Influence of Chitosan and Serum on the State of Broiler Chickens

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ABSTRACT

The development of ways to reduce the cost of feed rations can be solved by expanding the range of input components through the use of secondary products of the food industry. In the Republic of Uzbekistan, silkworm waste belongs to the above components for obtaining substances that increase productivity. These include chitosan obtained from chitin by deacetylation with varying degrees. Results have been obtained that indicate efficiency compared to diets currently used in industrial and vivarium conditions.

Keywords: Chitosan, chitin, broilers, poultry, feed, whey powder, protein.

Introduction. Intensive breeding and use chickens in conditions high concentration chickens and harmful impact many man-made factors accompanied by a decrease level resistance organism, increase percent morbidity and mortality of birds. These conditions require the use of nutritional supplements, prophylactic and therapeutic drugs [1].

"Chitosan" of natural origin, as well as its use as an immunostimulant, a means that increases the productivity of broiler chickens and improves the quality of poultry products, is of great scientific interest. The drug "Chitosan" is a natural polymer of polysaccharide nature, one of the most common organic compounds in nature. The raw material for its production is chitin, a structural polysaccharide of crustacean epidermis, insect cuticles, and the cell wall of fungi. The most common sources of its production are the shells of crustaceans (crabs, crustaceans, etc.) [2]. Biopolymer "Chitosan" has such properties as high sorption capacity, non-toxicity, wound healing ability, anticoagulant, bacteriostatic and antitumor activity. It is also a good flocculant, emulsifier, thickener and structurant.

The purpose of the work is to study the effect of the biopolymer chitosan + dry milk whey on the physiological and biochemical parameters of broiler chickens.

Literature review.

Currently, more than 100 fields of application of the preparation "Chitosan" and its derivatives are known, including recently obtained micro- and nanochitosans [3]. The problem of mycotoxicoses is so urgent today that it undoubtedly requires justification of the strategy for the prevention and elimination of toxins along the entire chain - from the field to the person [4]. Many factors determine the success of poultry farming, but the quality of the finished product delivered to the consumer is of decisive importance [5, 6]. Products must be complete and harmless [7, 8].

Recently, an inexpensive product, whey, has been brought in to increase quantitative mass production. It is a by-product

obtained during the production of cottage cheese, cheese, milk and other dairy products. Its production in a circular economy system encourages more producers to process whey, which generates additional income and creates domestic sources of food resources. Whey is the richest food product [9, 10]. Contains components that strengthen the immune system, lactoferrin, immunoglobulin, a complete set of B vitamins, as well as micro and macro elements such as vitamin C, nicotinic acid, choline, vitamin A, vitamin E and biotin, Ca, K, P, Fe, Zn. The composition of whey is determined depending on the type of the main product and the technology of its production. Whey contains all essential amino acids. Dry whey is a powder obtained by drying dairy products. Dry whey also has a very rich composition. Contains the following minerals and vitamins: vitamin A, organic acids, vitamin B_2 , vitamin PP, vitamin H, phosphorus, iron, iodine, potassium, cobalt, etc. Dry whey contains almost all water-soluble salts and trace elements. Given that dry whey is rich in vitamins, it replenishes the entire vitamin composition of the body [11].

The development of ways to reduce the cost of food rations can be solved by expanding the range of input components through the use of secondary products of the food industry [12, 13]. Waste from the food industry is an important source of replenishment of food stocks. Whey from the production of cheese, cottage cheese and casein can play an important role in strengthening the food base. Interest in this food product is determined by an increase in its consumption due to a significant increase in demand for cheese and cottage cheese. The presence of valuable food solids (protein, milk sugar, mineral salts) in whey makes it possible to use it for the production of nutritional supplements. When properly processed, whey is a relatively inexpensive ingredient in animal feed and whole milk substitutes.

