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THE EFFECT OF TRASH FISH FEED TYPE ON ABSOLUTE WEIGHT GROWTH OF RICE FIELD EEL (*Monopterus albus*) SIZE 12-15 cm IN EXPERIMENTAL TANKS

Pengaruh Pemberian Jenis Pakan Ikan Rucah terhadap Pertumbuhan Berat Mutlak Belut Sawah *(Monopterus albus)* Ukuran 12-15 cm di Bak Bak Percobaan

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ABSTRACT

The rice paddy eel *(Monopterus albus)* is a freshwater fishery commodity of high economic value and is widely favored by Indonesian consumers. This species has the ability to breathe through its skin and gills, allowing it to survive in environments with low oxygen levels, enabling cultivation in muddy waters, swamps, and rice fields with minimal water quality conditions. The growth of rice paddy eels is strongly influenced by seed size and the type of feed provided. Eels measuring 12–15 cm can be fed either natural or commercial feed, although the use of commercial feed is considered less relevant due to its high price, despite its complete nutritional composition. An alternative feed source is trash fish, a type of marine fish waste containing adequate nutritional value and potentially supporting growth efficiency. This study aimed to determine the effect of different types of trash fish feed on the absolute weight growth of rice paddy eels measuring 12–15 cm in experimental tanks. The research was conducted using an experimental method with a Completely Randomized Design (CRD), consisting of three treatments and nine replications. The treatments included the administration of different species of trash fish: Treatment A using tembang fish, Treatment B using trevally fish, and Treatment C using petek fish. Rice paddy eels used as test organisms had an initial average weight of 5 g/individual and were stocked at a density of three individuals per 0.5 m². The experimental tanks were filled with freshwater at a depth of 10 cm. The results showed that Treatment B produced the highest increase in absolute weight growth, reaching 3.37 g/individual. Water quality parameters during the experiment remained within optimal ranges for eel cultivation, with temperatures of 27.1–27.7 °C, pH values of 6.7–7.1, and dissolved oxygen levels of 5.32–5.61 ppm, indicating suitable conditions for growth.

Keywords: Rice Paddy Eel, Feed, Growth

ABSTRAK

Belut sawah (*Monopterus albus*) merupakan komoditas perikanan bernilai ekonomi tinggi dan mampu hidup pada lingkungan dengan oksigen rendah sehingga mudah dibudidayakan di

perairan rawa dan sawah. Pertumbuhan belut dipengaruhi oleh ukuran benih dan jenis pakan. Pakan komersial kurang efisien karena harga tinggi, sehingga ikan rucah dapat menjadi alternatif sumber nutrisi. Penelitian ini bertujuan mengetahui pengaruh jenis ikan rucah terhadap pertumbuhan berat mutlak belut sawah ukuran 12–15 cm. Metode penelitian menggunakan Rancangan Acak Lengkap (RAL) dengan 3 perlakuan dan 9 ulangan: A (ikan tembang), B (ikan selar), dan C (ikan petek). Belut uji berukuran rata-rata 5 g/ekor dengan padat tebar 3 ekor/0,5 m². Hasil menunjukkan perlakuan B memberikan pertumbuhan berat mutlak terbaik sebesar 3,37 g/ekor. Parameter kualitas air selama penelitian terjaga pada kisaran optimal: suhu 27,1–27,7 °C, pH 6,7–7,1, dan DO 5,32–5,61 ppm.

Kata Kunci: Belut Sawah, Ikan Rucah, Pertumbuhan

INTRODUCTION

Indonesia possesses very large aquaculture fishery resource potential, reaching 15.59 million ha; however, the utilization of freshwater aquaculture accounts for only about 10.1%. One commodity with high economic value and strong market demand is the rice field eel (*Monopterus albus*). This species has physiological adaptability to low-oxygen environments, allowing it to be cultured in muddy waters, swamps, and rice fields. In addition, eels contain high nutritional value, such as protein content of 16–18% and essential amino acids, resulting in high commercial value. Despite this considerable potential, eel productivity in several regions, including Tuban Regency, remains low, with production reaching only 210 kg per year.

The success of eel aquaculture is strongly determined by feed suitability. High-protein commercial feeds are indeed capable of supporting growth; however, their high cost becomes a constraint for small-scale farmers. Trash fish represent an economical alternative with abundant availability and diverse protein contents, such as tembang fish (40–45%), selar fish (60–65%), and petek fish (32–36%). In Tuban, trash fish production reaches 350.6 tons per year; however, its utilization as eel feed has not yet been optimal. In addition, studies that specifically compare the effectiveness of several types of trash fish on the growth of rice field eels measuring 12–15 cm are still limited.

Based on these conditions, research is needed to determine the effect of trash fish types on the absolute weight growth of rice field eels, as well as to identify the best type of trash fish that can be used in aquaculture. This study is expected to provide practical and economical solutions in the form of more efficient alternative feeds for farmers, thereby increasing the productivity and sustainability of rice field eel aquaculture.

