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GROWTH AND SURVIVAL OF TILAPIA (*Oreochromis niloticus*) WITH STARVED PERIODICALLY IN BEDENG MUNIR VILLAGE, SOUTH PAGAR ALAM

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Abstract *This time fish farmers often face constraints on the high price of commercial feed which results in low profits for the farmers. One solution to reduce artificial feed is periodic starvation. Starvation can reduce and increase feed efficiency while increasing production and fish can grow equally without fasting. The purpose of this study was to determine the growth and survival of periodically fasted tilapia (Oreochromis niloticus) in Bedeng Munir Village, South Pagar Alam. The method used in fish farming consisted of two treatments, that is P0: control and P1: fasting treatment (fish were given commercial feed for 4 days and fasted for 1 day). The parameters observed were absolute length growth, absolute weight growth, total feed consumption, feed efficiency, survival, and water quality. The results showed that the P1 treatment produced the highest absolute weight growth of 16.5 g, the highest absolute length growth was 1.35 cm, the lowest amount of feed consumption was 1540 g, the highest feed efficiency was 204.94%, the survival rate was 89. %,. While water quality in both the treatment is still in the range of tolerance for tilapia as temperature 21.4 to 24.2 0C and pH 7.6 to 8.1.*

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INTRODUCTION

Fish consumption in Indonesia from year to year has increased and is higher than the target. In 2015 fish consumption reached 41.11 kg.capita-1 with a fish consumption target of 40.90 kg.capita-1 while in 2018 it reached 50.69 kg.capita-1 which was higher than the target of 50.65 kg.capita-1 . This consumption value causes fishery production to increase from year to year. As in 2018 production reached 6,242,846 tons and with a growth rate of fishery production of 1.93% (Ministry of Marine Affairs and Fisheries, 2018).

Fishery production includes all fish, both freshwater, brackish, and marine. One of the freshwater fish that has an increase in production is tilapia (*Oreochromis niloticus*) (Ministry of Marine Affairs and Fisheries, 2018). According to Ghufran and Kordi (2010), tilapia is a prospective commodity for the development of aquaculture. but the market for tilapia is quite open. The weight of tilapia that is sought to fill the domestic market is around 200-250 g. tail-1 or 4-5 g. tail-1 (Khairuman and Amri, 2013). To achieve the desired fish weight, feed is needed that can meet the nutritional needs of fish.

Feed is the most important thing for fish as a source of energy for fish survival and growth. According to Hadi *et al.*, (2009), current fish cultivators often encounter problems with the high price of commercial feed, resulting in low profits for cultivators. Costs incurred for feed reach 60% of production costs (Afrianto and Evi, 2005). One solution to reduce artificial feed is by periodic gratification. According to Tahe (2008), fasting can reduce and increase feed efficiency but still increase production and fish can grow on a par with no fasting.

The purpose of this study was to determine the growth and survival of tilapia (*Oreochromis niloticus*) which was periodically fasted.

MATERIALS AND METHODS

The tools used in this study were tarpaulin ponds measuring 2x2x1 m^3, waring 1x1x1 m^3, digital scales, ruler, pH meter, thermometer, fish drain. While the materials used are tilapia seeds measuring 10 cm and commercial feed with a protein content of 30%.

The research design in this study consisted of one control and one treatment, that is:
P0 : control (without starvation)
P1 : treatment of starvation (fish are fed commercially for 4 days and starvation 1 day).

The container used for maintenance is a net mounted on a tarpaulin-sized pool. Before use, the tarpaulin pool is cleaned first by removing the existing water and scrubbing the pool with soap. Then rinsed and filled with water as high as 60 cm (water volume 600 L). Before use, the water is deposited for at least 12-24 hours so that the dissolved oxygen content is sufficient and other gases are lost (Satyani and Priono, 2012).

The fish used were 200 fish with a stocking density of 1 fish/3L water) for each waring (Sari *et al.*, 2017). Before being added, the fish were acclimatized by floating the bag containing the fish on the surface of the water for 15 minutes. Then the fish were adapted to the new environment and commercial feed was given three times a day for two days at satiation.

After the fish adapted, the fish fasted for 24 hours, then the length and weight were measured for data on the length and initial body weight of the fish. Maintenance is carried out for 30 days.. Fish were fed with feed frequency three times a day at 08.00, 12.00, and 17.00 WIB at satiation. Once a week, fish sampling is done. If there are fish that die during maintenance, their weight and length will be measured.