Materials and research methods. Research and production experience in developing optimal doses and assessing the effect of chitosan + dry whey on the safety and quality of products from broiler chickens was carried out under the conditions of a conventional vivarium. The object of the study were broiler chickens of the Cobb variety. The experiment involved 100 chickens. Content - cellular, 6 goals. in a cage (4 groups). Group 1 served as control, groups 2, 3 and 4 - experimental. Chickens of the 2nd group additionally received chitosan + dry whey at a dose of 40 mg per head (chitosan 2 mg, dry whey 38 mg), group 3 - at a dose of 60 mg (chitosan 4 mg, dry whey 56 mg) and 4- group I - 80 received the drug in mg (chitosan 6 mg, dry serum 74 mg). Broiler chickens received “SuperDon” compound feed. The additive was introduced into the diet from the age of 7 days along with drinking water, after dissolving the biopolymer in a 2% solution of acetic acid. In the last decade of life, the use of premixes for broiler chickens was carried out to remove toxic feed components and antibiotics from the body [14, 15, 16]. In order to control the development of experimental chickens, considering their safety, they were weighed at the age of 28 days and at the end of the experiment (at the age of 42 days). During the experiment, the chickens of the experimental and control groups were observed for their clinical condition, safety and weight gain. Blood samples were taken at 3, 4, 5, and 6 weeks and the physiological and biochemical parameters were determined [17, 18].

Determination of meat moisture was determined by weight loss during drying of prototypes (GOST 9793-74. “Meat products. Methods for determining moisture”) . The study of the chemical composition (fat, ash, protein) was carried out according to GOSTs : 23042-86, 31727-2012, 25011-81.

Research results and discussion. Feeding the premix to chickens had a positive effect on the growth and development of broiler chickens, as evidenced by the positive dynamics of hematological and biochemical parameters. Prior to the start of the experiment, the number of erythrocytes in the blood of day-old chickens was $3.21\pm0.30 \times 10^{12}$/l. In the later periods of the study, this indicator increased in all groups, and on the 42nd day of the experiment it was the highest in the 2nd experimental group, where the

number of erythrocytes was 3.65±0.23×10^{12}/l (Table 1).

On the 6th week of the experiment, the hemoglobin index in the 4th group increased by 2.3% of the control value, in the 2nd group by 6%, in the 3rd group by 0.7% and amounted to 140.3±19, 23 g/l.

Before the start of the experiment, the content of total protein in the blood of chickens was 34.10±3.03 g/l, of which albumins - 16.25±1.35 g/l and globulins - 18.10±2.27 g/l. At the end of the experiment, this indicator was higher than the background values only in the 4th group, which amounted to 36.3±3.03 g/l, and the amount of albumins and globulins was 15.35±1.28 g/l and 21.15± 2.16 g/l is formed accordingly.

Table 1.
Blood parameters of birds of the control and experimental groups when using the used premix (M ± m, n = 25)

Indicators	Sample age, weeks	Control group	Experienced groups		
			1	2	3
1	2	3	4	5	6
Erythrocytes 10 ^{12} /l	3	3,21 ± 0,30	3,21 ± 0,30	3,21 ± 0,30	3,21 ± 0,30
	4	3,82±0,50	3,82±0,50	3,82±0,50	3,82±0,50
	5	3,61±0,33	3,62±0,24	3,65 ± 0,23	3,63±0,30
Hemoglobin, g/l	3	118 ± 6,87	118 ± 6,87	118 ± 6,87	118 ± 6,87
	4	125,2 ± 7,88	125,2 ± 7,88	125,2 ± 7,88	125,2 ± 7,88
	5	137,42 ± 14,2	132,64 ± 21,4	139,58 ± 16,7	140,3 ± 19,23
total protein, g/l	3	30,19 ± 1,64	30,19 ± 1,64	30,19 ± 1,64	30,19 ± 1,64
	4	34,1 ± 3,03	34,1 ± 3,03	34,1 ± 3,03	34,1 ± 3,03
	5	31,31 ± 2,64	33,8 ± 1,72	36,3 ± 3,03	35,5± 2,78*
Albumins, g/l	3	14,36 ± 1,21	14,36 ± 1,21	14,36 ± 1,21	14,36 ± 1,21
	4	16,25 ± 1,35	16,25 ± 1,35	16,25 ± 1,35	16,25 ± 1,35
	5	15,49 ± 1,35	14,35±0,42	15,35 ± 1,28	14,9± 1,66
Globulins, g/l	3	15,6±0,66	15,6±0,66	15,6±0,66	15,6±0,66
	4	18,10 ± 2,27	18,10 ± 2,27	18,10 ± 2,27	18,10 ± 2,27
	5	15,79 ± 1,32	19,3 ± 1,65	21,15 ± 2,16	20,55± 1,23**
Cholesterol, mol/l	3	2,51±0,34	2,51±0,34	2,51±0,34	2,51±0,34
	4	2,07 ± 0,15	2,07 ± 0,15	2,07 ± 0,15	2,07 ± 0,15
	5	2,61±0,25	2,29±0,36	2,1 ± 0,19	2,19±0,4
Glucose, mol/l	3	9,12 ± 1,78	9,12 ± 1,78	9,12 ± 1,78	9,12 ± 1,78
	4	8,8±0,73	8,8±0,73	8,8±0,73	8,8±0,73
	5	8,52 ± 1,71	8,46±0,85	8,28 ± 1,34	8,4 ± 1,52
Bilirubin, μmol /l	3	12,78±0,61	12,78±0,61	12,78±0,61	12,78±0,61
	4	11,05±2,8	11,05±2,8	11,05±2,8	11,05±2,8
	5	10,72 ± 3,46	9,27 ± 3,93	8,23 ± 3,41	9,74 ± 2,47

