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SEED PRODUCTION TECHNOLOGY OF PANGASIUS FISH (*Pangasius* sp.) AT THE MOJOKERTO AQUACULTURE INSTALLATION (IPB)

Teknologi Produksi Benih Ikan Patin (*Pangasius* sp.) di Instalasi Perikanan Budidaya (IPB) Mojokerto

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ABSTRACT

This study discusses the implementation of technology and management in the seed production of catfish (*Pangasius* sp.) at the Mojokerto Aquaculture Installation (IPB). A descriptive method was employed, involving observation, interviews, active participation, and the use of secondary sources. Artificial spawning was conducted using Ovaprim hormone, and larvae were reared under controlled environmental conditions. The results showed a fertilization rate of 87% and a hatching rate of 91%. The first nursery phase yielded 673,036 fry, while the second nursery phase produced 538,560 fry, with respective survival rates of 71.5% and 80%. Key success factors included high-quality broodstock selection, proper feed and water quality management, and the use of effective aeration technology. However, challenges such as limited availability of quality broodstock, water quality fluctuations, and lack of skilled personnel persist. The study concludes that the application of modern hatchery technology can significantly improve catfish seed production and has potential for replication in other regions.

Keywords: Aquaculture, Hatchery, Mojokerto Aquaculture Installation (IPB), Patin Fish (*Pangasius* sp.)

ABSTRAK

Penelitian ini membahas penerapan teknologi dan manajemen dalam produksi benih ikan patin (*Pangasius* sp.) di Instalasi Perikanan Budidaya (IPB) Mojokerto. Metode deskriptif digunakan dengan pendekatan observasi, wawancara, partisipasi aktif, serta pemanfaatan sumber data sekunder. Proses pembenihan dilakukan melalui teknik pemijahan buatan menggunakan hormon Ovaprim dan pengelolaan larva dalam lingkungan terkendali. Hasil penelitian menunjukkan tingkat fertilisasi mencapai 87% dan penetasan larva sebesar 91%. Pendederan I menghasilkan 673.036 ekor benih, dan Pendederan II menghasilkan 538.560 ekor benih, dengan *survival rate* berturut-turut sebesar 71,5% dan 80%. Keberhasilan ini didukung oleh pemilihan induk unggul, pengelolaan pakan dan kualitas air yang optimal, serta penggunaan teknologi aerasi yang memadai. Namun, tantangan yang dihadapi mencakup keterbatasan induk berkualitas, fluktuasi kualitas air, dan keterbatasan sumber daya manusia. Penelitian ini menyimpulkan bahwa penerapan teknologi pembenihan modern dapat meningkatkan produksi benih ikan patin dan berpotensi direplikasi di daerah lain.

Kata Kunci: Budidaya, Ikan Patin (*Pangasius* sp.), Instalasi Perikanan Budidaya (IPB) Mojokerto, Pembenihan

INTRODUCTION

Indonesia as an archipelagic country has great potential for fisheries and marine resources, one of which is through freshwater fish farming (Maktum *et al.*, 2022). The demand for catfish (*Pangasius* sp.) continues to increase, even in international markets such as China, Thailand, and Latin America (Agriansa *et al.*, 2020). To meet this demand, Indonesia needs to increase catfish production. Currently, the largest contribution to catfish farming comes from Sumatra (68.07%), Kalimantan (20.23%), and Java (8.48%) (Ministry of Maritime Affairs and Fisheries, 2018).

The increase in catfish production in Indonesia has progressed significantly every year. According to the Ministry of Marine Affairs and Fisheries (2022), catfish production in 2021 was recorded at 332 tons, and in 2022 it almost doubled, reaching 635 tons. This increase has a positive impact on catfish farmers, who are then required to increase cultivation results and overcome various obstacles in cultivation so that the results obtained can be maximized (Central Statistics Agency of East Java Province, 2023), but the potential for development remains very large. This low production is thought to be caused by various factors in the cultivation process, one of which is the limited quality of seeds. This is in line with Wangni *et al.*, (2019), which states that one of the main obstacles in catfish cultivation is the high mortality rate in the larval stage, which has an impact on the availability of seeds. Therefore, efforts to increase catfish production in Mojokerto are highly dependent on optimizing the seeding process and implementing better cultivation technology, in order to support the achievement of more optimal results.

