



Production performance of bronze featherback (*Notopterus notopterus* Pallas, 1769) with different feed types

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Abstract. Bronze featherback (*Notopterus notopterus* Pallas, 1769) is one of Indonesia's endemic fish which has decreased in population, so it needs to be farmed, to take pressure off the wild population. The right type of feed is an important aspect of aquaculture activities because it determines success in cultivation. This study aims to determine the right type of feed for the cultivation of bronze featherback. This research was conducted from June to August 2019 in the fish pond of Sungai Geringging Village, Kampar Kiri District, Riau. The design used in this study is a completely random design with the treatment of different types of feed. The types of feed used are pellets + vitamin E, bycatch scrap meat (*Rasbora* spp., *Thynnichthys thynnoides*), and mussel meat (*Sinanodontia woodiana*). The results showed that the treatment of bycatch feed produced the best fish growth with absolute weight growth value of 6.98 g, absolute length growth of 11.48 cm, daily growth rate of 2.338%, with larval survival rate of 87% and a protein retention value of 19.8.

Key Words: bycatch, growth, knife fish, pellets.

Introduction. Bronze featherback (*Notopterus notopterus* Pallas, 1769) is one of Indonesia's endemic fish that has high economic value (Yulindra et al 2017). With a high-fat content, the bronze featherback has a delicious and distinctive taste (Sunarno 2002). In addition to the high-fat content, this fish also has high protein and vitamin A content. In Indonesia, bronze featherback is used as a raw material for making processed foods. The attractive body shape makes the bronze featherback also a preferred ornamental fish. Community needs for these fish are still obtained solely from catches in public waters, causing a decline in the population of bronze featherback in nature (Yulindra et al 2017). Aquaculture activities are suitable solutions to reduce the exploitation of fish from nature for human consumption (Benkendorff 2009; Anderson et al 2011). With the cultivation of bronze featherback, the community's need for these fish could be met and the pressure on the wild population will be reduced.

Feed management is an important part of fish farming (Ullman et al 2019). Feed optimization is important to ensure profitability (Reis et al 2019). The bronze featherback is a carnivorous fish (Shillewar & Nanware 2009) and carnivorous fish have a lower ability to utilize carbohydrates in the feed compared to herbivorous fish and omnivorous fish (NRC 2011). Based on the results of research on the intestinal content of bronze featherback, it is known that the bronze featherback in nature eats organic detritus, fish scales, insects, fish, shrimp, sand, and plant litter (Srivastava et al 2012). For the best aquaculture practices, the appropriate feed must be provided, which is essential for obtaining the best results. Therefore, this is the aim of this study, to research what feed type produces the best performances in the rearing of bronze featherback (*Notopterus notopterus*).

Material and Method

This research was carried out from June to August 2019 in the fish pond of Sungai Paku Village, Kampar Kiri District, Kampar Regency, and Riau Province (Figure 1). The feed treatments in the study of bronze featherback aquaculture technology were the following: pellets (min. 35% protein, min. 2% lipids, 2% crude fiber, 3% ash) + vitamin E (P1), bycatch scrap meat (*Rasbora* spp., *Thynnichthys thynnoides*) (P2) and mussel meat (*Sinanodonta woodiana* meat) (P3). The design used was a completely randomized design with 3 levels of treatment and 3 replications.

Fish were kept in a stocking density of 5 fish/cage. The cages were of 1 x 1 x 1 m and the fish were fed 3 times a day (morning, afternoon, and evening), at a dose of 5% per weight of fish biomass. Fish are measured in length and weight once every 10 days until the end of the 90 days experiment. Total lengths of fish were measured using graph paper and fish were weighed with the Shimadzu ELB600 precision scale with an accuracy of 0.05 g.

