The use of Chitosan hydroxyapatite in improving the Clinico-physiological indicators of broiler chicks, as well as in increasing productivity and preservation

Diyor Toshmurodov[1*], *Dusmurat* Eshimov[1], *Sobir* Eshburiyev[1], *Soatmo'min* Aliyarov[1], and *Ikrom* Fayzullayev[1]

[1]Samarkand State University of Veterinary Medicine, Livestock and Biotechnologies, Samarkand, Uzbekistan

Abstract. Experiments were carried out on 15-day chicks of 160 heads belonging to the Ross-308 cross. For the experiment, 4 groups were formed. Group 1 chicks were a control group and fed mixed feed, which was used in the farm until the end of the experiment. Group 2-3-4 experimental group chicks were given different amounts of chitosan hydroxyapatite (grower) with food ration for 13 days from the 15th to the 28th. Including: experimental group 2 chicks were given 0.4 g/kg, Experimental Group 3 chicks were given 0.7 g/kg and Experimental Group 4 chicks were given 1g/kg. At the end of the experiment, the best results were observed in the chicks of the third experimental group. In the control group in particular, the body temperature from the clinical-physiological indicators turned out to be 2.4% higher than in Group 3. And the number of breaths increased by 6.2% compared to control. Body weight was 8.3% higher. Sustainability was 100% in the 3rd experimental group at the end of the experiment and 92.5% in the control group.

1 Introduction

A distinctive feature of industrial poultry farming is a high concentration of poultry head numbers in restricted areas, which leads to increased contamination of production buildings with microorganisms and contributes to the emergence of diseases with a complex etiological structure [10].

In Uzbekistan, broiler chicks of an industrial type are also raised in large numbers on the mattresses. This in turn leads to an increase in infectious invasive and infectious diseases among poultry, as well as a violation of physiological-biochemical indicators. As a result, the productivity indicators of poultry decrease.

Maintaining the health of poultry, successfully realizing its genetic indicators, obtaining a quality and environmentally friendly product, increasing the high efficiency and

* Corresponding author: toshmurodovdiyor7@gmail.com

profitability of production are assessed according to the normal functioning of the immune system. [5-7]

Poultry in the meat direction are given mixed feed consisting of 3 different types of start, rost and finish food rations, and at 15 days start goes from food feed to rost food feed. As a result, changes in the intestinal microflora are also observed with the exchange of rations. That is, the beneficial microflora in the intestine decreases, and conditions are created for the reproduction of harmful microorganisms. This leads to a decrease in the level of natural resistance of the body, a decrease in meat productivity, an increase in the susceptibility of poultry to infectious diseases. For this reason, the use of immunomadulatory drugs in broiler meat-oriented poultry production, which bring genetic indicators of poultry to a normal surface and increase productivity, is currently very relevant [1-2, 8].

However, methods of effective use of immunomadulatory drugs in poultry farms of Uzbekistan have not been sufficiently studied. Specifically, chitosan hydroxyapatite is being studied for the first time in broiler poultry as an immunomadulatory drug. The purpose of our study was to study the effect of the drug Chitosan (bombyx mori) hydroxyapatite on the productivity, shelf life and clinical-physiological indicators of the Chick organism[8].

2 Materials and methods

Scientific -research work Samarkand city "Afrasiab poultry" M. Ch. J. In the poultry farm of, broiler was carried on Chicks belonging to the Ross-308 cross on the meat route. Laboratory and clinical trials were carried out on the farm itself. Taking into account the body weight of chicks, 4 groups were formed on the basis of analogues principle. The conditions for how to feed broiler chicks and fulfill zootechnical requirements were analyzed. To increase productivity in broiler chicks, scientific research has been carried out on the effect of various amounts of chitosan hydroxyapatite on the body.