METHODS

Place and Time

This study was conducted for 30 days, from 1–30 November 2025. The research location was the Fish Seed Center (BBI) Jojogan, Singgahan District, Tuban Regency, East Java Province.

Research Equipment and Materials

The equipment used in this study included tarpaulin tanks as rearing containers, aerators and their accessories, digital scales, fish nets, pH meters, DO meters, thermometers, buckets, hoses, and shelters in the form of used roof tiles or PVC pipe sections. Other supporting equipment included stationery, cameras, and laptops.

The materials used consisted of rice field eel juveniles (*Monopterus albus*) measuring 12–15 cm in length with an average weight of 5 g per individual, clean freshwater, detergent, and trash fish feed consisting of tembang fish, selar fish, and petek fish.

Containers and Test Animals

The experimental containers were tarpaulin tanks measuring 100 × 50 × 25 cm with a water depth of 10 cm. The culture water was first settled for 24 hours before use. The test animals used were rice field eels in healthy condition, free from deformities, relatively uniform in size, and actively moving. The stocking density applied was 3 individuals per tank, resulting in a total of 81 test animals placed in 27 experimental containers.

Feed and Feeding

The test feed used consisted of trash fish, namely tembang fish, selar fish, and petek fish. Feed was provided at a dose of 10% of the test animals' biomass weight. Prior to feeding, the feed was cleaned, cut according to the eel's mouth opening, and then dried until the moisture content was below 10–12%. Feeding was carried out twice daily, in the afternoon and at night.

Experimental Design

This study employed an experimental method using a Completely Randomized Design (CRD) consisting of three treatments and nine replications. The treatments tested were differences in trash fish feed types, namely: treatment A (tembang fish), treatment B (selar fish), and treatment C (petek fish). Container placement was conducted randomly using a lottery system to avoid research bias.

Research Procedures

Before the experiment began, all containers were washed using detergent, rinsed with freshwater, and dried. The containers were then filled with water to a depth of 10 cm and aerated. The test animals were acclimatized for seven days before treatments were applied. During the study, total water replacement was carried out every three days. Water quality parameters including temperature, pH, and dissolved oxygen were measured twice daily, in the morning and afternoon. At the end of the study, all test animals were weighed to obtain final weight data.

Data Analysis

Growth data were analyzed using one-way analysis of variance (ANOVA) to determine the effect of treatments on the observed variables. If the analysis results indicated significant or highly significant differences, the analysis was followed by the Least Significant Difference (LSD) test. All data analyses were performed using IBM SPSS Statistics software version 21.

Absolute Weight Growth

The absolute weight growth of rice field eels was calculated based on the difference between the average final weight and the average initial weight of the test animals, using the formula:

$$W = Wt - Wo$$

Information:
W = Absolute weight gain of test animals (g)
Wt = Average final weight of test animals (g)
Wo = Average initial weight of test animals (g)

RESULTS

The results of the study showed that the provision of trash fish feed had different effects on the absolute weight growth of ricefield eels (Monopterus albus) measuring 12–15 cm. The highest average absolute weight growth was obtained in treatment B (scad) at 3.37 g/fish,

followed by treatment A (scad) at 2.04 g/fish, and the lowest in treatment C (scad) at 0.20 g/fish.

Table 1. Range, average and standard deviation of absolute weight growth of 12-15 cm rice field eels for each treatment

Treatment	Absolute weight growth range of rice field eels (g)	Average (g)	Standard deviation (sd)
A	1,77 – 2,23	2,04	0,155
B	3,17 – 3,53	3,37	0,123
C	0,18 – 0,24	0,20	0,185

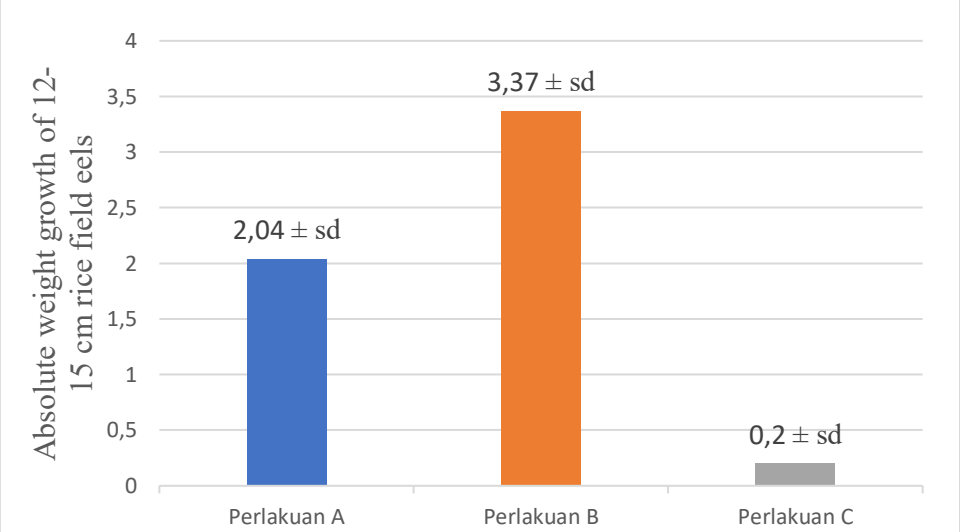

Figure 1. Graph of the average absolute weight growth of 12-15 cm rice field eels for each treatment.

