Bonylip Barb Fish Fingerlings Cultivation (*Osteochilus hasselti* C.V.) in a Growing Round Container

Santika Ahmad[1*], Ibnu Bangkit[1], Iskandara[1] and Izza Mahdiana Apriliani[1]

[1]*Department of Fisheries, Faculty of Marines and Fisheries, University of Padjadjaran, Jl. Raya Bandung–Sumedang Km 21, Jatinangor 40600, Indonesia.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This research was purposed is to find the optimum current for growth and growth of Bonylip Barb fingerlings (Osteochilus hasselti C.V). Method used in this research is compelitely Randomized Design (CRD), consists of three treatments and four replications. The treatments are : A (without current or (control), B (with 0.1 ms-1 water current) and C. (0.1 ms-1 water current cabined with venture aeration). Bonylip Barb of 4 – 6 cm size are kept as many as 15 fish / x Liters and the amount of feed given is adjusted to the feeding rate (FR) of 10 % of Bonylip Barb biomass carried out every three times a day and adjusted for growth every ten days. Water quality during maintenance (40 days) was observed once every 10 days while survival, absolute weight growth, daily growth rate, feed conversion ratio and feed efficiency were observed every ten days. After 40 days of maintenance, the best result showed 0.1 ms-1, with 100% survival rate , 6.09 g absolute growth, 3.13% specific growth rate , 3.48% feed conversion ratio was , and 30.04%. feed efficiency.

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Corresponding author: Email: santika.ahmad198@gmail.com;

1. INTRODUCTION

Bonylip Barb *(Osteochilus hasselti)* is an Indonesia endemic (native) fish that live in fresh waters, such as rivers and swamps. The characteristics of Bonylip Barb almost similar to the goldfish, such as the corners of its mouth which has two pairs antennae that serve as the sense of touch. The tip of a pointed-shaped mouth snout (rostral) folded. This fish is quite popular because of its delicious meat, chewy and savory and the thorns are less than Tawes fish [1]

The market prospects for nilem fish are sufficient broad, not only in the local market, however has also been able to penetrate the market international. Demand for size 5 Bonylip Barb fish seeds gram is high enough because it is intended as a substitute for goldfish for dry "baby fish". Bonylip Barb fish seeds aged 1 days can be sold per cup (generally contains 30,000) at a price reaches IDR 12,000.00 [2]

Bonylip Barb fish farming has a good advantage both economically and environmental sustainability. These fish include economically valuable fish. Nilem is very vogue especially in the area of West Java. Nilem is a fish which consumes algae hence it is classified as herbivores.

According [3], when the water flows too low, it will reduce the production of fish due to reduced oxygen content in the water and metabolic waste and impurities in the water is not immediately wasted. The water flow is too torrential will hamper the growth because most of the energy will be used to maintain the position of the fish so it will not carried away by the current.

In addition, according [4], water currents affect the distribution of water quality parameters. Water movement can be one factors that determine the survival and growth of fish. Movement water is able to provide environmental changes experienced by the fish. Presence movement of water will result in the distribution of environmental factors such as temperature, oxygen, carbon dioxide and others become more prevalent, even penyerbaran food was also uneven.

There are several kinds of containers used for the cultivation of fish for instance; the aquarium, pond soil, cement tanks, tarpaulin pool, bath fiberglass with diverse sizes According [5]. One pool that becomes Aquaculture is an option in the round-shaped pool. circular pool suitable to be applied in all cultivation of fish,. Where the current rotation for a good cause the fish will swim without bumping into the pool, because the circular pool is not have a corner. In addition, the circular pool will prevent the occurrence of dead water in any part of the pool. In contrast to the pool square, the possibility of water bodies especially high at the corners of the pool.

2. MATERIALS AND METHODS

This research was conducted at the PSDKU Fisheries Laboratory Building, Faculty Fisheries and Marine Sciences, Padjadjaran University from July to December 2019. The instrument used was a gallon measuring 19 L, diameter 27.5 cm,water level 34 cm weight 700 g, height 48.5 cm. The material used is 180 Bonylip Barb fish with a size of 4-6 cm, and granular commercial fish feed

The experimental design carried out in this research was a Completely Randomized Design (CRD) consisting of Three treatments and four replications, namely:

Treatment A: Treatment (Control)
Treatment B: Treatment Provision 0.1 current 0.1 ms^{-1} on round container
Treatment C: Treatment of the current administration of 0.1 ms^{-1} combined with venturi.

2.1 Data Analysis

The data used were analysis of variance (ANOVA) with the F test at a 95% confidence interval, which was used to determine whether the treatment had a significant effect on the survival rate, absolute weight growth rate, feed conversion ratio and feed efficiency. If the treatment has a significant effect, then a further test is carried out with the Duncan test, while the water quality data is analyzed descriptively.

