Journal of Fish Health
Volume 5, Issue 3, August 2025
https://doi.org/10.29303/jfh.v5i3.7882

Survival Rate of Barramundi (*Lates calcarifer*) Larvae Maintenance at Balai Besar Riset Budidaya Laut dan Penyuluhan Perikanan (BBRBLPP) Gondol

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Received:
August 2nd, 2025
Accepted:
August 21th, 2025
Published:
August 31th, 2025

Keywords:
Barramundi*, Lates calcarifer,* Larvae, Survival Rate, Feed

ABSTRACT

Barramundi (*Lates calcarifer*) is a high economic commodity that has euryhaline properties. The maintenance of barramundi larvae is quite crucial in its cultivation efforts. This study aims to determine the survival rate of barramundi during maintenance at the Balai Besar Riset Budidaya Laut dan Penyuluhan Perikanan (BBRBLPP) Gondol, Bali. The activity lasted for 35 days, observing the parameters of larvae development, type and variety of feed, and water quality. The feed used consisted of natural feed such as *Rotifera* sp., *Nanochloropsis* sp., and *Artemia* sp., as well as artificial feed in the form of PSP and KAIO 3. Feeding was carried out gradually according to the age of larvae with adjusted frequencies and doses. The results showed that larvae showed progressive morphological and behavioral development from day 0 to day 27. The survival rate achieved was 79% of the total 40,000 larvae released, far exceeding the SNI standard (20%). Water quality during maintenance was within the optimal range. Additional efforts such as adding probiotic, daily siphoning, and water changes contributed to successful rearing. These results demonstrate that the combination of good feed and optimal water quality management significantly influences the success of barramundi larval cultivation. This study provides an important foundation for the development of efficient and sustainable large-scale barramundi cultivation.

INTRODUCTION

Barramundi (*Lates calcarifer*, Bloch) is a fish with high economic value due to its high public demand. Its cultivation began because it was known that this fish has relatively fast growth, is easy to maintain, and has a high tolerance to environmental changes such as salinity (Hasibuan *et al*., 2018). The euryhaline ability of barramundi allows this fish to adapt to various levels of water salinity, both in freshwater, brackish water, and marine. This characteristic provides opportunities for cultivators to develop barramundi in various types of environments. With its ability to adapt in salinity, barramundi can be raised in ponds that have varying salinity due to water changes or tidal influences (Ridho & Patriono, 2016).

The first successful spawning of barramundi occurred in 1989 at the Sub-District of the Coastal Aquaculture Research Center in Serang, West Java. Most barramundi production in Indonesia is obtained from offshore catches, with only a small portion obtained from aquaculture (Darosman *et al*., 2019). While commercial barramundi cultivation is currently being developed, it still faces several challenges, particularly during the larvae stage (Zulfiani *et al*., 2019).

One of the causes of larvae mortality is the quality and availability of feed. Feeding issues faced by barramundi larvae have become a major concern in aquaculture. High quality feed is essential to produce and ensure white snapper grows to its maximum potential (Aulianto *et al*., 2025). One of the main challenges is the difficulty in providing feed that meets the specific nutritional needs of larvae, which are essential for their growth and survival (Nurmasyitah *et al*., 2018). However, in the last decade, research has succeeded in developing more efficient and nutritious larvae feeds, including the use of microalgae-based feeds and probiotics, which have been shown to improve larvae health and disease resistance (Sahputra *et al*., 2017).

Balai Besar Riset Budidaya Laut & Penyuluhan Perikanan (BBRBLPP) Gondol has implemented a variety of feeding methods for barramundi larvae, resulting in high larvae yields and exports to various regions. Therefore, it is important to understand the survival rate of barramundi larvae (*Lates calcarifer*) reared at the BBRBLPP Gondol to produce high-quality of barramundi.

