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Farming of Nile Tilapia (*Oreochromis niloticus*) at Krido Yuwono Farm, Panembangan Village

Emyl Rohayati*, and Kasprijo

[1]Department of Aquaculture, Faculty of Fisheries and Marine Sciences, Jenderal Soedirman University, Purwokerto 53122, Central Java, Indonesia.

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Correspondence:
emylrohayati@gmail.com

Abstract

Tilapia farming is the practice of raising fish from fry to marketable size to meet increasing consumer demand. This study aims to evaluate tilapia farming activities at the Krido Yuwono Panembangan Fish Farming unit. The research methods employed were direct observation and active participation in all farming processes to obtain comprehensive and accurate data. The variables observed included farming stages, fish length and weight, survival rate (SR), specific growth rate (SGR), and feed conversion ratio (FCR). The farming activities consisted of several stages, including pond preparation (drying, liming, fertilization, and water filling), seed stocking, feeding management, and water quality control. The results showed that the survival rate reached 86.67%, indicating a relatively high level of fish survival during the culture period. The specific growth rate was recorded at 1.77% per day, while the feed conversion ratio was 1.35, reflecting efficient feed utilization. Overall, the applied farming practices were effective and supported optimal tilapia production.

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Introduction

Indonesia has abundant fisheries potential, both marine and freshwater. There are a number of fish species in the region, including the popular species of tilapia. Tilapia is sold and marketed raw or fresh, as well as cooked or processed (Salsabila & Suprapto, 2018). This freshwater fish is not native to Indonesia, as it is an imported fish that has gone through various stages to become popular among Indonesians (Isra, 2020). Tilapia is a fish that has several advantages, including being able to survive in changing water conditions and being euryhaline, meaning it can live in freshwater, brackish, and marine environments (Kahar, 2019).

The tilapia market has good prospects in Indonesia, with annual demand increasing for this type of fish with high economic value (Susilawati *et al.,* 2022). This is due to the delicious and savory taste of tilapia, making it highly sought after by the public (Alfira, 2015). Considering the high public interest in eating tilapia, it is important to balance their availability on the market, which necessitates cultivating tilapia to satisfy community needs (Marie *et al.,* 2018).

Tilapia farming is currently very popular and has been widely practiced by fish farmers in various regions in Indonesia (Christin *et al.,* 2021). The development of tilapia farming is currently often found in freshwater bodies such as rivers, lakes, ponds, and reservoirs (Kahar, 2019). This is possible because tilapia farming plays a crucial role in supporting the Indonesian economy due to its relatively easy method. One of the stages in fishery farming is the grow-out stage. The grow-out stage is the stage of tilapia farming to produce tilapia of a certain size (Isra, 2020). This grow-out stage requires sufficient competence and knowledge to support the success of the tilapia grow-out business, so information regarding the stages of tilapia grow-out is essential.

Materials and methods

Time and Location

This study was conducted for 30 days at the Krido Yuwono Fish Farming Group (Pokdakan) located in Panembangan Village, Cilongok District, Banyumas Regency Central Java, Indonesia (7°22′24″ S and 109°9′21″ E).

Fish Breeding Procedures

Pond Preparation

Pond preparation involves cleaning the pond area and then drying the bottom to oxidize organic matter into nutrients. Once the pond is dry, liming is performed using dolomite at a dose of 385 grams/m2 to neutralize the soil pH and kill pathogens and pests. Pond fertilization was carried out using NPK fertilizer (Nitrogen, Phosphorus, and Potassium) dissolved in water to stimulate the growth of natural food organisms such as phytoplankton and zooplankton. The final stage is filling the pond with water to a height of approximately 30 cm and allowing it to settle for one day before stocking the fish fry.

Seed Spreading

The fry to be released into the rearing ponds are first acclimatized to adjust to the new environment's temperature and prevent stress. Healthy tilapia fry require a normal body shape and no defects, a healthy body, and active movement. The size of the tilapia fry released during this rearing activity is 11-17 cm and weighs 20-80 grams per fry.

