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Natural Feed Additive in Rations of Laying Hens

N. A. Yurina[1], S. I. Kononenko[1], A. B. Vlasov[1], A. A. Danilova[1], A. N. Gneush[2]

[1]*Krasnodar Research Centre for Animal Husbandry and Veterinary Medicine, Pervomaiskaya Street, 4, Znamensky village, Krasnodar, Russia*
[2]*Kuban State Agrarian University n. a. I. T. Trubilin, 350044, Kalinin Street, 13, Krasnodar, Russia.*

Abstract:

The aim of the presented work was to study the effect of the silt feed additive (SFA), made on the basis of the bottom sediments of the Khan Lake of the Krasnodar Territory, on the egg productivity and the morphometric composition of the laying hen eggs. The experiments were carried out in the conditions of the Krasnodarskaya poultry farm (Krasnodar) on laying hens of Haysex Brown cross in accordance with the Methodology for Scientific Research on Feeding Poultry (Sergiev Posad, 2005). To conduct researches on the principle of analog groups, 2 groups (control and test) were formed, 40 heads each. The chickens of the first (control) group received complete compound feed (CCF), and the chickens of the second (test) group - CCF + 1.5% SFA by weight of the feed. The stock density, the front of feeding and drinking, the temperature and humidity regimes throughout the experiment were in line with the recommendations of VNITIP (2005). The experiment lasted from the beginning of the egg laying period to the 65-week-old age of the poultry. The introduction of the tested silt feed additive (SFA) into the composition of the complete compound feed at the amount of 1.5% by weight contributed to an increase of the poultry survival rate by 2.5%, egg productivity per average laying hen by 1.5% and for the initial laying hen - by 2.0%, 0.7% more eggs of the high category and 4.1% - of the first category, 1.5% decrease of feed costs per unit of production, a positive dynamics of improvement in the morphometric parameters of eggs (egg weight and their components, thickness of the shell). Thus, the feeding of the silt feed additive in the composition of complete compound feed for poultry of the egg production direction is very effective, as it increases the survival rate, productivity and quality of the products.

Keywords: egg productivity, feed consumption, laying hens, morphometric analysis ofeggs, silt feed additive.

INTRODUCTION

Today, the issue of the need for the development of a scientifically validated system for the adequate feeding of farm animals and poultry is acute, which must be achieved through the production of high-quality fodders, a competent approach to the composition of rations, and the creation of various feed additives that increase the live weight gain and strengthen general resistance of the animal organism. At the same time, it is necessary to take into account the possibilities of local food supply, economic efficiency and environmental safety [1].

The Russian Federation has approved the National Doctrine of Food Security. The guarantor of its achievement is the implementation of the food security plan to increase domestic production of the country. The main task of agriculture is to increase the productivity of farm animals along with the high quality of the products.

Poultry industry for a long period is a leading component among other branches of agriculture due to high payback in industrial production [2].

A number of problems affecting modern society, namely, the deterioration of the ecological situation, the reduction in the production of livestock products, along with the increase of consumers, the lack of new technologies in the field of keeping, feeding and reproduction of animals, compel the poultry industry to actively search for new feeds that would reduce the amount of feed , spent for the production of a unit of production, as well as to increase the biological and ecological safety of products in the conditions of modern realities [3, 4].

Particular attention should be paid to the growig of high-yielding poultry lines and crosses, as they require constant improvement of the nutrient requirements of the ration for the maximum realization of the genetic potential while maintaining high quality products.

The main deterrent to the development of the poultry industry is the lack of food supply. To solve this problem, various feed additives based on natural raw materials are widely used. The main criteria for these feed resources are considered to be availability, simplicity of production, cheapness and environmental safety. Feed additives produced on the basis of silt bottom sediments of lakes meet all of the above requirements [5-7].

In the bottom sediments of lakes, three main components can be noted: biologically active, organic and mineral, which interact directly with each other.

The composition of the silt includes all the necessary components for the growth and development of highly productive animals. Humic acids are stimulants of biological processes in the body of animals, have antimicrobial and antiseptic action, promote the transport of trace elements and other important components to the organs of the animal, thereby increasing the productivity of animals and poultry. The silt includes carotenes - integral components of the animal's diet; vitamins B_1, B_2, B_3, B_{12}. The composition of the mineral part includes microelements in easily digestible form - calcium, magnesium, phosphorus, iron, potassium, sodium, and also manganese, cobalt, vanadium, molybdenum, iodine, bromine, copper, zinc, chromium, nickel. Areas of silt application are very extensive and suitable for use in various branches of agriculture, as well as in a variety of climatic conditions [8-11].

Due to a wide range of active substances included in the composition of the silt, the adaptive capacity of the animal organism increases, metabolic processes are normalized, which contributes to a more rational use of feed nutrients, which leads to an increase in the productivity of the poultry and improves the quality of eggs [12].