METHODS

This activity was carried out for 35 days, from October to November 2024 at the BBRBLPP Gondol, Bali. The location was selected based on primary data obtained from direct observation, interviews, and documentation, while secondary data were obtained from various relevant library sources that support snapper cultivation activities. Data analysis was conducted descriptively, with the observed parameters being the stage of larval development and the Survival Rate (SR). The SR formula (Purwati & Diniariwisan, 2025) is:

$$SR = (Nt \div No) \times 100\%$$

Where:
Nt = Total of fish at the end
No = Total of fish at the beginning

Meanwhile, the feed provided is in the form of natural feed such as *Rotifera* sp., *Nannochloropsis* sp., and *Artemia* sp. While the artificial feed is pellet feed in the form of powder and granules, namely PSP (Pre-Starter-Pasta) and KAIO 3. Stock of natural feed such as *Nanochloropsis* sp., *Rotifera* sp. and *Artemia* sp., is available from the results of previous culture activities by BBRBLPP. The data that has been obtained is analyzed descriptively, by explaining according to conditions in the field and supplemented with literature studies from various sources.

RESULTS

Feeding Activity

Feeding is carried out in a variety of ways, with details shown in Table 1.

Table 1. Combination in Feed Time and Type

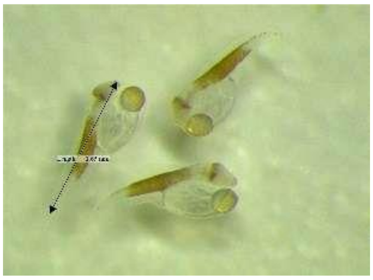
Larvae Age	Type of Feed	Dose	Frequency	Time (WITA)
D0 – D1	Egg yolk			
D2 – D6	*Nanochloropsis*			
	Rotifera	10 ind/ml	2x	08.00; 15.00
D7 – D12	*Nanochloropsis*			
	Rotifera	10 ind/ml	2x	08.00; 15.00
	PSP 5	Ad-satiation	3x	07.00; 11.00; 15.00
D13 – D16	*Nanochloropsis*			
	Rotifera	10 ind/ml	2x	08.00; 15.00
	KAIO 3	Ad-satiation	3x	07.00; 11.00; 15.00
D17 – D27	*Nanochloropsis*			
	Rotifera	10 ind/ml	2x	08.00; 15.00
	KAIO 3	Ad-satiation	3x	07.00; 11.00; 15.00
	Artemia	2 ind/ml	2x	08.00; 15.00

*Note: D = day

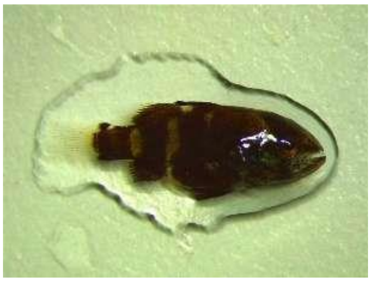
Larvae Growth

The growth of larvae from hatching until day 27 can be seen in Table 2.

Table 2. The Growth of Barramundi Larvae

Age (D)	Picture	Characteristic	Behavior
0-1		The egg is still developing	Fertilized eggs are transparent and float
2-3		The body is transparent, tail and head can already be distinguished, mouth is still closed, has egg yolk. The eyelids are visible but the eyes are not yet open, the internal organs are visible but are still round and not perfect yet	The movement of larvae tends to still follow the current

Age (D)	Picture	Characteristic	Behavior
4-5		The eyes are visible, mouth is open and the body is starting to become pigmented, the internal organs are starting to develop but are not perfect yet.	
6-8		Melanophoral pigment cells have spread and are clearly visible from the back to the base of the tail, the shape of head begins to oval towards, the operculum begins to be visible	Larvae tend to live at the bottom and occasionally rise to the surface
9-11		The head is slightly rounded, shape of the mouth is clearly visible, the lower mouth is longer than the upper one, pigment on tail and dorsal fin begins to appear	
12-14		Segmented cartilage appears on the dorsal fin, the body shape widens and tends to be oval, the body pigment becomes darker and patterned, the base of tail becomes wider	Larvae start to appear on the surface
15-17		The body shape begins to become slimmer, melanophores spread throughout the dorsal and anal ventral fins, the body is dark with white spots on stomach to the back, the tail fin is increasingly developed.	Larvae tend to be on the surface and swim with the current, starting to flock to oxygen sources

