,5±0,1
	On the 7th day		51,5±0,4	49,4±1,8	49,1±2,1
	On the 14th day		52,1±0,6	53,4±2,3	52,8±1,4
HCT, %	To experiences	30-50 %	30,2±9,1	44,5±2,2	43,4±3,5
	On the 7th day		35,1±2,2	31,2±9,3	30,1±8,7
	On the 14th day		32,7±1,5	33,4±3,3	32,1±0,9

The use of Genesis for experimental rats has multi-directional effects on erythrocytic indices. Thus, the hemoglobin content prior to the use of the drug Genesis in all animals was below physiological values. Similar changes were observed 7 days after the start of experiments in rats of all experimental groups. At 14 days from the beginning of the experiment, we recorded a rise in hemoglobin levels in the blood of rats in all experimental and control groups. In the statistical processing of the obtained results, the absence of a strict correlation dependence between them was revealed. The average concentration of hemoglobin in the erythrocyte in all experimental rats is similar to that of hemoglobin and is below the level of the physiological norm.

It should also be noted that the physiological levels of the average concentration of hemoglobin in the erythrocyte of animals are in the range of 350-389 g/l.

The effect of Genesis on the body of the chicken breeders Lombard Brown was studied taking into account changes in clinical, hematological and productive parameters [1;7;8;10;13].

For this purpose 2 expert groups of hens-laying boys aged 20-21 weeks were selected on the basis of analogues. The duration of the experiments was 45 days. Kumar-dryers of 1 experimental group in the main diet prescribed Genesis in the amount of 1%.

Kuram-dryers of 2 experimental groups - 2% of the main ration. During the experiments, a daily bird inspection was carried out. Attention was paid to behavioral reactions, edema of the feed, and also to determine the body temperature, pulse rate and respiration. From the biochemical parameters of hens blood serum, inorganic calcium, phosphorus, calcium-phosphorus ratio, alkaline phosphatase, urea, creatinine, creatine Kinase, cholesterol, total protein, glucose were determined.

During the observation period, the following state of experimental chicken bearers was revealed. The bird kept in cells for 5 heads. At the same time, there was no aggressive

behavior in relation to other chickens. They freely moved, no pain in the limbs and joints. Earrings and scallops had a bright pink color without bruising and necrotic areas. No pathologic changes were also detected on the skin and mucous membranes. The body temperature, pulse rate and respiratory movements during all the experiments were within the physiological hole [4;8;9;17].

Indicators characterizing the productivity of hens are the changes in the body weight and egg productivity. The dynamics of productive indicators of chicken bearings when using Genesis is presented in Table 3.

Table III: - Dynamics of productive indicators of chicken bearings.

Indicators	Groups of laying hens		
	Experienced 1	Experienced 2	Control
Live weight at the beginning of the experiments, g.	1607,3±12,4	1613,6±21.1	1628.8±13.7
Live body weight after 45 days from the beginning of the experiments, g.	1745,5±24.1	1781,4±32.1	1772,6±12.1
The number of eggs laid per group, pcs.	198,8±10.1	212,4±21.6	204,5±9,5
The number of eggs laid on 1 head, pcs.	39,6±6,8	42,4±5,3	40,8±9,8
Number of egg mass per group, kg	11,19±2,4	11,95±1,4	11,66±2,7
Number of egg mass per head, kg	2,23±,1,1	2,39±0,9	2,33±0,7
Egg production,%	88,0±2,7	94,2±9,8	90,66±9,7

The highest gain in live weight of the body was detected in the hens of the first experimental group, using 1% of the Genesis preparation from the total amount of the basic diet. The analogical tendency is observed also in relation to egg-laying stock of chickens. Thus, in the first experimental

group for 45 days 42,4 eggs per one loaf were taken down. The egg density is 94,2%, which is 7% more than in the control poultry and 4% more than that of the other hens of the second experimental group.

Data from biochemical studies are presented in Table 4.

