The efficiency of the use of “Biostrong 510” additive in the technology of broiler chicken meat production

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Abstract. Growing chickens for meat is the main link in the technological chain of broiler production. Broilers – the final hybrid obtained as a result of interbreeding of different chicken breeds lines (meat parent forms), tested for compatibility. Because of this, the bird has an intense growth rate, high taste of meat. Consumer demand for broiler meat has been increasing steadily in recent decades. Biostrong 510 (BIOSTRONG 510) herbal feed supplement to improve palatability and increase consumption or feed for farm poultry. The mechanism of action is based on the joint action of several plant substances, in which there are active substances, which, when combined, affect a certain category of animals. Four groups of broiler chickens (1 control and 3 experimental) of the Cobb 500 cross at the daily age of 50 heads each were formed to conduct the experiment by the method of analogues. The experiments were carried out with the daily up to 40 days of age. Expenses of feeds in the experimental groups was lower than in the control group by 0.07, 0.13, 0.12 kg, respectively. The purpose of this work was to establish the feasibility and effectiveness of enrichment of animal feed with vegetable feed additive "Biostrong 510" used in the production of meat broiler chickens. Assessing the results of scientific and economic experience, we can safely say that in all the experimental groups in which "Biostrong 510" was used as an additive, the gain in the live weight of broiler chickens was increased compared to the control group. In total, 4020 g of compound feed was spent for the period of an experiment for each experimental group of broiler chickens. Due to the improved taste of feed, the palatability in the experimental groups was higher than in the control group by 0.3 %; 0.9 %; 0.8 %. The cost of feed in the experimental groups was lower than in the control group. For example, in the control – 1, 87 kg per 1 kg of body weight gain. In experimental – below 0.07; 0.13; 0.12 kg, respectively. As a result of the experiment, it was found that the viability of experimental broiler chickens was almost 100%. The natural loss of livestock was only due to technological injuries. The obtained data on the productivity of broiler chickens indicate a favorable effect of plant feed additive on the live weight of broiler chickens. Based on the results of the research, we recommend to introduce a plant feed additive based on essential oils and plant substances "Biostrong 510" in the composition of complete feed in the amount of 150 g/t to increase live weight, growth intensity, preservation, meat productivity, reduce feed costs per unit of broiler chickens of the cross "Cobb 500".

1. Introduction

The successful development of the broiler industry is determined by achievements in breeding, use of specialized feed and compliance with the recommended conditions of farming. Poultry farms and
organizations-members produce more than 85% of eggs and poultry meat of the total volume produced by agricultural enterprises of the Russian Federation [1-8].

The emphasis on the development of poultry has to be done not only because of the fact that it is the most "precocious" industry, but also because it gives the greatest return per unit of spent feed, labor and other resources in conditions of limited grain resources. The cost of feed and labor is 2-3 times lower in poultry than in pig and cattle breeding. Dietary poultry products are significantly cheaper than other products containing animal protein. Thus, from the point of view of the population and state interests in terms of solving the food problem, the development of poultry farming should be carried out on a priority basis [9-17].

The nutritional value of broiler meat as a food product, the availability of technological equipment, the use of highly productive meat crosses is the basis for increasing the production of broiler meat [18-26].

The share of poultry meat in the total production of livestock and poultry in all categories of farms is more than 20%. Poultry products account for 30-35% in the large industrial centers of Russia in the structure of the population nutrition.

Providing the population of Russia with poultry products of its own production determines the food independence of the country, which depends on the development of the national agricultural sector. In this case, an important role is played by the possibility of increasing the poultry productivity with the lowest production costs. The world experience of this branch successful introduction of proves a need to solve a feed problem first of all. Only with a complex feeding of a bird, the genetic potential of productivity is realized [27-30].

Today there is a necessity for a correct and scientifically based clinical and morphological assessment of agricultural, wild, exotic birds organisms metabolism with the search and use of drugs in industrial poultry, correcting metabolism, safety, productivity of livestock and improving the quality of poultry products [31-33] in modern socio-economic conditions.

To this end, the use of “Biostrong 510” as a vegetable feed additive to increase productivity and reduce the cost of feed per unit of production is relevant in industrial poultry farming.

The purpose of this work was to establish the feasibility and effectiveness of enrichment of animal feed with vegetable feed additive "Biostrong 510" used in the production of meat broiler chickens.

2. Material and methods

The scientific-economic experiment was held to examine the efficiency of adding herbal feed additive "Biostrong 510" in compound feeds for broiler chickens under the conditions of the poultry farm LLC "Ptitsefabrika Akashevskaya".

