OPTIMIZATION OF MAGGOT (*HERMETIA ILLUCENS*) USING HOUSEHOLD WASTE MEDIA ON ECONOMIC ANALYZING OF NATIVE CHICKEN AT STARTER PERIOD

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ABSTRACT

The purpose of the study was to determine the potential of maggot with household waste media as local feed for the economic analyzing of native chicken. The materials used in this study were maggot flour from household waste media with tofu dregs as food ingredients, 120 of native chickens 0-6 weeks age old, commercial feed, basalt feed consisting of corn, rice bran, soybean meal, fish meal, coconut oil, salt and premix. The basal ration was prepared with a Metabolizable Energy (EM) of 3000 kcal/kg and 19% crude protein. This study used non-factorial completely randomized design (CRD) consisting of 6 treatments and 4 replications as follows: P0: control 1 (chicken fed commercial feed), P1: control 2 (basal ration), P2: basal ration + administration of maggot and its medium 5%, P3: basal ration + administration of maggot and its medium 10%, P4: basal ration + administration of maggot and its media 15%, and P5: basal ration + administration of maggot and its media 20%. Parameters observed include production costs, profit/loss analysis, R/C ratio analysis and income over feed cost (IOFC). The results of the research showed that the provision of maggot flour and its media can be used up to 20% (P5). These treatments can increase the profits, R/C ratio, IOFC, and reduce the production costs. Conclusion of the research was the provision of maggot flour with the media from household waste up to 20% had a positive result on economic analyzing of native chickens at starter period.

Keywords: Native Chicken, Maggot, Economic Analyzing

INTRODUCTION

Native chicken was known as a type of poultry that produces eggs and meat, so it was called a dual function. Native chicken meat has a distinctive taste and texture that was liked by the Indonesian people and can even be said to have its own market segment. Arlina and Subekti (2011) state that native chickens have the privilege of having a fairly good resistance to disease, has adapted to their environment, and the production of eggs or meat was preferred by the community. Native chicken was a source of animal protein and was known for its existence because it has become a part of Indonesian people's lives, especially in rural areas.

In terms of growth, native chickens were not as fast as broiler chickens, although native chickens have been raised intensively and with feeding as in broiler chickens. The main component on raising of native chickens was feed. Various ways have been done to reduce feed costs. Many farmers use commercial feed with various modifications, which are adjusted to the availability of feed ingredients. The cost of feed was expensive because the raw material for protein sources was increasing in price and had been begun to be scarce. Protein source feed ingredients were fish meal and soybean meal. Beski et al., (2015), protein components have an important role in an animal feed formula because they are involved in the formation of body tissues and are actively involved in vital metabolism such as enzymes, hormones, antibodies and so on.

Fish meal was one of the protein sources in poultry feed and almost all feed formulas use fish meal as a protein source. According to Rambet *et al*., (2016) stated that farmers often obtain uncertain quality of fish meal due to being processed from various sources and its

availability was limited so that it affects the quality and price of feed. One of the efforts to overcome this problem was to look for alternative feed raw materials whose quality was almost the same as fish meal.

Alternative local feed ingredients that can be used to replace fish meal in commercial feed, one of which was black soldier fly (Hermetia illucens) which from household waste media. Black soldier fly (BSF) had a high protein content between 38.98% - 44.9% (Nyakeri's, 2017), crude fat of 29.1% and crude fiber of 16.4% (Jayanegara's, 2017).

This study aims to obtain the most optimal feed composition for native chickens through partial replacement of commercial feed of broiler chicken with local raw materials, especially substituted for protein source feed ingredients, namely fish meal. Local raw materials that were available and have not been fully utilized in feed, especially poultry feed, namely maggot (*Hermetia illucens*). This feed can be used as an option for providing protein source feed. Maggot that was rearing from household waste can be used as a source of protein feed, seeing the amount of maggot in kitchen waste that was not utilized.

Utilization of household waste was one way to overcome the increasing accumulation of organic waste, such as vegetables or fruits as a medium for the growth of maggot or Black Soldier Fly (BSF) larvae. Maggot or known as the Black soldier fly (BSF) (Hermetia illucens) larvae is one of the animals that had high protein content between 40-50% and a fat content ranging from 29-32%. The success of maggot production and quality was largely determined by the growing media. But not all media can be used as spawning grounds for Hermetia illucens flies because the Hermetia illucens like of specific media, such as the aroma of media (Rachmawati, 2010).