Feeding

The feed given during this study was Ruby-2 feed with a protein content of 23%. Feed was provided three times daily at 08:00, 13:00, and 17:00 Western Indonesian Time (WIB; UTC+7). The feed was given to tilapia with a dose of 3% of the total body weight of the fish.

Observation Parameters

Survival Rate (SR)

The survival rate of tilapia fish is calculated based on the percentage of test fish that are still alive at the end of the study out of the total number of test fish kept in a maintenance medium. Fish survival is measured based on Effendie (1997):

$$\text{SR} = \frac{Nt}{No}\ x\ 100\%$$

Where:

SR = Survival Rate (%)

No = Number of fish at the beginning of maintenance (fish)

Nt = Number of fish at the end of maintenance (fish)

Specific Growth Rate (SGR)

The specific growth rate was calculated by measuring the weight of the fish from the beginning to the end of the culture period. The weight of the tilapia was measured once a week by sampling 20 tilapia. The growth rate was calculated based on Zonneveld *et al*. (1991):

$$\text{SGR} = \frac{lnWt - lnWo}{t}\ x\ 100\%$$

Where:

SGR = Spesific Growth Rate (%/day)

lnWo = Fish body weight at the beginning of maintenance (g)

lnWt = Fish body weight at the end of maintenance (g)

t = Maintenance time (days)

Feed Conversion Ratio (FCR)

Feed Conversion Ratio is calculated based on the Djajasewaka (1985):

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

Where:

FCR = Feed conversion rate

F = Amount of feed given during maintenance (g)

D = Total weight of fish that died during maintenance (g)

Wt = Total weight of fish at the end of maintenance (g)

Wo = Total weight of fish at the beginning of maintenance (g)

Water Quality

The water quality parameters measured in this study were temperature and pH. Water temperature was measured using a digital thermometer, while pH was measured using a portable pH meter at approximately 08:00 WIB each week.

Data Analysis

The data on tilapia growth and the data obtained were analyzed descriptively and then presented in tabular form.

Results

The increase in weight and body length of fish during the maintenance period shows that the energy derived from feed can be consumed by fish exceeding the energy requirements for maintenance and activities so that growth can occur optimally (Christin *et al.,* 2021)

Water Quality Management

Water, as a growth medium for fish, plays a crucial role and is key to successful fish farming. Therefore, water quality must

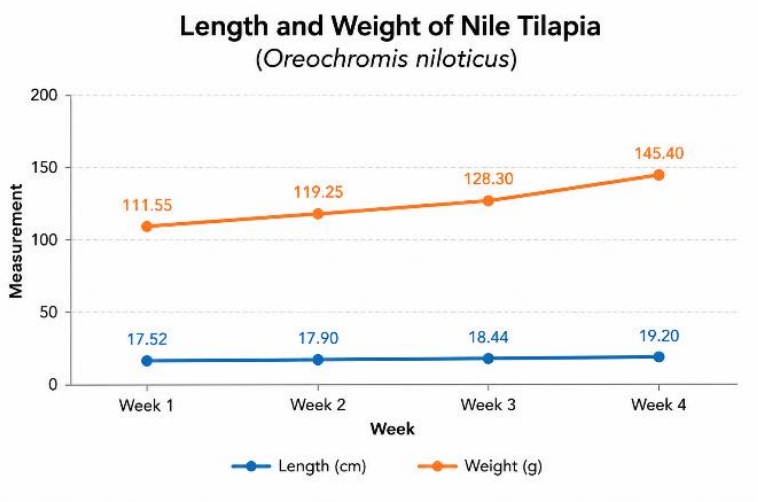

Figure 1. Results of Measurement of Length and Weight of Tilapia Fish

be maintained to ensure it meets the requirements (Arafah, 2021). Water quality is a key factor influencing the growth of farmed fish. Good water quality can increase fish appetite and food intake (Azhari & Martina, 2018). The results of water quality measurements during this internship are presented in Table 2.

