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EVALUATION OF MUTIARA STRAIN CATFISH SEED PRODUCTION (*Clarias* sp.) AT UPR FARM 169 KUBU RAYA, WEST KALIMANTAN

Evaluasi Produksi Benih Ikan Lele Mutiara (Clarias sp.) di UPR Farm 169 Kubu Raya, Kalimantan Barat

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ABSTRAK

Ikan lele mutiara merupakan salah satu komoditas unggulan di sektor budidaya ikan air tawar di Indonesia. Ikan lele memiliki keunggulan kualitas daging yang baik, laju pertumbuhan yang cepat, serta dapat hidup dengan kepadatan yang tinggi. Ketersediaan benih secara kontinue menjadi salah satu faktor penting dalam memenuhi permintaan benih ikan lele di Kalimantan Barat. Beberapa permasalahan yang dihadapi pembudidaya adalah pembudidaya belum mengetahui tingkat produktivitas hasil budidaya yang dilakukan, sehingga aktivitas usaha dilakukan secara tradisional sebagian besar pembudidaya dalam melakukan usaha belum memperhatikan aspek teknis. Penelitian ini bertujuan untuk mengevaluasi sistem produksi benih ikan lele di Farm 169, Kubu Raya, Kalimantan Barat. Proses pembenihan meliputi persiapan kolam, seleksi induk, pemijahan, penetasan telur, pemeliharaan larva dan pemanenan larva, pemberian pakan, pemberian dan pengelolaan kualitas air. Penelitian dilaksanakan dengan pendekatan deskriptif yakni mengikuti dan mengamati serangkaian kegiatan produksi di lokasi pengambilan data. Metode pengumpulan data meliputi observasi yakni melakukan pengamatan kegiatan di lokasi, wawancara dan partisipasi aktif melakukan kegiatan produksi. Hasil perhitungan fekunditas ikan lele mutiara diperoleh jumlah telur sebanyak 142.200 butir, derajat pembuahan sebesar 85,08 %, derajat penetasan sebesar 83,12 %, dan tingkat kelangsungan hidup larva sebesar 92,62 %.

ABSTRACT

Mutiara Strain Catfish is one of the leading commodities in the freshwater fish farming sector in Indonesia. Catfish has the advantage of good meat quality, a fast growth rate, and can live at high density. The continuous availability of seeds is one of the key factors in meeting the demand for catfish seeds in West Kalimantan. Some of the problems faced by farmers are that they do not yet know the level of productivity of the cultivation results they achieve, so that business activities are carried out traditionally. Most farmers, when conducting their business, have not paid attention to technical aspects. This study aims to evaluate the catfish seed production system at Farm 169, Kubu Raya, West Kalimantan. The seeding process includes pond preparation, broodstock selection,

spawning, egg hatching, larval maintenance and harvesting, feeding, providing and managing water quality. The study employed a descriptive approach, involving the observation of a series of production activities at the data collection location. Data collection methods include observation, which consists of observing activities in the area, as well as interviews and active participation in production activities. The results of the fecundity calculation of Mutiara catfish showed that the number of eggs was 142,200, the fertilization rate was 85.08%, the hatching rate was 83.12%, and the larval survival rate was 92.62%.

Kata Kunci	*Produksi, Clarias gariepinus, Evaluasi, Lele mutiara, Pembenihan*
Keywords	*Breeding, Clarias gariepinus, Evaluation, Production, Mutiara strain catfish*
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INTRODUCTION

Clarias sp. is one of the primary commodities in the freshwater fish farming sector in Indonesia. Catfish have the advantages of good meat quality, fast growth rate, and can live at high densities (Adamek et al., 2011). Mutiara catfish (Clarias sp.) is a catfish resulting from individual selection from the Sukamandi Fisheries Centre, published by the Ministry of Marine Affairs and Fisheries (KKP) in 2015. Mutiara catfish has an elongated body morphology, is not scaly, and has a flat and long head that almost reaches a quarter of its body length (Saputri & Razak, 2018). Mutiara catfish is one of the most popular freshwater fishery commodities.

According to data from the Ministry of Marine Affairs and Fisheries (KKP) for 2021, Indonesia's catfish production was 1.04 million tons, increasing to 1.37 million tons in 2022. Domestic demand for catfish shows a consistent increasing trend. Data from the Ministry of Maritime Affairs and Fisheries (KKP, 2020) noted that the national catfish production target increased from 1.39 million tons in 2020 to 1.65 million tons in 2024. However, production achievement until 2023 reached 1,137,807 tons. This indicates a shortage of 514,193 tons, equivalent to 31.12% of the target (DJPB, 2023).