Four groups of broiler chickens (1 control and 3 experimental groups) were formed to conduct the experiment by the method of analogues of the "COBB 500" cross at the daily age of 50 heads each. The experiments were carried out with birds aged 1 day up to 40 days of age. The experiment was carried out according to the scheme presented in table 1.

| Group             | Livestock chickens, heads. | Main diet, feed | Quantity of "Biostrong 510", % of dry matter of compound feed |
|-------------------|---------------------------|----------------|----------------------------------------------------------|
| Control           | 50                        | PK + of "Biostrong 510" | -                                                        |
| I Experimental    | 50                        | PK + of "Biostrong 510" | 0.01                                                    |
| II Experimental   | 50                        | PK + of "Biostrong 510" | 0.015                                                   |
| III Experimental  | 50                        | PK + of "Biostrong 510" | 0.02                                                    |
The peculiarity of feeding was that a different amount of vegetable feed additive "Biostrong 510" was introduced in the feed of experimental groups broiler chickens.

Complete feed was used in feeding of experimental broiler chickens: PK 5-0 (pre-starter, 1 to 7 days), 5-1 PK (starter, from 8 to 15 days), 5-2 PK (grower/growth, from 16 to 22 days), PK 6-1 (finisher 1, from 23 to 34 days), PK 6-2 (finisher 2, Art. 35 days.).

Feeding of poultry was carried out with dry balanced feed with nutritional parameters corresponding to the recommended norms of the cross "COBB 500". Feeding front was 2.5 cm per 1 head (deviations up to ±5% are allowed). The quality of water for drinking met the requirements of GOST R 51232-98. The choice of water supply sources was carried out in accordance with SanPiN 2.1.4.559-96. Water hardness was within the permissible limits (no more than 30°). The drinking front was not less than 1 cm per head (deviations up to ± 5% are allowed). Access to water was constant.

During the scientific and economic experience, experimental broiler chickens were placed on a deep bedding (in specially fenced sections) when kept on the floor.

The poultry houses had a mixed ventilation system. The air flow was carried out both through the roof, where roof fans are installed, and through the supply valves. Exhaust fans are installed in the wall openings. There were plastic ventilation shafts on the roof. Lighting was provided by smooth adjustment, localized in the area of feeders.

Materials of researches are processed by method of variation statistics on the personal computer with use of the software of Microsoft Office of Excel 2007.

Bistrong 510 (BIOSTRONG 510), herbal feed Supplement, is to improve palatability and increase consumption of feed for farm poultry. The mechanism of action is based on the joint action of several plant substances, in which there are active substances, which, when combined, affect a certain category of animals.

The content of the main active substances with the possibility of their detection in premixes and compound feeds by analytical methods both in quantity and quality is guaranteed.

The composition of the feed additive "Biostrong 510" includes essential oils, herbal plants and flavorings. Carrier and auxiliary substances are wheat bran, limestone, silica, and starch.

The feed additive "Biostrong 510" does not contain genetically modified products.

The composition of this additive: essential oils (microencapsulated), sharp substances, bitter substances, saponins.

"Biostrong 510" contains: anise oil-5.33%; thyme oil – 3.33%; gentian powder – 20%; chili paprika powder – 10%; killaya extract – 23.34%; wheat bran – 21.5%; limestone – 10%; silicon dioxide – 5%; starch – 1.5%.

The maximum permissible deviations in the content of ingredients did not exceed 15%.

Feeding of broiler chickens was organized in accordance with the norms of feeding for the cross "Cobb 500". When growing the experimental broiler chickens, the calculation of food consumption was carried out: per head per day and per 1 kg of live weight gain. During the experiment, the broilers were placed on deep bedding. The relative humidity, the temperature in the poultry house, the light supply in the room were automatically controlled by the "Francom" company microclimate computer system.

4020 g of feed for each study group of broiler chickens was spent during the scientific and economic experiment.

For the entire period of farming, the palatability of the feed in experimental groups exceeded the eaten one in the control group. In the experimental groups, the feed palatability was higher, since the inclusion of "Biostrong 510" increased the palatability of feed, due to its composition.

3. Research result
For 1 kg of broiler live weight gain, 1.87 kg of feed was consumed in the control group. The feed costs of the experimental groups were lower than that of the control group by 0.07; 0.13; 0.12 kg.
Safety was determined for 40 days in order to determine the effect of feeding in the rations of experimental broiler chickens on the body's stability of the experimental chickens of various doses of the herbal feed additive “Biostrong 510.”

The survival rate of the 1st experimental group was 98 %, the 2nd experimental group - 100%, the 3rd experimental group – 100%.

The effectiveness of the use of plant feed additive in the experiment was established by taking into account changes in the live weight of birds during the accounting period (figure 1).

