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The Growth of Tilapia (*Oreochromis niloticus*) with the Addition of Probiotics to Feed in Sakatiga Village, Indralaya District, Ogan Ilir Regency, South Sumatera

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Abstract

Feed is a source of energy to support the growth and survival of fish. To increase feed consumption to the maximum, it is necessary to add an intake to fish feed to increase the digestibility of fish to feed. One alternative that can be done is by adding (supplements) to the feed. Probiotics are an alternative that can be used as a supplement to aquaculture fish feed. The purpose of this field practice is to determine the effect of adding probiotics on the growth of tilapia. This field practice was carried out in August - October 2020 in Sakatiga Village, Indralaya District, Ogan Ilir Regency, South Sumatera. In infield practice, there were two treatments, namely P0: control (without the addition of probiotics) and P1: treatment with the addition of probiotic EM4 at a dose of 15 ml/kg. The container used is a waring placed in a concrete tub. The stages of the implementation of this field practice start from the preparation of containers, adding probiotics to feed, raising tilapia, and collecting data. The parameters observed were fish growth (length and absolute weight), specific growth rate, feed conversion (FCR), fish survival, and water quality (temperature and pH). The results showed that the results of the P1 treatment gave better results than the P0 treatment, the absolute length growth of 3.71 cm, the absolute weight growth of 6.10 g, the specific growth rate of 5.15% / day, the FCR of 0.74, and survival of 90%. The water quality in both treatments during maintenance was included in the normal standard for tilapia as the temperature of 27.5 - 29.8 °C and pH of 6.7 - 8.4. The addition of probiotics can be proposed as an effort to increase the production of tilapia aquaculture.

INTRODUCTION

Based on data from the 2018 Ministry of Maritime Affairs and Fisheries (KKP) annual report, Indonesia's national fishery production touched 24.45 million tons and increased compared to the previous year. This production value is a combination of aquaculture production and capture fisheries with a value of 17.25 million tons and 7.2 million tons, respectively. In that year, domestic fish consumption increased by 50.69 kg/ capita/year, or an increase of 7.08% from 47.34 kg/capita/year in 2017 (KKP, 2019).

According to Liandy (2017) one of the freshwater consumption fish products that play an important role in the value of aquatic production in tilapia (*Oreochromis niloticus*). Tilapia is one of the fishery commodities that are favored by the community to meet the needs of animal protein. In addition to having thick meat and delicious meat taste, tilapia also has high nutritional and nutritional content which is good for the health of the body so that it is liked by many people. The high ability of tilapia in adapting to environmental conditions and a fairly wide salinity makes tilapia a commodity that has the potential to be cultivated. The various advantages of tilapia make the demand for tilapia increase every year. In 2018, the production of tilapia reached 1.5 million tons (KKP, 2018).

Feed is a source of energy to support the growth and survival of fish and spends about 60-70% of production costs (Mansyur and Tangko, 2008). The obstacle that many farmers complain about in tilapia cultivation is the high price of commercial feed. Therefore, the maximum use of feed is expected to reduce feed costs. To increase feed consumption to the maximum, it is necessary to add an intake to fish feed to increase the digestibility of fish to feed. One alternative that can be done is by adding (supplements) to the feed.

Probiotics are an alternative that can be used as additional ingredients (supplements) into aquaculture fish feed (Mansyur and Tangko, 2008). According to Ramadhana *et al*. (2012), probiotics for aquaculture can be applied through commercial feed, water, or natural feeds such as rotifers and artemia as an intermediary. Commercial probiotics are commonly used in aquaculture and are easily obtained, one of which is EM4. The content contained in this probiotic includes bacteria *Lactobacillus* sp., *Acetobacter* sp., *Streptomycetes* sp., and yeast. The use of EM4 in feed can increase feed digestibility and growth of tilapia (Fadri *et al*., 2016). The purpose of this study was to determine the effect of adding probiotic EM4 to the growth of tilapia (*Oreochromis niloticus*).

METHODOLOGY

Place and Time

This research was carried out at UPR Mandiri Sakatiga, Sakatiga Village, Indralaya District, Ogan Ilir Regency from August to October 2020.

Research Materials

The tools used in research activities include concrete pools, nets, buckets, filters, scales, rulers, injections, spray bottles, pH meters, and thermometers. While the materials used include tilapia 3-5 cm in size, probiotic EM4, commercial feed (39% protein content).

