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USE OF FEED ADDITIVES ON THE PALM FAT BASE IN FEEDING OF LAYING HENS

The efficiency of the use of feed additives on the basis of dry palm fat feeding hens and their impact on productivity and quality indicators of eggs are investigated. For the experiment, we selected four groups of chickens-analogues of "Hajseks Brown" cross, 50 goals in each group within the second productive phase. The main diet of the control and experimental groups of hens was balanced for the main nutrients according to the norms of feeding VNDITIP and recommendations for the cross "Hajseks Brown". It is established that their use increases the poultry productivity by 2,8-9,8%, and the mass of eggs by 2,3-2,9%, while feed conversion for 10 eggs increased from 2,14 to 1,9 kg -2,03 kg. In general, it should be noted that the inclusion into the feed vegetable fat additives has strengthened the thickness of eggs shells ih the experimental poultry, namely, in the group II by 10.0%, in III and IV gfoups by 3,3-10,0% (P>0,99).

Keywords: *laying hens, feed additives, palm fat, diet, egg yolk.*

***Formulation of the problem*.** Modern industrial poultry farming is a high-tech industry of agriculture, which directs to obtain a large number of products at the lowest cost. To ensure a high level of productivity in the poultry farms they use intensive housing and feeding technology.

The modern system of rationing feeding enables the need to ensure the birds in the major nutrients and obtain high productivity due to economical use of feeds. Implementation of the genetic potential of productivity in modern poultry crosses is accompanied by constant demands to improve energy nutritional value of animal feed [1].

Unfortunately, the reserves of increase of energy and protein nutrition of basic components of animal feed at the expense of traditional crops, maize, barley, wheat are nearly exhausted. And only the manipulation of these components will not provide solution to the problem of energetic nutrition of feed mixture. In addition, the growing demand of food grains in the world leaves less and less room for the use of such grain for animal feed.

Analysis of recent research and publications. Over the past 10 years the share of grain weight in compound feed for poultry has fallen from 68 to 50%. That is, in the feed industry there is a tendency to use cheaper raw materials, including non-traditional and by-products of industrial production [6, 7].

According to V. Egorov [1], L. Podobed [4] for more than 50 million tons of vegetable oil are produced annually in the world. In terms of production in the first place is soybean oil – 19 million tons, then the palm oil – 15.3 million tons, – 9.0 million, and sunflower – 8 million tons. Most often, sunflower and soybean oils are used in feeding poultry which are significantly different from other vegetable oils in high level of linoleic acid, its content is 55-60%. Namely, these types of oils are most commonly used in feeding diets of productive poultry. And an excessive amount of linoleic acid, which is supplied to them, breaks mineral metabolism in laying hens. This adversely affects the quality of the egg shell. When feeding broiler chickens excessive intake of linoleic acid

leads to an increase of abdominal fat. It should also be borne in mind that during the cold season it is impossible to achieve uniform mixing of vegetable oil in feeds [8].

Therefore, new alternative direction in energy nutritious diet of poultry feeding is the use of dry vegetable fats, such as palm. But by reason of non-traditional revenue sources they have not yet been widely used and require a detailed study of the effectiveness of their use [8].

Purpose of the study. The aim of the work was to study the efficiency of the use of dry vegetable oils, namely palm fat, in the diet of poultry, as well as to establish the optimal dose of administration into feed of laying hens of egg productive direction.

Objects and methods of research. To achieve this goal scientific and economic experiment was held in a private production company "Agrocenter" of Dnipropetrovsk region.

For the experiment, we selected four groups of chickens-analogues of the cross "Hajseks Brown" 50 goals in each group at the second phase of their productivity.

The poultry was kept in 3-tiered cages of BKN-3A type. All groups received Complete feed over the study period, which lasted 120 days.

The scheme of the experiment is shown in Table 1.

Table 1

The scheme of the experiment

Group, (n = 50)	Feeding character
I (control)	Complete feed (PC)
II	PC + 3% VAMFC instead of the same amount of soybean meal (3%)
III	PC + 4% PFC instead of the same amount of soybean meal (4%)
IV	PC + 8% PVS instead of the same amount of soybean meal (6%) and soybean extruded (2%)

For the period of the scientific and economic experiment, the birds age was 420 days.

