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Effects of *Moina* sp. [Straus, 1820] adding of Snail Flour to Increase the Larvae performance of Jelawat Fish (*Leptobarbus hoevenii* [Bleeker, 1851])

Muhammad Browijoyo Santanumurti¹, Jafar Sidik², Berta Putri³, Siti Hudaidah³

¹Department of Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya 60115 Indonesia

²Aquaculture Program, Faculty of Agriculture, University of Lampung, Jl. Prof. Sumantri Brojonegoro, Bandar Lampung, Lampung 35141, Indonesia

³Department of Fisheries and Marine Science, Faculty of Agriculture, University of Lampung, Jl. Prof. Sumantri Brojonegoro, Bandar Lampung, Lampung 35141, Indonesia

³Corresponding author: idahasan64@gmail.com

Abstract. Enrichment is the process of adding an ingredient aiming to compliment and increase the nutrient feed. Potential snail flour served as a media enriched in *Moina* sp. because it has a high nutrient content. The objective of the study was to assess the provision of *Moina* sp. enriched with golden snail flour to the growth and survival of larvae of jelawat fish (*Leptobarbus hoevenii*). This research was conducted at Sungai Gelam Freshwater Aquaculture Center, Jambi and Faculty of Agriculture, University of Lampung. The research design was a complete randomized design (RAL) with 4 different treatments of golden snail flour doses, namely A (control), B (4 g/l), C (8 g/l), D (12 g/l), with 3 repetitions. Data absolute length growth, absolute weight growth, and survival rate were analyzed using the Anova test and continued with the BNT test. The results showed that the application of *Moina* sp enriched with golden snail meal 4 g/l and 8 g/l had a significant effect on long growth and weight but had no significant effect on the survival rate of jelawat fish.

1. Introduction

Jelawat fish or *Leptobarbus hoevenii* (Bleeker, 1851) is a consumption fish that has economic value from Indonesia [1]. The potential for jelawat fish aquaculture can encourage export activities and have good prospects in the future to meet market needs. However, the activity of jelawat fish aquaculture is still constrained by availability [2]. This is because jelawat fish have not been cultured intensively and depend on catches in nature so that their presence is decreasing [3]. The availability of quality jelawat fish seed is also still difficult to obtain and its survival is very low. Therefore, there is a need for the availability of quality seeds so that they are able to support aquaculture activities. One of the efforts to improve seed quality is by adding nutrients or enrichment to natural feed which is used as the first feed for jelawat fish seeds. Enrichment can be done by adding useful nutrients to increase and accelerate growth (Wisnu, 2007). *Moina* sp. is one type of zooplankton commonly used as natural food for freshwater fish larvae. This organism has a complete nutritional content and is easy to digest. To optimize the rearing of fish larvae, natural feed *Moina* sp. enriched with supplements. One supplement that can be added is snail flour. The results of the proximate test on snail flour obtained the nutritional content of crude protein (PK) 46.2% metabolic energy (ME) 1920



kcal/kg, calcium (CA) 2.9% and phosphorus (P) 0.35% [5]. Based on this, gold snail flour has the potential as an enrichment material in natural feed to increase the nutritional value contained in it in order to increase the growth and survival of jelawat fish larvae.

2. Material and methods

2.1. Sample preparation

The materials used were jelawat fish larvae, snail flour and *Moina* sp. Jelawat fish larvae used in this study were 1-3 cm in size and were obtained from the Faculty of Agriculture, University of Lampung. *Moina* sp. and the snail flour used came from the Faculty of Agriculture, University of Lampung. The design used was a Completely Randomized Design (CRD), consisting of 4 treatments with 3 replications. The treatment used in this study was A (control), A (4 g/l), B (8 g/l) and C (12 g/l). The stocking density of jelawat fish larvae was 4 fish/liter. The amount of feed given was 60 ind/fish larvae with feeding 4 times a day and maintenance was carried out for 15 days.

