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BLACK SOLDIER FLY LARVAE MANURE DEGRADATION AS FISH MEAL REPLACER IN NATIVE CHICKEN RATION

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Abstract

This study aims to reveal the effect of manure meal which were relegated from black soldier (Hermetia illucens) insect larvae (MD) as fish meal replacer and mixed in the ration on the performance of local chicken grower phases. This research used 60 native chickens two weeks old. Study using 20 units of battery cage system with a size of 50 x 50 x 70 cm. Each unit enclosure three chickens, free-range occupy, that equipped with eating and drinking bowl. The chickens got ration treatment with difference level MD meal from larvae Hermetia illucens (Black soldier fly) as fish meal replacer; as follows: RA = rations with 15% fish meal + 0% MD meal; RB = rations with 10% fish meal + 5% MD meal; RC = Rations with 5% fish meal + 10% MD meal; RD = rations with 0% fish meal + 15% MD meal. Results indicated that up to the level of 15% fish meal in the ration of native chicken grower phases, can be replaced with MD (mixed of one week manure and eight days instar larvae), although there is a tendency of decreasing feed intake of chickens treated.

Key words: fish meal replacer, manure degradation (MD), native chickens

INTRODUCTION

Native chickens have high adaptability advantages in being able to adapt various situations, e.g. environmental conditions, climate change and local weather [1]. The increase in population and production and also the business efficiency of native chickens, needs to be improved from the traditional system into agribusiness [7]. In general, the nutritional needs for chicken raised during the early weeks (0-8 weeks) of life (grower phase), therefore it should be given rations containing adequate energy, protein, minerals and vitamin in an equal number.

Fish meal is one of the ingredients that are commonly used in rations as a fairly good source of nutrition, especially as a source of animal protein. Fish meal as poultry ration raw materials are the first in providing as animal protein source for the crude protein possessed a very high average based on its use in poultry rations composition, could reach10% of the ration [2]. Furthermore it is said that the use of fish meal in poultry rations determine the sold price. Therefore, fish meal can be replaced with other foods as a source of animal protein that can reduced the costs without reducing the ration quality. One of the alternative feed ingredients are easily available, cheap and can be used replace fish meal is degradated manure of *Hermetia illucens* (Black soldier fly) larvae.

Manure is a major ingredients from variety of insects *Hermetia illucens* (Black soldier fly) in the nature, including the larvae. The presence of insects in nature is already created such that it can play a role in the process of preparation of the natural cycle of nutrients, of course can produce a variety of food sources for other animals [3]. Insect waste can used as biodegradable protein and other nutrients in manure into a biomass that rich in protein so it can be used as an alternative fodder.

Based on the Table 1, studies to determine the effect of replacement of fish meal with degradable manure products of larvae *Hermetia illucens* (Black soldier fly) meal, can replaced the fish meal in the ration of native chicken grower phases and provide a good carcass quality. To determine the extent of the effect of the substitution of fish meal with degradation products of larvae *Hermetia illucens* (Black soldier fly) in the ration of native chicken grower phase and is able to provide good quality carcasses.

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Table 1 Laboratory Results Degradable Manure (DM) Larvae *Hermetia illuscens (Black soldier fly)* and Fish Meal

Amino Acids (%)	Flour MHD *	Fish meal **
Serine	1,119	00:06
Glycine	0.140	12:09
Histidine	3020	2.2
Arginine	9,570	6.8
Threonine	4,210	2.8
Alanine	2,080	1.1
Tyrosine	2,387	2.8
Valine	4672	3.5
Isoleucine	1,796	3.7
Leucine	2,071	5:19
Lysine	1,077	6.4
Phenylalanin	3,222	2.8
Methionin	4,437	2.0
Aspartic Acid	2,195	-
Glutamic Acid	3,759	-

Notes: * Udayana University UPT Analytical Laboratory, Bali (2013).
** Wahyu, 1998.

MATERIALS AND METHOD

This research used 60 female domestic chickens two weeks old, in 20 units of battery cage system with a size of 50 x 50 x 70 cm. Each unit enclosure in free-range chickens occupied with three chickens, equipped with places of eating and drinking bowl.

There are four ration treatments, the standard grower phase ration that added with fish meal and degradable manure of *Hermetia illucens* (Black soldier fly) larvae (DM) as a substitute for fish meal as follows:
RA = rations with 15% fish meal + 0% DM;
RB = rations with 10% fish meal + 5% DM;
RC = rations with 5% fish meal + 10% DM;
RD = rations with 0% fish meal + 15% DM.

The ration and drinking water throughout the study provided *ad libitum*. The degradable manure that is used in this study is one week old manure mixed with eight-days-old larvae.