Based on the above potential, the researchers wanted to know the optimalization of maggot (Hermetia illucens) with household waste media as a local feed technology to increased of economic analyzing of native chickens.

METHODS

The materials used in this study were maggot flour from household waste media, 120 of native chickens 0-6 weeks age old, commercial feed, basal diet consisting of corn, rice bran, soybean meal, fish meal, coconut oil, salt and premix. The basal ration was prepared with a Metabolizable Energy (EM) of 3000 kcal/kg and 19% crude protein. The basal ration presented at Table 1.

Table 1. Basal Ration of Native Chicken

Ingredient	P1 (%)
Rice bran	10.00
Fish meal	10.00
Soy bean meal	20.00
Corn	55.00
Coconut oil	3.00
Salt	1.00
Premix	1.00
Amount	**100.00**
Crude fiber (%)	5.02
Crude fat (%)	6.54
Metabolizable energy (kcal/kg)	3074.22
Crude protein (%)	19.17

Table 2. Chemical Composition of Treatment Basal Ration.

Basaliet	Treatment					
	P0	P1	P2	P3	P4	P5
GE (Kcal/g)	3,200.00	3,775.00	3,872.00	3,885.00	3,892.00	3,898.00
CP (%)	19.97	19.17	19.05	19.36	19.54	19.70
Crude fiber (%)	3.94	5.02	5.40	5.31	5.27	5.18
Crude fat (%)	5.32	6.54	6.36	6.42	6.50	6.55
Water content (%)	13.00	14.52	14.32	14.27	14.18	14.15
Ash (%)	8.02	9.04	9.63	9.52	9.50	9.45

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The research was conducted begun with making maggot flour from household waste media and analyzing nutrients (proximate analysis). The first step of manufacturing of maggot starts from purchasing 30 g of BSF eggs, then incubate the BSF eggs used rice bran media that has been fermented for approximately 3 days. After the maggot eggs hatch then baby maggot was moved to ousehold waste media with prepared tofu dregs as feed. After that maggot can be harvested at the age of 10 days. Maggots with the media, then dried in an oven/heater at a temperature of 60^0C and a blender to make it smooth. The maggot flour then stored in a dry place. Then mixed in feed of native chicken according the treatments. The treatment conducted at 120 of native chicken were placed in 24 experimental cages. native chickens were randomly divided into 6 treatments with 4 replications, where each replication consisted of 5 native chickens. Then the native chicken will be treated with commercial feed and basal ration (Table 1) those added with maggot flour. Drinking water were given adlibitum. The treatment was given during the study when native chickens were 0–6 weeks age old based on the each of treatments and were given in the morning. Parameters observed include production costs, profit/loss analysis, R/C ratio analysis and income over feed cost (IOFC).

This study used non-factorial completely randomized design (CRD) consisting of 6 treatments and 4 replications. The research data was tested with ANOVA and if there was a significant difference, it was continued with the Duncan multiple range test.

RESULTS AND DISCUSSION

Result

Data Table 3 showed that the treatments did not significant effect on economic analyzing of native chicken.

Table 3. Average of Production Cost, Profit/Loss Analysis, R/C Ratio and Income Over Feed Cost (IOFC)

Treatments	Production cost (Rp)	Profit/loss analysis (Rp)	R/C ratio	IOFC (Rp)
P0	25.417	5.132	1,20	12.632
P1	24.700	3.553	1,14	11.053
P2	24.411	3.817	1,16	11.317
P3	23.860	4.496	1,19	11.996
P4	23.776	5.042	1,21	12.542
P5	24.514	5.624	1,23	13.124

Discussion

Production costs were all costs incurred in one production or period. Production costs consist of fixed costs and variable costs. The research showed that the provision of maggot

flour and its media from household waste up to 20% as a substitute for commercial feed and basal feed was not significant different on production costs. The highest production cost was found in P0 with a value of Rp. 25,417, while the lowest production cost was found in P4 with a value of Rp. 23,776. This was due to differences in the price of feed and how much feed was consumed which includes variable costs that differ for each treatment. The difference in feed prices was caused by the difference in the percentage of maggot flour and its media from household waste in feed which was relatively cheaper than fish meal. This opinion was in line with Nuraini (2003) that production costs cannot be separated from the production process because production costs were inputs or inputs multiplied by the price. One of the causes of high variable costs was the high cost of feed. This opinion was supported by the opinion of Listiyowati & Roospitasari (2009) that feed was considered the most important factor because 80% of the costs incurred by a farmer are used to purchase feed. In line with the opinion of Veldkamp and Bosch (2015) quality feed was one of the factors that determine the success of a farm as well as being the largest component of expenditure in a poultry business activity, which was 50-70% of the total cost.

