



The Utilization of *Chlorella* sp. in Feed to Growth Performance of Gouramy (*Osphronemus gouramy.Lac*) Grower Phase

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KeyWords

Absolute Growth Rate, Feed Conversion Ratio, Gouramy, *Chlorella* sp.

ABSTRACT

*This study aims to determine the optimal doses of *Chlorella* sp. meal into the feed which results in a high growth rate in the gouramy grower phase. The study was conducted in January until March 2018 (40 days) at Production Hall of Gouramy and Nile Stockpip (BPPSIGN) Singaparna-Tasikmalaya. This study used the Completely Random Design (CRD) method, consisting of four treatments and four replications, namely commercial feeding (control), *Chlorella* sp. 1%, 2% and 3%. Parameters observed were feed conversion ratio, absolute growth and water quality. The feed conversion ratio and absolute growth data were analysed using variance analysis (ANOVA), while the quality of water was analysed descriptively by comparing it to the water quality standard SNI 2006. The results showed the best treatment was achieved within the dose 3% *Chlorella* sp in feed, which result feed conversion ratio of 2,85, absolute growth 44,66 gram and water quality parameters between 25,95-27°C, pH between 6,15-6,54 and Dissolved Oxygen (DO) between 5,16-5,96 mg/L.*

INTRODUCTION

Giant gouramy (*Osphronemus gourami*.Lac) is one of the original fish of Indonesian waters. Giant gouramy is also much favored by Indonesian, because it has a very savory, delicious taste and has a high economic value (Ricky 2008). Based on the statistics of Marine Affairs and Fisheries Ministry, carp production in 2015 was increased, the first quarter was 22,863 tons, the second quarter was 24,121 tons and the third quarter was 29.922 tons (Ministry of Marine Affairs and Fisheries 2015).

Giant gouramy is a type of fish that has a slow growth, one of which is the change of digestion performance when the fry phase has carnivorous character (detritus feeder), the fermentation phase of omnivorous character (detritus and foliage feeder) and the grower phases with herbivorous character (green foliage feeder) impact to slower growth (Kusumah 2010). It is presumed that giant gouramy has a short intestine compared with herbivorous fish in general, so the process of digestion and absorption of food in the intestine becomes less effective due to less absorption surface area of digestive essence (Kordi 2011). According to Bambang (2010), growth barriers of giant gouramy can be overcome by the provision of quality feed in sufficient quantities. In the fish cultivation, feed is one of some important factor that affects the survival and growth of aquaculture commodities. Fish cultivation is strongly influenced by the availability of adequate feed in quantity and quality to achieve the expected result. The feeding factor determines the cost of production to reach 60-70% in fish farming, so it needs effective and efficient management. One of the efforts to obtain optimal growth is with the addition of extra feed which has good quality and appropriate with the needs of fish (Handajani 2011).

An addition feed is a mixture of very high feed content of one food substance, useful as extra nutrients to support the fish growth to be bigger faster (Kusumah 2010). An addition feed is good for the carp growth and does not inhibit carp digestion, one of them is *Chlorella* sp. (Elrifadah 2013). *Chlorella* sp. is a Chlorophyceace type of phytoplankton used as a natural feed in the phases of hatchery and fish enlargement through zooplankton (Chilmawati and Suminto 2008). Natural food of fish derived from microalgae *Chlorella* sp. can accelerate fish growth, because *Chlorella* sp. has a high nutrient content and easily digested, it can also increase fish weight and increase endurance so that carp can have a better life and more able to survive from death. An addition feed given of *Chlorella* sp., is not only for giant gouramy, it can be given as well for milk fish, indigo, mas, shrimp, shellfish, and koi fish (Gusrina 2011).

This study aims to determine the optimal amount of *Chlorella* sp. meal addition into the feed which produced high growth rate in the carp enlargement phase.

