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INSERTION OF DISSOLVED ORGANIC MATTER BASED OF PROBIOTICS WITH DIFFERENT DOSAGES IN AQUACULTURE MEDIA TO KELABAU FISH (*Osteochillus melanopleura*) LARVAE SURVIVAL

Penyisipan Bahan Organik Terlarut Berbasis Probiotik Dengan Dosis Berbeda Pada Media Budidaya Terhadap Sintasan Larva Ikan Kelabau (*Osteochillus melanopleura*)

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ABSTRACT

Kelabau fish (*Osteochilus melanopleura*) is an economically important fish in South Kalimantan. The obstacle that is still often encountered in its cultivation is the low survival of the larvae produced. The aim of this study was to determine the best probiotic dose for survival of kelabau fish (*O. melanopleura*) larvae. This research was conducted for 3 (three) months. The place of research is the Freshwater Aquaculture Fishery Center (BPBAT) Mandiangin, Karang Intan District, South Kalimantan Province. This study used an experimental method using a complete randomized design (CRD) with three treatments and three replications. Treatment A was given dissolved organic matter in the form of probiotics 0 ml/L (as a control), treatment B was given 0.5 ml/L, treatment C was given 1 ml/L. The water used in the research containers was filled with 3 liters of water each with a water level of 15.9 cm and a stocking density of 45 larvae in each treatment. The results of the research showed that the survival rate of kelabau fish larvae in treatment A was 95.24%, treatment B was 96.03%, treatment C was 96.83%. The survival Anova test results obtained that administration of probiotic-based dissolved organic matter has no effect on survival of larvae. The results of water quality measurements for temperature and pH parameters can be said to be good for the maintenance and survival of kelabau fish larvae during observation.

Key words: Dissolved Organic Matter, Larvae, *Osteochilus melanopleura*, Probiotic

ABSTRAK

Ikan kelabau (*Osteochilus melanopleura*) merupakan ikan ekonomis penting di Kalimantan Selatan dan telah dibudidayakan. Namun masih banyak kendala yang sering ditemui pada budidayanya terutama masalah rendahnya sintasan larva yang dihasilkan. Penelitian ini dilakukan untuk mengetahui dosis probiotik terbaik terhadap sintasan larva ikan kelabau (*O. melanopleura*). Penelitian ini dilakukan selama 3 (tiga) bulan. Tempat penelitian adalah Balai Perikanan Budidaya Air Tawar (BPBAT) Mandiangin Kecamatan Karang Intan Kabupaten Banjar

Provinsi Kalimantan Selatan. Metode eksperimental Rancangan Acak (RAL) dengan tiga perlakuan dan tiga ulangan digunakan dalam penelitian ini. Perlakuan A pemberian bahan organik terlarut berupa probiotik 0 ml/L (sebagai kontrol), perlakuan B pemberian 0,5 ml/L, perlakuan C pemberian 1 ml/L. Wadah penelitian masing-masing diisi sebanyak 3 liter air dengan ketinggian air 15,9 cm serta padat tebar larva sebanyak 45 ekor pada setiap perlakuan. Hasil penelitian sintasan larva ikan kelabau di perlakuan A 95,24%, perlakuan B 96,03%, perlakuan C 96,83%. Hasil uji Anova menunjukan bahwa pemberian bahan organik terlarut berbasis probiotik tidak berpengaruh pada sintasan larva ikan kelabau. Hasil pengukuran kualitas air untuk parameter suhu dan pH sesuai untuk pemeliharaan dan kelangsungan hidup larva ikan kelabau selama pengamatan.

Kata Kunci: Bahan Organik Terlarut, Larva, *Osteochilus melanopleura*, Probiotik

INTRODUCTION

The kelabau (*O. melanopleura*) is a local fish species with significant economic value. This fish lives in rivers, lakes, and swamps flowing through rivers throughout South Kalimantan. A member of the Cyprinidae family, the kelabau is phenotypically similar to the nilem (*Osteochilus hasseltii*), but is larger with smaller scales, reaching weights of 1-4 kg per fish (Yustiati & Asiah, 2019). The kelabau fish is the mascot of the city of Banjarmasin, and for its preservation, the Mayor of Banjarmasin released 10,000 kelabau fish into the Tatah Belayung River on June 13, 2023 (Riyadi, 2023). This fish itself has entered the realm of cultivation through the domestication stage at the Mandiangin Freshwater Aquaculture Center (BPBAT) and has been developed through seeding efforts.

