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THE IMPLEMENTATION OF MANURE DEGRADATED BY BLACK FLY LARVAE (*Hermetia illucens* L.) ON NATIVE LAYER PHASE CHIKENS EGG QUALITY

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Abstract

This study aims to determine the extent to which the utilization of manure flour resulting from the degradation of black fly (Hermetia illucens L.) larvae on egg weight, egg yolk weight and egg mass of native chickens the variables were egg weight, egg yolk and egg mass of layer phase native chickens. This study used a completely randomized design (CRD) consisting of 4 treatments and 5 replications in the form of degraded manure flour (MHD) of black fly (Hermetia illucens L.) larvae as follows: R0 = 0% MHD flour, R1 = 5% MHD flour, R2 = 10% MHD flour and R3 = 15% MHD flour. The results showed that the treatment had no significant effect (P>0.05) on the variable, so it could be concluded that the use of degraded manure flour (MHD) of black fly larvae (Hermetia illucens L.) with a level of up to 15% in egg-laying stage native chickens was added on feed formulations.

Key words: *eggs, larvae, manure.*

INTRODUCTION

Free-range chicken is a local chicken that is spread throughout the Indonesian archipelago which is often raised by breeders and rural communities as an effort to utilize their yards, fulfill nutrition and increase income. Poultry livestock, especially native chickens, is an alternative that is expected to provide animal protein for the community to fulfill the community's nutrition in the form of eggs. Egg quality is a general term to define external and internal quality. One of the factors that can affect the quality of native chicken eggs is the feed given to these livestock.

The productivity of laying hens is not only influenced by genetic factors but also by environmental factors (Dameanti et al., 2020) such as housing (Gustira et al., 2015). The nutrient content in the ration also greatly affects the quality of the eggs (Permana et al., 2020).

Manure is poultry faeces mixed with urine, and is the main food for a variety of insects in nature, including the larvae of *H. illucens* L. (black fly). The existence of insects in nature has indeed been created in such a way that they can play a role in the natural cycle of preparing nutrients from manure and of course they can produce a source of feed for livestock. Insects can biodegrade protein and other nutrient waste in manure into a protein-rich biomass that can be used as an alternative animal feed.

Larvae Degraded Manure (MHD) from (*Hermetia. illucens* L.) is an alternative feed ingredient as a protein source. MHD contains 51.15% protein (Manangkot et al., 2014). Furthermore, MHD is able to produce free-range chicken carcasses that are low in cholesterol (Rotinsulu et al., 2021). Manure Degradation Results (MHD) Black fly larvae (*Hermetia illucens* L.) are able to implement as a substitute for fish meal in rations of free-range laying hens on quality, cholesterol and triglyceride content in eggs and carcasses (Manangkot et al., 2014).

Starting from the above thoughts, a research has been carried out on "Implementation of Manure Results from the Degradation of Black Fly (*Hermetia illucens* L.) Larvae on the Quality of Layer Phase Village Chicken Eggs.

MATERIALS AND METHODS

This study used 60 female free-range chickens, Layer Phase, aged 6 months. The feed ingredients used in the study were yellow corn,

concentrate and black fly larvae manure flour (MHD). The treatment uses a ration prepared based on the needs of free-range chickens. This study used 20 units of battery system cages with a size of 70 x 70 x 100 cm, equipped with places to eat and drink. Other equipment used is a scale, also equipped with an electric lighting device. The design used was Completely Randomized Design (CRD) with 4 treatments and 5 replications. (Steel and Torrie, 1994). as follows: R0 = 0% MHD flour, R1 = 5% MHD flour, R2 = 10% MHD flour, R3 = 15% MHD flour. Larvae Degraded Manure (MHD

Research procedure

The preparation was to provide MHD flour, which started with taking the manure, catching flies, until the stage where the flies were caged together with the manure for 8 days, then the manure was dried in the sun until it was dry, and ground into flour. Furthermore, the preparation of cages, places to eat and drink for free-range chickens is cleaned and sterilized with a disinfectant before use. The cages measure 50 x 50 x 75 cm each. Furthermore, before the chickens were put into the chicken coop, they were weighed to get the initial body weight. The chickens were randomized and put into the experimental unit.