The main results of the study. The native literature does not have sufficient information yet about the effectiveness of the inclusion of dry vegetable feed fats in the fodder for animals and birds. Among the new and not yet sufficiently studied feed additives, which private company "Pro-Fat" (Dnepropetrovsk) produces on the basis of dry vegetable fats (palm and lauric) are feed additives such as vitamin and aminoacid-mineral fat complex (VAMFC), protein and fat concentrate (PFC), protein and vitamin supplement (PVS). These additives are a source of nutrients and biologically active substances. The high content of fat and protein in the supplements indicates the possibility of replenishing the diet and positive impact on poultry productivity. VAMFC is made on the basis of palm oil – 30%, and soybean meal – 55% protein-fat complex – 18% palm oil and 82% sunflower meal, protein-vitamin supplement – 10% palm oil and 68% soybean meal.

Using these feed additives yielded mixed fodder recipes with maximum energy saturation (table 2).

Organization of full feeding of laying hens in the period of the experiment makes it possible to obtain objective results and logically justify it. The main diet of the control and experimental groups of laying hens was balanced for the main nutrients according to the norms of feeding VNDITIP and recommendations for cross “Hajseks Brown” [2, 3, 5].

The introduction of feed additives based on vegetable fats allowed balancing the diet of research groups for energy and major critical amino acids. Dynamics of livestock, live weight and productivity of laying hens are shown in the table 3.

Productivity of studied poultry for the period of the experiment was equal among the groups (amount of eggs.): I (control) – 3921; II – 4306; III – 4069; IV – 4126. Thus, for the entire period of the scientific and economic experiment the productivity of egg-laying hens in relation to the control group increased: in II^{d} group by 9,8%; in III^{d} by 3,8%, in the IVth by 5,2%. And they received from

them for the initial layer, respectively, by 7,7 pc.; 3,0; 4,1 pc. more compared to the control.

Table 2

Recipe feed for laying hens,%

Indicator	Group			
	I (control)	II	III	IV
Corn	15	15	15	15
Wheat	45	45	45	45
Sunflower meal	20	20	20	20
Soybean meal	6	3	2	-
Soy extruded	2	2	2	-
Marble chips	6,08	6,65	6,08	6,65
Premix	1	1	1	1
Chalk	4	4	4	4
Salt	0.3	0.3	0.3	0.3
Lizin	0.33	-	0.33	-
Methionine	0,17	-	0,17	-
Hamekozim	0,05	0,05	0,05	0,05
Holin chloride	0,07	-	0,07	-
VAMFC	-	3	-	-
PFC	-	-	4	-
PVS	-	-	-	8
Total:	100	100	100	100

An analysis of the dynamics of live weight in experimental groups showed that the live weight of poultry at the beginning of experience in all groups was 1840-1890 g, that is, was practically identical. But at the end of the experiment live weight of the poultry in studied groups declined, primarily due to the higher productivity of the studied poultry. Thus, hens in the II-nd group had the highest productivity, and that was resulted in a significant decrease in bodyweight as compared to other experimental groups – 55 vs. 140 g and 80 g in the III^{d} and IVth groups.

Table 3

Dynamics of the population, live weight and productivity of laying hens

Indicator	Group			
	I (control)	II	III	IV
Number of poultry at the beginning of the period	50	50	50	50
Number of poultry at the end of the period	48	49	49	48
Safety,%	98	99	99	98
Weight at the beginning of the experiment, g	1890	1875	1840	1855
Weight at the end of the experiment, g	1876	1735	1785	1775
Obtained eggs per an initial hen, pieces	78,4	86,1	81,4	82,5
Obtained eggs per an average hen, pieces	83,4	86,1	83,0	85,6
Efficiency of productivity compared with the control group, %	100	109,8	103,8	105,2
Feed conversion, kg – per 1 kg of egg mass – per 10 pcs. eggs	3,28 2,14	3,06 1,95	3,07 2,06	3,04 2,03

Introduction to the diets of studied groups those feed additives revealed that the cost of feed per 10 pcs. eggs in the I-th group was 2,14 kg of feed, in the II-d group by 9,7% less than in the III-d - by 3,9%, in the IV – 5,4% less in relation to the control group.

The increase of egg weight in the chickens of experimental groups caused changes in the number of egg mass produced. In general during the experiment from the hens of experimental groups more egg mass was obtained as compared with the control group, respectively by 6,8, 7,3 and 7,9%. This in turn led to reduced feed costs to produce 1 kg of egg mass from 3,28 kg in the control to 3,04-3,07 kg in the experimental groups.

Analysis of indicators of eggs quality from the hens of experimental groups, which are shown in Table 5, showed that the mass of eggs from laying hens in the III-d and the IV-th experimental groups was 67,1-66,9 g, and was by 2,9-2,6% higher compared with the control group. At the same time, the reduce of the eggs mass in poultry from the II-d experimental group 2,3% ($P<0,95$) in unreliable difference compared with the control, took part, in our opinion, due to a significant increase in their egg production, namely, 9,8%.