The success of the kelabau fish hatchery at the Mandiangin BPBAT has significantly contributed to the diversification of cultivated species to meet the community's protein needs. Generally, a common obstacle in fish farming, particularly hatchery production, is poor larval survival due to the lack of adequate feed availability. (Akbar *et al*., 2013). Furthermore Marlida *et al*. (2022) explains that after hatching, larvae obtain their energy reserves from their parents in the form of egg yolk. This is a critical phase in the life of fish, particularly when the food source is switched from endogenous (yolk) to exogenous, or external, food. This transition period is called the "point of no return."

The morphological and physiological development of larvae plays a major role in receiving external food. According to Marlida (2001) The ability of larvae to obtain external nutrition also depends heavily on mouth opening and the availability of suitable food. The impact of nutritional requirements on larval development, quality, and survival is significant, as malnutrition can increase morphological and behavioral abnormalities, as well as mass mortality (Takeuchi, 2013; Viegas, 2019; Rathore *et al*., 2016). The insertion of dissolved organic materials into the maintenance media has been tested on several types of fish, namely the Sangkuriang catfish (*Clarias gariepinus* Var) (Adriani *et al*., 2019), and papuyu fish (*Anabas testudineus* Bloch) (Elrifadah & Marlida, 2023).

Several factors are thought to contribute to low yields, including poor environmental conditions, pathogen infections, and the larvae's weak physiological functions, particularly their ability to digest food. One way to improve these poor environmental conditions is by administering probiotics. Probiotics are live microbial agents that benefit the host by modifying the microbial community, enhancing the host's response to disease, and improving environmental quality (Widanarni *et al*., 2014). The presence of beneficial bacteria that colonize the digestive tract at the beginning of the development of the fish life cycle is very important because the aquatic environment is often exposed to potential pathogens (Ringo *et* *al*., 2018). High larval mortality at the beginning of maintenance is a challenge that must be faced in the aquaculture industry (Hoseinifar *et al*., 2024). According to Akbar *et al*. (2013) Probiotics can be administered directly into the water in aquaculture. The benefits of probiotics extend beyond fish growth rates, particularly through improved growth performance in humpback grouper (Marlida *et al*., 2014), Even the use of probiotics from larval sizes has been studied to produce better fish production in terms of growth and disease resistance, even increasing survival rates (Rizkiyani, 2020). The probiotic bacteria used can be from the lactic acid bacteria (LAB) group (Ringo *et al*., 2018) or non-LAB (Hoseinifar *et al*., 2024).

The use of organic materials dissolved in water during the life of the larvae can be a solution to overcome the high mortality rate. This ability is based on three things: (1) the ability of the larvae to absorb and utilize organic substances dissolved in a medium across the skin surface by simple diffusion (osmosis), which is known as 'Putter' (Heming & Buddington, 1988); (2) dissolved organic matter is absorbed by fish along with water through the gills and lateral line (Lin & Arnold, 1982); and (3) absorbed through the mucosal cells in the oral cavity or during osmoregulation (Blaxter, 2023).

Research by Akbar *et al*. (2013) yang menggunakan probiotik EM4 dan diterapkan melalui media air pada pemeliharaan Clownfish (Amphiprion percula) larvae at a dose of 8 mg/L resulted in high survival rates, final weight, and length. Therefore, this study was conducted to determine the best probiotic dosage for the survival of cloverfish (Osteochillus melanopleura) larvae to improve cloverfish cultivation activities, especially during larval rearing activities.

METHODS

Research Management

This research was conducted at the Mandiangin Freshwater Aquaculture Center (BPBAT), Karang Intan District, Banjar Regency, South Kalimantan Province. The time required for this study, from preparation to publication, was approximately 3 months.