Research Design

The research design in this study consisted of one control and one treatment, namely:

P0 : control (without probiotics)
P1 : addition of probiotics with a dose of 15 ml/kg feed

Work Procedure

Media Preparation

The container used for rearing tilapia seeds is to use two cages with a size of 2x1x0.5 m. The cages are installed in a concrete pool measuring 4x2x0.5 m with a water level of 0.4 m.

Addition of Probiotics to Commercial Feed

Mixing of probiotics in feed is done by spraying evenly in the feed using a spray bottle. For 1 kg of commercial feed, it takes 15 ml of probiotics (Lumbanbatu *et al.*, 2018). The feed used in this research was 1 kg. However, before being sprayed onto the feed, the probiotics are thawed first by mixing 50 ml of distilled water (Harmilia *et al*., 2019). After that, they are put into a spray bottle to be sprayed on the feed. Then fermented by incubating at room temperature for 24 hours. The addition of probiotics is done every day,

the feed added with probiotics is adjusted to the daily needs of fish feed.

Fish Maintenance

As many as 100 tilapias were cultivated in each container, with a stocking density of 100 fish/m^2 (Ariwibowo, 2010). Before stocking the tilapia seeds, acclimatization is carried out first to avoid stress on the tilapia fry. The acclimatization process is carried out by floating the plastic bag containing tilapia seeds for 15 minutes, then the plastic bag is tilted until tilapia seeds come out by themselves (Anugraheni, 2016). After the acclimatization process, the tilapia fry was adapted to feed and the environment for 7 days, and then the fish have fasted for 24 hours (Fitriyah, 2016). Initial sampling was carried out before rearing. Tilapia rearing was carried out for 35 days starting from seed stocking. The feeding frequency is 3 times a day (at 08.00 a.m., 12.00 p.m., and 4.00 p.m.) with a dose of 5% of body weight (Lumbanbatu *et al.*, 2018). Sampling is done once every 7 days and if there are dead fish, the weight and length are measured.

Parameters

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

$$W = Wt - Wo$$

Where:
W = absolute weight growth (g)
Wt = final weight (g)
Wo = initial weight (g)

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

$$L = Lt - Lo$$

Where:
L = absolute length growth (cm)
Lt = final length (cm)
Lo = initial length (cm)

The specific growth rate (SGR) is calculated by the formula:

$$SGR = \frac{\ln Wt - \ln Wo}{t} \times 100\%$$

SGR = specific growth rate (%)
Wt = final average weight (g)
Wo = initial average weight (g)
t = maintenance time (days)

The feed conversion ratio (FCR) is calculated by the formula:

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

FCR = feed conversion ratio
F = amount of feed given (g)
Wt = final average weight (g)
Wo = initial average weight (g)
D = weight of dead fish (g)

Survival rate (SR) is calculated by the formula, as follows:

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

SR = survival rate (%)
Nt = number of fish at the end of study
No = number of fish at the beginning of study

Water Quality

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 Analysis

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

Growth is a change in shape due to the increase in length, weight, and volume in a certain period individually (Aliyas *et al.,* 2016). Based on the results of observations made on tilapia rearing for 35 days, data on absolute growth yield, specific growth rate, feed conversion, and survival of tilapia in the treatment of adding probiotics (P1) increased higher than the control (P0). Different things happened to feed conversion, the value decreased (Table 1).

Table 1. Absolute growth, SGR, FCR, and SR of tilapia during the study.

Parameters	Treatments	
	P0	P1
Absolute length growth (cm)	2.23	3.71
Absolute weight growth (g)	2.81	6.10
Specific growth rate (%/day)	3.51	5.15
Feed conversion	0.97	0.74
Survival (%)	86.00	90.00

Based on Table 1. it is known that the growth in length and absolute weight of treatment P1 is higher, namely 3.71 cm and 6.10 g compared to treatment P0 which is 2.23 cm and 2.81 g. According to Ardita *et al.* (2015), the speed of seed growth in tilapia can be influenced by internal factors and external factors. Internal factors that affect the growth rate include fish body conditions such as the fish's ability to utilize residual energy and protein after metabolism. Meanwhile, external factors such as environmental factors and feed affect fish growth. These two factors will balance the state of the fish's body while in the maintenance medium and support the growth of the tilapia's body.

