***Utilization of Bycatch from Fishing and Fish Processing Waste as Formulated Feed Raw Materials in Silver pompano (Trachinotus blochii* Lacepede 1801*) Grow Out***

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ABSTRACT

The existence of the fisheries industry has a positive impact on regional economic development and coastal fishermen, but on the other hand it causes environmental problems, due to the resulting waste and decreasing environmental quality. In fisheries production residual waste there are still many useful nutrients that can be used, such as carbohydrates, proteins, fats, mineral salts, and can be used as raw material for grow out fish feed. This utilization can also reduce the need to import fish meal, and reduce waste.

This study aims to determine the effect of feed from the bycatchs of fish catching and processing on the growth of silver pompano weight.

After testing for 60 days, the average weight of silver silver pompano, in Control (K), obtained the highest results of 212.25 ± 2.05 g, followed by 198.58 ± 2.79 g (treatment A) and 188.83 ± 0.38 g (treatment B). Based on the results of the Anova analysis and Tukey’s advanced test, it showed the significant difference between Control and both treatments as well as between treatment A and treatment B.

Keywords : Waste, Formulated feed, Growth, Silver pompano

**INTRODUCTION**

Fishery processing waste can be in the form of pulverized meat, fish oil, flour and fish silage, collagen and gelatin, chitin and chitosan, organic fertilizer, and various handicrafts from scales and shells. Until now, most of these wastes have not been properly managed and utilized, more are dumped into rivers, lakes, seas, beaches and landfills (Jayathilakan, K, *et al*, 2012). Added by Boonyaratpalin, M, (1997), if this condition continuously happens it will have a negative impact on the environment and can hinder the development of the fishing industry in the future. This of course is not in accordance with the concept of environmentally sound development or sustainable development.

Besides the practice of waste disposal, it can reduce the usability and use value of fishery products, so that it is economically very detrimental. The Indonesian government has endeavored to maintain the carrying capacity of the environment through the development of clean industries and efforts to improve the use and use of fishery products (Kongeo *et al*. 2010). Strategies that can be implemented in order to achieve these goals include increasing efficiency in handling and processing fisheries byproducts, maximizing the utilization of fishery waste to reduce the amount of waste produced, and treating the waste below the specified threshold so that the disposed waste will not make pollution to the surrounding environment (Guo, Z, *et al* 2012).

 Problems arising in the management of fishing results and utilization of waste include, among others, most fishermen have not utilized waste which occurs as a byproduct of fishing business, if utilized, it is still not optimal. Fisheries and processed waste can still be used to produce fish meal as raw material for artificial fish feed. The desired results of the study to use fishery waste as raw material for fish meal production and use it for artificial fish feed formulation, expected to support Ministry of Maritime Affairs and Fisheries program in reducing fisheries waste. The program can maintain sea water quality, increasing fishing communities and increasing beneficial of silver pompano grow out culture. The objectives of this study were to determine the effect of pellets from fish waste on the growth of silver pompano.

MATERIALS AND METHODS

 This research was carried out at the Main Center of Marine Fish Aquaculture, Lampung, Hanura Village, Teluk Pandan Subdistrict, Pesawaran District, from March to June 2019, and for making feed formulations carried out at the BBPBL Lampung Feed Factory. The raw material for fishery waste was taken from the location of the fish auction (TPI) of Lempasing, Bandar Lampung, with the type of mixed fish waste and waste processing from trash fish (fillet). Trial of grow out is carried out in floating net cages, Teluk Hurun, Teluk Pandan Subdistrict, Pesawaran District. The equipment used were, among other things, pelleting machines, large scales, digital scales, oven machines, feed printing machines, sieves, shovels, floating net cages, 18 units of 1 x 1 x 1.5 m3 net, feed container, spoon, and proximate analysis device. Materials used include catching waste (mixed trash fish), and fish processing wastes (trash residue). Silver pompano seeds, size 100 - 120 g, commercial artificial feed, multivitamins, adhesives, fresh water for fish immersion, and drugs.

