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Effects of Dietary Fish Waste Meals as Protein Source on Quail Growth Performance (Study on Starter Phase)

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Abstract. This study used 300 male day-old quails was conducted to observe the effect of dietary fish waste meals (FWM) as source protein in the ration on growth performance. The birds were randomly allotted into five dietary treatments in a poultry house. At day old, the quail weighed, and allotted into 30 wired pens. The five treatments were: basal diet without fish waste meal (FWM) (CONTROL; T0); 2% FWM (T1); 4% FWM (T2); 6% FWM (T3); and 8% FWM (T4). The dietary using iso- calories and iso-protein. Each treatments replicated 6 times with 10 birds in each replication pens. Body weight and feed intake were collected on day 0, 7, 14, and 21 for calculating of weight gain, feed intake, and feed conversion ration. Data obtained in this study were statistically analyzed using one way classification of variance. Results showed dietary of fish waste meals show any significant effect on feed intake and feed conversion ration, but did not show significant effect on body weight.

INTRODUCTION

Fish is one of the food sources that is easily obtained in the market. The distribution flow of fish from fishermen usually leads to fish auction market as the first step in the distribution process. Furthermore, in the process of selling fish, both on a large and small scale, it produces by-products in the form of fish waste. Part of fish waste consists of fish heads, bones, and frame as well as fish whose physical condition is not suitable for sale, small fish with low economic value, and fish that are not suitable for consumption [1]. The existence of fish waste is an obstacle in fish canning locations because it pollutes the environment, which causes odors, biomass, and low use [2]. Bandar Lampung city has a fish auction market, namely TPI Gudang Lelang which is located in Teluk Betung, Bandar Lampung. The results of the survey that we have done, there is a lot of fish waste that is not used optimally. This condition causes environmental pollution in the form of odors and organic waste. The research of Hasiib et al. [3] and Pratiwi et al. [4] showed that fish waste has a fairly high crude protein, which is around 50%. This showed that fish waste has the potential as a protein source that can be used by animal feed.

Furthermore, this fish waste can be processed simply to be used as flour to be used as a protein source. The use of fish waste meal is expected to reduce feed costs which are quite high, around 70% of production costs. The protein content in fish waste is expected to increase the productivity of quail, which is now growing rapidly along with increasing demand and increasing awareness of the importance of consuming animal protein. Crude protein will

optimally used for quail growth, where the amino acid of animal protein is more complete and easier for the body to digest [5]. The value of the supplementary effect of protein is expected to be balanced with the addition of fish waste meal as a protein source, so the animal growth will be optimal. Furthermore, if growth is optimal, the level of livestock productivity will also increase.

MATERIAL AND METHODE

Proximate Analyze of Fish Waste

This research was conducted at the Animal Nutrition and Feed Laboratory, Department of Animal Husbandry, Faculty of Agriculture, University of Lampung from April to June 2021. The research was carried out in laboratory experiment and was purposive. Fish waste was obtained from the Fish Auction Place (TPI) Gudang Lelang, Bandar Lampung which had been sorted. The preparation process into flour is carried out by cutting fish waste into 3-5 cm, then drying in the sun to air dry. Then it was oven-baked at 60°C to make it easier to make flour. Then, when it is dry, it is milled. Then, analyzed proximately by the AOAC method [6]. Moisture, extract ether, crude protein (Nx6,25), ash, and crude fiber analyzed were done in duplo for each sample.

Birds Grouping, Diets, and Experimental Design

Three hundred male day-old quails were randomly allotted into five dietary treatments in the poultry house. At a day old, the quail weighed and allotted into 30 wired pens (40x100x50) cm³. The five treatments were: basal diet without fish waste meal (FWM) (CONTROL; T0); 2% FWM (T1); 4% FWM (T2); 6% FWM (T3); and 8% FWM (T4). The dietary using iso-calories and iso-protein. Each treatment was replicated 6 times with 10 birds in each replication pen. The ingredients and chemical composition of the diets are presented in Table 1. Feed formulation using windows user-friendly feed formulation (WUFFDA) 1.02.