Profit and loss analysis describes the profit earned in a period obtained by reducing all revenues and costs incurred during a certain period. The amount of profit or loss will be known from the difference between income and expenses. The results howed that the provision of maggot flour and its media from household waste up to 20% as a substitute for commercial feed and basal feed was not significantly different on the profit and loss analysis. The highest profit was found in P5 as Rp. 5,624, then followed by treatment P0 as Rp. 5,132,- then followed by treatment P4 as Rp. 5,042,- then followed by treatment P3 as Rp. 4,496, then followed by treatment P2 as Rp. 3.817,- and the smallest average profit value was found in P1 treatment as Rp. 3.553,-. Where the selling price of native chickens in each treatment was not the same where the price was according to the final body weight. The difference in profits can be seen where the greater the value of profits in line with the increase in the concentration of maggot flour and its media from household waste in the treatment. that was because the price of maggot flour and its media from household waste was cheaper than commercial feed and basal feed, so that the cost of feed was smaller and overall, automatically lower production costs incurred. This opinion was supported by the opinion of Kasmir and Jakfar (2005) that production costs affect the profit and loss analysis. Another opinion by Soekartawi (2001) that farm income was the product of the product obtained and the selling price.

The R/C ratio was the ratio between sales receipts and the costs incurred during the production process to produce the product. The results showed that the provision of maggot flour and its media from household waste up to 20% as a substitute for commercial feed and basal feed, was not significantl different on the R/C ratio analysis. The largest R/C ratio was found in treatment P5 at 1.23, then followed by treatment P4 at 1.21, then in treatment P0 at 1.20, followed by treatment P3 at 1.19 and P2 at 1.16, and The smallest R/C ratio was found in treatment P1 of 1.14. These results indicate that the livestock farming which was fed with maggot flour and its media from household waste was feasible to be used as a business, because the R/C ratio obtained was greater than one. This opinion was supported by Murib's (2014) that the higher the ratio of business obtained in the livestock business, the more efficient the business, if the R/C ratio obtained was more than one, it means that the business being carried out was profitable. The above opinion was in line with Mulyadi (2001) if the R/C Ratio > 1 then the business was feasible to continue while the R/C Ratio < 1 then the business was not feasible to continue. According to Yosefa (2018), the R/C value > 1 means that the breeder has been able to produce an ideal comparison to produce a profitable business, because the value of revenue was still above the value of the costs incurred in the livestock business per period.

Income over feed cost (IOFC) is the income obtained from the difference between the sales

revenue per head and the average cost of feed consumed per head during the study. The results of the analysis of variance showed that the provision of maggot flour and media from household waste was used up to 20% as a substitute for commercial feed and basal feed, which was not significantly different from income over feed cost (IOFC). The largest IOFC was found in treatment P5, which was Rp. 13,124, - then followed by treatment P0 of Rp. 12,632, - then followed by treatment P4 of Rp. 12,542, - then followed by treatment of P3 of Rp. 11,996,- and P2 of Rp. 11,317. then the smallest IOFC was found in treatment P1 of Rp 11,053,-. It can be seen that the IOFC increased along with the increasing concentration of maggot flour and media from household waste in the treatment. This is because the cost of P5 feed is cheaper than P0 and other treatments because maggot flour and media from household waste are relatively cheaper than commercial feed and basalt feed. The lower the cost of feed, the higher the IOFC produced because one of the factors that affect the IOFC is the cost of feed. This opinion is in accordance with Rasyaf's (2004) statement which states that income over feed costs are influenced by feed consumption, body weight gain, feed costs and selling prices. This is in accordance with the statement of Muharlien and Ani (2015) that IOFC is obtained by calculating the difference between the total revenue and the total cost of feed used during the study.

CONCLUSION

Conclusion of the research were administration of maggot flour and its media from household waste up to 20% (P5) increase the profits, R/C ratio, IOFC, and reduce the production costs.

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