The determinations made in this study were: absolute weight growth, absolute length growth, specific growth rate (SGR), survival rate (SR) and protein retention. The following formulas were used:

$$\text{Absolute Weight Growth} = W_t - W_0$$

$$\text{Absolute Length Growth} = L_t - L_0$$

$$SGR = \frac{\ln W_t - \ln W_0}{t} \times 100\%$$

$$SR = \frac{nt}{n_0} \times 100\%$$

$$R = \frac{K - I}{P} \times 100\%$$

where:

- wt = fish weight at the end of the study
- w0 = fish weight at the beginning of the study
- Lt = fish length at the end of the study
- L0 = fish length at the beginning of the study
- t = time
- nt = number of fish at the end of the study
- n0 = number of fish at the beginning of the study
- R = protein retention
- K = Protein weight of fish at the end of the study
- I = Protein weight of fish at the beginning of the study
- P = given protein weight

The data obtained was tabulated and a statistical test was performed using the SPSS 16 application. The statistical test conducted was a homogeneity of variances test and one-way analysis of Variance (ANOVA). If the ANOVA test results show a significant difference ($p < 0.05$), and further tests are performed using the SNK test to determine differences between treatments.

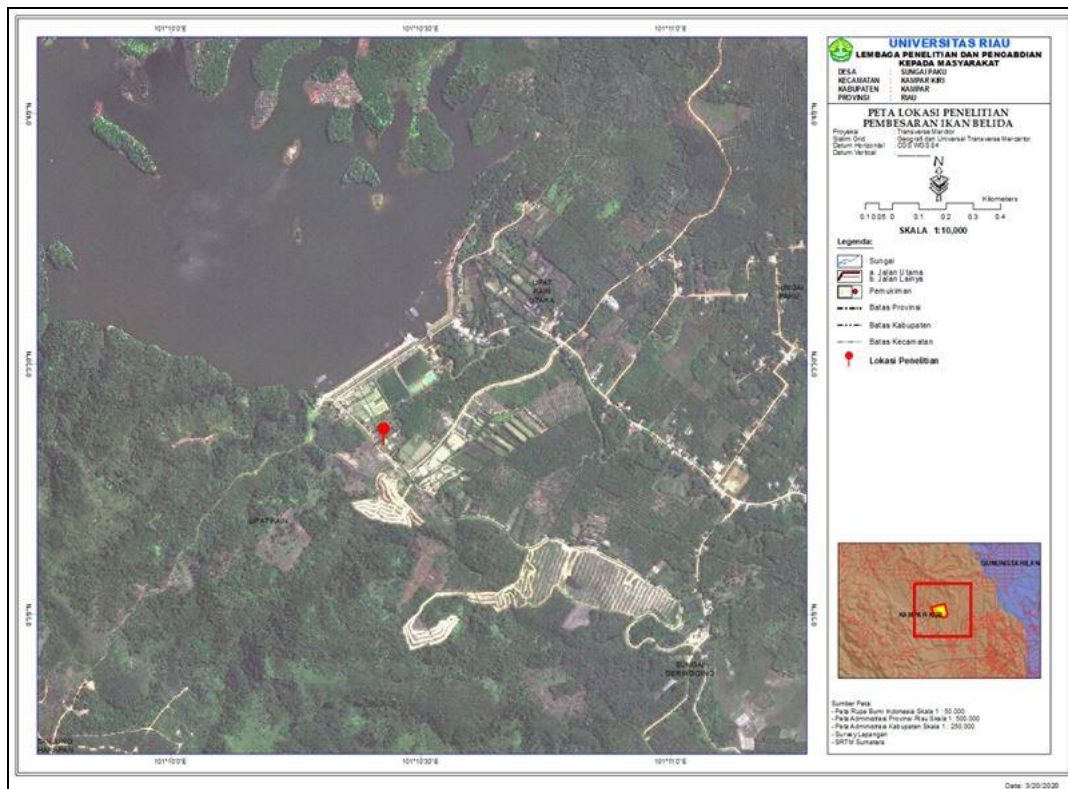


Figure 1. Research area.

