Effects Of Using Fermented Tuna Innards In Fish Feed Formula To Pangasius (Pangasius Sp.) Growth

Alexander KorinusMarantika, Anik Martina H, Arningwilujeng Ekawati

Abstract: The purposes of this research were to determine the best dosage of the tuna innards fermentation powder substitution based on its survival rate, specific growth rate, and the conversion ratio of pangasius fish (Pangasius sp.) fish feed. The fish feed test formula contained 30% of raw protein. The tested fish feed consisted of fish powder mixed with substitution powder from fermented tuna innards. The substitution in fish feed A=(0%), B=(10%), C=(20%), and D=(30%). The number of pangasius fish thrown into 50x30x30 cm aquarium was 20 fish with average weight 3.12±0.03g. Fish feeding frequency was 5% 5% three times a day at 08:00, 13:00 and 19:00, for 40 days. The results showed that with the added fermented tuna innards protein powder substitution dosage until 20% of the fish feed, the survival rate improved reaching 100%, the best specific growth rate was at 3.36 (% BB) and the fish feed conversion ratio declined at the lowest 1.55 (g/g).

Index Terms: fermented tuna innards, pangasius fish (Pangasius sp.)

1. Introduction

Pangasius fish (Pangasius sp.)culture ikanpatin (Pangasiussp.) is currently still practiced by most farmers in Java, Kalimantan and Sumatera Island. Intensive culture system was mostly conducted by these farmers. The intensive culture system needs fabricated fish feed supply or commercial fish feed in great amount (60-70% of the production cost). Efforts to improve pangasius fish growth rate are still continuously worked on. One of them is by making effective fabricated fish feed that will reduce its high production cost. One way to reduce dependence on commercial and fabricated fish feed is by utilizing natural waste of tuna fish innards as natural animal protein source. Indonesia is a country with the highest tuna fish potential in the world as its total production of tuna reaches 613,575 metric tons a year (Anonymous, 2015). According to observation conducted by Prasertsan and Prachumratana (2008), average tuna innards weighed 5.18% - 7.05% of the total fish weight and they contained 75-80% of water so they could decay fast. According to McLauchlinet al. (2015) and Jiang et al. (2007) sombroid fish contained a lot of free histidine in the flesh tissue or innards which can be turned into histamine through decarboxylation and histamine producing bacterial activity. Thus, fermentation is the way to preserve the quality, according to Carlile and Watkinson (1995). Fermentation technology preserves the nutrition content and the quality better than its original material because microbes were catabolic that they convert complex components into simpler substances so they will be easily digested. Furthermore, the microbes can also produce amino acid and some other vitamins such as riboflavin, vitamin B12 and provitamin A with better flavor. Therefore, the formulated fish feed given was expected to improve fish physiological function regarding its ability to digest food. The purposes of this research were to determine the best dosage of the tuna innards fermentation powder substitution from its survival rate, specific growth rate, and the conversion ratio of pangasius fish (Pangasius sp.) fish feed.

2. Materials and Method

2.1 Fish Rearing

Rearing container used for the fish was twelve aquariums sized 50x30x30 cm. They were cleaned and arranged on the shelves then filled with 30 litres of aerated water with a filter and a heater in each aquarium. Each aquarium was filled with 20 fish with average weight 3.12±0.03g. The fish was from Sukamandi in West Java. Before the research, the fish was prepped for two weeks in Fish Reproduction Laboratory in Faculty of Fisheries and Marine Sciences UniversitasBrawijaya Malang. Fish feed given was 5% of the fish biomass, three times a day at 08:00, 13:00 and 19:00 for 40 days of rearing.

2.2 Formulated Fish Substitution

Fish feed used for the research was fabricated fish feed with 30% protein content (18% animal protein and 12% plant protein) with same plant protein material for all treatments (soy powder and bran, while animal protein consisted of fish powder mixed with substitution powder from fermented tuna innards. The treatments detailed as follows:

1. Fish feed A= 0% substitution, fish powder protein source at 100%
2. Fish feed B= 10% substitution, fish powder protein source at 90%
3. Fish feed C= 20% substitution, fish powder protein source at 80%
4. Fish feed D= 30% substitution, fish powder protein source at 70%

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2.3 Data Analysis
The research used complete randomized design with four treatments and each with three replications. To measure the effects of the treatments to the variable observed, analysis of variance was used with 95% confidence level and then followed with the least significance different test and polynomial orthogonal test. Variable used to evaluate the difference among treatments included survival rate, specific growth rate, and fish feed conversion ratio.