The absolute weight growth of tilapia during maintenance was calculated using the following formula:

$W = Wt - Wo$ ....(1)

Where: W= Absolute weight growth of fish (g); Wt = Weight of fish at the end of maintenance (g); and W0= Weight of fish at the start of maintenance (g)

The absolute length growth of tilapia during maintenance was calculated using the following formula:

$L = Lt - Lo$ ....(2)

Where: L= Absolute length growth of fish (cm); Lt= Length of fish at the end of maintenance (cm); and L0 = Length of fish at the start of maintenance (cm)

The feed efficiency (FE) calculation is calculated by the following formula:

$FE = \frac{(Wt+D)-W0}{F} x\ 100\%$ ....(3)

Where: FE= Feed efficiency; F= Amount of feed given (g); Wt= Fish weight at the end of maintenance (g); W0= Fish weight at the beginning of maintenance (g); and D= Weight of dead fish of maintenance (g)

Survival or survival rate (SR) is calculated using the formula, as follows:

$\mathrm{SR} = \frac{\mathrm{Nt}}{\mathrm{No}} \mathrm{x}100\%$ ....(4)

where; SR= Survival of fish (%); No= Number of fish at the beginning of maintenance (fish); Nt= Number of fish at the end of maintenance (fish)

Water quality parameters that were measured during the research activities were pH using a pH meter and temperature using a thermometer. Measurements were taken every morning during maintenance.

Data on growth, specific growth rate, feed conversion, survival, and water quality obtained will then be processed using Microsoft Excel and analyzed descriptively and supported by the literature.

RESULTS AND DISCUSSION

Based on Table 1, the length and absolute weight growth values of P1 treated fish were higher than P0. This is because the fasted fish will initially experience hunger but the fish body will eventually adjust to lowering its body activity and metabolism so that it can save energy (Sari *et al.,* 2017). This energy is used for maintenance because fish need energy continuously regardless of whether the fish has fasted or not (Putra, 2015). Fasted fish will increase their appetite compared to fish without fasting and the increased feed consumption can be used to meet the metabolic needs of fish after being fasted because it provides sufficient nutrition for the fish (Yuwono *et al*., 2005). Based on research conducted by Subekti *et al.,* (2017) also showed that the highest growth rate was found in freshwater pomfret which was fasted periodically, namely 1 day fasted and 3 days fed with an absolute length growth value of 2.79 cm not significantly different from treatment without fasting is 2.64 cm.

Absolute growth, feed efficiency, and survival of tilapia are presented in table 1.

Table 1. Absolute growth, feed efficiency, and survival of tilapia

Treatments	Absolute length growth (cm)	Absolute weight growth (g)	Feed efficiency (%)	Survival (%)
P0	1.33	15.9	172.59	91%
P1	1.35	16.5	204.94	89%

The feed efficiency values obtained based on Table 1 show that the P1 treatment produced a higher efficiency value than the P0 treatment. This proves that the feed given to fish that are periodically fasted is more efficient at turning into meat than the feed given to fish without fasting. The higher the growth and the lower the feed consumption, the higher the efficiency. According to Yuwono *et al.,* (2005) feed reduction by fasting can increase feed efficiency without slowing growth and even increasing the absolute growth rate of groupers. This result is in line with the research of Subekti *et al.,* (2017) which showed that the feed consumed by fasted fish was lower but more efficient. Research from Mustofa *et al.,* (2018) also shows that the highest feed utilization efficiency value during maintenance is treatment with fasting.

The survival results obtained by unfasted fish were higher than I in the P0 treatment, which was higher than the survival of the fasted P1 fish. However, the survival of fasted fish was not much different from that of non-fasted fish and the survival value was still above the minimum value of the survival value of tilapia based on the 2009 National Standards Agency (BSN), which stated that for the survival of tilapia the minimum is 75%. Therefore, the fasting treatment did not affect the survival value of tilapia.

The water quality of tilapia rearing media during rearing is presented in Table 2.

Table 2. Water quality

No	Treatments	Value	Optimal range*
1.	Suhu (°C)	21.4 – 25.2	25.0-30.0
2.	pH	7.6 – 8.1	6.5–8.5

Information : *BSN, 2009

The survival rate of fish is influenced by several factors, such as snacks and available water quality because if the water quality is optimum it will result in a high survival rate and if the handling is done incorrectly it will result in stressed fish and fish conditions will decrease, causing fish to die. (Mustofa *et al*., 2018).

Water quality is an important factor and must be considered in fish farming. In general, water quality measurements can support water quality. Based on Table 2., the temperature of the tilapia rearing media in field practice ranged from 21.4 to 25.2°C. According to BSN (2009), the optimum temperature for rearing tilapia fry is 25 - 30oC. The lowest temperature is not included in the optimum temperature category but at that temperature can still be tolerated by tilapia. The pH values obtained from this field practice ranged from 7.6 to 8.0. The pH value is in the pH-optimum range for the maintenance of tilapia fry from 6.5 to 8.5 (BSN, 2009).

CONCLUSION

The results showed that the P1 treatment produced the highest absolute weight growth of 16.5 g, the highest absolute length growth of 1.35 cm, the lowest amount of feed consumption was 1540 g, the highest feed efficiency was 204.94%, survival was 89 %. While the water quality in both treatments was still within the tolerance range for tilapia, namely a temperature of 21.4 – 24.2 0C and a pH of 7.6 – 8.1.

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