Sustainable seed availability is a crucial factor in meeting this demand. Seed production is significantly influenced by the quality of the broodstock and the spawning techniques used. One strategy that can be used to increase seed production is through gonad maturation engineering. These efforts include optimizing broodstock feed nutrition and using hormonal induction techniques to stimulate the maturation process (Nainggolan et al., 2014). The quality of nutrients in broodstock feed and its ability to store energy are important determinants of gonad maturation time (Mañanós et al., 2008), which further contributes to improving the quality of eggs, larvae, and seeds (Sangsawangchote et al., 2010).

Good maintenance of catfish (Clarias sp.) broodstock is closely related to feed management, as this is the primary factor in successful cultivation. Catfish broodstock generally require a protein content of 35-40% to achieve optimal growth (SNI 2014). In addition, the application of hormonal induction technology has been proven effective in accelerating and standardizing gonad maturation and increasing hatching efficiency in various farmed fish species. Good broodstock management is also an essential aspect in

improving reproductive quality and performance, as well as anticipating future productivity declines.

Some of the problems faced by farmers are that they do not yet know the level of productivity of the cultivation results they are achieving, so that business activities are carried out traditionally. Most farmers, when conducting their business, have not paid attention to technical aspects (Aprilia et al., 2021). This study aims to evaluate the catfish seed production system at Farm 169, Kubu Raya, West Kalimantan.

METHOD

Time and Place

Data collection was conducted from April 22 to July 26, 2024, at the Farm 169 Kubu Raya in Kubu Raya Regency, West Kalimantan.

Cara Pembenihan Ikan yang Baik (CPBI)

Catfish farmers have implemented Good Fish Seeding Practices (CPBI) (Certificate No. 2656.3105.A2.B1-Form CPIB23) in producing quality catfish seeds, which include technical, managerial, food safety, and environmental requirements. The CPIB standard is used to obtain a certificate from the Directorate General of Aquaculture. CPIB is a seed quality management system to produce quality seeds that meet food safety and environmentally friendly requirements. In addition to the sufficient quantity of seeds, seed quality is also a key determining factor in the success of a cultivation business. To produce high-quality seeds, seeding activities must employ techniques in accordance with established standards and procedures. The CPIB references used for catfish seed production are SNI 8035:2019 for Good Fish Seeding Practices and SNI 6484.1:2014 for catfish seeding.

Research Procedure

The research was conducted using a descriptive approach, namely following and observing a series of production activities at the data collection location. Data collection methods include observation, which involves observing activities in the area, as well as interviews and active participation in the production process.

Data Analysis

The data obtained from the research results, in the form of ecological, biological, economic, and sociological data, were analysed descriptively and processed using Microsoft Excel 2013. Ecological data obtained from the research results, in the form of biological, economic, and sociological data, were analysed descriptively and processed using the Microsoft Excel 2013 program. The data grouping is presented in Table 1.

Table 1. Data Grouping

No.	Study	Data Type
1	Ecology	a. Management of cultivation containers
		b. Water quality management
2	Biology	a. Measurement of fecundity, degree of production, hatching rate, and survival rate
		b. Feed preparation and biosecurity program
3	Economy	a. Calculation of costs (input and output) and profit and loss
		b. Calculation of Break-Even Point

RESULTS

Ecology Aspects

The management of the cultivation container on farm 169 is carried out before starting production activities, consisting of preparing the maintenance container and broodstock stocking, preparing the spawning container, and preparing the egg hatching container. The stages of cultivation container management are presented in Table 2. Management of cultivation media is carried out from the preparation stage through maintenance and post-harvest. The stages of cultivation media management are presented in Table 3, and water quality measurements are presented in Table 4.

Table 2. Management of seed containers

No.	Parameters	Result
1	Type and size of container	The tarpaulin pond is rectangular with dimensions of 1.80 m x 1 m x 70 cm for broodstock maintenance, 2.90 m x 1.80 m x 70 cm for spawning, egg hatching and larval rearing.
2	Preparation of broodstock maintenance containers, broodstock, spawning, and egg hatching	The tub is dried for 1 day, then brushed evenly, and finally rinsed with clean water to remove dirt and moss. Furthermore, sterilisation is carried out. The container is installed with aeration and given kakaban as a fish substrate for catfish spawning. The egg hatching container used is a spawning container.