Table IV: - Dynamics of biochemical indicators of chickens

Indicators	Groups of laying hens		
	Experienced 1	Experienced 1	Control
Calcium, mmol/L	2,74±0,12	2,94±0,23	2,95±0,12
Phosphorus, mmol/L	1,89±0,07	2,24±0,09	2,19±0,14
Calcium-phosphorus ratio	1,45±0,05	1,31±0,12	1,35±0,09
Alkaline phosphatase, U/ l	433,74±12,6	488,67±23,1	455,67±32,6
Urea, mmol/L	2,0±0,01	2,67±0,07	2,67±0,11
Creatinine, mmol/L	30,33±3,42	28,67±5,87	24,67±2,89
Creatine Kinase, U/L	35,00±3,09	25,33±4,65	21,00±2,37
Cholesterol, mmol/L	1,06±0,01	2,16±0,15	1,65±0,17
Total protein, g/L	47,67±6,32	56,00±12,5	48,67±5,81
Glucose, mmol/L	4,2±0,99	5,13±1,21	3,57±0,18

The biochemical parameters of blood serum of chickens of experimental groups have differences in comparison with similar parameters of the control bird. Thus, levels of calcium and phosphorus have a close relationship and characterize the tension of mineral metabolism in productive poultry. The reference values of this indicator are in the range of 1: 2,2 - 1: 2,5. In the experiments conducted, the ratio of calcium and phosphorus in the control group is 1.45, while in the first and second groups 1,31 and 1,35, respectively.

The activity of alkaline phosphatase in poultry according to Bessar-bova BF is 360-740 U / L. The values of this indicator in these studies were in Experimental 1 and 2 groups 488,7 and 455,6, respectively, which is higher than

the similar indicator of control females by 13% and 5% [2;3;15; 24].

The content of urea in serum from hens of experimental groups was found to be 2,67 mmol/l, and in hens-laying in the control group – 2,0 mmol/l. In general, the urea values in experimental chickens do not go beyond the reference values.

The content of cholesterol in serum from hens in experimental groups was significantly higher than that in the control group. Thus, in the serum of hens of the first experimental group, the cholesterol content is 2,16 mmol/l, and the second group is 1,65 mmol/l.

The Probiotics Genesis Effect on the Productive Health of Laying Hens

The physiological values of this indicator in healthy hens are from 2,9 to 6,6 mmol/l. The obtained results can testify to the absence of a negative effect of the drug Genesis on the fat metabolism of hens [5;6;11;16;22;23].

The content of total protein and glucose in the blood serum of chickens is also within the physiological norm. The largest differences between these parameters from the control bird were found in the hens of the second experimental group.

Morphological characteristics of chicken eggs were carried out according to the following parameters: the shell thickness, the height of the air chamber, the shell density, the form index, the y-number, the yolk pH, the protein and carotenoids, the protein, yolk and shell content, as well as their ratio .

The introduction of the hens in the diet of Genesis contributed to an increase in the mean weight of the egg in the 1st experimental group by 1,92 g (3,3%), in the 2 experimental groups - by 3,5 g (6.1%) compared to a similar indicator of the control bird. According Russian state standard, eggs obtained from chicken bearings contained in rations with the addition of Genesis have a second category. The eggs of the hens of the control group according to the mean mass value belong to the first category.

The content of carotenoids in the egg was found to be between 14,3 and 15,0 mcg/g. Thus, in the control group it was 14,3 mcg/g, in 1 and 2 experimental groups – 14,8 mcg/g and 15,0 mcg/g, respectively. Thus, the obtained chicken eggs are considered to be biologically complete according to the content of carotenoids in them, and changes in the content of this indicator occur within the limits of the statistical error.

According to some authors, the protein content of the total egg mass is 52 - 57% with a density of 1,039 - 1,042 g/cm³. The weight of the egg yolk is in the range from 30 to 36 % by weight, with a density of 1,028 - 1,035 g/cm³. In our experiments, we found an increase in the egg yolk in chicken eggs. Thus, in the first experiment group, the mass of yolk was 2,2% more, in the 2 experimental groups - by 2,9% more compared to the same indicator of the control group. The increase in the weight of the yolk is also of great importance in the selection of eggs for incubation purposes, since the yolk during the period of embryogenesis serves as a source of water and nutrients, and also performs thermoregulatory functions [12;14;18;20;23].

IV. CONCLUSION

The use of the drug Genesis does not lead to a change in clinical signs and hematological parameters of laboratory animals. Changes occur within the values of control animals and their reference values. In addition, during the 14-day study, no case was observed in experimental rats. In this regard, the installation of LD50 was not possible. This allows the Genesis to be considered non-toxic in the test range and varies with doses in a wide range.

The obtained results of biochemical studies of chicken blood serum with the use of Genesis indicate its positive influence on different types of metabolism, as well as on the functioning of such systems as locomotor, urinary, digestive, nervous, and others [19;21;22].

Genesis has a positive effect on the morphological parameters of chicken eggs. It also increases the efficiency of feed use.

ACKNOWLEDGMENT

Materials required for this project were provided by the scientific center of the company SIGMA PLUS (Sarsansk, Russia, www.sigmagenesis.ru). In the biotechnology laboratory of the Center, the preparation GENESIS was developed, and also preclinical studies were conducted on laboratory animals.