2.2 Research parameter calculation

Observations of proximate analysis, survival rate, growth length and weight were carried out at the beginning and end of the study. Weighing of the test fish was carried out every 10 days using a measuring instrument in the form of a scale. According to previous study, the formula for calculating the weight gain of the test fish was as follows [6]:

$$W = W_t - W_o$$

W : Weight growth (gram)

W_t : Final average weight (gram)

W_o : Initial average weight (gram)

Absolute length measurements were carried out every 10 days. The absolute length growth according to previous study formula was as follows [6]:

$$P = P_t - P_o$$

P : Absolute length growth (cm)

P_t : Final length (cm)

P_o : Initial length (cm)

The number of dead fish was counted every day until the end of the study. According to previous study the survival rate of fish was calculated using the formula [6]:

$$SR = \frac{N_t}{N_o} \times 100\%$$

SR : Survival rate (%)

N_t : Final number of fish (fishes)

N_o : Initial number of fish (fishes)

Parameters observed and measured were temperature, pH, and DO. Water quality measurements (temperature, pH and DO) were carried out once every day for 15 days of maintenance. Growth in length and weight was processed using analysis of variance (Anova) to determine the effect of giving golden snail flour on the enrichment of *Moina* sp. and data covering fish survival and growth. If there was a difference between treatments, then proceed with the BNT test at a 95% confidence interval. Meanwhile, water quality was analyzed descriptively.

3. Result and discussion

Proximate test was used to determine the percentage of nutrients in a feed based on its chemical properties, including water content, protein, fat, fiber, carbohydrates and ash. Proximate analysis could also be used to determine the quality of a feed. Snails flour could be used as an alternative feed for farmed animals by giving them directly or by processing them into flour as a substitute for fish meal. In this study, snails were processed into flour which was used as a nutrient enrichment ingredient in *Moina* sp. and as enrichment than given to the jelawat fish larvae. Enrichment aimed to increase the content in an ingredient and was expected to give a better impact to complement and add nutritional value content of *Moina* sp.

The proximate test results showed that the snail flour used had a protein content of 55%. Proximate test results also indicated that there was an increase in the nutritional content of *Moina* sp., especially in the value of the protein content. The proximate test results ranged from 58.82 to 65.78%. The protein content of *Moina* sp with the addition of golden snail flour as an enrichment material had increased. This was because snail flour had high protein and increased the nutritional content of *Moina* sp [5].

Table 1. Proximate analysis of the treatments in this study

No.	Parameter	Percentage (%)			
		Protein	Fat	Crude	Ash
1	Snail flour	55.21	3.00	1.91	10.48
2	A (Control)	58.82	14.28	2.98	4.62
3	B (4 g/l)	65.79	21.72	3.78	5.39
4	C (8 g/l)	64.51	20.25	3.13	5.78
5	D (12 g/l)	59.25	14.48	3.26	4.77

Parameters of the length, absolute weight and survival rate of jelawat fish larvae are presented in (Table 2)

Table 2. Parameters of the length, absolute weight and survival rate of jelawat fish larvae in this study

Treatments	Length (mm)	Weight (mg)	Survival Rates (%)
A	5.30±0.103 ^a	14.80±0.954 ^a	86.67±2.89 ^a
B	8.80±0.240 ^b	19.65±0.472 ^c	93.33±2.89 ^a
C	8.44±0.263 ^b	17.57±0.929 ^b	91.67±5.77 ^a
D	5.99±0.273 ^a	15.10±0.755 ^a	85.00±5.00 ^a

The absolute length growth of jelawat fish larvae based on (Table 2) obtained the absolute length results in the study ranging from 0.53 to 0.88 cm. Analysis of variance (Anova) showed that the length growth of jelawat fish larvae was significantly different between treatments ($P < 0.05$). Based on the results of the BNT test, the results of treatment A (control) were significantly different from treatment B (4 g/l) and C (8 g/l) but were not significantly different from treatment D (12 g/l), in treatment B (4 g/l) was not significantly different from treatment C (8 g/l) but significantly different from treatment A (control) and treatment D (12 g/l). The highest length growth was found in treatment B (4 g/l) and treatment C (8 g/l) because the results of the analytical test were not

significantly different while the lowest growth was in treatment D (12 g/l) and treatment A (control). Treatments B and C had the highest length growth due to the absorbed nutrient content which was not much different between the two.

Giving *Moina* sp. enriched using golden snail flour had an effect on the length growth of jelawat fish larvae. However, the difference in results between treatments was due to the nutritional content of *Moina* sp. so that it did not meet the optimal needs for the growth of jelawat fish larvae. The availability of feed that had high nutrition can increase fish growth and less than optimal growth if nutrient intake was low or lacking [7]. High nutritional feed was also needed by larvae for the development of simple organs [6].