Animals Tsest

The test animals used in this study were Ovaprim (*O. melanopleura*) larvae obtained from the spawning of broodstock. Broodstock were artificially spawned with a ratio of 1 female to 1 male. The female broodstock was injected with the hormone ovaprim at a dose of 0.7 ml/kg diluted with aquabidest, while the male broodstock was injected with a dose of 0.2 mL/kg. The female broodstock was injected twice, with an injection interval of 6 hours after the first injection. The first injection was 1/3 of the dose and the second injection was 2/3 of the dose. The hormone injection for the male broodstock was carried out simultaneously with the injection of the two female broodstock. Three hours after the second injection, the hormonal effects began to be seen. The female broodstock was ready for stripping when it began to become restless and frequently swam to the surface as a signal that the eggs were ready to be ovulated.

Sperm was collected by massaging the male's abdomen. The sperm was then mixed with a 30 ml sodium chloride (NaCl) solution. After sperm collection, the female was massaged to release her eggs, which were collected in a basin and mixed with the sperm, stirred with a chicken feather, then added clean water little by little until the eggs expanded, then transferred to a prepared container. The eggs were hatched in an aerated aquarium. The eggs were collected using a tablespoon and placed into the aquarium while stirring gently to prevent clumping. The eggs hatched after approximately 12 hours. The larvae were then reared until the yolk was completely absorbed, for 3 days. After that, the larvae were prepared for experiments adding probiotic-based dissolved organic matter at various treatment doses.

Care of test animals

The test animals were reared in observation containers consisting of 9 experimental units. The observation containers used were 9 plastic jars with a diameter of 15.5 cm and a height of 25 cm. Each jar was filled with 3 liters of water. The jars that had been filled with water were then aerated for 24 hours. After the media was ready, a probiotic solution produced by BPBAT Mandiangin was inserted with a dose according to the treatment. Probiotics were administered before spreading the kelabau fish larvae with a dose of 0 ml/L of media (treatment A), 0.5 ml/L of water media (treatment B) and 1 ml/L of water media (treatment C). The stocking density of the test fish was 42 fish/container. The experiment began when the larvae were 3 days old and continued until they were 8 days old, without feeding, relying solely on media containing probiotic-based dissolved organic matter. The parameter observed during maintenance was survival rate.

Rancangan Percobaan

The experimental design used in this study was a Completely Randomized Design (CRD), with three treatments and three replications. Each treatment only observed one factor, namely the survival of the catfish larvae. The treatments applied in this study were:
Treatment A (control) without the addition of dissolved organic matter
Treatment B (probiotic-based organic matter dose of 0.5 mL/L of water medium
Treatment C (probiotic-based organic matter dose of 1 mL/L of water medium)

Observation Parameters

Larval Survival Observation

Larval survival was determined visually by counting the number of live fish based on the number of dead larvae in each observation. Observations for dead larvae were conducted twice daily, in the morning and evening, by observing the water surface for floating dead larvae. Water aeration was turned off during the observation to facilitate and ensure accurate observation.

The survival rate was calculated using the formula Venkatachalam & Kandasamy (2017) are as follows:

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

Where:
SR = Survival
Nt = Number of catfish larvae at the end of the study (tails)
No = Number of catfish larvae at the beginning of the study (tails)

Water Quality Observations

Water quality observations are conducted throughout the maintenance period. Daily water quality observations include temperature measurements using a water thermometer and pH measurements using a pH meter.

Hypotesis

Ho: The provision of probiotic-based dissolved organic matter has no effect on the survival of kelabau larvae.

Hi: The provision of probiotic-based dissolved organic matter has an effect on the survival of kelabau larvae.

Data Analysis

The data analysis used statistical analysis at a 95% confidence interval ($\alpha = 0.05$). The design used was a completely randomized design (CRD) with one factor, assisted by statistical software SPSS Statistics version 24.