Food and drinking water are given 2 times a day (morning and evening) *ad libitum*. Data on egg weight and yolk weight were recorded by weighing the eggs and yolks using a Petri dish as a container and an electric scale.

Research Rations

The composition of feed ingredients used to cover the nutritional needs of chickens used in preparing rations are presented in Table 1

Table 1. Composition of feed ingredients to make up the ration

Material Food	Proteins	Coarse fiber	Fat	Ca	P	EM
Corn[1]	8.60	2.00	3.90	0.02	0.30	3370
Concentrate[2]	30.00	7.00	2.00	12.0	1.50	970[3]
MHD Flour[4]	51.15	2.06	2.75	9.84	3.20	2940

[1]Composition Table Analysis Results (Scott et al, 1982)
[2]PT. Shinta Prima
[3]Results of Calculation of Metabolic Energy of Corn and MHD Flour
[4]Manangkot analysis results, 2014.

To be able to meet the needs of native chickens in accordance with the nutritional needs of layer phase native chickens, the composition of the research ration to be used, can be seen in Table 2 and the composition of food substances in the research rations in Table 3.

Table 2. Composition of Research Rations

Material Food	Amount			
	R0, %	R1, %	R2, %	R3, %
Corn	60	60	60	60
Concentrate	40	35	30	25
MHD Flour	0	5	10	15
Total	100	100		100

Table 3. Composition of ration food substances study

Food content	R0	R1	R2	R3
Proteins (%)	17.16	18.16	19.26	20.07
Coarse Fiber (%)	4.00	3.75	3.50	3.26
Fat (%)	3.14	3.18	3.22	3.25
Ca (Calcium) (%)	4.81	4.70	4.60	4.50
P (Phosphor) (%)	0.78	0.87	0.95	1.03
Metabolic energy (EM) Kkal/kg	2410	2509	2607	2705

Note: Calculation results of the composition of food substances.

Research Variables

1. Egg weight is a comparison between the total weight of the eggs produced (g) with the number of eggs produced (grains) or by the formula:

$$BT = \frac{\text{Total weight of eggs produced (g)}}{\text{Number of eggs produced (grain)}}$$

(North, 1984)

2. Egg Yolk Weight (g)
   The weight of the yolk is measured by weighing each yolk (North, 1984). The measurement is done by weighing the weight of the egg yolk (g) after being separated from the egg white.
3. Egg Mass
   Egg mass is the product of egg weight and HDP. The units are grams/head/day. Determination of egg mass Olgun et al. (2009)

As follows:

$$EM = \frac{HDP \times BT}{PP}$$

EM : Egg Mass (g/ekor/hari)
HDP : Hen Day Production (%)
BT : Egg Weight (g/head/day)
RP : Research Period (day)

Data Analysis

Data were analyzed statistically using analysis of variance with Completely Randomized Design (CRD) (Steel and Torrie, 1994).

RESULTS AND DISCUSSIONS

Effect of Treatment on Egg Weight

Data from observations and calculations of the average egg weight of each treatment given during the study are listed in Table 4.

Table 4. Average Egg Weight (g/item)

Test	Treatment (g)			
	R0	R1	R2	R3
1	53.88	52.61	52.71	56.35
2	52.29	51.25	49.35	53.59
3	52.40	55.54	51.40	46.36
4	50.38	53.87	54.33	54.93
5	57.72	51.03	51.93	47.25
Total	266.67	264.30	259.72	258.48
Average	53.33	52.86	51.94	51.70

Based on analysis of variance on the use of manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) in free-range chicken rations, there was no significant effect (P>0.05) on egg weight. With the understanding that the use of manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) with levels of 5%, 10%, 15% in free-range chicken rations, does not cause a difference in egg weight.

