

The Efficiency of Adding the M-feed Supplement into the Composition of Feed for Broiler Chickens

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ABSTRACT

It was found that adding different dosages of the M-feed supplement in the composition of mixed feeds for broiler chickens had a positive effect on metabolism and productivity, improved the absorption and use of mineral elements of the diet, normalized blood, and increased growth energy by 7.6% compared to the control group, leading to a decrease in feed consumption per 1 kg of weight gain. Based on the analysis of the control slaughter and morphological cutting of carcasses of broiler chickens, it was observed that the inclusion of a new feed supplement called M-feed in the diet contributed to an increase in the slaughter qualities and slaughter yield of half-gutted and gutted carcasses. The weight of the half-gutted carcass of broiler chickens of the 2nd experimental group was 8.9% higher compared to the weight of the chickens in the control group and 6.08 and 4.6% higher than the weight of the chickens in the 1st and 3rd experimental groups. The supplement under study also contributed to the production of higher quality meat. Thus, in the experimental groups, the yield of carcasses of the first category compared with the control chickens was 5.0-9.5% higher. The carcasses were characterized by an increased mass of edible parts and muscles.

Key words : Broiler chickens, Ross-308, M-feed supplement, compound feed, diet, mineral elements, live weight, average daily gain, poultry meat, cross

INTRODUCTION

Poultry meat farming is one of the most stable branches of agricultural holdings in Russia. The development of intensive poultry farming is possible only in the presence of highly specialized breeds and lines when by crossing those breeds and lines one can obtain highly productive poultry hybrid. With balanced feeding and increasing the biological value of compound feed, the most complete manifestation of the genetic potential of the bird is ensured.

Among the factors of good nutrition for poultry, it is important to enrich their diets with various feed supplements of Russian and foreign production. However, most feed supplements used in feeding broiler chickens are ineffective and expensive, which leads to an increase in the production cost. In this regard, in recent years, constant work has been going on in Russia regarding the use of environmentally-friendly, multicomponent feed supplements of natural origin, which have specific properties and have a positive effect on the organism of the birds. One of these

supplements is M-feed, a high-tech combined and completely natural product created by one of the largest European companies, OLMIX, using nanotechnologies (Prytkov *et al.*, 2017; Prytkov *et al.*, 2017; Prytkov and Kistina, 2018). This preparation has undergone extensive scientific industrial testing in various branches of animal husbandry. Studies of Russian scientists have established a positive effect of M-feed on the metabolism and productivity of quails, young sheep and cattle. However, there is little information on the use of this feed supplement in poultry meat production. Therefore, the study of the possibility of using the M-feed supplement in the composition of feed for Ross-308 broiler chicken cross to improve metabolism and increase productivity is relevant and is of certain interest for modern science and production (Kistina, 2017; Prytkov and Kistina, 2017; Gaiirbegov *et al.*, 2018).

MATERIALS AND METHODS

The studies were carried out on broiler

chickens of the Ross-308 cross. Experimental studies were carried out in the production conditions of Agrofirma Oktyabrskaya JSC, Lyambirsky region, Republic of Mordovia, Russian Federation.

Depending on the technological schedule, on an average, the enterprise holds about 3360 thousand heads of poultry. The duration of growing broiler chickens equalled 40 days, the slaughter was carried out on day 41. This poultry variety was distinguished by very early maturity and omnivorousness. The potential of the broilers of this cross was unique as they were fast-growing poultry with high genetic potential for growth and efficient feed conversion. The chickens were kept in big Dutchman cell batteries. Optimal conditions of keeping and feeding were created for the poultry. To study the effectiveness of the use of the new M-feed supplement in broiler chickens' diets; an experiment was carried out in the production environment of Agrofirma Oktyabrskaya JSC from January 2019 to April 2020.

On the principle of analog pairs, 240 heads of day-old broiler chickens of the Ross-308 cross with an average live weight of 40 g were selected. Four groups of 60 heads in each were formed. Temperature and light conditions, air humidity, feeding and watering areas of the poultry during the experiment corresponded to the recommended standards of the All-Russian Scientific Research Veterinary Institute of Poultry (VNITIP).

The broiler chickens were fed with complete feed under the recommended VNITIP standards (Prytkov *et al.*, 2017). In terms of completeness and the content of ingredients in the composition of feed, all groups of broiler chickens were the same and differed only in the content of the studied feed supplement in the feed composition. The supplement in question was a natural feed supplement made of environmentally-friendly raw materials. Broiler chickens of the control group received

the main diet, and the experimental groups, in addition to the main diet, received different dosages of the M-feed supplement (Table 1).