![Figure 1](image1.png)

**Figure 1.** Dynamics of live weight gain of broiler chickens, g (P<0.05; P<0.01).

In the course of our research, it was found that the intensity of experimental broiler growth chickens was high, as evidenced by the average daily growth of live weight. The experimental groups exceeded the control group in terms of the average daily growth (figure 2).

![Figure 2](image2.png)

**Figure 2.** Dynamics of average daily growth, g (P<0.05; P<0.01).

The absolute increase was calculated to study the indicator of live weight gain completely. The absolute gain in live weight in broiler chickens of all experimental groups was greater than in the control group (figure 3).

![Figure 3](image3.png)
The addition of a plant-based feed additive to the main diet had a positive effect on the absolute gain in live weight and allowed to increase it in the experimental groups.

One of the birds' development signs is growth. Growth rates reflect its intensity for a single segment. The greatest relative gain was obtained from the chickens of the second and third experimental groups, receiving vegetable feed additive "Biostrong 510" in their diets in the amount of 0.015 and 0.02% per 1 ton of feed, respectively 192.76 and 192.71% (figure 4).

In order to establish the effect of feeding vegetable feed additives on meat productivity by the method of T. M. Polivanova (1987) in the slaughter shop of the poultry farm at the end of the experiment, control slaughter of broiler chickens was carried out.

Broiler chickens of experimental groups 1, 2 and 3 had superiority over the control in pre-slaughter live weight, which was higher by 4.3; 8.3; 7.7 %, respectively (As shown in Table 2). According to
the results obtained in the half-eviscerating, it can be seen that the experimental groups of broilers by weight exceeded the control group by 4.5; 8.9; 8.2 %. The mass of the eviscerated carcass in the experimental groups prevailed over the control group. The mass of eviscerated carcass in the first experimental group was higher than in the control group by 119.5 g, in the second experimental group – by 181.7 g, in the third experimental group – by 169.8 g.

| Group          | Pre-slaughter live weight of 1 head, g | Half-eviscerated carcass weight, g | Eviscerated carcass weight, g | %          | %          |
|----------------|-----------------------------------------|-----------------------------------|-----------------------------|------------|------------|
| Control        | 2037.6±24.4                             | 1626.0±36.2                       | 1323.2±19.8                 | 79.8       | 63.6       |
| 1st experimental | 2150.4±20.7**                           | 1690.2±26.1                       | 1423.6±18.6*                | 78.6       | 66.2       |
| 2nd experimental | 2206.7±21.2**                           | 1771.9±29.2                       | 1504.9±17.7**               | 80.3       | 68.2       |
| 3rd experimental | 2195.6±26.0**                           | 1758.7±31.1                       | 1493.0±24.4**               | 80.1       | 68.0       |

Note: * P<0.05; ** P<0.01

Thus, the introduction of the vegetable feed additive “Biostrong 510” into the basic ration of broiler chickens from the experimental groups contributes to an increase in the pre-slaughter body weight, the weight of the half-gutted carcass, the mass of the gutted carcass and the slaughter yield, compared to the control. Moreover, the best indicators were established in the second experimental group.

For the second experimental group of chickens, the boning of the carcass thoracic part showed that muscle tissue occupied 368.7 g (24.5 %) of the total weight and exceeded 75 g (25.5 %) of the control group. The third experimental group also exceeded this figure by 67.6 g (23%) and amounted to 361.3 g (figure 5).

![Figure 5. Morphological composition of the breast of experimental broiler chickens, g (P<0.05; P<0.01).](image.png)

During the boning of the carcass femoral part it was revealed that with almost identical outputs of muscle tissue, skin and bone, the advantage in absolute terms was on the experimental groups broilers side.

With equal bone mass, they were superior to the young birds of the control group in terms of muscle tissue in the first experimental group by 21 g (12.5 %), skin by 1.8 g (5.0 %); in the second experimental group by 30.6 g (18.2%), skin by 3.4 g (9.5%); in the third experimental group by 26 g (15.5%), skin by 1.6 g (4.5%) (figure 6).
Figure 6. Morphological composition of the breast of experimental broiler chickens, g (P<0.05; P<0.01).

Figure 7. Morphological composition of the lower leg of experimental broiler chickens (P<0.05; P<0.01).