160 head of 1-day chicks belonging to the Ross-308 Cross were selected from the Afroasiatic poultry farm and 4 groups of 40 heads were formed each. The storage conditions of the chicks were the same. The first group of control group chicks were fed to the end of the experiment with granulated mixed feed, compiled on the basis of a farm diet. Experimental group chicks of groups 2-3-4 were given for 13 days from the 15th to the 28th day, adding various amounts of chitosan hydroxyapatite (grower) to the diet of food. Included: 0.4 g/kg to chicks of the 2nd experimental group. The 3nd experimental group chicks were given 0.7 g/kg and the 4th experimental group chicks from 1g/kg. Experiments were carried out until the slaughter (42 days).

From clinical-physiological indicators, body temperature (prolife) was determined using an electronic thermometer with the help of an introduction into a cloaca of 2 cm in the direction of the rectum;

- the breathing rate was calculated by checking the movement of the lower abdomen under the cloaca (birds do not have a diaphragm; abdominal muscles play an important role in the act of breathing).

The growth of the living weight of chicks in the experiment M.V. It was determined by Krylov's (1969) improved method.

$$R = \frac{W_t - W_o}{W_o} \times 100 \quad (1)$$

Here: R-1 percent increase in live weight of the head chick; W_t - 1 live weight of the head chick at the end of the experiment (g); Pre-experimental live weight (g)of the Wo-1 head chick; Coefficient 100.

The preservation of poultry was determined by the daily census of poultry that died during the entire growing season.

3 Results

Any biologically active substance that is included in the diet can cause various levels of changes in the body of animals that consume it. Evidence of this has been expressed in a large number of studies conducted in poultry.

We know that clinical-physiological indicators of poultry are monitored and determined depending on body temperature, number of breaths, rate of heart contraction,increase or vice on the iontrary in blood pressure, color and laying of feathers. Changes in the listed processes are primarily caused by the derailment of physiological processes in the body, and due to improper feeding and malfunction of storage conditions.

The clinical-physiological indicators of chicks were at the level of regulatory indicators at the beginning of the experiment (up to 1-14 days). At the 15th day, with the alternation of the diet of food, significant changes in body temperature and breathing began to occur. In particular, on the 28th day of the experiment, changes in the number of breaths and body temperature began to be felt. In the control group, the body temperature was slightly higher by 0.53%, 1.17% and 0.12%, respectively, compared to experimental groups. At the end of the study (Day 42), however, experimental groups had 1.7%, 2.4%, and 1.1% lower than control. Among the experimental groups, in the 3rd experimental group, the body temperature was at the norm level.(Table 1).

Table 1. Body temperature of broiler chicks (C^o) n=10.

Age, days	Groups			
	I control	**II experience**	**III experience**	**IV texperience**
1	40.47±0.03			
14	40.6±0.06			
28	41.24±0.2	41.02±0.25	40.76±0.22	41.18±0.24
42	41.7±0.28	41.0±0.17	40.72±0.15	41.24±0.23

We calculated the breathing rate by checking the movement of the lower abdomen under the cloaca. In this case, the respiratory rate compared to the control group is 2.4 in experimental groups, respectively. 6.2 and 2.1% were higher.

Table 2. Broiler Chick respiration rate (1 min) n=10.

Age, days	Groups			
	I control	**II experience**	**III experience**	**IV experience**
1	34.4±051			
14	66.85±0.48			
28	67.4±0.81	67.8±08	69±0.70	67.4±0.92
42	66.4±1.6	68±0.7	70.4±0.5	67.8±0.86

The living weight of broiler poultry is important in the general assessment of the productivity of the poultry, including the effectiveness of its feeding. During the study, the growth and development of broiler chicks was assessed by changes in body weight.

The change in body weight of broiler chicks from the beginning to the end of the experiment is presented in table 3. From the data obtained, it can be seen that in this table, the living weight of one-day chicks is taken from 50 g to 55 g when compared to one.

On the 14th day of the experiment, no significant changes were observed in the live weight of chicks in all groups. Only from the 28th day, significant changes in living weight began to be observed between groups.

Table 3. Changes in broiler chick live weight with age (g) n=20.

