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Original Research Paper

Optimizing Tilapia Hatchery Systems with Good Fish Breeding Practices (CPIB) in Lingsar District, West Lombok

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Abstract: Embung Pas Hamlet in Sigerongan Village, Lingsar District, West Lombok Regency, has quite large aquaculture potential, especially for tilapia commodities. However, in practice, tilapia fish breeder still faces various obstacles such as the less-than-optimal productivity of tilapia fry produced. Lack of understanding of the standards for Good Fish Breeding Practices (CPIB) is one of the main factors that hinders increased productivity and sustainability of hatchery businesses. This community service activity aims to improve the understanding and skills of tilapia fish breeder in Embung Pas Hamlet in applying the principles of CPIB. The implementation method includes counseling, discussion, and direct assistance with a participatory and demonstrative approach. Evaluation is carried out to measure changes in participants' knowledge and attitudes before and after the activity. The results of the activity showed a significant increase in understanding and technical skills of breeding related to aspects of biosecurity, water quality management, proper use of feed, and management of aquaculture waste. The participants also showed enthusiasm and commitment to implementing CPIB in their daily activities. This activity also encourages collective awareness of the importance of quality standards in sustainable hatchery. In conclusion, CPIB training and mentoring have a positive impact on increasing the capacity of fish breeder in Embung Pas Hamlet and have the potential to become a model for sustainable and competitive fisheries community empowerment.

Keywords: Aquaculture; CPIB; Tilapia

Introduction

Indonesia is known as the second richest country in biodiversity after Brazil. However, in the field of fisheries, Indonesia can be said to be the richest country in the world. It is known that there are more than 2,000 species of fish in Indonesian waters, both in the sea and fresh water. From this, it is not surprising that fish have very good prospects for cultivation, so that the fisheries sector can support the economy, especially in Indonesia (Hermawan, 2023).

West Nusa Tenggara is one of the provinces in Indonesia that has the potential to have quite

large fishery resources. Aquaculture Statistics Data states that NTB Province has a sea area of around 29,159.04 km^2, a coastline of 2,333 km and coral waters of around 3,601 km^2. The potential for fishing in the NTB public waters is estimated to reach an area of 12,208.14 ha. Especially the freshwater cultivation area (pond) with an area of 7,618.8 ha. The number of Fishery Households (RTP) cultivating cages in NTB in 2020 was recorded at 652 with a production volume of 2,443 tons in 2020 (Hasyim et al., 2022).

Lingsar District is one of the districts in West Lombok Regency which is the location for the development of freshwater fish farming initiated by the regional government of West Nusa Tenggara Province: The area of irrigated rice fields is 1238 ha and ½ technical 410 ha. The natural conditions are mostly lowland areas with flat and slightly undulating land surfaces. The average temperature is 20°C at the lowest and 24°C at the highest. The rainy season occurs between October-March and the dry season between April-September, with an average rainfall of 6 wet months and 6 dry months, averaging between 2000-3000 mm/year, with the number of rainy days ranging from 62-95 days/year (Hasyim et al., 2022). The majority of the population of Lingsar District are fish farmers, both to meet the demand for seeds and for community consumption in West Lombok Regency (Triastuti et al., 2021). One type of fish that is widely cultivated in Lingsar District is tilapia.

Tilapia (*Oreochromis niloticus*) is a mainstay cultivation commodity in Indonesia. FAO Statistics Data in 2010 showed Indonesia as the third largest tilapia producer in the world after China and Egypt. Tilapia cultivation is very popular because it is easy to maintain, has a fast growth and reproduction rate, and is resistant to pests and diseases. In addition to being kept in ponds, tilapia can also be cultivated in other media such as fast-flowing water ponds, floating net bags, cages, and rice fields (Syuhriatin, 2020).

The production process of tilapia cannot be separated from the role of hatchery activities. One of the supporters of the sustainability of cultivation businesses, especially tilapia fish farming, is a stable supply of fish fry. So far, the availability of fry for tilapia farming businesses has been obtained from seeding centers, but sometimes the amount of fry supply available is not sufficient for the needs of the aquaculture business, so that currently many small and large-scale hatchery businesses have emerged (Nugraha et al., 2023). The problem faced by tilapia breeders in Lingsar District is the less than optimal production of tilapia fry because there has been no implementation of Good Fish Breeding Practices (CPIB). CPIB itself according to Prabowo et al. (2024) is a fish breeding technique that pays attention to all aspects, management, environment, breeding techniques, including infrastructure which are needed so that the fry meet standards and later when entering the enlargement phase, the fish produced are safe for consumption.

Based on the problem of the less than optimal production of tilapia fish fry in Lingsar District due to the non-implementation of Good Fish Breeding Practices (CPIB), the solution offered is to conduct community service activities that focus on the implementation and direct training of CPIB to local fish breeders. The activity procedures include: initial survey of the ongoing tilapia hatchery conditions, counseling and training based on direct practice in the field, assistance in the implementation of CPIB, and evaluation of the results of the implementation through observations of the number and survival rate of tilapia fry. Data is collected through observation, interviews with fish breeders, and recording of breeding results during the activity period. The target of this activity is to increase the knowledge and skills of fish breeders in implementing CPIB, increase the productivity of tilapia fry, and create a sustainable tilapia hatchery model that can be replicated in other areas in West Lombok Regency.