REFERENCES

1. Aliyeva S.M., Akhmedkhanova R.R., Astarkhanova T.S. Use of local forage products of natural origin in compound feeds of broiler chickens // Scientific journal of the Kuban State Agrarian University, 2016. №117 (3). p. 1314-1325.
2. Antipov V. A., Subbotin V. M. Efficiency and prospects for the use of probiotics // Veterinary Medicine, 1980. №12. p. 55-57.
3. Arkhipov A.V. Lipids of feed: meaning, content, composition // Veterinary, zootechny and biotechnology, 2016. №3. p. 40-47.
4. Bakhitova L.M., Khaisanov D.P. Influence of an aluminosilicate additive on protein metabolism in fattened pigs // Zootechny, 2007. №5. p. 14-15.
5. Belookov A. A. Principles of Biotechnology for Processing Agricultural Products. Troitsk: UGAVM, 2006. - 112 p.
6. Bessarabov B. F., Alekseeva S. A., Kletikova L. V. Etiopathogenesis, diagnosis and prevention of metabolic disorders in poultry. - M.:Zoomedit, 2011. - 296 p.
7. Bobylev G. A. Ways to improve the efficiency of production of eggs and egg products in Russia // Poultry and poultry products, 2013. №4. p. 22-25.
8. Buryakov N. P. The Main Factors of Improving the Quality of Chicken Eggs // Ration and Veterinary, 2008. №1. p. 9 - 12.
9. Vodolazhchenko S. A. Natural sorbents in feeding agricultural poultry. - Great Luke, 2002. - 122 p.
10. Hamidov M. G. Environmental justification for the use of zeolites in the poultry industry // AIC. Achievements of science and technology, 2002. №9. p.10.
11. Javadov E. D., Vikhrev I. N., Papazyan T. T., Shchepotkina S. V., Prokofyeva N. I. Antibiotics in poultry farming: alternative methods for preventing diseases and treating poultry // Poultry farming, 2017. №11. p. 41-46
12. Egorov I. A. Dry forms of fats in compound feeds of broiler chickens // Combined feed, 2000. №8. p. 43.
13. Ignatovich L. S., Korzh L.V. Component feed additives with the use of nettle flour in rations of laying hens // Poultry farming, 2015. №7. p. 35 - 38.
14. Kletikova L.V. Protein and carbohydrate metabolism in layers // Poultry farming, 2010. №1. p. 55 - 56.
15. Kletikova L.V., Pronin V.V. Biochemical status of the blood of chickens of the cross "Hisex Brown" when grown at a high-tech enterprise // Farm animals, 2014. №1. p. 5-6.
16. Kletikova L.V., Yakimenko N.N., Fomicheva M.V. Tolerance of Chickens of the Kobb-500 Cross to Related Stress // Veterinary Medicine and Feeding, 2017. №4. p. 18 - 20.
17. Kochish I. I., Lukashenko A. Neutralization of heavy metals in the body of broilers // Livestock Russia, 2006. №1. p.19.
18. Krasnokutsky R., Sorokin O. Probiotics for animals on the Russian market // Tsenovik. Agricultural Review, 2017. №12. p. 54 - 60.
19. Kurmakayeva T. V., Petrova Yu. V., Avdeenko A. V. Morphological characteristics of broiler chicken meat when added to the diet of succinic acid and emicidin // Agrarian Scientific Journal, 2014. №12. p. 19-22.
20. Maksimiyuk N. N., Denisenko A. N., Lysak R.V. Prospects for the use of protein hydrolysates to increase the resistance and productivity of animals and birds // Successes of modern natural science, 2010. №12. p. 117-118.
21. Makhonina V. N. Comparative evaluation of the biological value of raw meat and slaughter animals and poultry // Poultry and Poultry Products, 2016. №3. p. 26-28.

22. Mullakaeva M. O., Volkov A. Kh. Hematological indices of turkeys of the agricultural company «Zalesny» // Uchenye zapiski KGAVM N.E. Bauman, 2010. №201. p. 281-283.
23. Ovchinnikov A. A., Tukhbatov I. A., Lakomy A. A. Hematological indicators of broiler chickens when used in the diet of probitox and toxfin // Agrarian Bulletin of the Urals, 2015. №7. p. 40- 44.
24. Okolelova T.M, Mansurov R. S. Increasing the productivity and safety of broilers using the Strolitin and Butofan OR preparations // Poultry farming, 2015. №2. p. 21-24.