METHOD OF RESEARCH

Place and Time of Research

The research has been conducted in Production Hall of Gurami and Nilem Fish Stockpipers (BPPSIGN) Singaparna-Tasikmalaya from January to March 2018. The tools used in this research are fish pond size 8m x 4.5m, fish net size 1m x 1m x 1m as many as 16 ponds, analytical scales of pocket scale brand with accuracy of 0.01 grams of 1 piece, drain 1 piece, 16 pieces plastics, 3 pieces small bowl, 3 pieces small count, millimeter block with 1 mm accuracy of 1 piece, mercury thermometer with a precision of 0.1^oC, pH meter brand Hanna Instruments (USA), DO meter of LT Lutron DO 5590 with 0.1 mg/L and the pellet machine.

Ingredient and Method

Materials used included *Chlorella* sp. commercial brand powder NOW Food Certified Organic *Chlorella* Pure Powder Broken cell 4545 gram, gouramy fish size of 10 cm as much as 400 fry; 6th stadia, from Development Center of Gurami and Nilem Stock Booster (BPPSIGN), PF-800 commercial feed with 39% - 41% protein content and chicken egg used is the white part of the egg.

The method used in this study is Completely Randomized Design (RAL) with 4 treatments and 4 repetitions on various feed composition as follows:

Treatment A: 100% commercial feed

Treatment B: 5% Commercial Feed + 1% *Chlorella* sp.

Treatment C: 5% Commercial Feed + 2% *Chlorella* sp.

Treatment D: 5% Commercial Feed + 3% *Chlorella* sp.

Procedure

Research is done through several stages including preparation of maintenance container, covering pond preparation and acclimatization of fish gouramy for 7 days and feed making. Considering the weight of 25 fish as the initial weight, then weighing the feed as much as 5% of the mass weight of the fish and after that, prepare *Chlorella* sp. (1,2,3%). Provision of feed 2 times a day at 08:00 and 16:00 pm. Measuring water quality parameters measured include temperature, pH and DO.

Data Analysis

Data feed conversion ratio and absolute growth were analyzed using variance analysis (ANOVA) with a 95% confidence level. If there is a significant difference, continue with Duncan's Multiple Test at 95% confidence level. While water quality data was analyzed descriptively by comparing it water quality standards (SNI 2006).

Observation Parameters

1. Feed Conversion Ratio

$$FCR = \frac{F}{(W_t + D) - W_o} \times 100 \%$$

Descriptions :

FCR : The amount of feed given during the study (%)

W_t : Test fish weight at the end of the study (gr)

W_o : Test fish weight at the beginning of the study (gr)

D : Total fish weight that died during maintenance period (gr)

2. Absolute Growth

$$W_m = W_t - W_o$$

Descriptions :

W_m : Test fish weight at the end of the study (gr)

W_t : Test fish weight at the beginning of the study (gr)

W_o : Test fish weight at the beginning of the study (gr)

3. Water quality parameters observed include temperature, DO and pH.

RESULT AND DISCUSSION**Food Conversion Ratio**

According to Effendi (2004), the Feed Conversion Ratio (FCR) is the amount of feed needed to produce 1 kg of cultivation fish meat. If the value of FCR = 1 means to produce 1 kg of fish meat in the aquaculture system, it takes 1 kg of feed. The value of feed conversion and growth is a parameter that describes the level of fish acceptance for feed. The provision of commercial food that has been added with *Chlorella* sp flour. with a different presentation level for 40 days has produced a variety of FCR values (Figure 1).