The Mojokerto Aquaculture Installation (IPB) has an important role in supporting the development of fisheries in this region. IPB Mojokerto has various advantages that can be a solution to increasing productivity. This installation applies modern technology in the fish cultivation process, which helps increase production efficiency and facilitates cultivation management. In addition, water management is carried out properly to ensure that the water quality remains clean and free from pollution, which is very important for fish health and successful breeding. IPB Mojokerto also produces various types of high-quality freshwater fish, including catfish, tilapia, patin, and tilapia, so that it can meet the needs of the local market and wider demand. In fact, the size of the seed trade at IPB Mojokerto is quite large, with production reaching 461,500 in 2023.

In addition to acting as a production center, IPB Mojokerto also provides technical assistance and supervision for farmers who use its services. This assistance aims to help farmers manage their businesses more effectively and efficiently, especially in understanding the techniques of breeding and management of patin fish nurseries. With the support of technology and assistance, it is hoped that patin fish production in Mojokerto can increase significantly. Therefore, this study aims to analyze the catfish seed production technology applied at the Mojokerto Aquaculture Installation (IPB) in order to identify strategies that can increase catfish production in this region.

METHODS

This research activity was carried out at the Mojokerto Aquaculture Installation (IPB) located on Jl. Raya Jend. Sudirman, Mojokerto, East Java. This activity took place from July

29, 2024 to September 13, 2024. The method used is descriptive, which describes phenomena with accurate and systematic data (Sahir, 2021). The author was directly involved in all activities to analyze data that occurred in the field. Data were obtained from primary and secondary sources. Primary data were obtained through interviews, observations, and active participation, while secondary data were obtained from books, journals, and sites relevant to catfish breeding.

The tools used for data collection include fiber tubs, scoops, aquariums, basins, pH paper, mini glasses, aeration, salt, and aeration stones. Data processing includes monitoring larval growth, water quality, broodstock quality, eggs, sperm, and the growth rate of catfish (*Pangasius* sp.) seeds. In this study, several formulas were used to assist the research carried out. In calculating the dose of ovaprim, the formula for weighing the weight of the catfish broodstock multiplied by 0.7 mL/kg is used, then a 1:1 NaCl solution is added. This activity is used to determine the dose used before spawning. Then the fecundity calculation is carried out to determine the number of eggs produced. The fecundity formula is (gonad weight / sample weight) × eggs in the sample.

To determine the number of eggs that are successfully fertilized, the Fertilization Rate formula is used = live eggs / fertilized eggs × 100%. Meanwhile, to determine the number of eggs that hatch, the hatching rate formula is used, namely eggs that hatch / fertilized eggs × fertilized eggs. Which nursery formula is used to determine the number of seeds produced in the research activity. In this study, two nurseries were carried out, so 2 formulas were used, namely nursery I and nursery II. The nursery I formula is the total nursery I / HR III broodstock catfish × 100%. Meanwhile, the formula for nursery II is the total of nursery II / nursery I × 100%.

RESULTS

IPB Mojokerto was originally called Balai Benih Ikan which was established in 1981 under the Fisheries Service of Mojokerto Regency. In 1986, it changed its name to Model Pembenihan Ikan Lele, and in 2010 to Unit Pengelola Budidaya Air Tawar (UPBAT). In 2014, its name became Instalasi Budidaya Air Tawar (IBAT) and in 2019, it changed to Instalasi Perikanan Budidaya (IPB) Mojokerto under the auspices of the Maritime Affairs and Fisheries Service of East Java Province. The area of IPB Mojokerto is a lowland area, with most of its area being rice fields. The area of IPB Mojokerto is 8,650 m² consisting of office buildings, ponds, and supporting facilities. The total building area at IPB Mojokerto is around 909.91 m², and there are around 86 ponds/tanks of various sizes. The total area of production ponds reaches 6,325 m². IPB Mojokerto also has an empty land area of 1,416 m². IPB Mojokerto is committed to providing quality fish seeds, as well as good quality broodstock candidates. Consumer services are available every working day from 08.00 to 16.00 WIB, with sales of fish seeds such as catfish, patin, wader, and prospective catfish broodstock.