TABLE 1. Ingredients and chemical composition

Description	T0	T1	T2	T3	T4
Items %					
Yellow corn	51,00	52,85	53,51	55,80	56,65
Soybean meal	23,93	24,93	23,17	25,25	23,70
Palm oil	1,45	1,65	1,70	2,15	2,20
Meat bone meal	5,20	3,20	3,00	1,45	0,50
Rice brand	14,87	11,77	11,77	6,50	6,65
Limestone	0,95	1,00	1,00	0,95	0,50
DCP	1,20	1,20	0,45	0,50	0,40
Salt	0,30	0,30	0,30	0,30	0,30
Vit-Min. Premix	0,45	0,45	0,45	0,45	0,45
DL-Methionine	0,35	0,35	0,35	0,35	0,35
L-Lysine HCL	0,30	0,30	0,30	0,30	0,30
Fish waste meal	0,00	2,00	4,00	6,00	8,00
Total	100,00	100,00	100,00	100,00	100,00
Chemical composition					
ME (kcal/kg)	3,047	3,024	3,039	3,033	3,036
Dry meter (%)	86,11	85,97	86,81	86,67	87,28
Ash (%)					
Crude Protein (%)	20,57	20,44	20,25	20,72	20,23
Extract ether (%)	5,67	5,61	5,83	5,86	6,03
Crude fibre (%)	3,90	3,62	3,62	3,16	3,17
NNE (%)					
Calcium	1,23	1,25	1,28	1,32	1,23
Total P	0,97	0,94	0,88	0,87	0,90
Available P	0,40	0,40	0,49	0,51	0,56
AA lysin	1,29	1,30	1,30	1,35	1,33
AA methionine	0,66	0,66	0,66	0,67	0,67

Sampling Procedure, Parameter Measured, and Data Analysis

Bodyweight and feed intake were collected on days 0, 7, 14, and 21 for calculating weight gain, feed intake and feed conversion ratio. By the end of the experimental period, calculate total feed intake and feed conversion ratio. The variable includes feed intake, final weight, and feed conversion ratio. Data obtained in this study were statistically analyzed using the one-way classification of variance using SPSS for Windows Version 26 (SPSS GmbH, Munich, Germany).

RESULT AND DISCUSSION

Proximate Analyze of Fish Waste

The proximate analyze of fish wasted showed in Table 2. The results of the proximate analysis showed that fish waste flour contained 7.42% water content, 92.58% dry matter, 31.81% ash content, 13.60% crude fat content, 36.00% crude protein content, and crude fiber content. 2.17%

TABLE 2. Proximate analyze of fish waste

Description	Percentage (%)
Moisture	7,42
Dry matter	92,58
Ash	31,81
Extract ether	13,60
Crude Protein	36,00
Crude fiber	2,17

The results of the proximate analysis showed that fish waste meal had a crude protein content of 36%. This indicates that fish waste can be used as a protein source feed [7, 8]. However, the crude protein content of fish waste flour tends to be lower when compared to research conducted by Estabén et al. [9] which showed that the crude protein content of fish waste meal was 58%. The results of Sihite's [2] also showed that the crude protein of fish waste meal was 53.62%. The difference in protein in fish waste is influenced by several factors, including species, environmental conditions, substrate for growth, sex, maturity, and harvest season [8-11].

In addition, fish meal waste also has a fairly high fat content of 13.60%. Further Gasco et al. [8] also explained that the high extract ether (>10%) can be used as a potential energy source. The presence of fat in the feeds also able to increase the adhesion between feed ingredients and prevent separation between feed ingredients. This is supported by the high fatty acid content in fish waste [11]. The fatty acids composition include monounsaturated acid, palmitate acid, and oleic acid. It's indicated that is a good lipid source for animal, because total n-3 highly unsaturated fatty acids and arachidonic acid 20:4n-6 levels. However, the high level of 18:2n-6 fatty acid of trout intestine. Which is not a natural consistuent of sea bream lipids. Differences in liver glycogen content were more pronounced than differences in dietary carbohydrate. Increased haematocrit values with diets (such as B) prompting faster growth have been reported. Trout offal is an alternative, non-polluting way of using the by-products of fish industry in sea bream diets [12,13].

