THE EFFECT OF PERIODIC FASTING ON THE GROWTH PERFORMANCE OF SALINE TILAPIA Oreochromis niloticus

Pengaruh Puasa Secara Periodik Terhadap Kinerja Pertumbuhan Ikan Nila Salin Oreochromis niloticus

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ABSTRAK
Ikan nila salin (Oreochromis niloticus) merupakan komoditas budidaya unggulan Indonesia dan bernilai ekonomis penting. Permasalahan secara umum untuk meningkatkan produksi O. niloticus yaitu tingginya biaya pakan. Pemuasaan pakan merupakan alternatif untuk meningkatkan efisiensi pemanfaatan pakan dan kinerja pertumbuhan. Tujuan penelitian ini untuk mengetahui pengaruh pemuasaan pakan secara periodik terhadap kinerja pertumbuhan benih ikan nila salin. Penelitian didesain dalam rancangan acak lengkap, empat perlakuan tiga ulangan dengan tingkat pemuasaan pakan berbeda, yaitu perlakuan A : Pemberian pakan setiap hari tanpa pemuasaan secara periodik, perlakuan B : 1 hari dipuasakan 3 hari di beri pakan secara periodik, perlakuan C : 1 hari dipuasakan 5 hari di beri pakan secara periodik, perlakuan D : 1 hari dipuasakan 7 hari di beri pakan secara periodik. Sebanyak 120 ekor benih ikan nila salin dipelihara selama 35 hari, diberi pakan dosis 3% dari bobot tubuh. Hasil penelitian,
menunjukkan benih ikan nila salin dengan perlakuan 1 hari dipuasakan 7 hari di beri pakan secara periodik menghasilkan efisiensi pakan (0,58%), rasio konversi pakan (2) dan laju pertumbuhan harian (0,14%) tertinggi dibanding perlakuan lainnya.

Kata Kunci: Oreochromis niloticus, Pakan, Puasa, Pertumbuhan.

INTRODUCTION

Saline tilapia (Oreochromis niloticus) is one of Indonesia's leading commodities and is popular with the public for its supply of animal protein (Aldi et al., 2022; Lusiana et al., 2022). O. niloticus cultivation with a high stocking density system has the potential to be developed to support economic resilience and national food security (Utami et al., 2022; Soeprijanto et al., 2023). Saline tilapia is a freshwater tilapia fish that was developed into a tilapia fish that is able to tolerate wide salinity/euryhaline, with a salinity range of 0 - 35 ppt (Haryadi et al., 2015). The prospect of cultivating saline tilapia is very wide open, with international market demand of USD 14.4 billion or IDR 230 trillion in 2024 (KKP, 2024).

Feed is an important factor that must be considered in efforts to increase the productivity of farmed fish (Kasman et al., 2022). However, the problem that often arises in fish rearing is high feed costs, namely more than 60% of the total production costs of fish being raised (Ragasa et al., 2022). The method to increase the efficiency of feed utilization and accelerate growth is by starvation of feed (Assan et al., 2021). Liang-Lu et al., (2019) reported that the method of fasting zebrafish for certain periods had an impact on increasing the optimization of nutrient utilization, minimizing stress due to low temperatures by modulating lipid catabolism and autophagy. Furthermore, it was also reported by Laheng et al., (2020) that the periodic feed fasting method produced a better feed conversion ratio compared to fish without fasting. Tanjung et al., (2023) also stated that starving feed on koi carp seeds Cyprinus carpio caused faster growth compared to without fasting.

Based on this, it is important to conduct this research with the aim of analyzing the effect of periodic food starvation periods on the growth performance of fish fry Saline tilapia O. niloticus.

METHODS

This research was carried out from August to September 2023 at the Aquaculture Laboratory, Aquaculture Study Program, Faculty of Agriculture, Muhammadiyah Makassar University, Jl. Sultan Alauddin No.259, Makassar City, South Sulawesi 90221. The research design used an experimental method with a completely randomized design (CRD), consisting of 4 treatments, 3 repetitions each. The test fish used saline tilapia seeds measuring 3 cm from BPBAP Takalar. The feed uses the PF 1000 brand. The research container uses 12 plastic basins, 40 cm in diameter with a capacity of 10L, and filled 80% and equipped with aeration to supply oxygen. The stocking density of test fish is 1 fish/1 liter of water.

The research treatment dosage refers to research by Rosady et al., (2012) modified, as follows: Treatment A: Feeding every day without periodic fasting, treatment B: 1 day fasting, 3 days feeding periodically, treatment C: 1 day fasted for 5 days and fed periodically, treatment D: 1 day fasted for 7 days fed periodically. Feeding of 3% of body weight is carried out at a feeding rate, with a feeding frequency of three times a day, namely at 08:00, 12:00 and 16:00 WITA referring to Kasman et al., (2022) modified.