Results

The growth in weight of bronze featherback is depicted in Figure 2 and graphs of the growth in length of bronze featherback are presented in Figure 3. The best value of growth in absolute weights is 49.73 grams in the feed treatment with bycatch scrap meat. This is caused that bronze featherback prefer the feed with bycatch scrap meat compared to the other two feeds used. The response of bronze featherback shows that it responds more quickly to the feed with bycatch scrap meat and consumes more of it than the other two feeds. Based on the results of statistical tests, the feed with bycatch scrap meat has a significant effect ($p < 0.01$) on the growth of the absolute weight of the bronze featherback. This is in accordance with the nature of bronze featherback in nature which shows more consumption of fish compared to other naturally available feeds (Srivastava et al 2012; Burnawi & Pamungkas 2016).

The absolute length growth value of bronze featherback reared with different feed types is presented in Figure 3. The highest absolute length growth value of bronze featherback was obtained using the feed with bycatch scrap meat, with a value of 11.48 cm. This is presumably because bronze featherback prefer to consume fish, compared to other feeds. Based on the statistical test results it is shown that the feed with bycatch scrap meat has a significant effect ($p < 0.01$) on the growth of the absolute length of bronze featherback. Based on previous research conducted by Kaur & Rawal (2017) the growth of bronze featherback is categorized with allometric growth so that the growth of the absolute weight of bronze featherback is directly proportional to the growth of the absolute length of bronze featherback. Samad et al (2017) obtained a length gain of *Notopterus chitala*, that are kept in polyculture with tilapia, of 16.5 cm in 6 months. The daily growth rate value of bronze featherback is presented in Figure 4. The value of the daily growth rate (SGR) of bronze featherback reared with different feed types shows that the highest value is in the case of the feed with bycatch scrap meat, with a value of 2.38%. Based on the results of the statistical tests it is shown that the treatment given has a significant effect ($p < 0.01$) on the SGR of bronze featherback. Daily growth rate of bronze featherback fish in this study (2.388%) was higher than in the study conducted

by Dewi et al (2019), in which bronze featherback were given different types of feed treatments, with an SGR value of 2.0%.

The survival value of bronze featherback from this study is presented in Figure 5. The value of survival rate (SR) of bronze featherback reared with different feed types shows that the highest value is in the case of the feed with bycatch scrap meat (P2) and pellet+vitamin E (P1), with a value of 87%. Based on the results of statistical tests it is shown that the treatment given has no significant effect ($p > 0.05$) on the survival rate of the fish. Bronze featherback species (*Notopterus chitala*) that are polyculture maintained with tilapia have a higher survival value of 100% (Samad et al 2017) and survival rate of Chitala bronze featherback (*Notopterus chitala*) larvae reach 98.50% (Hossain et al 2006).

The results of the analysis of the protein retention value of bronze featherback are presented in Figure 6. The highest protein retention value is in the case of the feed with bycatch scrap meat, with a value of 19.8%. Based on the results of statistical tests it is known that the treatment given has a significant effect ($p < 0.01$) on the value of protein retention of bronze featherback. Protein retention shows the amount of body protein increase related to the protein feed consumption (Ballestrazzi et al 1994). Furthermore, Wilson and Poe (1987) say that the amount of protein retention in addition to describing the presence of protein deposits in the body of fish, also describe the protein sparing effect of fats and carbohydrates as a provider of energy for daily activities.