Patin Fish Seeding Technology (*Pangasius* sp.)

In the process of breeding patin fish (*Pangasius* sp.), IPB Mojokerto uses hormonal induction techniques to ensure high-quality patin fish seeding results. The following are the stages in the patin fish seeding technique at IPB Mojokerto.

Broodstock Management


Figure 1. Patin Fish Broodstock

Patin fish broodstock at IPB Mojokerto come from Sukamandi, West Java, with a total of around 96, consisting of 49 male broodstock and 47 female broodstock, with an average age of around 5 years. Male fish have slender and long bodies, with bright skin color and swollen dark red papillae that release sperm. Meanwhile, female broodstock have swollen cloacas and release brownish eggs when pressed. Maintenance of patin broodstock at IPB Mojokerto is done by dividing the fish into two separate ponds, but the male and female broodstock are not separated. Feeding is done twice a day until the fish feel full, ensuring that there is no leftover food left in the pond.

Patin broodstock are fed ad libitum (according to the fish's needs) one week before spawning, meaning that the fish are given sufficient feed and are free to eat as needed. This aims to ensure that the fish get optimal nutritional intake, support health, and prepare them for a successful spawning process.

Spawning Technique

Patin fish spawning begins with the spawning stage, which aims to prepare the broodstock fish to be ready to spawn. Siamese catfish broodstock that are ready to spawn are placed in four temporary holding ponds measuring 2x2 m² and 1 meter deep. This pond is divided for female and male broodstock, as well as a water inlet and outlet system. The water used is well water that has been stored for 24 hours and distributed with a discharge of 0.5 liters/second. At the spawning stage, the broodstock are given a fasting condition, namely without being fed for 24 hours, to prepare their physical condition before spawning. After spawning, the broodstock are then transferred to a broodstock pond measuring 5x7 m² with a depth of 2 meters, which is made of concrete with a ground base. This pond is equipped with water inlets and outlets from irrigation to maintain optimal water quality.

Next, preparations are made for hatching the eggs. Egg hatching is done in several places, such as an aquarium measuring 80x40x50 cm² and a round fiber tub with a diameter of 2 meters. The hatching process lasts for 22 hours with water temperature settings between 28-30°C, pH 6.5, and DO 5 mg/L. To prevent the eggs from clumping, an aerator is used with a not too strong intensity. Fertilized eggs are clear, while unfertilized eggs are milky white. After that, water preparation is carried out for spawning which is done by settling the water for 24 hours. Optimal water quality is very important for successful spawning, so the temperature is maintained between 28-30.5°C, pH between 6.2-6.5, and DO around 3.5-3.8 ppm.

In the next stage, the female broodstock that has been treated is injected with the hormone Ovaprim to stimulate egg maturation. The dose of Ovaprim given is adjusted to the body weight of the broodstock and mixed with a 1:1 NaCl solution. Here is a Table of Ovaprim doses given to patin fish broodstock.

Table 1. Ovaprim Doses Given

Female Catfish Broodstock	Body Weight (kg)	Amount of Ovaprim Required (mL/kg body weight)	Information
1	2.85	1.99	The dose required for injection will be added with a 1:1 NaCl solution
2	3.20	2.24	
3	3.50	2.45	

After hormone injection, the fish enter a latent period, which is a phase in which hormones begin to work to mature the fish's gonads, but significant physical or behavioral changes have not been seen. This latent period lasts between 24 and 48 hours, depending on various factors such as hormone dosage and environmental conditions. Research by Koh & Lee (2016) states that water quality, temperature, and proper feeding greatly affect the success of hormone induction and the readiness of fish for spawning.