The studied indicators were monitored :

- live weight of chickens : by weighing chickens during control periods;
- safety of chickens : by counting mortality and culling of livestock;
- average daily gain : by dividing the total weight gain for the entire growing period by the number of days.

The effect of the studied supplement M-feed in the composition of broiler diets on their meat productivity, at the end of the experiment, at the age of 41 days, a control slaughter was carried out in the slaughterhouse of the poultry farm. From each group, three heads of broilers the live weight of which corresponded to the average indicators for the weight of the studied groups were slaughtered. As a result of anatomical cutting, the following parameters were determined :

Half-gutted carcass weight (without blood, feathers, glandular stomach, intestines, and pancreas).

The weight of the gutted carcass (without blood, feathers, head, legs, wings, gastrointestinal tract, excluding the gizzard without cuticles and genitals), in addition, the weights of the liver, stomach, and heart were determined.

Biochemical and morphological studies of broiler blood were carried out at the State Budgetary Institution Mordovian Republican Veterinary Laboratory.

The processing of the data obtained was carried out by the methods of mathematical statistics adopted in biology and medicine on a computer using the Statistica software, version 2.6. The difference in the average indicators between the groups was considered significant at the level $P=0.05$ according to the Student's criterion.

Table 1. Design of scientific and economic experiment

Group	Dosage of M-feed supplement
Control	0-41 basic diet (BD)
1st experimental	0-30 BD + M-feed : 175 mg/100 g of compound feed from 31-41 BD+M-feed supplement 70 mg/100 g of compound feed
2nd experimental	0-30 BD+M-feed : 175 mg/100 g of compound feed from 31-41 BD+M-feed supplement 100 mg/100 g of compound feed
3rd experimental	0-30 BD+M-feed : 325 mg/100 g of compound feed from 31-41 BD+M-feed supplement 130 mg/100 g of compound feed

RESULTS AND DISCUSSION

Providing the population with dietary meat depended on the completeness of poultry feeding. Intensive rearing of meat chickens allowed to accelerate the production of cheap meat and at the same time improve its quality since broilers grew and developed rapidly, assimilated feed well and ensured high profitability. Mineral substances played an important role in the body of young poultry. Minerals affected the metabolism, absorption of biologically active substances, served as a building material for the formation of organs and tissues, the formation of products; participated in the processes of respiration, hematopoiesis, digestion, absorption, synthesis, decay, and excretion of metabolic products from the body. The addition of feed supplements into the feed for broiler chickens had a positive effect on productivity, safety and growth energy (Prytkov *et al.*, 2019a; 2019b; 2019c; Bochkareva *et al.*, 2020; Prytkov *et al.*, 2020; Prytkov *et al.*, 2020a; 2020b; 2020c; 2020d).

The safety of broiler chickens during the rearing period in all groups was 99%. The analysis of the data showed that the inclusion of the M-feed supplement in the broiler chicken feed had a positive effect on their metabolism and productivity. Adding various dosages of M-feed into the feed mix for broiler chickens contributed to the rapid growth of experimental broiler chickens. Thus, broiler chickens of the 2nd experimental group from one day to 40 days of age increased their live weight by 70 times, and the chickens of the control group and the 1st and the 3rd experimental groups increased their weight by 65, 66.5, and 67.4 times, respectively. The

maximum absolute increase in live weight equalled 2765.0 g in broiler chickens of the 2nd experimental group, which was 7.7, 5.4 and 4.1% more than in the chickens of the control, 1st, and 3rd experimental groups.

It was seen by analyzing the dynamics of average daily gain of broiler chickens, that the largest average daily gain on average for the period of the experiment in the 2nd experimental group amounted to 69.1 g, which was 7.6, 5.5 and 4.1% more, in comparison with the chickens of the control, 1st and 3rd experimental groups, respectively (Table 2). The maximum growth intensity in all groups was observed for the finishing period of growing from 35 to 40 days and reached the level of 103.2 g in the 2nd experimental group, 97.2 g in the 1st experimental group, and 98.3 g in the 3rd experimental group. Comparing the absolute growth and live weight of broiler chickens for the experiment, it was found that these indicators were higher in broiler chickens of the 2nd experimental group.