The ash obtained is quite high, namely 31.81%. This ash content value is quite high when compared to SNI 01-2715-1996 grade III about fish meal with a maximum ash of 30%. This is presumably because the calcium content in fish bones is quite high, so it affects the ash content. The results of the research by Gencbay and Turhan [11] reported that fish waste has a fairly high calcium content, which ranges from 22.55-45.31 g/kg. Several research results show that fish waste has the potential to be used as a protein source for poultry [4,12]. It is based on crude protein content >20%. The use of fish waste as feed can also be used as a solution in reducing fish waste and reducing feed costs because the price of protein source feed tends to be high. Provision of fish waste for poultry can be given in fresh condition or in the form of flour depending on the type of poultry. The research results of Daud et al. [12] showed that the use of leubiem fish waste as much as 10% can increase the productivity of laying ducks. In addition to application to laying ducks, the provision of canned fish waste is also able to increase the productivity of broiler chickens [13]. Fish waste can be used as alternative feedstuffs in swine diets, partially to meet the protein requirements and to serve as a substitute for common sources of protein (soybean meal and commercial fish meal) [9].

Now days, using food waste as animal feed is of interest because it benefits the environment and the public and reduces the cost of animal production. FAO [13] reported most Asian countries due its low production cost, relatively high productivity, and the simple production technology. More importantly, carp farming has a relatively low carbon footprint because most carp species can utilise natural food to various extent and carp have low animal protein requirements in their commercial feed.

The Effect of Fish Waste on Growth Performance of Quail

The effect of fish waste on growth performance of quail showed in Tabel 3.

TABLE 3. The effect of fish waste on growth performance of quail

Variable	Treatments					Statistic	
	T0	T1	T2	T3	T4	P Value	SEM
Feed intake (g)	147,76 ^{ab}	139,85 ^b	143,80 ^b	159,33 ^a	144,76 ^b	0,053	121,072
Final weight (g)	38,87	37,82	42,87	40,00	39,11	0,263	15,758
Feed conversion	3,83 ^{ab}	3,70 ^b	3,39 ^b	4,00 ^b	3,72 ^b	0,08	0,121

This study was designed to investigate the respon of quail to giving of fish waste meals. Result showed fish waste meals show any significant effect on feed intake and feed conversion, and did not show significant effect on final weight. Kharag et al. [14] reported feeding sea fish waste significant effect on feed intake and feed conversion during the 1st until 4th weeks, but no significant differences on weight gain were observed in week 4th. Feed intake affected by level of fish waste meals and the highest showed on T3 (6% fish waste meal). Protein contain essential amine acid that require for monogastric. Quail need essential amine acid such as lysine, methionine, and tryptophan. All of amine acid will used to increasing growth performance of quail and can stimulating appetite and feed intake of quail. The difference between treatments effected by similiar nutrient content by feeding formulation using iso-calories and iso-protein concepts [15].

Final weight showed did not significant effected by giving fish waste. The results showed that the growth of quail weight in the 3rd weeks showed good data, which was around 40 grams. This means that the provision of fish waste meal showed good growth when compared to the control. This is in line with the same nutrient content in each treatment (Table 2). This is supported by Salemdeeb et al. [16] and Amirkolaie [17], that broiler poultry should be with iso-protein, especially the amino acid balance in the feed to support their growth.

The other side data showed feed conversion ration significant effected. This is suspected because the feed given to quail can increase feed conversion [18]. Selection of good feed ingredients and maintenance management greatly affected the body's ability to convert feed. In addition, it is suspected that protein content also influences feed conversion. However, this feed conversion showed did not significant effect on final weight. This condition is suspected because the type of house used is an opened house which causes high environmental temperature conditions. The opened house system keeps the quail under heat stress conditions. This makes the chickens will reduce their feed consumption. Some energy and nitrogen will be used to manipulate the cooling mechanism, so that nutrients that should be used for growth cannot be used optimally [5]. Sun et al. [19] showed that the digestibility of amino acids and protein decreased during heat stress. This shows that under heat stress conditions, the level of digestibility and absorption of protein will decrease, so that it has an impact on the level of protein efficiency in the body [20,21].

CONCLUSION

Based on this study, it can be concluded that fish waste meal can be used as a protein source for animal feed and can increase growth performance of quail on starter phase.

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