The following table presents the results of observations on the maintenance of seed media, which include three main parameters, namely water source, water filling, and water sterilization process. This third aspect is a crucial component in the early stages of seeding, as it directly impacts the quality of the environment where eggs hatch and larvae develop. The selection and treatment of the right water media will determine the hatching rate success and larval survival rate (Table 3).

Table 3. Management of seed media

No.	Parameters	Result
1	Water source	Sungai kapuas yang telah diendapkan
2	Water filling	Water filling is done before the activity begins. The height of the water used ranges from 20 to 50 cm, with a corresponding water volume of 1,044 to 900 litres.
3	Water Sterilisation	Redbuldok and EM4 as much as 835.2 ml of water in egg hatching.

The results of measuring water quality parameters used during the fish breeding process, especially temperature and pH (Table 4).

Table 4. Results of water quality measurements

No.	Parameters	Result
1	Temperature	29-30 ℃ for broodstock maintenance, spawning and larval rearing 26-30 ℃ for egg hatching.
2	pH	7-8 for broodstock maintenance, 6-9 for egg rearing, 6.5- 9 for egg hatching and 6.5- 8 for larval rearing.

These two parameters are crucial for supporting the success of broodstock maintenance, spawning, egg hatching, and larval rearing. The optimal temperature and pH range will create an environment that promotes development and larval survival.

Biology Aspect

Observation of biological aspects of performance includes fecundity parameters, fertilization rate, hatching rate, survival, and feeding program. The results of the Mutiara catfish seeding performance measurements are presented in Table 5.

Table 5. Catfish seed performance parameters

No.	Parameters	Result
1	Broodstock selection	The broodstock originates from the branch of dinas kelautan dan perikanan wilayah utara Subang (CDKPWU), with broodstock aged 1.5 years. The body shape of the male broodstock is slimmer and longer. The genitals are pointed and extend towards the back. The body shape of the female broodstock is larger and fuller, and the stomach is bloated and soft. The genitals are round with a wide hole and are red. If massaged towards the genital hole, they will release eggs.
2	Spawning Method	Semi-artificial spawning
3	Hormone dosage	0,3 ml/Kg
4	Fecundity	142.200 eggs
5	Number of fertilized eggs	120.983 eggs
6	Fertilization rate	85.08 %
7	Number of larvae hatched	100.561 larvae
8	Hatching rate	83.12 %
9	Number of larvae after 14 days	93.144 larvae
10	Survival rate after 14 days	92.62 %

The following table presents information on the broodstock feeding program and biosecurity measures implemented during the breeding process. Proper feeding, in terms of type, nutritional content, prolis dosage, and frequency, is an essential factor in supporting the reproductive quality of broodstock fish (Table 6).

Table 6. Feeding and biosecurity programs

No.	Parameters	Result
1	Broodstock feed	Hi-Provite 781-2
2	Broodstock feed content	Protein Min 31 %, Fat Min 5 %, Fiber Max 8 %, Water content Max 13 %, Ash content Max 12 %
3	Prolis dosage in feed	15 ml prolis in 0.5 liters of water for 1 kg of feed
4	How to give prolis to broodstock feed	Prolis 30 ml is added to 0.5 litres and stirred evenly. Next, it is poured into 1 kg evenly and stored in an airtight container for 12 hours.
5	Frequency of feeding the broodstock	2 times a day

No.	Parameters	Result
6	Duration of feeding with additional prolis	60 days
7	Biosecurity	
	a. Water	a. Filter and sterilization
	b. Container	b. Installation of netting on top of the container
	c. Tools	c. Washing with ekstradine

Additionally, biosecurity measures, encompassing water, container, and equipment management, are implemented to prevent contamination and maintain the health of the breeding environment. The combination of feed management and biosecurity aims to increase the efficiency and success of fish seed production.

Economy Aspect

The parameters of business analysis in the study of economic aspects include costs incurred and income, profit and loss calculations, and break-even points. The results of the finansial analysis calculations are presented in Table 7.

Table 7. Financial analysis

No.	Parameters	Result
1	Investment cost	Rp. 24.711.500
2	Variable cost	Rp. 494.279
3	Production cost	Rp. 2.218.000
4	Revenue	Rp 2.712.279
5	Profit	Rp.8.532.297
6	*Break Event Point* (BEP)	
	a. BEP price	a. Rp.26.943
	b. BEP Production	b. 54.710 larvae

DISCUSSION

According to Buwono *et al*., (2021), Mutiara catfish can grow quickly, so it has the potential to be developed in cultivation to replace other types of catfish. Female Mutiara catfish begin to mature gonads when they reach the age of 10 months, and like other African catfish, 1.5 months (6.5 weeks) after spawning, can mature again (rematuration) with a proportion of mature broodstock of 64% (Iswanto *et al*., 2016).