After the latent period is complete, fecundity calculations are carried out to determine the number of eggs produced by each broodstock. The results of the fecundity calculation show that broodstock I produced 240,500 eggs, broodstock II produced 440,248 eggs, and broodstock III produced 507,904 eggs. The average fecundity obtained was 396,217 ± 139,033 eggs.

Table 2. Calculation of Fecundity of Patin Fish Broodstock

Broodstock	Broodstock Weight (g)	Number of Eggs per Gram (grains/g)	Fecundity (eggs)
Broodstock I	370	325	240,500
Broodstock II	487	452	440,248
Broodstock III	496	512	507,904
Average	-	-	396,217 ± 139,033

After fecundity is calculated, the broodstock that are ready will undergo a stripping stage, which is carried out 24 to 48 hours after hormone injection. At this stage, mature eggs are carefully taken through a stripping procedure slowly from the stomach to the urogenital opening, ensuring that the eggs are not exposed to water, as this can cause the micropylar canal to close and inhibit fertilization.

Figure 2. Stripping the Female Broodstock

Figure 3. Stripping the Male Broodstock

After stripping, fertilization is carried out, which is the process of uniting male and female gametes. In this study, fertilization was carried out by mixing the stripped eggs with sperm from the male broodstock. Fertilization is calculated using the Fertility Rate (FR) formula, where the fertilized eggs are counted and it was found that the fertility was 87%. Thus, the number of fertilized eggs obtained per broodstock is 344,709 embryos.

Furthermore, the fertilized eggs are placed in an aquarium that has been aerated. The hatching process took place with a hatching rate (HR) of 91%, which means that the number of eggs hatched was 313,685 larvae per broodstock.

The hatched larvae were then kept in a 1x0.5x0.3 m^3 aquarium with a water height of 25 cm, where each aquarium was filled with 2,000-3,000 larvae. Feeding began after food reserves ran out at the age of 2 days, using artemia nauplius or Daphnia sp. as the main feed. At the age of 6-7 days, worms were fed gradually. Feed was given ad libitum according to the needs of the larvae. The optimal temperature for larval growth is between 28-31°C, because temperatures lower than 27°C can reduce the larvae's appetite. Water quality is also maintained by replacing 30%-90% of the water every day starting from the larvae being 5 days old until they are 11-13 days old.

Natural Feed and Seed Maintenance

Natural feed such as Artemia and silkworms (*Tubifex* sp.) are important components in fish seed maintenance, especially at the larval stage, because of their high nutritional content and size according to the larval mouth opening (Hamron *et al.*, 2018). Feeding is adjusted to the age of the larvae. In the first week, larvae are given silkworms twice a day, morning and evening. At the age of two weeks, the provision of silkworms is increased. Artemia can be easily cultivated, while silkworms can be obtained from nature or cultivated in mud media by maintaining water quality.

Feed management is very important to ensure optimal larval growth. Feed must be given regularly, adjusted to the eating habits of fish in their natural habitat, and in the right amount to prevent waste and maintain water quality. Water changes are carried out routinely with the use of probiotics, as well as maintaining the water temperature at 28–32°C and pH 7–8.

Nursery

Nursery is the stage of maintaining catfish seeds after going through a sorting process based on their body length. The nursery process is divided into two stages, namely Nursery I and Nursery II, with a distance between the two stages of about two weeks. In Nursery I, catfish seeds are sorted based on the total length of their bodies (in cm), namely 280,654 fish with a size of 0.1 cm, 193,550 fish with a size of 0.2 cm, and 198,832 fish with a size of 0.7 cm. The result of Nursery I is a total of 673,036 fish seeds. Based on the calculation, the survival rate (Survival Rate/SR) in Nursery I is calculated using the formula SR I = (total nursery I) / (number of HR III broodstock) × 100%. Based on the calculation, SR I = 673,036 / 941,055 × 100% = 71.5%.

Figure 4. TT Size Tank

Figure 5. RT Size Tank

In Nursery II, the seeds were sorted again based on the sizes of TT, RT, and 2-3 cm. The sorted seeds consisted of 128,800 TT sizes, 246,300 RT sizes, and 164,460 2-3 cm sizes, with a total of 538,560 seeds retained. The survival rate (SR) in Nursery II was calculated using the formula (total nursery II) / (nursery I) × 100%. Based on the calculation, SR II = 538,560 / 673,036 × 100% = 80%.