The results showed that the average egg weight for each treatment ranged from 51.70 to 53.33 g. The results of this study are above the standards put forward by Sarwono (1995) that the weight of native chicken eggs ranges from 35.00-45.00 g. Egg weight is influenced by several factors, namely genetics, maturity stage, age, nutrients in the feed. Analysis of egg weight variance showed that treatment had no significant effect (P>0.05) on egg weight. This was due to the nutritional content in the research rations, especially protein and balanced energy, so that the effect of using manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) at a level of 5-15% did not have a significant effect on egg weight.

According to Latifah (2007) the size of the size of poultry eggs is strongly influenced by the content of protein and essential amino acids in the feed. The content of food substances in the rations of this study, including balanced protein and energy. That is, the content of nutrients has been fulfilled according to the needs of free-range chickens.

Effect of Treatment on Egg Yolk Weight

Observational data and calculation of the average egg yolk weight of each treatment given during the study are listed in the Table 5.

Table 5. Average Egg Yolk Weight (g/item)

Test	Treatment (g)			
	R0	R1	R2	R3
1	17.36	18.77	17.98	17.75
2	14.94	17.66	14.14	18.07
3	15.33	16.47	17.75	15.91
4	20.29	17.78	15.64	22.94
5	18.98	15.65	15.48	14.85
Total	86.90	86.33	80.99	89.52
Average	17.38	17.27	16.19	17.90

Based on the analysis of variance, it was shown that the use of manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) in free- range chicken rations showed no significant effect on free-range chicken egg yolk weight. The average egg yolk weight for each treatment ranged from 16.19-17.90 g. The results of this study are still above the standard put forward (Hartono et al., 2014), namely 12.83-16.00 g. Leeson & Summer (2001) stated that the weight of the yolk was affected by the quality of the feed. The results of this study, the weight of egg yolks is relatively the same. This means that the quality of the treatment ration, in this case protein and energy, is balanced, resulting in the same weight of egg yolks.

The effect of treatment was not significantly different on egg yolk weight. In this study, using a level of 5-15% manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) on egg yolk weight, the nutrient content in the rations was fulfilled.

Effect of Treatment on Egg Mass

Data from observations and calculations of the average egg mass of each treatment given during the study are listed in Table 6.

Table 6. Average Mass of Eggs (g/head/item)

Test	Treatment (g)			
	R0	R1	R2	R3
1	47.70	45.81	46.39	48.91
2	32.76	38.82	41.82	49.78
3	40.94	37.30	47.96	37.30
4	44.20	49.30	35.52	49.86
5	42.50	37.76	39.70	36.61
Total	208.10	208.99	211.38	222.45
Average	41.62	41.80	42.28	44.49

Based on the analysis of variance, it was shown that the administration of manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) at a level of 5-15% had no significant effect (P>0.05). This means that the use of 5-15% manure resulting from the degradation of black fly larvae in the ration is relatively the same. The average egg mass for each treatment ranged from 41.62-44.49 g/head/day. The results of this study are in the range stated by Leke et al. (2016) that the average egg mass is 40.10-44.94 g. So this study shows that R3 has the highest egg mass, namely 44.49 g. The average egg mass is related to egg production. High feed consumption will result in high egg production. The determining factors for egg mass are the number of eggs and the weight of the eggs. Egg weight is related to egg mass, where the pattern of increasing egg mass is in line with the growth pattern of mature follicles (yolk).

Egg mass is affected by feed consumption, because feed consumption is used for growth in order to reach an adult body while it is also used for egg production. Yolk weight of free-range chickens correlates positively with egg mass and egg size, the height and low mass of eggs depends on the feed (North & Bell, 1990). In the treatment ration, the higher the level of use of manure flour resulting from the degradation of black fly larvae (*Hermetia illucens* L.) is followed by an increase in protein and energy. That is, there is a balance between protein and energy in the research ration. So as to produce the same egg mass. If the egg mass increases, production also increases, conversely, egg mass decreases, egg production decreases (Nasikin et al., 2015). Egg mass is the correlation between egg weight and egg production.

CONCLUSIONS

Based on the results of data analysis and discussion that the use of manure flour resulting from the degradation of black fly larvae to a level of 15% produces the same egg weight, yolk weight and egg mass in native chickens. MHD can be used in free-range chicken rations as much as 15%.

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