2.2 Units

The Bonylip Barb fingerlings that will be treated are acclimatized for 7 days in a fiber container which was given aeration and commercial feed. There were 15 fish kept in the container equipped with aeration. Feeding was carried out three a day, namely in the morning at 08.00 West Indonesia Time , daytime at12.00 West Indonesia and Time late in the evening at 17.00 West Indonesia Time using a mix of test feed

which was 10% of fish biomass, The siphoning was done every day and the water volume is replaced by 10% to maintain water quality during rearing. Bonylip Barb fish was reared for 40 days.

2.3 Experimental Methodology

Bonylip Barb fish fingerlings were kept in an gallons as a rearing container with a density of 15 fish/L. Fish were weighed once every 10 days to get the value of survival rate, absolute growth, specific growth rate, feed conversion ratio, feed efficiency. Measurement of water quality in Bonylip Barb habitat such as temperature, DO (Dissolved oxygen) and pH was done every 10 days to maintain the environment of the fish according to the standard values required for the fish to live.

Observed parameters include:

a. The Degree of Survival Mathematical Formulas

The survival rate of test animals can be determined by using formula according [6]

$$SR = \frac{Nt}{No} \times 100\ \%$$

Information:

SR: Degree of Survival (%)
Nt: Number of living fish at the end of treatment (individual)
No: The number of fish at the beginning of treatment (individual)

b. Weight Absolute Growth Mathematical Formulas

Calculation of absolute weight growth is done using the [7]

$$G = Wt - W_0$$

Information:

G: Growth absolute weights
W_0: Weight average at the beginning of the research (g)
Wt: The average weight of the fish at the end of the study (g)

c. Daily Growth Rate Mathematical Formulas

Daily growth rate measurement using formula [6]

$$LPH = \frac{InWt - InWo}{t} \times 100\ \%$$

Information:

LPH: Daily Growth Rate of weights
Wt: Average weight at the end of treatment (t-day)
Wo: Average weight of initial treatment (day 0)
T: Observation Duration (days)

d. Feed Conversion Ratio Mathematical Formulas

Conversion of feed calculated using the formula [8]

$$FCR = \frac{F}{(Wt + D) - Wo}$$

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Information:

FCR: Food Conversion Ratio / Feed conversion ratio
F: The amount of feed given (g)
Wt: Weight of test fish at the end of the study (g)
D: The weight of dead fish (g)
Wo: Weight of test fish at the beginning of the research (g).

e. Effeciency of Feeding Mathematical Formulas

Calculate feed efficiency with the formula [9]

$$EP = \frac{(Wt + D) - Wo}{} \times 100\ \%$$

Information:

EP: Efficiency of Feeding
Wt: Biomass at the end (g)
Wo: Biomass at the beginning (g)
D: Bonylip Barb biomass that died during the research (g)
F: Amount of feed given during the research (g)

2.4 Water Quality

The parameters observed were water quality (Thermometer, Dissolved Oxygen, pH and Ammonia), survival rate, absolute weight growth, daily growth rate, feed conversion ratio and feed efficiency. The data obtained were analyzed using analysis of variance (ANOVA) with the F test at a 95% confidence interval, which was used to determine whether the treatment had a

real effect or not. If the treatment has a significant effect, then a further test with the Duncan test was conducted, while the water quality data were analyzed descriptively.

3. RESULTS AND DISCUSSION

3.1 Water Quality

Water as the medium of fish life must qualify the parameters that suitable for fish life because water quality can influence the growth. The results of average water quality measurements can be seen in Table 1. Based on the measurement results, the temperature range in gallons treatment was between 26,45 – 28, 35 ℃, this range is still within the range of the standard quality temperature according to [10] for Bonylip Barb fish, which is 18-28 ℃. The temperature affects the response of fish to feed. The optimum water temperature in the rearing media can make the fish's response to feed optimum. However, if the temperature is less or more than the optimum temperature range.

Dissolved oxygen content shown in Table 1. DO values do not have significant differences between treatment A and B because the bubbles generated through aeration was quite large in treatment A as compared to treatment B . Low

DO can endanger fish life because oxygen is a vital need for every living thing. But during experimental period, there is no sign of low dissolved oxygen. The content of dissolved oxygen in both treatment was range from 5,78 - 7, 6 mg / L. It indicates that these values are within the optimum range accounting to [11] which is >3 mg / L. This shows that the fish's need for dissolved oxygen was fulfilled during the research.

