Effect of fish feed concentrate on egg production of laying hens

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Abstract. The article contains materials of scientific research on the using of fish feed concentrates in the feeding of laying hens. It has been proved experimentally that this feed concentrate has a positive effect on the egg production of laying hens of the cross Haysex White. Thus, when this supplement was included in the diet of laying hens, the following results were obtained: egg production in the experimental groups increased and were higher on 13.3; 15.7 and 18.3%, the amount of egg mass-on 15.9; 18.3 and 34.6% higher than in control group.

1 Introduction

Poultry farming is one of the most precocious (early) branches of animal husbandry. It makes it possible to get such food products as meat and eggs in the shortest time. Poultry farming is developing rapidly all over the world and is one of the main sources of protein. However, in Russia, according to RosPoultryUnit, poultry meat production in January 2019 decreased by 3.8% compared to January last year to 502 thousand tons in live weight, and the production of chicken eggs - by 0.4% to 3.04 billion eggs.

The main factor affecting the development of poultry farming is the feed base. For poultry, the deficiency of protein and minerals is very harmful.

The issues of rational use of fish feed and seafood waste are currently insufficiently studied in the pig industry of the Far East. However, production tasks require resolution of ways of rational use of these valuable feed products in the production of pork, taking into account specific feed conditions.

In the far Eastern region, there is an opportunity to expand the use of the species diversity of extracted bioresources and their waste from processing in the feeding of farm animals.

The Far East region has all the possibilities for realizing the genetic potential of farm animals and poultry. In Primorsky region it possible to use inexpensive seafood and waste products from their processing in feeding animals and poultry widely.

Seafood and fish products, as well as waste products from their processing, are rich in protein and minerals that are necessary to provide of animal and poultry diets all nutrients.

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Concentrates of marine origin have antioxidant, radioprotective characteristics, increase the body's resistance to diseases, increase the immune system, and improve metabolism.[1-8]

Fish meal made from non-food fish and waste from processing of food fish, crustaceans and marine mammals and other hydrobionts is the most valuable source of protein and amino acids. It is used for the enrichment of compound feeds and for maintaining the correct balance of fatty acid and amino acid compositions, the content of raw protein, the level of calcium and phosphorus, as well as for the prevention of diseases of poultry. Fishmeal, thanks to its components, contributes to the development of vital body systems: the immune system is activated, egg production increases, the digestibility of nutrients increases, and young birds fledge better. [9-11]

Fresh fish contains almost all the vitamins that animals need. During processing, some of the vitamins that are less resistant to high temperatures are destroyed. Fish meal contains many b vitamins, and varieties derived from whole fish with liver contain vitamin D.

Due to its richness in high-grade protein, calcium, phosphorus and b vitamins, fish meal is widely used primarily in the preparation of combined feed for young poultry. In feed for young animals, fish meal is included in an amount of up to 10%, and for older young animals - up to 5-7 %. The use of combined feed with fishmeal can increase the weight gain and egg production of chickens by 20-25 % while reducing the cost of plant feed per unit of production by 15-20 %. These compound feeds contribute to higher safety and increase the viability of piglets and chickens. [12-15]

Egg production is one of the important indicators used in poultry farming to determine the productivity of poultry, primarily egg and chickens. It measured by counting the annual amount of laid eggs. Hens of egg breeds usually begin lay when young individuals reach 75% of the weight of an adult bird, although other factors (breed, month of birth, conditions of detention) also have a significant impact. The most precocious chickens are those that were born in March: since during their rapid growth, the daytime increases rapidly, egg laying hens of egg breeds that were born in February-March can begin at the age of 4.5 months. Chickens that were born in late spring or summer, grow in conditions of decreasing daylight, and therefore they often begin to nest only the next year. Factors that affect egg production:

- nutrition
- bird health;
- lighting;
- breed;
- air temperature;
- the age of the hen.

The main factor influencing on egg production are breed and nutrition.

We conducted a scientific research experiment to include a fish feed concentrate in the diet of laying hens. The experiments were carried out in the farm of the Ussuriisky district of Primorsky region on the hens of the Haysex White cross.

The purpose of the research is to study the possibility of including a fish feed concentrate in the diets of laying hens.

To achieve this goal, we have formulated the following tasks:

1. To detect the optimal feeding doses in the diets of laying hens
2. To study influence of including a fish feed concentrate on the egg production of laying hens
3. To compare the economic effect of eggs production of control and experimental groups of laying hens.

2 Research methods

We formed 4 groups of laying hens (control and 3 experimental) with 50 heads each using the method of analogs. Laying hens of the control group were fed the main diet adopted in the farm, the rations of the experimental groups included fish feed concentrate in a dose of 3, 5 and 7% as part of the feed. The scientific experience of including a fish feed concentrate lasted 120 days (17 weeks). The research scheme is shown in table 1.

Table 1. Research scheme.