Moina sp. has a fairly high nutritional content and good digestibility. However, from the results of this research, the content was not sufficient for the needs of jelawat fish larvae. This was caused by *Moina* sp. characteristic that was planktonic and move actively making it difficult for larvae to eat them [8]. The length growth of jelawat fish larvae was influenced by the nutrient content in the feed and the ability of the larvae to digest and absorb feed nutrients. Accordance with the previous study which stated that the quality of feed was not only determined by the high nutritional content but also determined by the ability of the fish to digest and absorb food [9].

The absolute weight growth of jelawat fish larvae based on Table 2 obtained showed that fluctuated between treatments. The absolute weight growth in this study ranged from 14.80-19.65 mg. Analysis of variance (Anova) showed the absolute weight growth of jelawat fish larvae was significantly different between treatments ($P < 0.05$). Based on the results of the BNT test, it was found that in treatments A (control), B (4 g/l), C (8 g/l) and D (12 g/l) there were significant differences between treatments. However, treatment A (control) was not significantly different from treatment D (12 g/l). The highest weight growth of jelawat fish larvae was in treatment B (4 g/l) of 19.65 mg and the lowest was in treatment A (control) of 14.80 mg. Giving *Moina* sp. enriched with snail flour had an effect on the weight growth of jelawat fish larvae. Each treatment had an increase in weight growth but significantly different from each other were treatments B (4 g/l) and C (8 g/l) with the highest weight growth in treatment B (4 g/l).

In this study, there was a difference in fish weight which was in line with the nutritional content of *Moina* sp. Thus the nutrients contained in the snail flour could be absorbed by *Moina* sp which could then be utilized by the larvae for growth. According to previous study protein and fat were nutritional components needed by fish larvae. Protein functions as an energy source, repaired or maintained body tissues and promoted growth [10].

However, the feed consumed would undergo a metabolic process, some of the digested feed would be absorbed as energy for metabolism, movement activities and the rest would be used for growth. Meanwhile, feed that was digested but not absorbed would be excreted as feces. The amount of energy used also affected the weight growth of fish larvae such as movement, digestion, nutrient storage and other metabolism, so that the energy used for weight growth was relatively smaller [11]. Changes in fish weight could result from changes in energy allocation which resulted in different fish weight even though the length was the same [12].

The survival of fish larvae is the ratio of the number of fish that live at the end of rearing with the ratio of the number of fish stocked at the beginning of rearing. Based on the results of the study which were presented in Table 2. The survival rate of jelawat fish larvae ranges of 85.00-93.33%. Based on the results of the ANOVA test ($\alpha = 0.05$) showed that the feeding of *Moina* sp. enriched with snail flour had no effect on the survival of jelawat fish larvae. Survival rates could be influenced by various factors, factors that affected fish survival include external and internal factors. External factors included all environmental conditions in which fish live and grow, including physics, chemistry and aquatic biology. Factors that affected survival rate were the environment and the quantity of feed to maintain body vitality [13]. Survival could be affected by appropriate food intake so as to increased body resistance which would have an impact on increasing the survival rate of fish supported by optimal water quality management. Internal factors were factors that came from the fish itself, including body resistance or

immunity (Putra and Sukendi, 2005). Added another factor that affected the survival of fish was the age of the fish [6]. The age of the fish was related to the feed it consumed, especially at the larval stage. The larval phase was a critical stage in the life cycle of fish, so that the appropriate feed would affect the survival of the larvae.

Table 3. Water quality parameters of jelawat fish larvae in this study

Parameter	Value	Optimum value
Temperature (°C)	26-29	25-32*
pH	6.98-7.57	6 -7.5*
DO (mg/l)	3.51-6.33	3-7**

Source: [11]
[15]

Measurement of water quality in rearing jelawat fish larvae showed that the temperature was 26-29°C, pH was 6.98-7.77, and dissolved oxygen was 3.51-6.33 mg/l. Observation of water quality in showed that all parameters were still within tolerance limits. Based on research data, water quality during maintenance was still in the optimal range for jelawat fish larvae.

4. Conclusion

The results showed that the application of *Moina* sp enriched with golden snail meal 4 g/l and 8 g/l had a significant effect on long growth and weight but had no significant effect on the survival rate of jelawat fish..

5. References

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