Age, days	Groups			
	I control	II experience	III experience	IV texperience
1	52.1±0.5			
14	440±7.22			
28	1261.1±17.55	1307.6±22.55	1331.6±19.97***	1301.3±24.13
Control %	100	103.7	105.6	103.2
42	2364.3±32.23	2515.2±30.7	2560.2±29.79	2505.8±27.5
Control %	100	106.4	108.3	106.0

According to the results of the study, the highest live weight among groups in the 28th day of the experiment was 1331.6 g, observed in the 3rd experimental group. This was 5.6% higher ($p \leq 0.001$) than the control group. On the 28th day of the study, the live weight of broiler chicks in experimental groups 2 and 4 increased by 3.7% and 3.2%, respectively, compared to control. Differences in live weight did not differ greatly from the statistical side. Until the end of the study, the live weight advantage of chicks in the experimental group remained.

By the end of the study (Day 42), the difference in the live weight of chicks in control and experimental groups had increased greatly. Including the highest live weight observed in experimental groups 3 and 2 was 2560.2 g and 2515.2 g, respectively. This was 8.3 and 6.4% higher than the control. In the 4th experimental group, however, it accounted for 6.0% of control compared to 2,505.8 g.

According to the results of the study, the most common indicator can be seen in the 3rd experimental group, a noticeable increase in body weight compared to follow-up control.

One of the important indicators when feeding broiler chicks is the preservation of chicks. From the analysis of the data of the daily inspection carried out, it can be seen that broiler chicks in all groups had a different storage capacity. Thus, if broiler retention was high in the first two weeks of development and was 100% in all groups, differences in Group Chick retention occurred on the 28th day of the study resulting in 92.5% of control group Chick retention at the end of the study. Experiment groups 2 and 3, however, were higher than the rest, accounting for 97.5 va100%while experiment group 4 retained 95%.

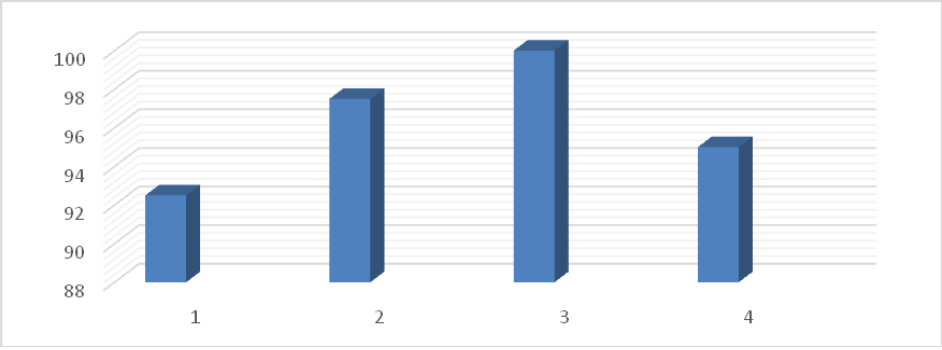

Fig. 1. Chick retention dynamics (%).

During the 42-day study carried out, the highest retention rate of broiler chicks was observed in the 3rd experimental group, which was 100%. Showed that there are no infectious pathological changes in the internal organs when deceased chicks are ruptured.

Symptoms of infectious diseases were not detected. The cause of Chick mortality was enteritis. Thus, in the 3rd experimental group, the highest survival of chicks was found.

4 Discussion

Chitosan (bombyx mori) hydroxyapatite broiler has been found to be an immunomadulator that affects Morpho-biochemical indicators of blood as well as the functional state of individual parts of the immune system when used as a biologically active substance in the diet of meat-oriented poultry[3, 5, 8, 12].

The results of ongoing research and experimental testing make it possible to recommend immunomodulators for introduction into poultry practice. This has a positive effect on the development of intestinal microflora by obtaining economically efficient and high-quality poultry products, as well as the development of the humoral and cellular immune system associated with the intestine, stimulating the gastrointestinal immune response [4, 13-15].

The purpose of the study was to study the productivity and quality of broiler meat using an immunomodulatory drug. To accomplish this goal, we used the drug Chitosan hydroxyapatite. Chitosan Mulberry contained in chitosan hydroxyapatite is a polymeric substance obtained from the heap of silkworm. It is used to stimulate natural immunity and improve Clinico-physiological indicators.