Research Methods

The experiment was conducted using a Completely Randomized Design (CRD) with four treatments and five replications. The data were tabulated, and then tested according to the analysis of variance for the effect of the treatment. The difference level of each ration treatment was Bergand tested according to a Duncan Range Test [4].

Research Procedures

Preparation is done to the cage, eating and drinking bowl for free-range of the chickens. The size of the 20 cages of 50 x 50 x 70 cm, is made to the sufficiency inhabited by three chickens in each box. The ration are standard feed that added with fish meal and degradation manure (MD) meal as fish meal replacer from larvae *Hermetia illucens* (Black soldier fly).

RESULTS AND DISCUSSION

Daily feed intake per chicks in each treatment during the experiment shown in the Table 2.

Table 2 Daily Feed Intake Average From All Treatment (grams)

Replication	Treatment			
	RA	RB	RC	RD
1	130.775	128.340	127.586	127.798
2	127.647	130.557	130.271	126.897
3	129.936	127.396	127.376	125.995
4	133.867	125.875	126.875	126.799
5	128.925	129.467	128.537	127.987
Total	**651.150**	**641.635**	**640.645**	**635.476**
Mean	**130.230**	**128.327**	**128.129**	**127.095**

From the Table 2, it can be seen that an increase in the level of MD flour in native chicken rations, obtained an average feed consumption varying from 127.095 to 130.230 grams per head per day. And the consumption of grower phase native chickens is 100-135 grams per head per day, the average feed intake in this study are still eligible for grower phases native chickens [6].

The results of analysis of variance showed that the treatment were non significance (P>0.05) on feed consumption, this means that the DM as fish meal replacer until 15% level in the diet of native chickens grower phases have the same effect on feed consumption. Non significant feed intake caused because most of the content of nutrients in the diet is relatively the same with the experimental feed, especially the balance of energy and protein. The energy level in the diet is an important factor that determines the amount of feed intake [2] and [5]. Food consumption is influenced by the balance of nutrients, growth velocity, ration quality, production levels, body weight, palatability and metabolizable energy level in the ration [6].

Although the analysis of the feed diversity has no significancy differences, but the average amount of feed intake showed a tendency to decrease with increasing percentage of DM meals in the ration. This is presumably because of the particles of DM meals that is smoother than fish meal, so the increase of DM percentage in the ration has an effect on the feed intake, while the birds especially native chickens tended to consume slightly larger particle form of ration; also allegedly less palatabel DM meals.

From the data of feed intake in Tabel 2, calculated the amount of consumption of nutrients based on the number of ration dry matter intake of each treatment as shown in Table 3.

Table 3 Daily Food Consumption Average

Ingredients	Treatment			
	RA	RB	RC	RD
	g			
Proteins	22.608	22.236	21.870	21.436
Fat	5.926	5.740	5.674	5.510
Crude Fiber	5.228	5.624	5.872	6.148
Metabolizable Energy (Kcal / Kg)	330.504	329.620	327.436	324.502

In the Table 3, shows that the consumption of feed ingredients is still eligible for native chickens grower phases, especially the consumption of metabolizable energy and protein intake. The amount of protein and metabolizable energy varies following the amount of feed consumption is between 21.436 to 22.608 grams per head per day for protein and 324.502 – 330.504 grams per head per day for metabolizable energy. Protein and metabolizable energy consumption are still in standard needs. The protein consumption of native chickens grower phases is 20.19 to 25.48 grams per head per day and metabolizable energy is between 320 - 445 grams per head per day [5].

Based on the results of analysis of variance, showed that the treatment effect is highly significant (P<0.01) against the consumption of nutrients (protein, crude fiber and fat). With Duncan's multiple range test on protein consumption between the treatment RC and RD showed a highly significant differences (P<0.01) with RA, whereas the treatment of RA with RB; RB to RC and RC with RD showed significant differences (P<0.05), but between the RB and RD treatment showed a highly significant difference (P<0.01).

Fat intake between treatments RB, RC, and RD showed a highly significant difference (P<0.01) with RA, as well as between the treatment RB and RC; RB and RD; showed a highly significant difference (P<0.01) but between the treatment RC and RD showed no significant differences (P<0.05).

For a crude fiber consumption between treatment RB, RC, RD showed a highly significant difference (P<0.01) with RA. As for the treatment of RB to RC; and RC with RD showed significant differences (P<0.05), but the RB treatment with RD showed a highly significant difference (P<0.01).

With increasing levels of DM meals in the ration of native chicken grower phase resulted a decreased intake of protein and fat, but increased the consumption of crude fiber. Metabolizable energy consumption shows that the treatment given, has non significant effect (P>0.05) on the metabolizable energy consumption, it means that energy consumption is the same level between the treatments.

CONCLUSIONS

Fish meal up to 15% level in the diet of native chicken grower phases, can be replaced with DM (one week of manure and eight days instar larvae), although there is a tendency to decrease the feed intake.

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