 In this study using a completely randomized design with 3 treatments including treatment A: Artificial feed with raw materials from bycatch of fishing waste, treatment B : Artificial feed with raw materials from processing waste, and Control: Use commercial feed for silver pompano. All treatments were repeated 6 times. The trial of silver pompano grow out are carried out in floating net cages. Silver pompano seeds were obtained from BBPBL Lampung, with an initial size of 100 - 120 g. HDPE net was used for 18 units of 1 x 1 x 1.5 m3 floating net cages, and each net is equipped with 4 net weights at each corner. Trial during 60 days. The fish is first adapted to formula feed for 7 days, before the trial. Stocking density of 20 fish / m3. Feeding was carried out using pellets with a protein content of 37% with additional supplements. According to Jayakumar (2011), the use of artificial feed in silver pompano grow out has been carried out to replace trash feed which availability in nature has begun to decrease and compete with human consumptions.

 Parameters observed were absolute weight, daily growth rate, survival rate, feed convertion ratio, and protein retention, Body weight sampling and fish length measurements were carried out every 10 days. Feeding was done twice a day at 08.00 am and 14.00 pm, by ad satiation method. Measurements of water quality include temperature, dissolved oxygen (DO), pH and ammonia every 14 days. The data obtained were then analyzed by analysis of variance (Anova) at a 95% confidence level using SPSS 16. If the results of variance showed significantly different results (P <0.05), further testing using the Tukey test was performed.

RESULTS AND DISCUSSION

*Growth performance*

 The results of the study included parameters, initial weight, final weight, initial length, final length, relative growth, amount of feed consumption, survival, growth rate and feed conversion, can be seen in Table 1.

Table 1. Initial weight, final weight, initial length, final length, relative growth, amount of

 feed consumption, survival, growth rate and feed conversion

|  |  |
| --- | --- |
| **Parameter** | **Treatment** |
| **K** | **A** | **B** |
| Initial Weigh (g) | 106,39 | ± | 0,59 | 106,56 | ± | 0,25 | 107,61 | ± | 1,84 |
| **Final Weight (g)** | **212,25** | **±** | **2,05ᶜ** | **198,58** | **±** | **2,79ᵇ** | **188,83** | **±** | **0,38ᵃ** |
| Initial Lenght (cm) | 18,63 | ± | 0,39 | 18,48 | ± | 0,36 | 18,36 | ± | 0,29 |
| Final Lenght (cm) | 20,81 | ± | 1,00 | 20,63 | ± | 0,16 | 20,44 | ± | 0,01 |
| **Feeding Consumption (g/d/fish)** | **4,33** | **±** | **0,14ᵇ** | **4,00** | **±** | **0,18ᵃ** | **4,03** | **±** | **0,05ᵃ** |
| Survival Rate (%) | 100,00 | ± | 0,00 | 100,00 | ± | 0,00 | 100,00 | ± | 0,00 |
| **Daily Growth Rate**  | **1,16** | **±** | **0,03ᶜ** | **1,04** | **±** | **0,02ᵇ** | **0,94** | **±** | **0,03ᵃ** |
| **FCR** | **2,46** | **±** | **0,10ᵃ** | **2,60** | **±** | **0,05ᵃ** | **2,98** | **±** | **0,05ᵇ** |
| **Protein Retention** | **21,85** | **±** | **1,76ᵃ** | **20,56** | **±** | **2,27ᵃ** | **17,54** | **±** | **1,71ᵃ** |

Description: Different letters in the same line after the standard deviation number, show a marked

 difference in treatment (p <0.05)

 The highest average weight of silver pompano is 212.25 ± 2.05 g for Control, followed by 198.58 ± 2.79 g for treatment A and then 188.83 ± 0.38 g for treatment B.
Growth chart of silver pompano during trial, can be seen in Figure 1.

 Figure 1. Silver pompano growth chart.

 Description: (K=Control, A=Treatment A, B=Treatment B)

 Table 2. Water quality parameter values during research

|  |  |
| --- | --- |
| Date |  |
| Salinity (ppt) | Temperature (oC) | pH\*\*\* | DO (mg/l) | NO2 (mg/l) | NH3 (mg/l) | PO4 (mg/l) | TOM |
| Apr 10 | 32 | 29,9 | 8,79 | 4,97 | 0,088 | 0,168 | 0,558 | 37,29 |
| Apr 24 | 32 | 30,1 | 8,76 | 5,99 | 0,018 | 0,018 | 0,433 | 29,32 |
| May 8 | 32 | 29,9 | 8,6 | 6,01 | 0,101 | 0,526 | 0,628 | 25,47 |
| May 22 | 32 | 29,8 | 8,51 | 5,89 | 0,064 | 0,185 | 0,706 | 34,63 |
| Standart Quality | 30 – 34\* | Nature | 7-8,5\* | >4 | 0,05\*\* | 0,3\* |  |  |

 Source: \* Based on seawater quality standards for marine biota, Minister of

 Environment No. 51, 2004
                \*\* Marine Environmental Pollution Control, PP No. 24, 1991

*Discussion*
 Based on the Table 1 showed that after 60 days of rearing, the average weight of silver pompano, for Control, obtained the highest yield of 212.25 ± 2.05 g (C), followed by 198.58 ± 2.79 g ( A) and 188.83 ± 0.38 g (B). From the results of the Anova analysis and Tukey's advanced test, it showed a significant difference between Control and both treatments A and treatment B. As well as treatment A, also significantly difference from treatment B.