Age (D)	Picture	Characteristic	Behavior
18-20		The spines and cartilage on the dorsal and anal fins are well developed and clearly visible	Active fish movement and cannibalistic behavior appears
21-23		The body is dark and there are white spots that resemble lines on the stomach and base of the tail	Larvae tend to swim in groups and against the current
24-27		The color slowly starts brighten; the shape is perfect	Active swimming

Survival Rate

The survival of barramundi larvae at the end of the observation period is shown in Table 3.

Table 3. Survival Results of Barramundi Larvae

Hatching Eggs / Larvae (D0)	Total larvae (D27)	SR	Reference
40.000 ind	31.619 ind	79%	20% (SNI 6145.4, 2014)

Water Quality

The results of water quality measurements carried out to monitor during larvae maintenance are shown in Table 4.

Table 4. Water Quality During Barramundi Larvae Maintenance Activities

Parameter	Unit	Range	Standart Value SNI 6145.4 (2014)
Temperature	°C	28 - 31	28-32
Salinity	ppt	32 - 35	26-33
pH		7.5 - 8.2	7.0-8.5
Dissolved Oxygen	mg/L	3.5 - 6,5	>4

DISCUSSION

Feeding Activity

Feeding of barramundi larvae is carried out when the egg yolk supply in the larvae begins to run out, namely at the age of D2, so that natural food *Rotifera* sp. is given from the age of D2-D27. The provision of Rotifers will be reduced as the larvae age and replaced with pellet feed. Rotifers is the main natural food needed in the maintenance of barramundi larvae. Rotifers have a size that matches the mouth opening of the larvae. The frequency of natural feeding *Rotifera* sp. is 2 times a day at 08.00 and 15.00 WITA with a density of 10 cells/ml. Optimal Rotifers feeding is given twice a day. This is in line with the opinion of Nurmasyitah *et al*. (2018), which stated that feeding rotifers twice a day with a density of 7-10 individuals resulted in a survival rate of 72%. This is further reinforced by research by Supryady *et al*. (2022), which states that the frequency of natural feeding Rotifers twice a day and can last until D30. The feed given is *Rotifera* sp. which originates from the mass culture process.

At the age of D7-D12 larvae, the larvae were given powdered pellet feed, namely PSP. As the larvae developed until D13, the use of powdered pellets was replaced with KAIO 3 feed which was blended first to obtain the appropriate size for the mouth opening of the barramundi larvae. The frequency of artificial feeding was 3 times a day, namely at 07.00, 11.00 and 13.00 WITA. Artificial feeding was carried out using the ad-satiation system, namely feeding until the fish larvae were full. This is in line with the opinion of Astuti *et al*. (2023) that artificial feeding was carried out every 1-2 hours a day. The method of providing artificial feeding to larvae by ad-satiation was given as much as possible until the fish larvae felt full. The most common artificial fish feed found on the market is pellets. Pellets themselves are expected to contain nutrients that have been stipulated by SNI in 2006, namely protein ranging from 20-35%, ash content of 2-10%, fat around 2-10% and water content containing less than 12%.