The degree of acidity (pH) of water in the rearing gallons ranges from 6,5 - 8,6. pH of water in the gallons is suitable for Bonylip Barb culture, the standard quality limit Bonylip Barb pH is 6.7 - 8.6 as recommended by [10] . Based on tabel 1, it can be seen that the pH shows the results are changing stable every week.
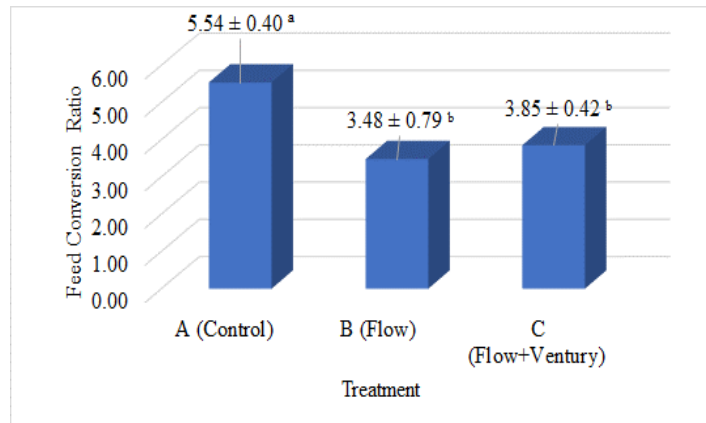
3.2 Survival Rate

The results carried out for 40 days of maintenance,highest survival of 100% in treatments B and C, the lowest survival rate occurred in treatment A that is 46.75%. The results of the further test were significantly different showing that treatment A was significantly different from treatment B (current) and C, treatment B was not significantly different from treatment C. (Fig. 1)

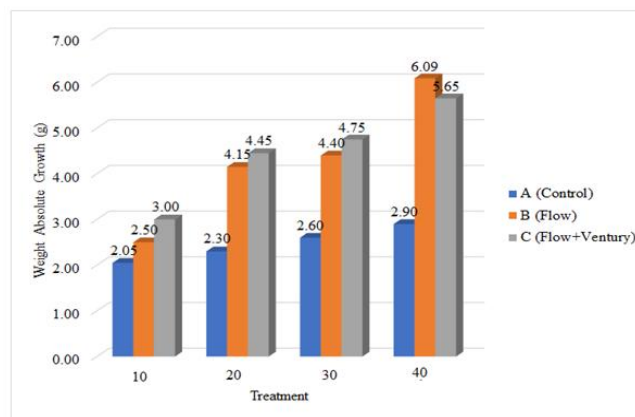**Table 1. Water Quality Measurement Result**

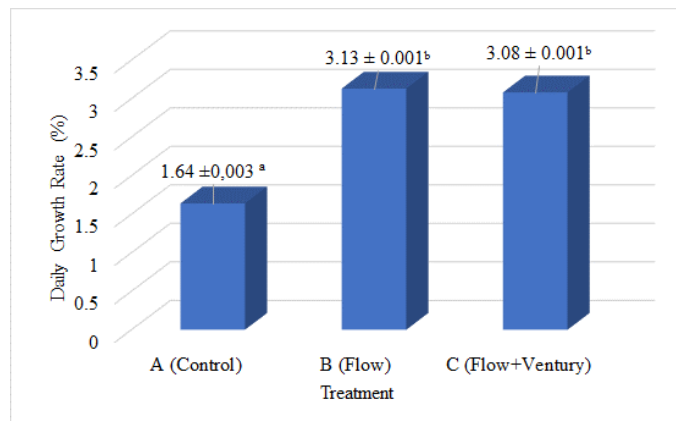| Parameter	Temperature	pH	DO (mg/L)
A (control)	26,45 - 28,35	8	5,78 – 6,90
B (Water Current)	26,1 - 26,3	6,5 - 7,7	7,1 – 7,3
C (Water Current + venturi)	26,1 - 26,4	7 - 7,8	7,4 – 7,6
Quality Standards	18-28° C*	6,7-8,6*	>3**
Source	[10]	[10]	[11]
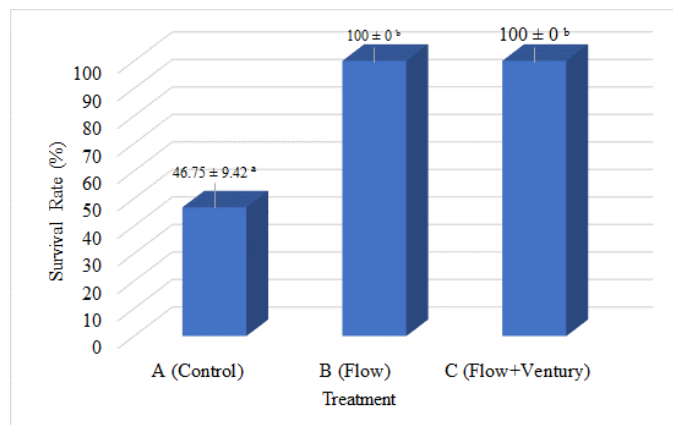
Fig. 1. Survival Rate Graphic

Fig. 2. Feed Conversion Ratio (FCR) Graphic

Fig. 3. Weight Absolute Growth Graphic

Fig. 4. Daily Growth Rate Graphic

Based on observations in 40 days, the highest survival rate was observed in treatment B and C and the lowest survival rate occurred in treatment A (control) of 46.75%.