In our research, the best indicator was determined in the 3rd experimental group at the level of physiological norm in relation to the control of body temperature and number of breaths from clinical-physiological indicators. Body weight was also 8.3% higher in Group 3 chicks compared to control, at 2560.2 g. And in control it was 2364.3 g. At the same time the highest retention was 7.5% higher than that control observed in experimental group 3. While in control it was 92.5%. The other 2 and 3 groups were 2.5% and 5% higher than chicks, respectively. From this we can conclude that with the exchange of nutrients in poultry mainly at the age of 15, changes in the intestinal microflora occur, and the decrease in the number of Lacto and Bifidobacteria is determined. We will study this in our later studies. As a result, it leads to a decrease in shelf life and body weight.

5 Conclusion

In addition to the food of chicks in the broiler meat direction, the immunomadulatory chitosan hydroxyapatite was given 0.7 g/kg from the 15th to the 28th day, compared with the control group, the normalization was 100%, increasing the live weight by 3560.2 g to 8.3%.And 92.5% in the control group.

References

1. D. Toshmurodov, S. Aliyarov, D. Eshimov, D. Ibragimov, Effect of chitozan bombyx mori immunomodulator on the physiological state of chickens, European Journal of Agricultural and Rural Education (EJARE), **2**, **10**, 6-9 (2021)
2. B.F. Bessarabov, S.A. Alekseeva, L.V. Kletikova, Laboratory diagnostics of clinical and immunobiological status in poultry (KolosS, Moscow, 2008)
3. E.A. Alekseeva, T.Y. Gavrilova, L.V. Kletikova, The effect of biologically active substances on the immune protection of chickens and laying hens, Free radicals, antioxidants and animal health: mat. inter. sci.- practical conference, Voronezh, 345-350 (2006)

4. M.E. Dmitrieva, Veterinary welfare is the key to the profitable operation of a poultry enterprise, Poultry and poultry products, **1**, 23-25 (2014)
5. I.A. Rubinsky, O.G. Petrova, Immune stimulants in veterinary medicine, Monograph, 270 (2012)
6. I.A. Egorov, V.A. Manukyan, T.M. Okolelova, T.N. Lenkova, Guidelines for feeding poultry, Under the general editorship of V.I. Fisinin and I.A. Egorov, Sergiev Posad, 199 (2015)
7. Q.X. Ergashev, Synthesis and properties of Bombyx mori chitosan composites with hydroxyapatite, diss. PhD in Chemical Sciences, Tashkent, 19-22 (2021)
8. I.V. Zhukov, A.A.Ushkova, The study of the causes of metabolic disorders and low intensity of specific immunity in laying hens, Bulletin of the Voronezh State University of Engineering Technology, **4**, 125-128 (2015)
9. M. G. Petrash, Poultry farming in Russia. History, The main directions. Development prospects (Koloss, Moscow, 2004)
10. A.P. Duktov, P.A. Krasoshko, I.S. Seruakov, V.I. Eremets, Biopolymers, immunostimulators and probiotics in broiler poultry farming, Monografia, Gorki, 289 (2016)
11. P.H. Godizov, D.V. Tsarukaeva, Immunophane as a stimulator of natural and specific resistance, Proceedings of the Gorsky State Agrarian University, **51**, **3**, 302-305 (2014)
12. G.A. Grosheva, N.R. Esakova, Interrelation of factors of natural resistance of the bird organism and immunity in vaccinations, Veterinary medicine, **8**, 24-27 (2000)
13. G.A. Grosheva, N.R. Isakova, New methods for assessing the natural resistance and reactivity of the bird organism, Veterinary medicine, **9**, 34-35 (1996)
14. S.S. Guo, K. Ma, I.M. Guo, The effect of the drug Antigen on the productivity of broiler chickens, their immune response and the microflora of the ileum, Poultry and poultry products, **2**, 47-48 (2013)
15. D.T. Muhamediyeva, L.U. Safarova, R.F. Ruzikulov, *Expert systems for diagnostics of infectious diseases in cattle*, BIO Web of Conferences, **71**, 01073 (2023)