The probiotics given contain photosynthetic bacteria, *Lactobacillus* sp., *Actinomycetes* sp., *Streptomyces* sp., and yeast, wherein the process the *Lactobacillus casei* bacteria in probiotics can live in the digestive tract of fish which will also increase the process of secretion of proteolytic enzymes in the digestive tract of carp due to changes in The increased acidity value is caused by the presence of lactic acid which is the result of the metabolic process of these bacteria (Arief *et al.,* 2014). According to Putri *et al.* (2012), the ability of probiotics to balance microbes in the digestive tract can improve the digestive process of fish, namely by converting carbohydrates into lactic acid which can lower pH, which ultimately causes stimulation to produce endogenous enzymes in increasing the process of nutrient absorption, feed consumption, growth and inhibit pathogenic organisms from attacking the digestive tract. From the results obtained growth in the treatment of addition of probiotics (P1) was higher than the control (P0). This shows that the feed given during rearing is well utilized by tilapia.

The specific growth rate is the percentage increase in fish size from the difference between the final weight and initial weight of the fish divided by the length of time it is reared. Based on Table 1, it can be seen that the P1 treatment produced a higher specific growth rate than the P0 treatment. This is due to the fermentation process of feed with probiotic EM4 which can increase feed digestibility. This is by the statement of Simanjuntak *et al.* (2020) which states that the addition of probiotics to feed can increase the digestibility of feed so that it is easier for fish to digest the feed given, the nutritional value of the feed also increases and the rate of absorption of fish nutrients increases, which can result in fish can use feed efficiently.

The feed conversion ratio (FCR) is used to determine the efficiency value of the feed consumed by fish which is converted into fish body weight gain. In this study, the results of the feed conversion value in the treatment of adding probiotics (P1) were better than the control (P0). This shows that tilapia can optimally utilize feed that is added with probiotics so that feed is used efficiently to convert into the meat and for growth, because the smaller the conversion value of fish feed, the better for the fish. The value of feed efficiency is not only determined by the amount of feed consumed by fish but is also influenced by other factors, namely fish weight, fish age, density, water temperature, and feeding method (quality, placement, and

frequency of feeding) (Setiawati *et al.*, 2013).

Survival or survival rate (SR) or also called survival rate is the percentage value of the number of fish seed organisms that live during maintenance which is calculated at the end of maintenance from the total number of initial stockings. The results of this study indicate that the treatment with the addition of probiotics (P1) resulted in a higher survival rate than the control (P0). Based on BSN (2009), the survival rate of tilapia obtained in this study is still quite high, because it is still above 80%. This shows that feeding with the addition of probiotics does not significantly affect the survival rate of tilapia. This is by the opinion. This is following with the opinion of Iribarren *et al.* (2012) which shows that the use of probiotics can affect the increase in survival, microbial balance, and resistance to pathogenic infectious diseases both in vitro and in vivo.

Water quality is an important factor that can determine the success of tilapia rearing. According to Siegers *et al.* (2019) stated that water quality will affect fish growth. Water quality parameter data are presented in Table 2.

Table 2. Water quality during the study.

Parameters	Treatments		Optimum (BSN, 2009)
	P0	P1	
Temperature (°C)	27,5 – 29,8	27,5 – 29,8	25 – 30
pH	6,7 – 8,4	6,7 – 8,4	6,5 – 8,5

Water conditions as a medium for rearing tilapia during maintenance are classified as normal standards based on temperature and pH parameters. Temperature values during maintenance ranged from 27.5-29.8 °C while the optimal temperature was 25-30 °C (BSN, 2009). The range of pH obtained during rearing tilapia was 6.7 – 8.4, the optimal value for tilapia based on BSN (2009) was 6.5-8.5.

CONCLUSION

Tilapia rearing using feed with the addition of probiotic EM4 resulted in better growth value and feed conversion ratio compared to feed without additional probiotics. The addition of probiotic EM4 to fish feed as much as 15 ml/kg of feed resulted in absolute weight growth of 6.10 g, absolute length growth of 3.71 cm, the specific growth rate of 5.15%, feed ratio of 0.74, and survival rate of 90%. The addition of probiotics can be proposed as an effort to increase the production of tilapia aquaculture.

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