Group	Length of research	Amount of poultry	Diet
control	120 days	50	Basic diet (BD)
I experimental	120 days	50	BD+3%
II experimental	120 days	50	BD+5%
III experimental	120 days	50	BD+7%

In our research, we established that fish feed concentrate had a positive effect on egg production. Total egg production for the period of the experiment is shown in table 2.

Table 2. Total egg production (n=50).

Month of egg laying / age of poultry, month.	Group			
	control	I experimental	II experimental	III experimental
First / 5-6	539	558	562	579
Second / 6-7	694	792	798	818
Third / 7-8	724	881	890	902
Fourth / 8-9	861	963	994	1034
Total:	2818	3194	3244	3333
% to control	100	113,3	115,1	118,2

Total egg production in the experimental groups was higher than in the control group. The largest total amount of egg was in the III experimental group and amounted to 3333 eggs for the research period, which exceeds the control by 18.2%. On average, the advantage of the experimental groups ranged from 13.3% to 18.2%.

The results of table 2 confirm our conclusions that the fish concentrate in the compound of combined fodder has a positive effect on the egg production of poultry, as it provides laying hens with minerals, protein, and improves metabolism.

The egg production during the experiment period is shown in table 3.

Table 3. Change in egg production and its intensity, per 1 head.

Month of egg laying. month	Group							
	control		I experimental		II experimental		III experimental	
	eggs	%	eggs	%	eggs	%	eggs	%
First	10.78±0.45	35.9	11.16±0.57	37.2	11.24±0.71	37.4	11.58±0.8	38.6
Second	13.88±0.77	46.2	15.84±0.8***	52.8	15.96±0.66*	53.2	16.36±0.77*	54.5
Third	14.48±0.7	48.3	17.62±0.7**	58.7	17.8±0.9**	59.3	18.04±0.82**	60.1
Fourth	17.22±0.5	57.4	19.26±0.6*	64.2	19.88±0.8**	66.3	20.68±0.97**	68.9
Total:	56.36	47.0	63.88	53.2	64.88	54.1	66.66	55.6
% to control	100		113.3		115.7		118.3	

Where: ***P≤0,1, **P≤0,01, *P≤0,05.

As a result of our research work, it was established that the most intensive growth of egg production was observed in the II and III experimental groups. The number of eggs laid

by laying hens of the experimental groups was higher than the analogues of the control group by 13.3-18.3%. On average, during the experimental period, the highest egg production was in the III experimental group and amounted to 66.66 eggs or 55.6%, which is higher than the control by 10.3 eggs or 18.3%.

In our research, we found that fish feed concentrate has a positive effect on egg production. The total amount of eggs was higher in experimental groups than control group. The results are shown in figure 1.

Fig. 1. Total amount of eggs.

The complex indicator of egg production is the egg mass. This indicator takes into account not only the egg productivity, but also the weight of the eggs, it can be more fully judged on egg production.

The results are presented in table 4.

During the experiment, the largest amount of egg mass was obtained in the III experimental group, which was 219.6 kg or 34.6% compared to the control. Therefore, our hypothesis that this feed concentrate has a positive effect on egg production was correct, and it is optimal to include in the diet of laying hens a dose of 7% as part of the feed.

Table 4. Amount of egg mass during the experiment period (n=50).

Index	Group			
	control	I experimental	II experimental	III experimental
Total amount of eggs	2818	3194	3244	3333
Weight of egg. g	57.9±0.85	59.2±0.77	59.5±0.85	65.9±0.7**
Amount of eggs mass. kg	163.16	189.08	193.02	219.6
% to control	100	115.9	118.3	134.6

Where: **P≤0,01.
Egg mass are shown in figure 2.

Fig. 2. Egg mass, kg.

As a result of the conducted research, it is established that the mass of eggs in the III experimental group is more than 65 g, therefore it corresponds to the category "selected", and gives additional selling profit.

To determine the economic effect of using a fish feed concentrate, we conducted a production experiment. The production experiment was carried out in the same farm, the number of poultry was 1000 in each group, two groups were formed (control and experimental). The duration of the experiment is 60 days. The results are shown in table 5.

Table 5. Economic results of fish feed concentrate inclusion.

Index	Group	
	control	experimental
Amount of poultry, heads.	1000	1000
The duration of the experience, days	60	60
Total amount of eggs	47890	52385
Price of 1 dozen eggs, rubles.	60	60
Profits from the sale of eggs, RUB	287340	314310
Price of feed fish concentrate, RUB	-	2993.8
Additional profit of the farm from the inclusion of concentrate, RUB.	-	28194
Additional profit of the company from the inclusion of additives, rubles (per head)	-	28.2

Economic efficiency of using fish feed concentrate is shown in figure 3.

Fig. 3. Profits from the sale of eggs, RUB.

The production experiment proved that the fish feed concentrate has a positive effect on the egg production of laying hens and economic indicators. When this concentrate is included in the compound feed, the economic effect was higher on 28.2 rubles per head.

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