RESULT

Larva Survival

Based on observations over 5 days of maintaining the kelabau fish larvae, the survival rate results are as shown in Table 1 below:

Table 1. Average survival rate (%) of kelabau fish larvae

Treatment	Day Observations -		Dead larvae (tail)	Survival (%)	Mortality (%)
	Beginning	End			
A	42	40,00	2	95,24	4,76
B	42	40,33	2	96,03	3,97
C	42	40,67	1	96,83	3,17

Source: Processed Primary Data

Water Quality

Water quality parameters observed during the maintenance period included temperature and pH. The observation data are presented in Table 2 below:

Table 2. Water quality range during the study

Observation Time	**Temperature (℃)**	**pH**
Morning	25,7–28,3	8,37–8,78
Afternoon	26,3–28,9	8,40–8,75

Source: Processed Primary Data

DISCUSSION

Survival

Table 1 shows that the average survival rate of the kelabau (Osteochillus melanopleura) larvae reared for 5 days was 95.24% in treatment A, 96.03% in treatment B, and 96.83% in treatment C. The treatment with the highest survival rate was treatment C (96.83%), and treatment A (95.24%), which had the lowest survival rate.

The results of the normality test showed a sig (0.200) > sig p (0.05), indicating that the data variance was normally distributed. For the homogeneity test, a sig (0.132) > sig p (0.05) indicated that the data variance was homogeneous. The results of the ANOVA survival test obtained a sig value (0.842) > sig p (0.05) and F count 0.179 < F table 5% 5.14 so that H0 was accepted, namely the provision of probiotic-based dissolved organic materials had no effect on the survival of kelabau fish larvae.

The survival rate of fish is influenced by internal factors such as gender, heredity, age, reproduction, resistance to disease and external factors such as water quality, stocking density, quantity and total amino acid composition of feed (Arzad *et al*., 2019). The nutritional needs of larvae immediately after hatching depend heavily on the rate of absorption and efficiency of yolk utilization. Both are crucial for early development, growth, and survival.

According to Apriyan *et al*. (2021) The addition of probiotics to culture media has a significant impact because the presence of probiotic microorganisms helps maintain the water quality of the culture media and also increases the immunity of the fish being raised. The benefits of probiotics extend beyond the growth rate of fish; even the use of probiotics at the larval stage has been studied to produce better fish production in terms of growth and disease resistance, even increasing survival rates. (Rizkiyani, 2020). The main advantage of adding probiotics through water media is through the performance of aquatic microbes in nitrification, denitrification and improving water quality, thereby increasing the balance of the aquatic ecosystem (Rahayu *et al*., 2024). The use of probiotics is also a hope for improving water quality by reducing the accumulation of harmful nitrogen compounds in the aquaculture environment (Fachri *et al*., 2024) and participate in replacing organic nutrients in the maintenance media (Hasan & Banerjee, 2020). Research by Lestari (2015) found that the survival rate of the larvae of the selis fish fed with natural silkworms enriched with probiotics reached 87.78%, while the survival rate of the larvae of the kelabau fish with the provision of probiotics given directly to the water media at a dose of 1 mL/L of media reached 96.83% as observed in this study. Torres-Maravilla *et al*. (2024) explains that in general probiotics help the process of nutrient utilization in the larval phase.

Water Quality

Water quality indirectly influences the survival of fish larvae. Water quality parameters observed in the rearing medium include temperature and pH. The average temperature during the rearing period is between 25.7°C and 28.3°C in the morning and 26.3°C and 28.9°C in the afternoon. The recommended temperature range for rearing kelabau larvae is 27-30°C (Rachimi *et al*., 2017). Based on the above opinion, the temperature during the study can be considered favorable for the maintenance and survival of the kelabau larvae.

The next water quality parameter observed in the rearing medium was the acidity level (pH). According to Gunawan *et al*. (2019) The suitable pH for all types of fish ranges from 6.7-8.6. Meanwhile, according to Rachimi et al. (2017) The water pH for rearing kelabau larvae ranges from 6 to 7.

The water pH values were 8.37 to 8.78 in the morning and 8.40 to 8.75 in the afternoon. Based on the above findings, the pH during the observations can be considered favorable for the maintenance and survival of kelabau larvae.

CONCLUSION

Based on the research results, the following conclusions can be drawn:

1. The highest survival rate of kelabau larvae in this study was achieved in treatment C, with a value of 96.83%. ANOVA results indicated that the provision of probiotic-based dissolved organic matter had no effect on the survival of kelabau larvae.
2. The average temperature during the rearing period ranged from 25.7°C to 28.3°C in the morning and 26.3°C to 28.9°C in the afternoon. The water pH ranged from 8.37 to 8.78 in the morning and 8.40 to 8.75 in the afternoon.

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