On D17, barramundi larvae were fed with Artemia. This corresponds to the mouth opening of the larvae. Furthermore, Artemia contains nutrients that can be used by larvae as an energy source for growth and body strength. The frequency of feeding *Artemia* sp. was twice a day, in the morning and evening after administering Rotifers at a density of 2 ind/ml. This is in line with the opinion of Marihati *et al*. (2013) who stated that the nutritional content of *Artemia* sp. is very much needed by larvae, such as protein as much as 52.7%, carbohydrates 15.4%, fat 4.8%, water 10.3%, ash 11.2%

Water Quality and Maintenance

Water quality plays a crucial role in the cultivation of barramundi. Continuous monitoring of water quality is crucial, as poor quality water can cause disease in the larvae. Based on Table 4, water quality parameters for barramundi rearing at the BBRBLPP Gondol are still within the normal range and meet the needs of barramundi larvae. Additionally, Ngoh *et al*. (2015) stated that temperature is a factor influencing dissolved oxygen levels in the culture medium. Low temperatures can increase dissolved oxygen levels. Conversely, increased water temperatures decrease dissolved oxygen levels, impacting fish metabolism (Firmansyah *et al*., 2021). pH levels also affect fish metabolism. The pH values ranged from 7 - 8, which is considered neutral. Neutral pH is one of the criteria for water in normal condition, making it a good habitat for aquatic organism (Diniariwisan & Sumsanto, 2024).

High pH slows fish growth. High pH can also increase energy expenditure for metabolic processes, leading to an accumulation of feces and excretions, and a decrease in growth rate because energy is diverted to metabolic processes (Insivitawati *et al*., 2022).

Dissolved oxygen is a crucial component for survival through respiration, maintaining health, and supporting bacterial activity in the decomposition of fish metabolic waste. Low oxygen levels can impact fish growth, as they are susceptible to stress, hypoxia, decreased swimming activity, and weakened immunity to disease. Conversely, too high levels of dissolved oxygen can also lead to larval mortality, as they are susceptible to swim bladder disease. Salinity affects fish growth through osmoregulation. Low salinity makes it difficult for osmoregulation, leading to death. High salinity makes it difficult for larvae to adapt (Fitrinawati & Utami, 2023).

Probiotic administration is one way to manage water quality. Probiotics are feed additives containing a number of bacteria (microbes) that provide beneficial effects on fish health by improving the balance of intestinal microflora, thus providing protective benefits, disease protection, and improved feed digestibility (Wahyuni, 2024). The probiotic used at BBRBLPP Gondol is AT-Bak probiotics mixed with molasses in a 1:1 ratio. The addition of molasses serves as a prebiotic or carbon source for the probiotic bacteria. The bacteria used in this probiotic consist of four types of bacteria: *Lactobacillus plantarum*, *Lactobacillus fermentum*, *Bacillus subtilis*, and *Pseudomonas putida*. The bacteria that play a role in improving the quality of aquaculture water are *Lactobacillus plantarum* and *Pseudomonas putida*. Both functions to degrade materials containing carbohydrates, proteins, and fats into carbon. Probiotic application is carried out when the larvae are six days old or after being given pellet feed with a frequency of once a day.

Water changes and siphoning are also efforts made to maintain good water quality to support fish growth and survival. Water changes are the process of replacing the water in the maintenance container with new water at a certain percentage (Kevin & Putra, 2022). Siphoning is an effort to clean the bottom of the pond from dirt and leftover food that will rot if allowed to accumulate and will affect the water quality of the maintenance medium. Siphoning is carried out after the larvae are 7 days old, using a special siphoning hose made of PVC pipe connected to a hose. Siphoning is carried out once a day in the morning at 07:30 WITA to prevent stress on the larvae. After that, a water change is carried out by reducing the water in the maintenance medium by 10-20% and adding new water. This aims to ensure that the addition of new water does not cause drastic changes that could lead to larval death. Water changes begin when the larvae are seven days old and are carried out routinely every morning. Changing the water volume is one way to improve water quality in the larvae maintenance medium. The suitability of the aquatic environment can support the life and growth of aquatic organisms and its value is expressed in a certain range (Rebhung *et al*., 2018).