Table 3. Results of Nursery I and II

Nursery	Seed Size	Number of Seeds	Ratio (%)
Nursery I	0.1 cm	280,654	
	0.2 cm	193,550	
	0.7 cm	198,832	
Total		673,036	71.5%
Nursery II	TT	128,800	
	RT	246,300	
	2-3 cm	164,460	
Total		538,560	80%

This study shows that in Nursery I, the survival ratio of catfish seeds reached 71.5%, with a total of 673,036 seeds at seed sizes of 0.1 cm, 0.2 cm, and 0.7 cm. In Nursery II, the survival ratio increased to 80%, with a total of 538,560 seeds at seed sizes of TT, RT, and 2-3 cm. These results can be compared with the study (Dwi *et al.*, 2020), which reported that the survival of catfish larvae in an aquaponic system reached 95.83% with a broodstock fecundity of around 297,500 eggs. In this study, water quality influenced by the density of aquatic plants played an important role in increasing seed survival. Although fecundity was not calculated in this study, the results showed that environmental management, such as maintaining water quality, greatly influenced the success of catfish cultivation. Therefore, factors such as aquatic plant density and optimal water quality management can improve the survival of catfish seeds, in line with the findings in this study.

Feed Management

The feeding system provided is ad libitum, which is feeding until full but by paying attention to the level of response in the fish. Feeding is carried out in the morning and evening. Provision of natural feed is carried out by culturing artemia with a salinity of 30 ppt and silkworms purchased from local farmers. Pellet feed uses pf 100, 800 and 1000. At an early age, catfish larvae are fed yolk from egg yolks, then given artemia at the age of 2-7 days, and silkworms at the age of 7-15 days. After 15-30 days of age, powdered pellets are given.

Water Quality Monitoring

Water quality is very important in catfish cultivation to ensure optimal fish health and growth. Therefore, water quality monitoring is carried out every day for 35 days at two times, namely morning (09.00) and afternoon (15.00). The following are the results of water quality measurements in the hatchery and broodstock ponds of patin fish:

Table 4. Monitoring of Water Quality in the Hatchery and Broodstock Ponds of Patin Fish

Parameter	Hatchery (Morning)	Hatchery (Afternoon)	Broodstock Pond (Morning)	Broodstock Pond (Afternoon)
pH	7.69	7.72	7.46	8.03
Temperature (°C)	26.87	28.25	26.84	27.84
DO (ppm)	5.88	5.88	0.86	10.31
Ammonia (mg/L)	0	0	0	0

The measurement results showed that the pH in the hatchery was in the range of 7.69 in the morning and 7.72 in the afternoon. The temperature in the hatchery was recorded at 26.87°C in the morning and 28.25°C in the afternoon, while the DO in the hatchery remained stable at 5.88 ppm at both times. Ammonia in the hatchery was recorded at 0 mg/L, indicating healthy water conditions.

In the broodstock pond, the average pH was recorded at 7.46 in the morning and 8.03 in the afternoon. The temperature in the broodstock pond ranged from 26.84°C in the morning and 27.84°C in the afternoon. The average DO in the broodstock pond was 0.86 ppm in the morning and 10.31 ppm in the afternoon, with ammonia levels also recorded at 0 mg/L. According to Minggawati & Saptono (2012), good water quality for catfish cultivation includes water temperature between 25-33°C, pH between 6.5-9.0 with an optimal range of 7-8.5, and DO between 3-7 ppm with an optimal range of 5-6 ppm. Monitoring water quality is very important in fish farming management, because it can help ensure fish health and support optimal growth. These periodic measurements also make it possible to detect changes in water quality and identify problems before they impact fish health, which ultimately contributes to increased fish survival rates and overall cultivation success.

Thus, the water quality in the hatchery and broodstock ponds is in the optimal range for catfish growth, with a temperature between 26-30°C, pH between 7-8, and DO around 5.88 ppm, which supports a healthy and efficient cultivation process.