3.3 Feed Conversion Ratio (FCR)

According to [12], Feed conversion was a comparison between the amount of feed given

and the amount of weight produced. FCR calculation results can be seen in Fig. 2.

Feed conversion ratio (FCR) of all treatment result depicted in Fig. 4. It has been observed that, there is no significant difference between treatment B and C at 5% significant level whereas significantly difference between treatment A and C and A and B. The lower FCR was observed in treatment B (flow) of 3.48. This means that to produce 1 g of meat requires 2.01 g of feed. That was, the more efficient the feed was turned into the meat [7].[13] states that the lower the value of feed conversion, the better because the amount of feed spent to produce a certain weight was small.

Thus the feed it has reasonably good qualities, as the feed given can actually be used by the fish for its maxsimum weight.

3.4 Weight Absolute Growth

The growth rate was the absolute growth difference that was measured based on the time sequence according to [14]. The observation of the growth of the absolute weight of fish seed Bonylip Barb Salama conducted 40 days of each treatment showed outgrowth absolute weight as shown in Fig. 3.

Based on observations of current treatment administration and ungiven current has an absolute growth during maintenance treatment B (Flow) has the greatest absolute growth sample followed by treatment C (Current), whereas treatment A (control) had the most absolute growth rate small. On the measurement of the absolute growth in the first ten days weighted average A value of the treatment was 2.05 g whereby this figure was the lowest reading compared two other treatments and the highest reaching 6.09 g for treatment B.

40 the average growth rate A treatment was the smallest at 2.9 g then respectively - participated in follow C treatment (venturi) at 5.65 g and the highest weight in treatment B (stream) reaching 6.09 g.

3.5 Daily Growth Rate

The daily growth was the percentage increase in growth each time interval [15]. The daily growth rate value of Bonylip barb fingerlings can be seen in Fig. 4.

Daily growth (LPH) of Bonylip Barb fish during maintenance the highest value in treatment B with a value of 3.13%. The result of further test, the smallest significant difference, is 5% level, it shows that treatment A is significantly different from treatment B and C, treatment B is not significantly different from treatment C.

3.6 Efficiency of Feeding

Average feed efficiency of fish seed Bonylip Barb fish during the study can be seen in Fig. 5. The result of variance analysis showed that treatment feeding rate provides highly significant effect ($P < 0.05$) on efficiency of fry feed to Bonylip Barb fish. The LSD also noted that treatment A (18.14%) had highly significant with other treatments, whereas treatment B (30.04) is not significantly different from the C (26.23%). The greater the value of feed efficiency, means the more efficient the fish used the food consumed for its growth [16].

Higher feed efficiency in treatment B and C in the suspect because of feed given more utilized by fish, this is due to feed spread evenly by current and not at a point that does not happen ompetition among fish. In addition, the consumption of dissolved oxygen (DO) affect fish
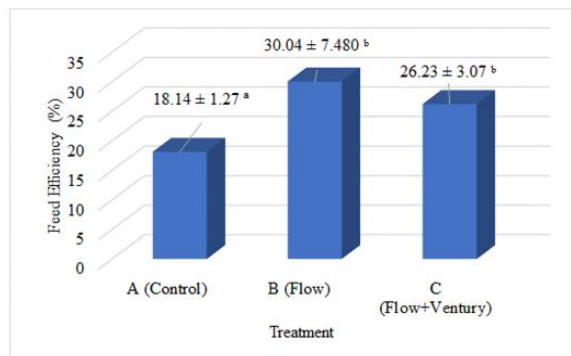

Fig. 5. Feed Efficiency Graphic

fast metabolism for growth, so that the fish more utilize the feed better. Feed efficiency value is also inversely proportional to the value of FCR in maintenance media.[17] states that the level of efficiency of use of the feed is best to be reached at a value lowest feed conversion calculations, which in the treatment of conditions feed quality better than other treatments.

4. CONCLUSIONS

The conclusion of this research was the 0.1 ms-1 water current combined with venture aeration at round container give 100% survival rate on fish seed Bonylip Barb , 6.09 g absolute weight growth, specific growth rate was 3.13 g, feed conversion ratio was 3.48%, and feed efficiency was 30.04%.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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