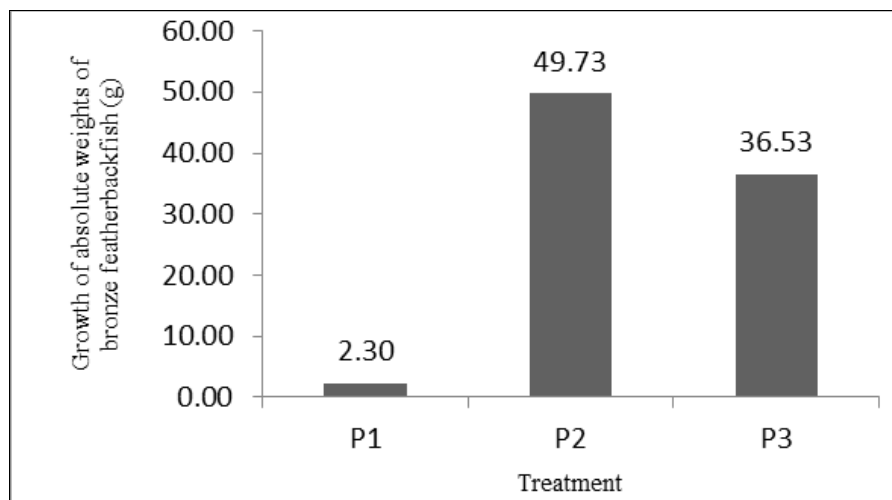


Figure 2. Growth of weight of bronze featherback during rearing.

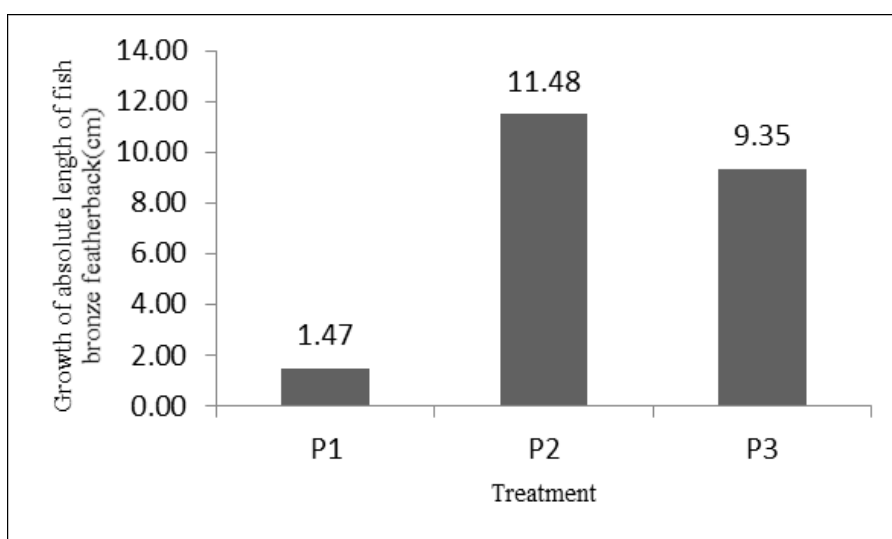


Figure 3. Growth of absolute lengths of bronze featherback

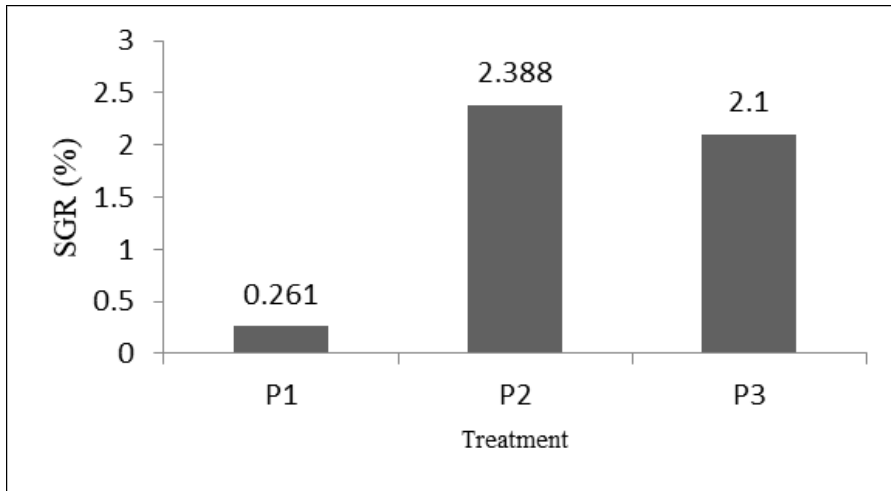


Figure 4. Daily growth rate of bronze featherback.