Survival Rate

Based on the observation of the survival of snapper seeds in BBRBLPP Gondol with the distribution of 40,000 barramundi larvae, the survival rate reached 79% at a size of 1 cm with a total of 31,619 barramundi larvae with a maintenance period of 27 days. The survival rate of barramundi larvae is included in the optimal category; this is based on SNI 6145.4 (2014) that the survival rate of white snapper larvae measuring 1-1.5 cm with a maintenance period of 30-32 days is at least 20%. The high survival rate can be influenced by several factors such as sufficient feed nutrition, controlled water or environmental quality, good handling and freedom from pathogenic organisms.

CONCLUSION

The conclusion from this activity is that the survival rate for barramundi larvae, even with the feed combination at BBRBLPP Gondol, showed optimal results of 79%. The combination consisted of providing natural feed (*Rotifera* sp. and *Artemia* sp.) and artificial feed (PSP and KAIO). Furthermore, the addition of probiotics, siphoning, and water changes are crucial for successful larval rearing. This provides an important foundation for the development of efficient and sustainable large-scale barramundi cultivation.

ACKNOWLEDGEMENT

This article is part of Humaero's apprenticeship for undergraduate thesis in the Aquaculture Study Program, University of Mataram. The author would like to express gratitude to BBRBLPP Gondol that facilitating the entire series of activities. We also extend our gratitude to all of laboratory staff and friends for the guidance.

REFERENCES

Astuti, E. P., A'yun, Q., Vitasari, A., & Sari, P. D. W. (2023). Kajian Teknis Budidaya Ikan Kakap Putih (*Lates calcarifer*) di Balai Perikanan Budidaya Air Payau (BPBAP) Situbondo, Kabupaten Situbondo, Jawa Timur. *Jurnal Perikanan Pantura (JPP)*, *6*(1), 269–280.

Aulianto, F., Azhar, F., & Diniariwisan, D. (2025). Effectiveness of Stocking Density on Growth and Feed Consumption of Barramundi (*Lates calcarifer*). *Jurnal Biologi Tropis*, *25*(1), 1065–1073. https://doi.org/10.29303/jbt.v25i1.8762

Darosman, T. C., Muhammadar, A. A., & Satria, S. (2019). Pengkayaan Rotifera (*Brachionus plicatilis*) dengan *Chlorella* sp. Untuk Pakan Larva Ikan Kakap Putih (*Lates calcarifer*). *Jurnal Ilmiah Mahasiswa Kelautan Perikanan Unsyiah*, 4 (2).

Diniariwisan, D., & Sumsanto, M. (2024). Analisis Kualitas Air Guna Mendukung Pengembangan Budidaya Ikan Berbasis Keramba. *Jurnal Perikanan Pantura*, *7*(2), 517–523. https://doi.org/https://doi.org/10.30587/jpp.v7i2.8412

Firmansyah, M., Tenriawaruwaty, A. & Hastuti, H. (2021). Study of Water Quality for Milkfish Cultivation (*Chanos chanos* Forsskal) in Fishpond of Samataring Village, East Sinjai Sub-District, Sinjai Regency. Tarjih: *Fisheries and Aquatic Studies,* 1(1):14-23.

Fitrinawati, H., & Utami, E. S. (2023). Performa Pertumbuhan Kakap Putih (*Lates Calcarifer*) dalam Karamba Jaring Apung, Tual, Maluku. *JSIPi (Jurnal Sains Dan Inovasi Perikanan)*, *7*(2), 158-165.

Hasibuan, R. B., Irawan, H., & Yulianto, T. (2018). Pengaruh Suhu Terhadap Daya Tetas Telur Ikan Kakap Putih (*Lates calcarifer*). *Intek Akuakultur*, *2*(2), 49-57.

Insivitawati, E., Hakimah, N., Chuldhori, M. S. (2022) Effect of Temperature pH, and Salinity on Body Weight of Asian Seabass (*Lates calcarifer*) at Different Stockings. IOP Conf. Series: Earth and Environmental Science. 1036.