3. Resultand Discussion

3.1 Survival Rate
After its rearing for 40 days, the pangasius fish with treatment A with substitution powder protein from fermented tuna innards at 0% could reach average 98.33% survival rate. Fish feed B with 10% substitution powder protein fermented from tuna innards resulted 98.33% survival rate, fish feed C with 20% substitution powder protein fermented from tuna innards resulted 100% survival rate, while fish feed D with 30% substitution powder protein fermented from tuna innards resulted 98.33% pangasius fish survival rate. Based on the analysis of variance, substitution of powder protein fermented from tuna innards on fish protein powder did not show real significance on the pangasius fish (Pangasius sp.) (P>0,05).

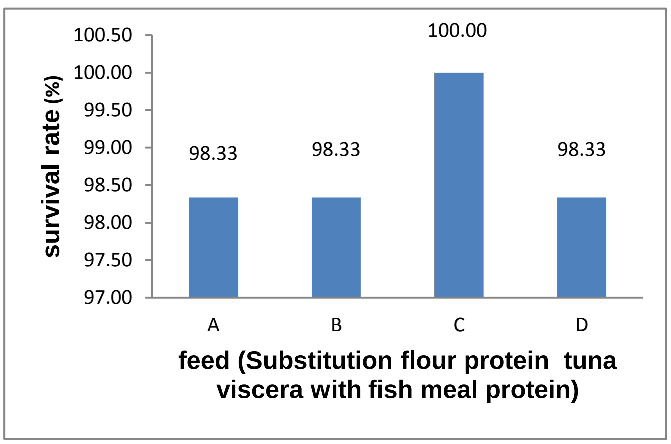

Figure 1. *Chart of pangasius fish survival rate (Pangasius sp.) for 40 days of observation*

According to Yulianto (2006), SR was affected by internal and external factors. Internal factors were from the fish body and external factors were from the fish feed quality and the water quality. Amanlia (2013) stated that the fish SR percentage was affected by some factors such as the ability of the fish to adapt in the environment, the fish handling during the spreading, the spreading density, and the appropriate water quality. The fish feed quality for the treatments, based on the specific growth rate and fish feed conversion ratio showed that powder protein substitution on fish feed C gave the best results so fish feed for treatment C has the best nutritive quality for pangasius fish growth.

3.2Specific Growth Rate (SGR)
Specific growth rate from the treatments A, B, C and D on the pangisius fish can be seen on Table 1.

Table 1. *Average specific growth rate of pangisius fish*

Treatment	Replication 1	2	3	Total	Average
A	2.90	2.99	2.98	8.87	2.96
B	3.14	3.14	3.13	9.41	3.14
C	3.42	3.45	3.46	10.33	3.44
D	3.22	3.21	3.19	9.62	3.21

Analysis of variance showed the real significance between the treatments (p<0,01), then it was followed with BNT test to measure the difference of the treatments' results.

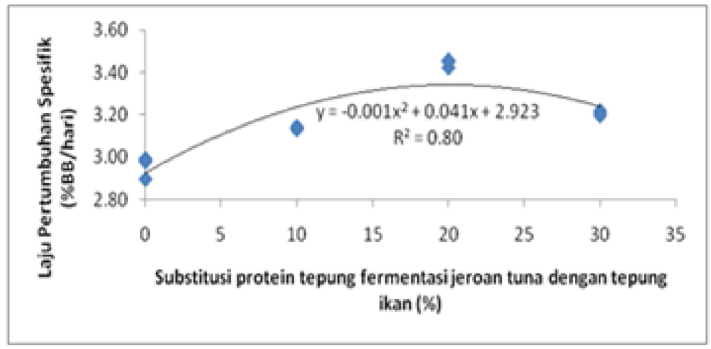

Figure 2, *the correlation of substitution powder protein from fermented tuna innards with fish powder protein and the SGR of pangasius fish (Pangasius sp.)*