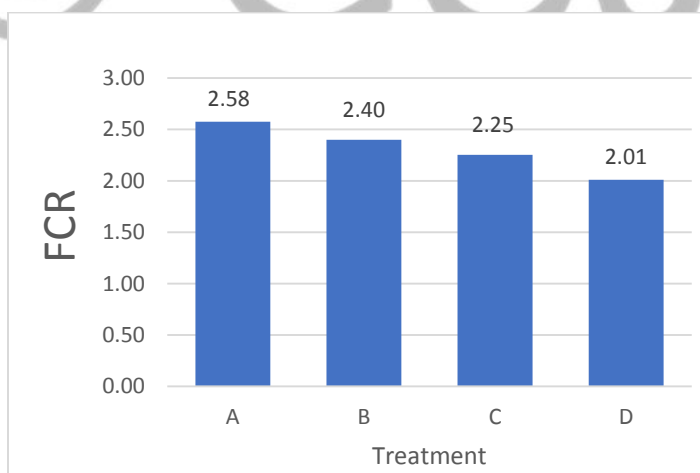


Figure 1. Food Conversion Ratio

The FCR value of carp which was given commercial feed treatment with *Chlorella* sp. added ranged from 2.01 to 2.58. The results of the study can be said to have an unfavorable FCR value because a good FCR is not more than 1. This is in accordance with Effendi's (2007) statement that the greater the FCR value is, the more feed needed to produce 1 kg of cultivation fish meat will, so, the smaller FCR value is, the better feed quality will become, but if the FCR value is high then the fish feed quality is not that good.

Treatment D, has the lowest FCR value, it is 2.01 with a dose of 3% then with a feed of 2.01 kg can produce 1 kg of carp meat. Treatment B (1% *Chlorella* sp.) Has a value of 2.40 and C (2% *Chlorella* sp.) Has a value of 2.25. Whereas in treatment A (control) there was no addition of *Chlorella* sp. in feed, shows the highest FCR value of 2.58. So to get 1 kg of fish meat required the amount of feed as much as 2.58 kg, this result shows the fish feed quality is less good. The analysis of variance results (Table 1)

showed that the addition of flour *Chlorella* sp. in commercial feed, has a significant different effect on carp feed conversion ratio.

Table 1. Food Conversion Ratio

No	Treatment	Average
1	A	2,58 c
2	B	2,40 b
3	C	2,25 b
4	D	2,01 a

Remarks: Values followed by the same miniscule are significantly different at 95% confidence level

Based on ANOVA analysis results showed that the addition of *Chlorella* sp. with different doses in feed significantly influence the FCR value of fish during the study. The results of the duncan distance test at a 95% confidence level showed significantly different results.

Based on Table 1, although the treatment feed has a relatively different composition, but giving the FCR average value is significantly different. The lowest average value was in treatment D with 3% flour *Chlorella* sp. at 1.3% and the highest value was in treatment A with control of *Chlorella* sp flour. amounting to 2.58%. This is consistent with the opinion of NRC (1993), that feed efficiency is related to the preference of fish in feed given, besides, it is influenced by the ability to digest too, supported by the opinion of Mudjiman (2002) which states one of factors that can affect digestibility of feed is a specific difference in the digestive system in fish that can cause differences in the fish ability of digest food.

According to Handajani (2010), in the digestion process, not all food components eaten can be digested into absorbable material. But in this study, additional ingredients are very well utilized by the fish's digestive system, because in additional ingredients there is a simple overhaul of complex compounds that make it easier for fish to digest.

Absolute Growth

Absolute weight growth is the difference between total body weight at the end of maintenance with the beginning of it. Fish weight measurements were carried out on day 0 to day 40, fish growth had significant values in treatment A to treatment D. The absolute weight growth of carp had the highest yield in treatment D of 44.66% and the growth of carp absolute weight has the lowest value in treatment A of 26.91.