 According to Colloso (1999), feed is one of the most influential factors in a grow out finfish, the protein contained in feed must be in accordance with the needs of the fish to growth. Growth is the addition of body size in the form of length, weight and volume and the number of body cells which along with the increase in time. Factors that affect fish growth include genetic, sex, age, disease, parasites, food and water temperature.

 Protein requirements varied according to fish species, and utilization of feed protein for fish growth, was influenced by fish size, protein quality, feed energy content, nutrient content balance, and feeding rate. The protein content of feed geatly determines the price of feed, because most of the feed components are protein (Hajra, A, *et al*, 1988). From Figure 1, it also shows that in Control, has the highest growth compared to treatment A and treatment B. This is also indicated by data on the amount of feed consumption in the highest Control, amounting to 4.33 ± 0.14 g / day / fish , which was significantly different from treatment A (4.00 ± 0.18 g / day / fish) and treatment B (4.03 ± 0.05 g / day / fish), while the amount of feed consumption in treatment A was not different from the treatment B.

 The highest daily growth rate was obtained in Control, amounting to 1.16 ± 0.03, then treatment A (1.04 ± 0.02) and treatment B (0.94 ± 0.03). The Anova test results and Tukey's advanced test showed that the daily growth rate of Control was significantly different from treatment A and treatment B. Between treatment A and treatment B were also significantly different. According to Seneriches, M.L.M, *et al* (1988), factors that influence growth include age, and environmental conditions, including food. If the availability of feed is not met, the growth rate will be hampered.

 Protein retention describes the proportion of proteins stored as proteins in fish body tissues (Hajra, A. *et al*, 1988). The results showed that the protein retention value of the three treatments had no significant difference, with the results of the Control being 21.85 ± 1.76, then treatment A and treatment B of 20.56 ± 2.27 and 17.54 ± 1.71 . This is because the protein content of the three feeds is almost the same, so the amount of protein absorbed and utilized by fish is also relatively the same. The ability of fish to absorb and utilize proteins from feeds is directly proportional to the amount of feed consumed.

 The value of the feed conversion ratio (FCR), based on the Anova test, between Controls (2.46 ± 0.10) was not significantly different from treatment A (2.60 ± 0.05) and treatment B (2.98 ± 0.05) . However, between treatment A was significantly different from treatment B. Feed conversion was high, indicating the use of feed for growth was less efficient. Conversely, if the FCR value gets lower, then the feed can be declared capable of supporting growth (Hepher, 1988). FCR is the amount of feed given to fish to produce 1 kg of meat. The lower the FCR value, the better the quality of the feed.

 The survival of fish during testing, as in Table 1, shows the same value for each treatment, which is 100%. This shows that the fish feed given is sufficient to meet the basic needs of fish, and even provides good growth. High survival, because fish are able to survive from disease, because energy from feed suffers as well as good fish endurance.

CONCLUSIONS

 The average weight gain of silver pompano, for Control, obtained the highest yield of 212.25 ± 2.05 g (C), followed by 198.58 ± 2.79 g (A) and 188.83 ± 0.38 g (B ), it showed a significant difference between Control and both treatments A and treatment B. And between treatments A also significantly different from treatment B. The highest daily
growth rate was obtained in Control, amounting to 1.16 ± 0.03, then treatment A (1.04 ± 0.02) and treatment B (0.94 ± 0.03) it was significantly different from treatment A and treatment B. Between treatment A and treatment B were also significantly different. Feed
treatment A, with fish meal raw materials originating from waste bycatch from fishing, can be used as an alternative material to produce artificial feed as silver pompano feed.
These results can support efforts to reduce the amount of fisheries waste, so that the cleanliness of the coastal and marine areas can be better maintained. Advance study for utilization of fisheries waste for fish meal production should be undertaken in order to support formulated fish feed industry development in Indonesia.

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