was determined by regression analysis. The regression analysis showed equation Y = - $0.001x^2$ +0.041x+ 2.293 with determination R^2= 0.80. From the equation result, the best specific growth rate was achieved from the usage of powder protein from fermented tuna innards at 20.9% of the formulated fish feed. The specific growth rate of the fish (Pangasius sp.) was at 3.36 %/total weight/day. This SGR value (3.36 %/total weight/day) was better than some results from previous researches such as by Anandaet al. (2015), where they added papain enzyme in the fabricated fish feed. The highest result of SGR was at 2.37%/total weight/day. Sari (2013), used papain enzyme to improve the utilization of fish feed protein and the growth showed SGR result at 5.96%/ total weight/day, and Amalia's research (2013), was only at 2.89%/ total weight/day. So the specific growth rate of this research was still at good level. It is assumed that the fermented tuna innards have experienced catabolism where the complex protein was converted into simpler parts so when the fish feed was given, it could be easily digested by the fish.

3.3Feed Conversion Ratio (FCR)
Data of average pangasius fish (Pangasius sp.) feed conversion ratio from the research can be seen from Table 2.

Table 2. *Data of average feed conversion ratio of pangasius fish (Pangasius sp.)*

Treatment	Replication 1	2	3	Total	Average
A	1.78	1.86	1.82	5.46	1.82
B	1.83	1.89	1.78	5.50	1.83
C	1.53	1.55	1.54	4.62	1.54
D	1.71	1.73	1.74	5.18	1.73

Analysis of variance showed the real significance between the treatments (p<0,01), then it was followed withresultsBNT test to measure the difference of the treatments'.

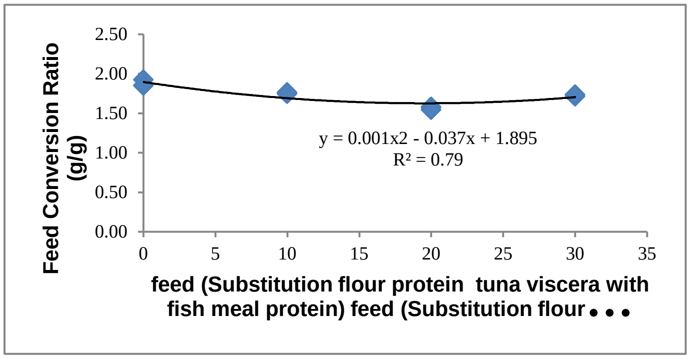

Figure 3. *Correlation of substitution powder protein from fermented tuna innards with fish powder protein and the feed conversion ratio of pangasius fish (Pangasiussp)*

Regression analysis. The regression analysis showed equation Y = $0,001x^2$–0,037x+1,895 and R^2= 0.79. From the equation result, the best feed conversion ratio was achieved from the usage of powder protein from fermented tuna innards at 18.5% of the formulated feed. The feed conversion ratio of the fish was at 1.55 g. According to Gusrina (2008), FCR was measured to determine how much feed was needed to gain 1 gram of fish weight. The less fish feed given, the smaller FCR value so the more efficient and the better quality of fish feed which was used. FCR value of tested fish feed which was far from one (1) indicated low quality of the fish feed tested. It was caused by unbalanced nutrition as the tested feed composition was inadequate from what the fish needed, so it caused the slow growth. Handayani and Widodo (2010) stated that FCR value in fish culture was really affected by quality and quantity of the fish feed. Based on the formulated fish feed, the average FCR value of these treatments was better than Widaksi research result Widaksi (2014) which using fish powder, meat powder and chicken powder substitutions in the formulated fish feed for better pangasius fish growth. The best FCR result of the research was 2.40% while Rachmawati and Samidjan research (2013), used fish powder substitution with maggot powder for better growth and survival rate of pangasius fish. The research best FCR result was at 25% substitution with 2.61% value.

5. Conclusion

Substitution powder protein from fermented tuna innards on fish powder protein at 20% of the fish feed was the best for the highest survival rate. The best specific growth rate was achieved from the usage of powder protein from fermented tuna innards at 20.9% with SGR value at 3.36 g/g, and the best feed conversion ratio was substitution at 18,5% with FCR value at 1.55 g/g.

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