Changes in annual water temperature, photoperiod, and increased water levels resulting from rainfall influence the maturation process of African catfish, stimulating the spawning process (de Graaf & Janseen, 1996). Reproductive problems are a significant challenge in catfish cultivation activities. The seasonal reproductive patterns of catfish often hinder the sustainable production of high-quality larvae and seeds. The gonad maturation process typically begins at approximately 10 months of age, with a spawning frequency of every 1.5 months (Enditha *et al*., 2021). Maintenance of catfish broodstock is given hiprovite 781 pellet feed with 31% protein content. High protein content will accelerate the gonad maturation process. Feeding is done ad libitum by spreading feed little by little. Broodstock is fed twice daily, at 12:00 p.m. and 7:00 p.m. In addition, the feed given is supplemented with additional nutrients (prolis) to increase the nutrient value required by the broodstock. Adding nutrient value to feed can stimulate gonad maturation, resulting in the production of high-quality eggs (Ardyanti *et al*., 2017).

Seeding activities are the initial stage of a series of fish farming efforts. The success of a fish seeding effort is influenced by factors such as the maturity of the fish to be

spawned, the food given during maintenance and environmental conditions. Spawning is the process by which the female broodstock releases eggs and the male broodstock releases sperm, which are then followed by mating. Spawning, as one of the reproductive processes, is a crucial link in the life cycle that determines the survival of the species (Sinjal, 2014).

The Mutiara catfish broodstock has been raised for 2 months in the broodstock maintenance pond, carried out in farm pond 169. The selection activity of broodstock ready to spawn is a critical activity in an effort to select good seeds, so that production can increase with superior characteristics. Maintenance of male and female broodstock of Mutiara catfish is carried out in separate ponds. This aims to facilitate management and to prevent unexpected spawning (Ardyanti *et al*., 2017).

Catfish seeding is carried out in tarpaulin ponds. Tarpaulin ponds are easy to make, do not require a large area, require a relatively small amount of capital, and the catfish harvesting process is easy. The advantages of using tarpaulin ponds include that they are easy to make, and the pond temperature is more stable than that of earthen ponds. Additionally, the costs incurred are lower than those of using permanent ponds (Abidin *et al*., 2019).

This study also examines economic aspects. According to Hakim (2020) fixed costs are the total costs that must be incurred during one production cycle with or without production being carried out and do not change even though the amount of production and sales of production results change. The Break-Even Point (BEP) is a state of business that neither experiences losses nor makes a profit, resulting in a balance, also known as the break-even point (Primyastanto *et al*., 2019). Based on calculations, the BEP value of the product type is 54,710 larvae, and the BEP sales value is IDR 26,943. According to Wibowo *et al*., (2022) explains that the concept of Break-Even analysis can help owners of catfish farming businesses plan profits and control business activities, thereby minimising losses that could lead to business closure.

Decreased water quality can cause various problems in Sangkuriang catfish cultivation, including stunted fish growth, the emergence of reproductive disorders in fish, reduced feed conversion ratios, and even death (Sinurata *et al*., 2021).

CONCLUSION AND SUGGESTION

Conclusion

The Mutiara catfish broodstock produced a fecundity of 142,200 eggs. The series of seeding activities includes pond preparation, broodstock selection, spawning process, egg hatching, maintenance and harvesting of larvae, seed distribution, feeding, and water quality management. The fertilization rate was 85.08 %, while the hatching rate reached 83.12 %. The average survival rate of catfish larvae at the age of 14 days was 92.62 %. During the larval maintenance period, the water quality parameters were optimal, with temperatures ranging from 26 to 30 °C and a pH of 6–9.

Suggestion

For the improvement and evaluation of Mutiara catfish seed production, farmers are advised to periodically select superior broodstock and record each stage of production in detail. Providing nutritious feed and optimal water quality management, including temperature and pH control, is crucial for supporting the growth and survival of larvae. Semi-artificial spawning techniques, combined with the proper dosage of hormones, also need to be applied consistently. Evaluation of production results, such as

fertilization and hatching rate, must be carried out every cycle. With sound and data-based management, business productivity and efficiency can continue to be improved.

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