Survival is the ratio of the number of fish surviving at the end of farming to the number of fish surviving at the beginning of farming (Angriani *et al.,* 2020). Fish survival can be influenced by several factors, namely the amount of feed given, stocking density, and water quality, including temperature, ammonia, DO, pH, and nitrite (Arafah, 2021). The survival rate calculated in this practical work was 86.67%, with 7 fish dying out of a total of 60 fish. Fish deaths only occurred in the first week of farming after being stocked into the rearing pond. This is thought to be due to the fish's adaptation response to the new environment (Mulqan *et al.,* 2017). However, the survival rate obtained was still considered good. This is in accordance with Christin *et al.,* (2021) which states that a good survival rate for cultivated fish is >50%.

The specific growth rate is the rate at which fish grow over time. The specific

Table 1. Results of SR, SGR and FCR Measurements of Tilapia

Variable	Measurement Results
Survival Rate (SR)	86,67%
Specific Growth Rate (SGR)	1,77%/day
Feed Conversion Ratio (FCR)	1,35

Table 2. Water Quality Measurement Results

No	Maintenance Period	pH	Temperature (°C)
1	Week 1	6,9	23,8
2	Week 2	6,5	25,3
3	Week 3	7	25,1
4	Week 4	6,8	25,5

growth rate provides an indication of the fish's ability to utilize feed nutrients by converting them into energy during the rearing period (Ririhena & Palinussa, 2021). Fish growth occurs due to the food intake, which the fish convert into energy for their activities and metabolism (Francisca & Muhsoni, 2021). The survival rate calculated in this practical work was 1.76% per day. This is thought to be due to the fish's ability to utilize the feed effectively to meet their nutritional needs, resulting in good growth (Christin *et al.,* 2021).

The feed conversion ratio (FCR) is the ratio between the weight of feed given to fish during the rearing period and the weight of the fish produced at the end of the rearing period (Christin *et al.,* 2021). The FCR calculation obtained in this practical work was 1.35, meaning that 1.35 kg of feed is needed to obtain 1 kg of fish meat. This FCR value is considered good, as a good FCR value ranges from 0.8 to 1.6 (Pranata & Kusuma, 2021). A lower FCR value indicates that the feed consumed by the fish is used more efficiently for growth. The FCR value is closely correlated with feed quality; therefore, a lower FCR value indicates better feed quality, and vice versa (Arafah, 2021). The FCR value obtained is relatively small, at 1.35, so it can be concluded that the feed provided is of good quality and the fish can utilize the energy obtained from the feed to support their growth.

The temperatures observed in this practical work ranged from 23.8 to 25.5°C. Meanwhile, the pH values obtained ranged from 6.5 to 7. These values are still within the optimal standards for tilapia farming. According to SNI 7550 (2009), the standard water temperature for tilapia farming is between 25 and 30°C. This optimal temperature will maximize the metabolic processes in the fish's body, thus positively impacting their growth (Rizky *et al.,* 2022).

Besides temperature, pH levels can also influence the growth and reproduction of fish. The pH value indicates the acidic or

alkaline conditions in the water. The pH level can be affected by the concentration of CO2 and other acidic compounds (Pranata & Kusuma, 2021). A low pH value can make fish susceptible to diseases, easily stressed, and slow their growth (Rizky *et al.,* 2022). The pH value range obtained is 6.5-7. This value is considered good according to the statement of Mulqan *et al.,* (2017) that the optimal pH range for tilapia farming is 6-8.5.

Conclusion

Based on the results obtained, it can be concluded that the tilapia farming activities at the Krido Yuwono Panembangan Fish Farming Group, Cilongok, consist of several stages. The pond preparation stages include drying, liming, fertilization, and filling with water, followed by seed distribution, feeding, and water quality management. Data obtained during this internship activity include a survival rate (SR) of 86.67%, a specific growth rate (SGR) of 1.77%/day, and a feed conversion ratio of 1.35. The water quality values obtained still meet the optimal criteria for tilapia farming.

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