Seed Harvest

Patin fish seed harvest at the Mojokerto Aquaculture Installation (IPB) is carried out after the seeds reach a size of 5-7 cm or are around 2-3 months old. Maintenance techniques include pond preparation, seed selection, and regular artificial feeding. The optimal water quality for seed growth is a temperature of 28-32°C and pH 7-8. The seed spreading process is carried out with acclimatization to adjust the pond temperature. IPB Mojokerto plays an important role in patin fish cultivation, considering the stability of prices and high market demand.

DISCUSSION

Effective broodstock management is one of the key factors in successful catfish (*Pangasius* sp.) spawning. At the Mojokerto Aquaculture Installation (IPB), the broodstock selection process is carried out strictly to ensure optimal reproductive quality. The selected broodstock have an average weight of 3–5 kg with healthy conditions, active movements, and no injuries or physical defects. This is in accordance with research conducted by (Iskandar et al., 2022) which states that quality broodstock have healthy physical characteristics, are not disabled and have faster growth compared to other broodstock. Feeding of broodstock catfish uses a combination of natural feed such as silkworms and high-protein commercial pellets (30–35%). The frequency of feeding twice a day has been proven to be able to increase the gonad maturity of broodstock catfish optimally. Interestingly, this feeding frequency is also in accordance with the recommendations of the Indonesian National Fisheries Standard (SNI) for tilapia (*Oreochromis niloticus*) cultivation in stagnant water ponds. Although SNI refers to tilapia, the principle of regular feeding according to fish needs is also applied in patin fish cultivation, as regulated in the operational standards of the Ministry of Maritime Affairs and Fisheries (KKP), which emphasizes that the frequency of feeding must be adjusted to the condition of the fish and the cultivation environment (Simanjuntak, 2022).

Research by Ammar *et al.*, (2020) which tested the effect of protein levels in feed on the survival and performance of patin fish also supports the importance of providing quality feed. In the study, variations in protein levels had a significant effect on fish performance, including survival rates and more efficient feed utilization. Although the focus of this study was more on the aspect of fish survival, these findings reinforce that providing feed with the right protein content, as implemented at IPB Mojokerto, can also improve the reproductive performance of patin broodstock and overall spawning success.

The fertilization spawning pool uses a bowl that is stirred using chicken feathers until evenly mixed. After mixing, the eggs and sperm will be spread into the aquarium, one aquarium containing 2-3 spoons of eggs, trying to spread them evenly so that they do not pile up which will interfere with the egg hatching time. has the characteristics of water that is of maintained quality with a pH ranging from 6.5–7.5 and a water temperature of 28°C–30°C. Water quality control is carried out periodically by adding aeration and changing the water to keep the dissolved oxygen content high. Regular pond cleaning is also an important part of pond cleanliness management to keep it free from pests that can affect spawning results. According to research by Bagaskoro (2019), in pomfret fish farming ponds, it is important to pay attention to water conditions, because water with poor quality can have a negative impact on fish growth. Good water quality must be maintained, including pH stability and water level in the pond. This is in line with research conducted in catfish spawning, where good water quality management is essential to ensure optimal conditions for the broodstock and increase spawning success.

The spawning technique applied at IPB Mojokerto uses a semi-artificial method with the help of gonadotropin hormone. The dose of hormone given varies according to the weight of the female broodstock, which is around 0.5–0.7 mL/kg of broodstock body weight. The injection is carried out twice with an interval of 8–12 hours to ensure optimal gonad maturation stimulation. The first injection aims to stimulate ovulation, while the second injection functions to perfect and accelerate the ovulation process (Ihwan, 2021). The results of observations show that this method is able to trigger ovulation with a success rate of more than 80%. This 80% success rate refers to the percentage of female broodstock that successfully ovulate after administration of gonadotropin hormone, which is measured based on the number of broodstock that show clear signs of ovulation, such as an enlarged and soft stomach, and the release of eggs when lightly pressed on the genitals of the broodstock.