Biochemical processes occurring in the body of a bird are closely related to blood. The quantitative composition of blood was one of the most labile indicators of the functional state of the body of broiler chickens, which quickly and accurately responded to the introduction of various supplements into the feed. In this regard, hematological parameters of experimental broiler chickens were studied. The use of the complex M-feed supplement in the diets of experimental broiler chickens in the optimal dosage had a beneficial effect on their health, which was confirmed by a significant increase in the blood of erythrocytes by 8.8%, hemoglobin (by 26.7%) in broiler chickens that had received an additional 250/100 mg per 100 g of compound feed. The

Table 2. Dynamics of live weight of broiler chickens (g)

Indicators	Groups			
	Control	1st experimental	2nd experimental	3rd experimental
Live weight (per day g)				
At the beginning of the experiment	40.0	40.0	40.0	40.0
7	180.3±0.25	186.8±0.16	206.8±0.20	193.0±0.42
14	471.7±0.31	479.3±0.10	515.0±0.22	475.0±0.26
21	909.0±0.61	961.3±0.37	986.7±0.29	962.0±0.74
28	1,496.0±0.86	1,534.7±0.28	1,585.0±0.30	1,536.2±0.82
35	2,130.0±0.58	2,175.8±0.10	2,289.2±0.39	2,204.8±0.48
40	2,606.5±0.78	2,661.7±0.14	2,805.0±0.40	2,696.5±0.46
Absolute weight gain g	2,566.5±0.78	2,621.7±0.14	2,765.0±0.40	2,656.5±.46
Average daily weight gain g	64.2	65.5	69.1	66.4

inclusion of the studied preparation in the diets contributed to a decrease in the number of leukocytes in the blood of chickens in all experimental groups (Bochkareva *et al.*, 2020; Prytkov *et al.*, 2020a; 2020b; 2020c; 2020d).

The anatomical cutting of carcasses of broiler chickens showed that when a new M-feed supplement was included in the diet for broilers, they had better slaughter qualities. Significant differences between the control and all experimental groups were obtained in the weight of semi-gutted and gutted carcasses. Thus, the weight of the half-gutted carcass of broiler chickens of the 2nd experimental group was 8.9% higher compared to the chickens of the control group and by 6.08 and 4.6, respectively, compared with the chickens of the 1st and 3rd experimental groups. The results of anatomical cutting of carcasses showed a positive effect of M-feed on the development of internal organs. Thus, the inclusion of the feed supplement in the composition of the diet in an amount of 250/100 mg/100 g of compound feed contributed to an increase in the weight of the stomach and liver of chickens in comparison with the chickens from the control group.

As a result of the control slaughter, it was found that the enrichment of the diet with different doses of the M-feed supplement had a positive effect on the meat productivity of broilers. The weight of carcasses of birds grown with the use of the studied supplement was higher than broiler chickens in the control group by 4.0-9.0%. At the same time, the largest carcass weight was observed in broilers of the 2nd experimental group. No significant difference was found between the groups in the slaughter yield. The supplement under study also contributed to the production of higher quality meat. Thus, in the experimental groups, the yield of carcasses of the first category compared with the control chickens was 5.0-9.5% higher. The carcasses were characterized by an increased mass of edible parts and muscles.

CONCLUSION

Feeding the high-tech M-feed supplement to broiler chickens kept in cages increased the growth energy, increased their safety, reduced the cost of feed for the production of a unit of product, had a beneficial effect on the flow of oxidative recovery processes, protein and

mineral metabolism. The inclusion of the supplement in the composition of mixed feeds in different dosages had a positive effect on the quantitative and qualitative indicators of meat productivity. The weight of the carcasses of experimental broiler chickens was 4.0-9.0% higher compared to the chickens from the control group. Among the approved dosages of M-feed in broiler chicken diets, the most effective dosage was 250/100 mg per 100 g of compound feed, which provided additional profit. To improve the quality of feeding broiler chickens, to increase their productivity and to normalize metabolic processes in the body, the M-feed supplement into the diet in the amount of 250/100 mg/100 g of compound feed was recommended. It was technologically appropriate to introduce M-feed into the composition of feed mixtures produced at feed mills or in feed shops of poultry farms by stepwise mixing.

Since the use of the new M-feed supplement in the diets of broiler chickens of the Ross-308 cross helped to improve their physiological, biochemical and productive indicators, it was considered appropriate to use M-feed when growing broiler chickens of other crosses, as well as in the composition of mixed feeds for other types of the poultry for egg and meat production, taking into account the zonal characteristics of their breeding.