At the protein weight the advantage was in the III-d group of laying hens, used protein and fat concentrate like a part of animal feed. However, if compared with the control group this advantage was incredible, but it was 9,2-6,5% ($P>0,95$) over the II-d and IV-th groups.

The inclusion into the basic ration of protein-vitamin supplement most significantly influenced on yolk weight. The poultry of the IV-th studied group on this indicator significantly exceeded as a control – by 12,8% ($P>0,95$) and the experimental groups by 12,2-13,4% respectively ($P>0,95$).

In laying hens of the II-d experimental group which used vitamin and amino acid-mineral-oil concentrate, egg weight was lower, but the weight and thickness of the shell was more. We attribute this to a better use of minerals that were obtained with this feed additive.

In general, it should be noted that the inclusion into feed the vegetable fat additives has strengthened thickness of the experimental poultry egg shell, namely, by 10.0% in the II-d group and by 3,3-10,0% ($P>0,99$) in III-d and IV-th groups.

Protein index in all groups was similar, and the yolk index was slightly lower in the experimental groups due to smaller height of the yolk.

Among the protein quality indicators the most connection with its index the Howe units have, since these indicators are determined on the base of the measurement of dense protein. The optimum value for the Howe units for the eggs is equal 65-87 [2].

From the data of our research it is clear that this figure is situated at the level of 77-80 units and within the average standard indicators. And considering that the Howe units decrease accordingly to the age of laying hens, then our results point to the effectiveness of the use at the second phase of egg-laying those feed additives, produced on the basis of palm oil.

Evaluating the results of the experiment with the zootechnical and economic points of view, it is possible to make a general conclusion about the expediency of the use of the proposed feed additive.

Conclusions and prospects for further research. Thus, the inclusion into the feed for laying hens the feed additives based on vegetable fats instead of soybean meal and extruded soybean contributed to a better productive use of nutrients, increase egg production by 2,8-9,8%. It is also a positive impact on the quality indicators of eggs and allowed to increase feed conversion for 10 pcs. eggs from 2,14 kg to 1,9-2,03 kg.

A prospect for further research is to study the impact of the use of feed additives on the basis of dry vegetable fats on the fractional composition of fatty acids.

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ВИКОРИСТАННЯ КОРМОВИХ ДОБАВОК НА ОСНОВІ ПАЛЬМОВОГО ЖИРУ У ГОДІВЛІ КУРЕЙ-НЕСУЧОК

Досліджено ефективність використання кормових добавок на основі сухого пальмового жиру у годівлі курей-несучок та їх вплив на продуктивність і якісні показники яєць. Для експерименту відібрали чотири групи курей-аналогів, кросу "Хайсекс коричневий" по 50 голів у кожній у другу фазу продуктивності. Основний раціон контрольної та дослідних груп для курей-несучок був збалансований за основними поживними речовинами, згідно із нормами годівлі ВНДІТІП та рекомендаціями для кросу Хайсекс коричневий. Встановлено, що при їх використанні продуктивність птиці підвищується на 2,8-9,8%, а маса яєць збільшується на 2,3-2,9% і дозволило підвищити конверсію корму на 10 шт. яєць з 2,14 кг до 1,9-2,03 кг. В цілому слід відмітити, що включення у комбікорми рослинних жирових добавок призвело до зміцнення товщини шкаралупи яєць піддослідної птиці, а саме у II – 10,0%, у III та IV – 3,3–10,0% (P>0,99).

Ключові слова: кури-несучки, кормові добавки, пальмовий жир, раціон, жовток.

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ИСПОЛЬЗОВАНИЕ КОРМОВЫХ ДОБАВОК НА ОСНОВЕ ПАЛЬМОВОГО ЖИРА В КОРМЛЕНИИ КУР-НЕСУШЕК

Исследована эффективность использования кормовых добавок на основе сухого пальмового жира в кормления кур-несушек и их влияние на производительность и качественные показатели яиц. Для эксперимента отобрали четыре группы кур-аналогов, кросса "Хайсекс коричневый" по 50 головы в каждой во вторую фазу производительности. Основной рацион контрольной и опытных групп для кур-несушек был сбалансирован за основными питательными веществами, согласно нормам кормления ВНДІТІП и рекомендациями для кросса Хайсекс коричневый. Установлено, что при их использовании производительность птицы повышается на 2,8-9,8% а масса яиц увеличивается на 2,3-2,9% позволило повысить конверсию корма на 10 шт.

Ключевые слова: куры-несушки, кормовые добавки, пальмовый жир, рацион, желток.

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