Feed Efficiency

Measuring feed efficiency aims to find out how much feed is consumed during maintenance. Feed efficiency (FE) is analyzed based on the formula (Takeuchi et al., 1988), with the formula:

\[
FE = \frac{\text{Weight Gain}}{\text{Feed Consumed}}
\]
FE = \frac{(Wt + Wa) - Wo}{F} \times 100\%

Information:
FE = Feed efficiency (%)
Wo = Shrimp weight at the start of the study (g)
Wt = Weight of shrimp at time t (g)
Wa = Weight of shrimp that died during the study (g)
F = Weight of feed consumed during the study (g)

**Feed Conversion Ratio (FCR)**

Feed conversion ratio or feed conversion ratio is calculated according to the formula used by Tacon (1987), namely:

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

Information:
FCR = Feed Conversion Ratio
F = Amount of feed consumed (gr)
Wo = Biomass of saline tilapia seeds at the start of the study (gr)
Wt = Biomass of saline tilapia at the end of the study (gr)

**Daily Length Growth Rate**

Daily length growth measurements were carried out at the beginning and end of maintenance. The formula used to calculate the daily length growth rate is according to Sari et al., (2017):

DLGR = \frac{\ln L_t - \ln L_0}{t} \times 100\%

Information:
DLGR = Daily length growth rate (%/day)
L_t = Average length of fish at the end of rearing (cm)
L_0 = Average length of fish at the start of rearing (cm)

**Data Analysis**

The test results which included feed efficiency, feed conversion ratio and daily length growth rate for each treatment were analyzed using variance, if there were differences between treatments then continued using the Duncan test at a 95% confidence interval using the SPSS version 26 program.

**RESULT**

**Feed Efficiency**

The results of the research showing the efficiency of feeding saline tilapia seeds that are not fasted compared to those that are periodically fasted are presented in Figure 1.

![Figure 1. Feed Efficiency of Saline Tilapia Fry that are Periodically Fasted](image-url)
Based on the results of analysis of variance (Figure 1), saline tilapia seeds that are periodically fasted have a significant effect (P<0.05) on feed efficiency. Duncan's further tests showed that the efficiency of feeding saline tilapia seeds with treatment of 1 day of fasting for 5 days of periodic feeding in treatment C and 1 day of fasting of 7 days of periodic feeding in treatment D was significantly higher than the other treatments. Furthermore, feeding every day without periodic fasting in treatment A and 1 day of fasting for 3 days of periodic feeding in treatment B were significantly lower than the other treatments.

**Feed Conversion Ratio**

The feed conversion ratio for saline tilapia fingerlings reared during the study is presented in Figure 2.

![Figure 2. Feed Conversion Ratio for Saline Tilapia Fish that are Periodically Fasted](image)

Based on Figure 2, it shows that periodic fasting has a significant effect (P<0.05) on the feed conversion ratio. The lowest average value for the feed conversion ratio was obtained in treatment D (1 day of fasting, 7 days of periodic feeding), significantly lower than the other treatments. Furthermore, the highest average value of feed conversion ratio (3.9) was significantly higher compared to other treatments.

**Daily Length Growth Rate**

The daily length growth rate of saline tilapia fry reared during the study is presented in Figure 3.

![Figure 3. Daily Length Growth Rate of Saline Tilapia Fry that are Periodically Fasted](image)

Based on Figure 3, it shows that periodic fasting has a significant effect (P<0.05) on the daily length growth rate. The lowest average value was obtained in treatment A (control), significantly lower than the other treatments. Furthermore, the highest average value in treatment D (0.15%) was significantly higher compared to other treatments.
DISCUSSION

The results of research on feed efficiency are the percentage increase in body weight with the total feed consumed by saline tilapia fry during rearing. The highest feed utilization efficiency was 0.58% in treatment D (one day fasted and seven days fed). This shows that saline tilapia that are periodically fasted show the ability to utilize feed optimally compared to those without fasting. This condition is thought to be related to the fish's efforts to increase the digestibility of nutrients, especially feed protein. This is closely related to optimizing the use of protein for growth. Feed starvation also causes a decrease in protease activity, but on the other hand, refeeding triggers an increase in protease activity. In addition, periodic food starvation showed an increase in the appetite of saline tilapia during the study. This is due to periodic emptying of the stomach during fasting, then after fasting, daily feed consumption increases. The high appetite of saline tilapia seeds greatly influences the high feed efficiency. The results of this research are in line with the research of Laheng et al., (2020), that periodic food fasting shows higher growth of tilapia fish compared to without fasting. Likewise, Ayuzar et al., (2021), reported that there were differences in the growth performance of milkfish fry including appetite, behavior, daily feed consumption, length growth, feed efficiency, feed conversion ratio during periodic fasting. Furthermore, it was reported that milkfish that were periodically fasted produced significantly better growth performance than those without food fasting.

The effectiveness of linear feed utilization supports an increase in the daily length growth rate and is able to significantly reduce the FCR value. It is suspected that periodic fasting increases the ability of saline tilapia to utilize the nutrients in the feed which are converted into body weight. Ntantali et al., (2023), reported that under fasting conditions, blood plasma triglyceride levels and fish fat tended to increase but on the contrary insulin levels decreased, and different conditions after being fed post-fasting showed increased fat and insulin levels, fat and triglyceride levels actually decreased. This fact is thought to mean that tilapia that are periodically fasted optimally utilize fat reserves in the body for metabolic energy (Villarroe et al., 2011), then during post-fasting when they are fed again, saline tilapia tend to utilize carbohydrates.

The high growth rate after fasting saline tilapia for one day and then being fed for seven days in this study, was also confirmed by Andrilla et al., (2019) that Chanos chanos milkfish with one day of fasting for four days on feed experienced compensatory growth, namely growth which is greater than normal conditions, post-fasting. Dawood et al., (2023) reported that tilapia fish that were fasted and fed after one day showed increased growth and better blood performance when compared to those without fasting. Furthermore, it was also reported that the technique of periodic fish fasting is the best strategy for optimizing feed efficiency and is economically a recommendation for increasing the production of O. niloticus.

CONCLUSION

Periodic feeding of saline tilapia seeds has a significant effect on feed efficiency, feed conversion ratio and daily length growth rate. The best results were found in the treatment of 1 day of fasting for 7 days of periodic feeding.

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