REFERENCES

- Bochkareva, E. V., Ageev, B. V., Kistina, A. A., Brazhnik, E. A., Bolshakov, V. N. and Novikova, N. I. (2020). Cellobacterin-T feed supplement with prolonged action. *Pitisevodstvo* **5-6** : 37-42.
- Gaiirbegov, D. Sh., Kiseleva, K. V., Simonov, G. A., Nikulnikov, V. S. and Simonov, A. G. (2018). Biological feed supplement in broiler chickens diet increases their productivity and improves blood composition. Natural resources of the central region of Russia and their rational use. 2nd All-Russian Research and Practice Conference dedicated to the 60th anniversary of the Department of Soil Science and Applied Biology of Oryol State University named after I. S. Turgenev. Oryol, Russia.
- Kistina, A. A. (2017). Biological rationale for the use of organic selenium-containing preparation selenium yeast in feeding laying hens. Resource-saving environmentally-

- friendly technologies for the production and processing of agricultural products. 11th International Research and Practice Conference. Saransk : Izd-voMordov. unta : 100-102.
- Prytkov, Y. N., Ageev, B. V., Bochkareva, E. V. and Kistina, A. A. (2020b). The effect of various dosages of cellobacterin-T on intestinal microflora in brown nick laying hens. *Biochem. Technol. Soc.* **11** : 56-59.
- Prytkov, Y. N., Kistina, A. A., Korotkiy, V. P., Ryzhov, V. A. and Roshchin, V.I. (2017). Biological substantiation of application of the coniferous-energy supplement in feeding of heifers. *J. Pharmaceutical Sci. Res.* **9** : 817-821.
- Prytkov, Yu. N. and Kistina, A. A. (2017). Scientific and practical substantiation of the use of the selenium yeast preparation in the diets of laying hens of the Lohmann Brown cross. *Agrarnyinauchnyzhurnal* **7** : 41-43.
- Prytkov, Yu. N. and Kistina, A. A. (2018). Influence of organoselenium preparations in the diets of black-and-white cows on metabolism and milk productivity. *Agrarnyinauchnyzhurnal* **1** : 31-35.
- Prytkov, Yu. N., Kistina, A. A., Ageev, B. V. and Bochkareva, E. V. (2020a). Influence of the cellobacterin-T feed supplement on the intestinal microflora of laying hens of the Brown Nick cross. *Agrarnyinauchnyzhurnal* **2** : 64-67.
- Prytkov, Yu. N., Kistina, A. A. and Bragin, G. G. (2017). Influence of a coniferous energy supplement on the digestibility and use of nutrients and minerals in the diets of heifers. *Agrarnyinauchnyzhurnal* **12** : 42-45.
- Prytkov, Yu. N., Kistina, A. A., Bragin, G. G. and Makarova, L. N. (2020c). Changes in the morphological and biochemical parameters of the blood of cows with the use of selenium-containing preparations in the diets. *Veterinaryivrach* **6** : 50-57.
- Prytkov, Yu. N., Kistina, A. A., Bragin, G. G. and Makarova, L. N. (2020d). Age-related dynamics of the formation and development of the mass of tissues and organs of heifers with hay and grass type of feeding. *Agrarnyinauchnyzhurnal* **3** : 58-65.
- Prytkov, Yu. N., Kistina, A. A., Kiseleva, K. V., Bochkareva, E. V. and Ruin, V. A. (2019a). Influence of the M-feed supplement in the diet on the growth rate and meat productivity of broiler chickens of the ROSS-308 cross. *Agrarnyinauchnyzhurnal* **6** : 61-64.
- Prytkov, Yu. N., Kistina, A. A. and Kiseleva, K. V. (2020). Influence of different dosages of the M-feed supplement in diets on the growth energy of broiler chickens of the Ross-308 cross. International Research and Practice Conference "Innovative Developments and Digitalization in the Agro-industrial Complex of the Russian Federation". Kazan, Russia.
- Prytkov, Yu. N., Kistina, A. A., Kiseleva, K. V. and Bochkareva, E. V. (2019b). Biological rationale of the use of the M-feed supplement in the diets of broiler chickens of the Ross-308 cross. International Research and Practice Conference "Current Problems of Innovative Development of Animal Husbandry". Bryansk Region, Russia.
- Prytkov, Yu. N., Kistina, A. A., Kiseleva, K. V. and Bochkareva, E. V. (2019c). Theoretical substantiation of the use of the M-feed supplement in the diets of broiler chickens of the Ross-308 cross. 48th Ogaryov Readings, Materials of a Scientific Conference. Saransk, Russia.