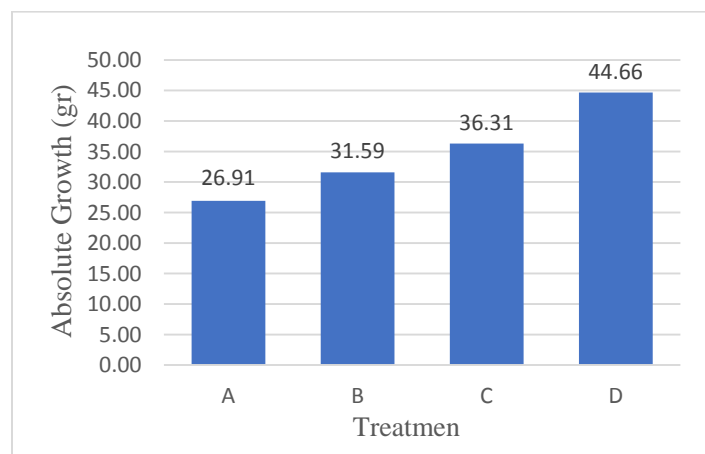


Figure 2. Absolute Growth

The results of variance analysis (Table 2) showed that the addition of *Chlorella* sp. To the commercial feed has given a significant different effect on the carp absolute growth.

No	Treatment	Average
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Table 2. Absolute Growth

1	A	26,91 a
2	B	31,59 b
3	C	36,31 c
4	D	44,66 d

Descriptions: Values followed by the same lower case are significantly different at 95% confidence

Figure 2 shows that the absolute growth rate of fish increases with higher doses of *Chlorella* sp. given. Those increase in growth rate of carp weight of enlargement phase, fed with addition of *Chlorella* sp. allegedly caused by the presence of very high nutrient content contained in *Chlorella* sp. consumed more efficiently, which in the end of the day, can improve feed digestibility and can help the process of food absorption, so that the feed consumed is more efficient which ultimately can increase the absolute growth rate in the carp phase of enlargement. Addition of *Chlorella* sp. which can optimally improve the quality of feed so as to increase the feed digestibility which eventually increase the growth it selfs (Masyamsur 2008).

Water quality

Water quality is one of the factors that support the growth and fish survival. Fish need environmental conditions or water media that supporting its metabolism activity, eating and breeding. In this study, the water quality parameters measured include temperature, pH, and dissolved oxygen (DO).

Table 3. Water quality in 40 days maintenance

Treatment	Parameters		
	Suhu (°C)	pH	DO (mg/L)
A	26.85 – 27.70	6.26 – 6.47	5.16 – 5.35
B	27.00 – 27.65	6.16 – 6.54	5.59 – 5.80
C	26.95 – 27.20	6.15 – 6.27	5.80 – 5.92
D	25.95 – 27.35	6.20 – 6.32	5.77 – 5.96

Water quality measurement results generally provide a suitable medium for carp growth (Table 3). Temperature measurements performed every four days for 40 days, ranged from 25.95 - 27.00°C, this result is quite good. According to SNI 01-7241-2006 about the the production of Giant gouramy (*Osphronemus gourami*.Lac) class of enlargement in the pond, explaining that range of 25-30°C is the optimal temperature range for carp so that, it can grow and develop well. This is characterized by increased fish body weight during maintenance.

Dissolved oxygen levels during the maintenance period ranged from 5.16-5.96 mg/L. According to SNI 01-7241-2006 concerning the production of Giant gouramy (*Osphronemus gourami*.Lac), the enlargement class in ponds requires the DO value for the carp cultivation which is at least 2 mg/L. The dissolved oxygen in this study revolves around an important factor for fish growth because oxygen is needed to breathe, motion activity, growth and production.

Other factors that influence fish growth are acidity levels (pH). According to SNI 01-7241-2006 on the production of Giant gouramy (*Osphronemus gourami*.Lac) class of enlargement in the pond, a good pH for the carp cultivation activities ranges from 6.0-8.5. The results of water quality measurements during the study of pH values ranged from pH 6.15-6.54, temperature increased can affect growth, increase in metabolic rate and organisms respiration which resulting oxygen consumption increased.

CONCLUSION AND SUGGESTION

Conclusion

The results showed that 3% addition of *Chlorella* sp. in carp feed produced the best growth, where absolute growth was 44.66 grams and feed conversion was 2.01.

Suggestion

Suggestions that can be given based on the results of the study are *Chlorella* sp. can be used as a additional feed that supports high absolute growth in carp with the addition of 3% in feed.

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