Undoubtedly, the number of experimental groups had a number of advantages in comparison with the control group, in particular, in the study of the lower leg morphological composition, and comparing the meat qualities of poultry (As shown in Table 3). The output of muscle tissue in the first experimental group was 128.4 g, which is more than the control group by 12 g (10.3%). In the second experimental group, the output of muscle tissue also prevailed over the control group and amounted to 136.9 g, which is more by 20.5 g (17.6%). In the third experimental group, this figure was higher than in the control group by 18 g (15.5%). Skin yield in the first experimental group was greater than in the control by 1.2 g, in the second group-by 1 g, in the third-by 0.7 g. The same situation was with the yield of bones and fat, the results of the experimental groups prevailed over the control group. Figure 7 shows a diagram of the experimental broiler chicken lower leg morphological composition.
Table 3. Economic Indicators of Experiment (rbl).

| Indicator                             | Control | 1-st Experimental | 2-nd Experimental | 3-rd Experimental |
|---------------------------------------|---------|-------------------|-------------------|-------------------|
| Average number heads.                 | 50      | 50                | 50                | 50                |
| Survival rate, %                      | 98      | 98                | 100               | 100               |
| Live weight when putting on the       | 42.1±0.04 | 42.2±0.02         | 41.9±0.03         | 42.0±0.03         |
| experiment, g                         |         |                   |                   |                   |
| Live weight at the end of the         | 2100.6±23.6 | 2190.4±28.8       | 2275.0±29.6       | 2263.5±28.7       |
| experiment, g                         |         |                   |                   |                   |
| The absolute gain, g                  | 2058.5±23.6 | 2148.2±28.8       | 2233.1±29.6       | 2221.5±28.7       |
| Additional growth was obtained, g     | -       | 89.7              | 174.6             | 163.0             |
| %                                     | 100     | 104.3             | 108.5             | 107.9             |
| The selling price of 1 kg, rbl.       | 96.73   | 96.73             | 96.73             | 96.73             |
| The cost of gain of 1 head, RUB       | 116.61  | 122.87            | 128.54            | 128.56            |
| Revenue from the sale of 1 head, RUB  | 203.1   | 211.83            | 220.0             | 218.89            |
| Profit, RUB                           | 86.51   | 88.96             | 91.46             | 90.33             |
| Additional revenue, RUB               | -       | 2.45              | 4.95              | 3.82              |
| Realized for 1 RUB add. costs, RUB    | -       | 1.77              | 2.43              | 1.40              |

Additional products (1 ruble spent) for the purchase of plant feed additives were received for 1.77 rubles in the first experimental group, for 2.43 rubles in the second experimental group and 1.40 rubles in the third experimental group.

Thus, the plant feed additive based on essential oils and plant substances "Biostrong 510" contains the main active substances with the possibility of their detection in feed by analytical methods, both in quantity and quality. Contains active ingredients exclusively of plant origin that, unlike synthetic, have a more intense effect on the body of the animal. Active plant substances that are part of the plant feed additive based on essential oils and plant substances "Biostrong 510", serve to improve the digestibility of nutrients. The mechanism of action is based on synergism of several herbal substances which are active substances, in mutual combination, affect the growth and development of broiler chickens.

It was possible to improve the taste of the feed and increase secretion in the digestive tract with the help of "Biostrong 510" during the experiment. Due to this, the intestinal microflora is stabilized, the accumulation of toxins decreased, inflammatory processes were regulated. The immune system began to work more actively. Assessing the results of scientific and economic experience, we can safely say that in all the experimental groups in which "Biostrong 510" was used as an additive, the gain in the live weight of broiler chickens was increased compared to the control group. The highest values of gain were observed in the second experimental group and amounted to 2275 g, which is more than the gain of the control group by 8.3 %.

In total, 4020 g of compound feed was spent for the period of an experiment for each experimental group of broiler chickens. Due to the improved taste of feed, the palatability in the experimental groups was higher than in the control group by 0.3 %; 0.9 %; 0.8 %. The cost of feed in the experimental groups was lower than in the control group. For example, in the control – 1, 87 kg per 1 kg of body weight gain. In experimental – below 0.07; 0.13; 0.12 kg, respectively.

As a result of the experiment, it was found that the viability of experimental broiler chickens was almost 100%. The natural loss of livestock was only due to technological injuries.

The obtained data on the productivity of broiler chickens indicate a favorable effect of plant feed additive on the live weight of broiler chickens.

The health status of broiler chickens was controlled by the determination of blood parameters: the content of red blood cells, white blood cells, hemoglobin, total protein, total calcium, phosphorus, cholesterol, and glucose. The studies conducted by us did not reveal the effect of plant feed additive.
on hematological parameters of broiler chickens in the experimental groups and were generally within the physiological norm, but there was a tendency to increase the total protein.

4. Summary
Based on the results of the research, we recommend to introduce a plant feed additive based on essential oils and plant substances "Biostrong 510" in the composition of complete feed in the amount of 150 g/t to increase live weight, growth intensity, preservation, meat productivity, reduce feed costs per unit of broiler chickens of the cross "Cobb 500".

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