*P<0.05; **P<0.01. Significantly compared to the control group

During the experiment in the control and experimental groups, all the studied blood biochemical parameters (glucose, bilirubin, cholesterol) were within the physiological limits.

As mentioned above, feeding the premix to chickens had a positive effect on their growth, development and safety.

From the experience it can be seen that the survival rate of broiler chickens of the 4th group, who received the premix at a dose of 80 mg at 5 weeks of age, was 0.6% and 0.1-0.3% higher than in the control, compared with the

2nd group. -3, the case in the 4th group was 2.1%, in the control - 2.7%.

Studies have shown that broiler chickens of the 3rd experimental group were characterized by high growth rate during the experiment. The average daily gain in it was 51 g (in the control - 45.1 g).

The largest live weight of birds in the group was in experimental group 3. It was 0.8 and 4.6% higher than in other experimental groups and amounted to 2182 g (Table 2).

The next stage of research was the study of meat quality indicators after feeding broiler chickens with a premix.

In the organoleptic study of carcasses of all the studied groups, the following indicators were revealed. In all samples, the surface of the carcass is dry, white-yellow with a pink tinge; the mucous membrane of the oral cavity is shiny, pale pink, slightly moistened; the beak is shiny; the eyeball is convex, the cornea is shiny; light yellow subcutaneous and visceral fat; the serous membrane of the abdominal cavity is moist, transparent; the incision muscles are slightly moist, light pink in color, have an elastic structure; the smell is characteristic of fresh meat.

The meat cooking test showed that the broth in all experimental samples was clear and fragrant. No foreign odor was found.

Table 2.
Dynamics of live weight and average daily gains of broiler chickens when premix is included in the diet.

Groups	Weight at the age of 2 weeks, g	Average daily gain at 3 weeks of age, g	Weight at the age of 5 weeks, g	Average daily gain at the age of 5 weeks, g
Control	900±64,3	30	1900±64,5	41.1
1- xperienced	1055±59,5*	35.1	2065 ±70,2*	46.7
2- xperienced	1079±55,2*	35.5	2145 ±75,1*	48.6
3- xperienced	1041 ±42,7*	34.1	2162 ±51,3*	49,0

* P<0.01.

Brief contents.

1. The blood parameters of premixes of broiler chickens treated at a dose of 80 mg/head were within physiological limits. Also, no pathological changes in the liver and kidneys were detected when using the drug according to this scheme.

2. Premix as a sorbent of mycotoxins, heavy metals and bacterial waste products and as a means of enveloping the mucous membrane of the gastrointestinal tract, reducing their entry into the body of chickens. This leads to an increase in the productivity of broilers and an increase in the biological value of meat.

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