

Effects of Blackfeed Plus Top Dressing Based on Mineral Shungite on the Productivity of Brown Nick Cross-Laying Hens

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Abstract

Stresses are an integral part of the technology for the production of eggs and poultry meat. The presence of mycotoxins in feed is one of the main feed stresses. The aim of the study was to evaluate the effect of the natural adaptogen "Blackfeed Plus" in the diets of laying hens on the industrial cross "Brown Nick". As a result of the research, a positive effect of the Blackfeed Plus feed additive (at a dosage of 1.0 kg/t of compound feed) on the productivity of laying hens of the Brown Nick cross was established. Based on the test results, it is possible to recommend the use of the Blackfeed Plus supplementary nutrition complex in the conditions of egg farms, especially for use in laying rations of the 3rd phase of feeding. During the research, a high potential of true sorption of the mineral shungite to mycotoxins, including to non-polar ones.

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1 Introduction

Agricultural poultry of modern genotypes has a high genetic potential for productivity, which often cannot be fully realized due to the impact of stresses of various nature on the body (Bogolyubova N.V. et al., 2022). Animal health is an integral part of their well-being, it serves as a prerequisite for both high productivity and the safety of the resulting products for humans (Proudfoot et al., 2015).

Stress is an integral part of egg and poultry production technology (Scanes, 2016; Surai and Fisinin, 2016; Surai, 2018; Surai et al., 2019). The presence of mycotoxins in feed is one of the main feed stresses. At the same time, stresses associated with vaccinations are added in the future, and, of course, heat stresses play a special role in the summer months (Surai et al., 2018). One of the most important problems associated with stress is the increased need for a number of nutrients and biologically active substances to combat stress, while their supply of food is usually reduced due to reduced feed intake (Bottje, 2019). From a physiological point of

view, stress is a deviation from optimal environmental conditions, including external conditions for keeping birds, internal conditions such as bacterial balance in the intestine, as well as feeding and watering conditions for birds, including deviations from the optimal composition of the diet (Surai et al., 2018). In general, the main stresses in the poultry industry can be divided into four main categories, including environmental, technological, feed and internal stresses (Surai et al., 2019).

The aim of the study was to evaluate the effect of the natural adaptogen Blackfeed Plus (manufactured by Blackfeed) in the diets of laying hens of the Brown Nick industrial cross.

2 Method

The tests were carried out on the livestock of the Brown Nick cross, from 442 days of life to 472 days of life in industrial poultry farming (Fig. 1). The duration of the experiment was 28 days (from 08/17/2022 to 09/13/2022). The feeding experiment was carried out according to the VNITIP recommendations (Fisinin et al, 2000, Egorov et al., 2019).



Figure 1: Chickens of the Brown Nick cross used in the experiment

The poultry diet consisted of 54.09% wheat, 12.8% sunflower meal (crude protein 34%), 2.1% feed yeast, 6.9% protein feed additive, 5.1% peas, 5.12% Gornozavodsky limestone, 3% shells, 2% premix for laying hens.

The content of normalized mycotoxins (fumonisin, T-2 toxin, aflatoxin, zearalenone, deoxynivalenol and ochratoxin) in compound feeds was not determined at the laboratory level; however, it is impossible to exclude their presence in the feed, because in its preparation, the grain of the 2021 harvest (last year) was used.

For the experiment, control (59,599 heads) and experimental (59,575) groups of laying hens of the Brown Nick cross were formed. The experimental group was given the Blackfeed Plus feed additive as part of the main diet (RR) in the amount of 0.05 g. per 1 kg of feed or 0.05%, there was no feed additive in the diet of the control group. Both groups were in the same conditions of keeping (outdoor), feeding and watering, at the same temperature and air humidity.

The Blackfeed Plus supplementary nutrition complex used in the feeding experiment is a thermally modified shungite mineral in the form of grains, a fraction 0.3-0.7 mm.

The supplementary nutrition complex "Blackfeed Plus" from the mineral shungite was tested for the ability to bind normalized mycotoxins. To determine the content of mycotoxins, we used solid phase competitive enzyme immunoassay (ELISA), characterized by high specificity and sensitivity, (Goryacheva I.Yu. et al., 2009).

3 Result and Discussion

The results of assessing the true sorption of the feed additive of the supplementary nutrition complex "Blackfeed Plus" from the mineral shungite to the main regulated mycotoxins are in Table 1.

Table 1: True sorption of the Blackfeed Plus feed additive from the shungite mineral (%).

Toxin	Initial concentration (mg/kg)	Adsorption (%)	Desorption (%)	True sorption (%)
Ochratoxin	0.300	100	0	100
Aflatoxin B1	0.050	100	0.2	99.8
DON	1.0	98.9	11.8	87.1
T-2	0.100	96.4	14.1	82.3
Fumonisin	2.0	100	0	100
Zearalenone	1.0	100	0	100

It has been established that the complex of supplementary nutrition "Blackfeed Plus" from the mineral shungite irrevocably binds normalized mycotoxins in the following concentrations: T-2 toxin - by 82.3%; aflatoxin B1 - by 99.8%; ochratoxin A - 100%; fumonisins - by 97.8%; zearalenone - 100%; deoxynivalenol - by 87.1%.

The results of the experiment on feeding laying hens are presented in Table 2.

Table 2: Influence of the feed additive "Blackfeed Plus" on the productivity of laying hens in comparison with the standard for cross-country

№	Chicken age (weeks)	Productivity (%)		Standard (%)	Experience vs.	
		Control	An experience		Control	An experience
1	64	86,9	86,9	81,8	0	+5.1 pp
2	65	87,5	88,2	81,2	+0.7 pp	+7.0 pp
3	66	85,9	88,3	80,6	+2.4 pp	+7.7 pp
4	67	86,1	88,2	80,0	+2.1 pp	+8.2 pp

The use of the Blackfeed Plus feeds additive significantly positively affected the productivity of laying hens. During 4 weeks of cultivation, the experimental group showed a steady increase in productivity in comparison with the standard (from 5.1 pp to 8.2 pp) and with the productivity indicators of the control group (from 0.7 pp to 2.4 pp).

Feed consumption per head per day in the experimental group (131 g) increased by an average of 3.0 g per head compared to the control group (128 g), which indicates an increase in feed intake.

This factor indirectly confirms the positive effect of the Blackfeed Plus supplementary nutrition complex on improving the quality characteristics of the feed. At the same time, it should be noted that even a slight presence of mycotoxins in feed can significantly reduce its palatability by birds (Surai et al., 2019).

The difference in safety between the experimental (98.95%) and control (98.91%) poultry houses was not significant and not statistically significant. The same applies to the quality of eggs obtained from laying hens in the experimental (95.87% pure eggs) and control (95.69% pure eggs) groups.

During the testing period, the negative impact of the Blackfeed Plus feed additive on the body of chickens was not revealed.

4 Conclusion

Thus, a positive effect of the Blackfeed Plus feed additive (at a dosage of 1.0 kg/t of compound feed) on the productivity of laying hens of the Brown Nick cross was established. Based on the test results, it is possible to recommend the use of the Blackfeed Plus supplementary nutrition complex in the conditions of egg farms, especially for use in laying rations of the 3rd phase of feeding. During the research, a high potential of true sorption of the mineral shungite to mycotoxins, incl. to non-polar ones.

5 Availability of Data and Material

Data can be made available by contacting the corresponding author.

6 Acknowledgement

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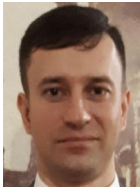
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