The results of the analysis of variance (ANOVA) showed that the type of trash fish feed significantly affected the absolute weight growth of 12–15 cm rice field eels ($F = 1736.60$; $p < 0.001$).

Table 2. One-way ANOVA test of absolute weight growth of 12–15 cm rice field eels.

	Sum of squares	Df	Mean square	F	Sign.
Between Groups	45,563	2	22,782	1736,60	<0,001
Within Groups	0,315	24	0,013		
Total	45,878	26			

Further testing at 5% LSD showed that all treatments were significantly different from each other, with treatment B providing the best growth results compared to treatments A and C.

Table 3. Average and absolute weight growth notation for 12-15 cm rice field eels

Treatment	N	Subset for alpha = 0,05		
		1	2	3
C	9	0,20[c]	-	-
A	9	-	2,04[a]	-
B	9	-	-	3,37[b]

DISCUSSION

The highest absolute weight growth observed in treatment B was presumably associated with the higher nutrient content, particularly protein, of selar fish compared to tembang fish and petek fish. Selar fish have been reported to contain approximately 60–65% protein, whereas tembang fish contain 40–45% protein and petek fish contain 32–36.58% protein (FAO, 2018; Winarno, 2022). High protein levels that meet the physiological requirements of rice field eels play a crucial role in body tissue formation and body weight gain.

Rice field eels are carnivorous organisms that require high-protein diets to support optimal growth. Salihin *et al.* (2024) reported that rice field eels exhibit the best growth performance when fed diets containing protein levels above 55%. Budiardi (2020b) stated that increasing dietary protein levels enhances the growth rate of aquatic organisms until an optimal point is reached.

In addition to protein content, feed palatability also influences feed intake and nutrient utilization. Selar fish possess a distinctive strong marine fish aroma and a soft flesh texture, making them easier to digest and more preferred by rice field eels (Rochman *et al.*, 2021). These characteristics allow for improved protein digestibility and nutrient utilization efficiency, thereby enabling a greater proportion of dietary energy to be allocated toward growth rather than body maintenance.

Conversely, the lower growth observed in treatments A and C was presumably due to their relatively lower protein content, which was insufficient to meet the physiological requirements of rice field eels. Protein deficiency can inhibit muscle tissue synthesis and metabolic enzyme production, causing dietary energy to be primarily utilized for body maintenance rather than growth. Under such conditions, aquatic organisms may experience reduced feed conversion efficiency and growth rates (Budiardi, 2020b; Sukmawati *et al.*, 2023).

Water Quality

Throughout the study, water quality parameters, including temperature, degree of acidity (pH), and dissolved oxygen (DO), were relatively homogeneous among treatments and remained within suitable ranges to support the growth of rice field eels measuring 12–15 cm.

Temperature

Water temperature during the study ranged from 27.1–27.7°C. ANOVA results indicated no significant differences in temperature among treatments ($p > 0.05$). This temperature range is still within the optimal range for tropical freshwater organisms, particularly rice field eels, which is 25–32°C (Effendi, 2003; Lefevre, 2016; Mao *et al.*, 2024)

Degree of Acidity (pH)

The pH values during the study ranged from 6.7–7.1 and did not show significant differences among treatments. This pH range remains within the optimal limits for rice field eel growth, which is between 5.0–7.5 (Santoso, 2014; Fitriani, 2020).

Dissolved Oxygen (DO)

Dissolved oxygen concentrations during the study ranged from 5.32–5.61 ppm and did not differ significantly among treatments. This range fulfills the oxygen requirements for the growth of rice field eels measuring 12–15 cm, which has been reported to be optimal at 5–6 ppm (Santoso, 2014; Zhang *et al.*, 2023).

CONCLUSION

The provision of different types of trash fish feed had a significant effect on the absolute weight growth of rice field eels (*Monopterus albus*) measuring 12–15 cm, with selar fish feed producing the highest growth result of 3.37 g per individual compared to tembang fish and petek fish. During the study, temperature, pH, and dissolved oxygen remained within optimal and relatively homogeneous ranges, and therefore did not act as limiting factors for rice field eel growth.

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