Kevin, K., & Putra, W. K. A. (2022). Efek Pergantian Air dengan Persentase yang Berbeda Terhadap Tingkat Kelangsungan Hidup Larva Ikan Kakap Putih (*Lates calcarifer*). *Jurnal Intek Akuakultur*, *6*(1), 1-12.

Marihati, Muryati dan Nilawati. (2013). Budidaya *Artemia salina* Sebagai Diversifikasi Produk dan Biokatalisator Percepatan Penguapan di Ladang 25 Garam Penelitian Madaya Balai Besar Teknologi Pencegahan Pencemaran Industri. *Jurnal Agromedia*, 31(1), 57-66.

Ngoh, SY., Tan, D., Shen, x., Kathiresan, P., Jiang, J., Liew, WC. (2015). Nutrigenomic and Nutritional Analyses Reveal the Effects of Pelleted Feeds on Asian Seabass *(Lates calcarifer*). 10 (12)

Nurmasyitah, Defira, C. N. & Hasanuddin. (2018). Pengaruh Pemberian Pakan Alami yang Berbeda Terhadap Tingkat Kelangsungan Hidup Larva Ikan Kakap Putih (*Lates calcarifer*). *Jurnal Ilmiah Mahasiswa Kelautan Perikanan Unsyiah,* 3 (1), 56–65.

Purwati, S., & Diniariwisan, D. (2025). Growth and Maintenance of Abalone Seeds (*Haliotis Squamata*) with Seaweed Feed at Balai Perikanan Budidaya Laut Lombok. *Journal of Fish Health*, *5*(2), 134–141. https://doi.org/10.29303/jfh.v5i2.6283

Rebhung, P. H., Umbu Rasa, F., & Tallo, I. (2018). Pengaruh Volume Pergantian Air Media Terhadap Kelulushidupan Larva Ikan Lele Sangkuriang (*Clarias gariepinus*). *Jurnal Aquatik, 1*(1), 18-23.

Ridho, M., & Patriono, E. (2016). Aspek Reproduksi Ikan Kakap Putih (*Lates calcarifer* Bloch) di Perairan Terusan Dalam Kawasan Taman Nasional Sembilang Pesisir Kabupaten Banyuasin. *Jurnal Penelitian Sains*, *18*(1), 168427.

Sahputra, I., Khalil, M., & Zulfikar, Z. (2017). Pemberian Jenis Pakan yang Berbeda Terhadap Pertumbuhan dan Kelangsungan Hidup Benih Ikan Kakap Putih (*Lates calcarifer*, Bloch). *Acta Aquatica: Aquatic Sciences Journal*, *4*(2), 65–75.

SNI 6145.4:2014. Produksi Benih Ikan Kakap Putih (*Lates calcarifer,* Bloch). 1790. Bagian 3: produksi induk. BSNI 6145.3:2014. Jakarta.

Supryady, S., Kurniaji, A., Syahrir, M., Budiyati, B., & Hikmah, N. (2022). Derajat Pembuahan dan Penetasan Telur, Pertumbuhan dan Kelangsungan Hidup Larva Ikan Kakap (*Lates calcarifer*). *Jurnal Salamata*, *3*(1), 7–12.

Wahyuni, E. S. (2024). Isolasi Dan Identifikasi Bakteri Asam Laktat Bersifat Mannanolitik Yang Berasal Dari Ileum Itik Kerinci Sebagai Kandidat Probiotik. *Doctoral Dissertation.* Universitas Jambi.

Zulfiani, Djawad, M. I., Zainuddin, Hamka, & Iman Sudrajat. (2019). Efisiensi Penyerapan Kuning Telur Pralarva Ikan Kakap Putih (*Lates calcarifer*, Bloch) pada Suhu Yang Berbeda. *Prosiding Simposium Nasional Kelautan dan Perikanan IV. Universitas Hasanuddin, Makasar*, *21*(1995), 367–373.