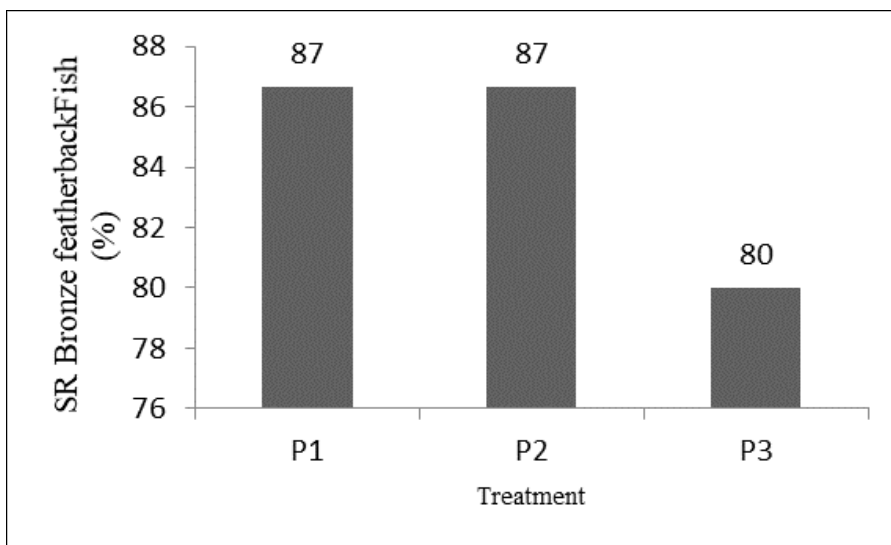


Figure 5. Survival rate of bronze featherback.

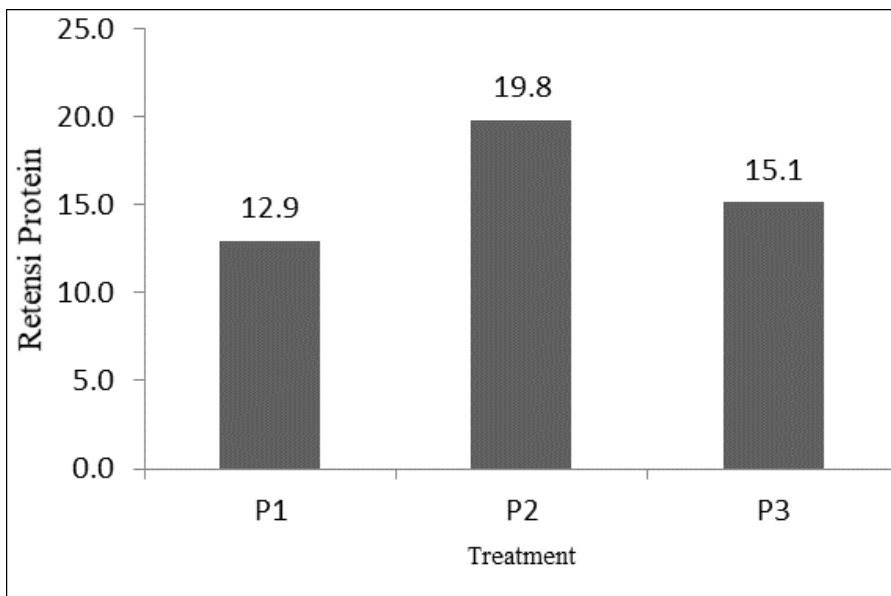


Figure 6. Protein retention of bronze featherback.

Conclusion. Based on the results of the research, it can be concluded that the type of feed affects the growth of bronze featherback in aquaculture activities. The best type of food for bronze featherback culture activities used in this study was bycatch scrap meat. So, it is advisable to provide bycatch scrap meat to bronze featherback in their growing process.

Acknowledgments. We thank the Ministry of Research and Technology, Indonesia for funding this research through the National Strategic research program.

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Received: 26 March 2020. Accepted: 23 April 2020. Published online: 09 August 2021.

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How to cite this article:

Sukendi, Thamrin, Putra R. M., Yulindra A., 2021 Production performance of bronze featherback (*Notopterus notopterus* Pallas, 1769) with different feed types. *AAFL Bioflux* 14(4):2086-2092.