There are contradictions on the use of bottom lake sediments as a feed additive for agricultural poultry, which may be explained by the fact that there are differences in chemical composition, depending on the place of their accumulation, the depth of the deposits, the origin, the place of formation [13].

Hydrogen sulfide and the active pH medium are balanced by ions of organic and inorganic compounds, biologically active substances, microelements, lipids and so on. Penetrating into the body, the biologically active substances of sapropel are distributed along tissues and organs, activate the reactions of oxidation of biological substrates and intensify bioenergetic processes. The organic compounds which present in the sapropel have a pronounced antibacterial effect, and antagonism of the microbial community of the silt relative to the foreign conditionally pathogenic organisms cause such an important quality of the mud as bactericidal activity [14].

The scientists of the Krasnodar Research Centre for Animal Husbandry and Veterinary Medicine have found that the use of fodder additive in the composition of combined feeds for young animals on the basis of dried silt sediments at the rate of 1.5-3.0% by weight of feed promotes an increase in the growth rate of the young laying hens and a decrease in feed costs per unit of weight gain [15].

Thus, the use of bottom sediments as a feed additive of various reservoirs contributes to an increase in the productivity and survival rate of farm animals, which makes the research relevant.

The objective of the research was to study the effect of feeding the silt feed additive (SFA) of the Khan Lake deposit of the Krasnodar Territory on the egg productivity and the morphometric composition of the laying hen eggs.

MATERIALS AND METHODS

Scientific experience was carried out in the conditions of the "Krasnodarskaya" poultry farm (Krasnodar) on laying-hens of the "Haysex Brown" cross. To conduct the research we formed 2 groups (control and test), 40 heads each on the basis of the groups-analogues. The stocking density rate, the front of feeding and drinking, the temperature and humidity regimes throughout the experiment were in line with the recommendations of VNITIP (2005). The duration of the experiment lasted from the beginning of laying period to the 65-week age of laying hens. The scheme of the experiment is presented in Table 1.

Table 1 - Scheme of the scientific and economic experiment (n = 40)

Group	Feeding characteristics
control	Complete combined feed (CCF)
2 - test	CCF + 1.5 % SFA by weight of the feed

During the whole experiment, the chickens of the control group received the basal diet consisting of the complete combined feed (CCF), and to the compound feed of the experimental group we added silt feed additive (SFA) at the rate of 1.5% by weight of the fodder, while changing the dosages of other feeds for the purpose of maximum preservation of nutritional status. Nutritional value of combined feeds is presented in Table 2.

Table 2 - Nutritional value of complete combined feeds for laying hens in the experiment from the beginning of laying period to 45 weeks of age

Item	Unit	Group	
		Control	Test
Metabolizable energy	Kcal/100g Ккал/100г	270.0	268.0
Crude protein	%	17.27	17.00
Linoleic acid	%	2.58	2.71
Crude fiber	%	5.74	5.57
Lysine	%	0.83	0.83
Methionine	%	0.42	0.42
Methionine + cystine	%	0.72	0.91
Calcium	%	3.60	3.0
Phosphorus	%	0.68	0.68

From the age of 45 weeks old and upward, the combined feed for laying hens contained 263-265 kcal of metabolizable energy and 16.3-16.5% of crude protein.

According to physicochemical parameters, the bottom sediments of the Yeisk deposit of the Krasnodar Territory under study are referred to mineralized silts, weakly sulfide peloids from a neutral to slightly alkaline medium reaction (pH 7.4). Ash content of bottom sediments is 94% on dry matter basis, mineralization - 6.5 g/kg, calcium content - 29.7 g/kg, macroelements - from 1.04 to 25.8 g/kg, trace elements – from 0.03 to 0.7 g/kg.

In the process of the experiment w examined the effect of feeding the SFA in complete combined feeds for laying hens, the survival rate of the chickens, the number of eggs laid down per initial and average laying hen by collecting and counting eggs from each group, the costs of feed for production, the division of eggs into categories (high and choice, first, second and third). In the middle of the laying period (34 weeks), 100 eggs from each group of hens were analyzed to determine the mass of eggs, white, yolk and shell - by weighing on an electronic balance, the height of the protein - an altimeter, the thickness of the shell - using the PUD-1 device.

RESULTS AND DISCUSSION

The survival rate of laying hens for the whole period of the experiment was 92.5% in the control group, in the experimental group - 95.0%, which is 2.5% higher. Egg productivity of laying hens during the experiment and feed consumption per the production unit are presented in Table 3.

Table 3 - Egg productivity of laying hens and feed consumption for production of 10 eggs

Items	Group	
	1	2
Eggs laid per an average laying hen, pcs.	278.97	283.07
Eggs laid per an initial laying hen, pcs.	266.93	272.28
Egg laying rate, %	84.79	86.04
Feed consumption per 10 eggs, kg	1.30	1.28

Feeding of the SFA in the composition of complete combined feed allowed to increase the egg productivity per the average laying hen by 1.5%, per the initial laying hen - by 2.0%, to reduce feed consumption for the production of 10 chicken eggs by 1.5%.