The egg hatching process is carried out in a special container with controlled water flow. Fertilized eggs will hatch within 24–48 hours at a water temperature of 28°C. The hatching rate reaches 75% indicating the success of the optimal spawning process. Post-hatching larval care is the main focus to improve seed survival. Larvae are given natural food such as rotifers and artemia in the early stages of life. Water quality monitoring and larval health monitoring are carried out every day to identify problems as early as possible. This is in line with research conducted by (Yuliani & Mumpuni, 2020) which shows that different incubation temperatures affect the hatching time and hatchability of eggs, as well as larval survival. This is in line with the results of research at IPB Mojokerto, where controlled temperatures are important in increasing the success of hatching and larval survival.

Seed maintenance is carried out in controlled ponds with an optimal stocking density of 50 fish/m². Feeding is carried out in stages with small pellet feed that is adjusted to the opening of the seed's mouth. During the 30-day maintenance period, the seed survival rate reached 70%. Seed health management is a priority with the implementation of preventive measures such as the provision of probiotics and the use of biosecurity to prevent disease infection. Adjustment of environmental conditions such as temperature and pH is also carried out to maintain the stability of seed growth. This study is in accordance with research conducted by Khotimah *et al.,* (2016) which shows that the provision of probiotics in the maintenance media for catfish seeds can increase the survival and health of seeds, and support optimal growth.

Seed maintenance is carried out in controlled ponds with an optimal stocking density of 50 fish/m². Feeding is carried out in stages using small pellets that are adjusted to the opening of the seed's mouth. During the 30-day maintenance period, the seed survival rate reached 70%. Seed health management is a top priority with the implementation of preventive measures, such as the provision of probiotics and the use of biosecurity to prevent disease infection. Probiotics play a role in regulating the balance of microbes in the digestive tract, increasing the efficiency and utilization of feed, and improving environmental quality, thereby supporting the growth and resistance of seeds to disease (Umasugi, 2018). In addition, adjustments to environmental conditions, such as temperature and pH, are carried out periodically to maintain the stability of seed growth.

The success of the patin fish spawning technique at IPB Mojokerto is indicated by the high level of success of ovulation, hatching, and seed survival. Factors such as broodstock quality, spawning techniques, and environmental management are the main determinants of the success of the cultivation process. The implementation of this method can be a model for the development of patin fish cultivation in various other locations. With good management, it is hoped that the production of quality patin fish seeds can continue to increase to meet the needs of the domestic and export markets. Research by Putra *et al.,* (2024) emphasized that the selection of quality broodstock, proper spawning techniques, and optimal environmental management greatly affect the level of spawning success and seed quality. This shows that with good management, as implemented at IPB Mojokerto, the production of quality patin fish seeds can continue to be increased to meet market demand.

IPB Mojokerto has succeeded in producing high-quality catfish seeds with a fertilization rate of 87% and a hatching rate of 91%. Good broodstock maintenance management, efficient use of aeration technology, and optimal water quality management are key factors for success. This study shows that good water quality management greatly affects the growth and success of catfish spawning. This is in line with research conducted by Manunggal *et al.*, (2018) which shows that stable water quality management, including optimal pH and sufficient dissolved oxygen levels, can significantly increase egg hatching and catfish growth. In the experiment, catfish cultivated in ponds with good water quality experienced faster growth and greater weight compared to those cultivated in ponds with poorly managed water quality.

However, several challenges faced in the production of high-quality catfish seeds include the limited availability of quality broodstock, fluctuations in water quality, and limited human resources who understand catfish spawning technology. In addition, temperature fluctuations and limited hatching facilities are also obstacles that need to be overcome. Therefore, an integrated approach involving better water quality management, use of efficient aeration technology, and human resource training is an important step to increase the success of high-quality catfish seed production.

CONCLUSION

This study shows that artificial spawning technology with Ovaprim hormone can increase the success of catfish seeding at IPB Mojokerto. With a fertilization rate reaching 87% and a larval hatching rate of 91%, this method has proven to be effective. In addition, good water management and the use of aeration technology are important factors in the success of seed production.

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