In the control group, 19.5% of eggs were assigned to the high and choice categories, to the first - 62.0%, to the second - 18.0%, to the third - 0.5%. In the experimental group – 20.2; 66.1; 13.2 and 0.5%, respectively. That is, the feeding of the SFA made it possible to receive 0.7% eggs more of the high category and 4.1% of the first category.

Morphometric parameters of hen eggs are one of the main indicators of their quality and are given in Table 4.

Table 4 - Morphometric parameters of hen eggs

Index	Group	
	1	2
Weight of eggs, g	59.7±0.33	60.0±0.28
Height of the white, mm	5.21±0.05	5.27±0.07
Weight of the white, g	36.50±0.44	36.54±0.38
Weight of the yolk, g	17.21±0.23	17.32±0.19
Weight of the shell, g	5.99±0.11	6.14±0.12
Thickness of the shell, mm	0.27±0.002	0.29±0.003

Regarding the poultry of the control group, by weight of eggs and their constituents, there was a certain tendency to increase the egg mass by 0.5%, white – by 0.1%, yolk – by 0.6%, eggshells by 2.5% and its thickness – by 7.4%, the height of the white - by 1.2%.

CONCLUSIONS

The increase in egg productivity by 1.5-2.0% due to the feeding of SFA in the composition of combined feeds for laying hens is probably due to the complex effect of the components contained in the bottom sediments of the Khan lake, and a slight improvement in the quality of the eggshell is due to the content of the available forms of macro- and microelements in the studied feed additive.

REFERENCES

1. Tyrkheev, A. P., Lumbunov, S. G., Effect of sapropel feed additive on sow productivity, *Bulletin of Buryat State Agricultural Academy named after V. R. Filippov* 2015, *4(41)*, 83-86.
2. Ignatovich, L. S., Korzh, L. V., Natural feed additives in the feeding of laying hens, *Modern trends in the development of science and technology* 2016, *1-4*, 89-94.
3. Lumbunov, S. G., Bakusheca, M. R., Shadurov, E. O., Influence of the sapropelic fodder additive on the egg productivity of laying hens of the “Haysex White” cross, *Bulletin of Buryat State Agricultural Academy named after V. R. Filippov* 2012, *1*, 63-66.
4. Tyurina, L., Tabakov, N., Sarazhakova, I., Sanitary-hygienic assessment of eggs of laying hens fed mineral mixtures based on belitic sludge, *Poultry Farming* 2011, *5*, 18-21.
5. Maltsev, A. B., Osmanova, G. H., The use of sapropel in the feeding of quails of the Japanese breed, *Theoretical and applied aspects of modern science* 2015, *9-1*, 98-101.
6. Maltsev, A. B., Osmanova, G. H., Menkova, N. A., Sapropel in the feeding of quails, *Innovative ways of livestock development in the 21st century: Materials of the Scientific and Practical Conference with international participation*, 2015, pp. 165-170.
7. Chetverikova, O. P., Brykina, L. I., Kavardakov, Yu. Ya., The use of bentonite and adaptogen in feeding laying hens, *Siberian Bulletin of Agricultural Science* 2012, *1*, 73-76.
8. *Use of green fodder on the basis of sapropel in mixed fodders for goslings-broilers*, SibNIIP of the Russian Academy of Agricultural Sciences, Omsk 2013.
9. Kaloev, B. S., Novikov, D. D., Use in the feeding of laying hens of local mineralized clays to improve productivity, *Proceedings of Gorsky State Agrarian University* 2016, *1*, 63-67.
10. Peredina, V. I., Radchikov, V. F., Tsai, V. P., Sapropel - a valuable food for animals, *Scientific and technological progress in agricultural production: Agrarian science - agricultural production in Siberia, Kazakhstan, Mongolia, Belarus and Bulgaria: Materials of the International Scientific and Technical Conference*, 2016, pp. 32-36.
11. Timofeeva, E. N., Microelements in the feeding of laying hens, *Poultry Farming* 2012, *1*, 25-28.
12. Ignatovich, L. S., New methods for feeding laying hens, *Agricultural sciences and agro-industrial complex at the turn of the century* 2016, *16*, 87-92.
13. Mityukov, A. S., Rumyantsev, V. A., Kryukov, L. N., Sapropel and prospects of its use in the agrarian sector of the economy, *Society, Environment, Development* 2016, *2*, 110-114.
14. Malchukovsky, L. B., Shchelkunov, A. V., Kulbekov, E. F., *Balneological conclusion on the chemical composition and physicochemical properties of mud from the "Ples Glubokiy" deposit of the Yeysk region of the Krasnodar Territory*, PGNIK FMBA of Russia, 2015.
15. Maksim, E. A., Yurina, N. A., Kononenko, S. I., Method of feeding chicks of egg production, *Collected scientific papers of the North Caucasus Research Institute for Animal Husbandry* 2017, *6*, 98-103.