Methods

This community service activity was carried out in June 2025 in Embung Pas Hamlet, Sigerongan Village, Lingsar District, West Lombok Regency. The series of activities included an initial survey of the condition of the tilapia hatchery, counseling on Good Fish Breeding Practices (CPIB), assistance in implementing CPIB directly in the field, and evaluation of the results of the activities. The purpose of this activity is to increase the capacity of fish breeders in managing fish hatchery businesses sustainably and according to good standards.

1. Initial Survey of Tilapia Hatchery Conditions

This community service activity begins with a location survey. An initial survey at the location

where the activity is carried out is needed to determine the real conditions of the tilapia breeders (Affandi, Scabra, et al., 2023; Affandi, Diniariwisan, et al., 2024; Affandi, Scabra, et al., 2024). Survey activities are mandatory so that activities can run well, namely achieving a high effectiveness value (Asri et al., 2023, 2025; Diamahesa et al., 2022). The initial survey is also a moment to get to know the tilapia breeders and related stakeholders such as village officials or local governments at the location where the activity is carried out.

In the survey activity, direct observations were also carried out at the hatchery location, interviews with fish breeders, and documentation of pond conditions, water quality, types of feed used, frequency of feeding, and fish maintenance and disease control techniques. The data obtained from this initial survey is used as a basis for designing extension materials and mentoring strategies that are appropriate to the needs and actual conditions in the field.

2. Counseling of Good Fish Breeding Practices (CPIB)

Counseling is carried out to introduce community service programs that include program objectives, program benefits, and the technology to be applied (Azzahra et al., 2024; Diamahesa, Marzuki, et al., 2023). The methods used are presentations using visual media, interactive discussions, and distribution of printed materials related to the importance of Good Fish Breeding Practices (CPIB). Counseling materials are compiled based on the results of an initial survey of hatchery conditions, so that the delivery of information becomes more relevant, easy to understand, and applicable according to the needs of fish breeders in the field.

3. Mentoring the Implementation of Good Fish Breeding Practices (CPIB)

Mentoring the implementation of Good Fish Breeding Practices (CPIB) is carried out with a direct practical approach in the field to ensure that tilapia breeders in Embung Pas Hamlet are able to implement the CPIB principles effectively (Affandi, Setyono, et al., 2023; Muahiddah et al., 2024). Mentoring includes technical guidance in pond management, water quality control, proper feeding, and routine implementation of sanitation and biosecurity. This activity is carried out in stages and continuously, accompanied by daily and weekly evaluations to monitor progress and overcome obstacles faced by fish breeders during the CPIB implementation process (Asri et al., 2024; Azhar et al., 2023).

4. Evaluation of Community Service Activity Results

The evaluation includes measuring the effectiveness of the implementation of Good Fish Breeding Practices (CPIB) by tilapia breeders and assessing the level of understanding and skills of participants (Affandi, Abidin, et al., 2023; Diamahesa et al., 2024; Diamahesa, Andriyono, et al., 2023). The results of this evaluation are used as a basis for assessing the success of the program, providing feedback to fish breeders, and formulating recommendations for the development of more sustainable tilapia hatchery in the future (Cokrowati et al., 2024).

Results and Discussion

1. Initial Survey of Tilapia Hatchery Conditions

This community service was carried out in Embung Pas Hamlet, Sigerongan Village, Lingsar District, West Lombok Regency, as shown in Figure 1. Embung Pas Hamlet, Sigerongan Village, located in Lingsar District, West Lombok Regency, has geographical conditions that are very supportive for freshwater fish hatchery activities. The area of this hamlet is in a lowland area that directly borders the mountainous area, so it has a stable and abundant source of clean water flow throughout the year. The existence of clear and pollution-free mountain water flow is one of the main advantages of Embung Pas Hamlet in supporting healthy and sustainable tilapia hatchery practices.

Figure 1. Community Service Activity Location

Tilapia (*O. niloticus*) has several advantages that make it one of the leading commodities in

aquaculture, including its rapid growth, high resistance to disease, and easy adaptation to various environmental conditions. In addition, tilapia has good economic value and high market demand, both for local and regional consumption. With the geographical conditions of Embung Pas Hamlet which has clean water flow from the mountains and a supportive climate, tilapia is very suitable to be bred in this area because the needs for ideal water quality and temperature can be met naturally, thus supporting optimal growth and productivity of fish fry.

Tilapia breeders in Embung Pas Hamlet still face various obstacles in the breeding process, one of which is the non-implementation of Good Fish Breeding Practices (CPIB) as a whole. This causes pond management and water quality to be suboptimal, feed use to be inefficient, and efforts to prevent fish diseases to be minimal. As a result, the productivity of tilapia fry is not optimal and risks reducing the quality of the fry produced, which ultimately impacts the income and sustainability of the community's hatchery business. Based on these problems, it is important to carry out this community service activity to improve the ability of fish breeders to implement CPIB so that the harvest results are more optimal. Thus, hatchery can run more efficiently and sustainably.

Figure 2. Tilapia Hatchery Pond at the Community Service Location

2. Counseling of Good Fish Breeding Practices (CPIB)

The counseling was conducted at a tilapia hatchery owned by one of the tilapia breeder in Embung Pas Hamlet. The counseling participants were tilapia breeders in Embung Pas Hamlet and several lecturers from the Aquaculture Study Program, University of Mataram. The counseling material provided was related to Good Fish Breeding Practices (CPIB). This counseling activity is useful for conveying information related to how to apply CPIB so that the harvest results are more optimal. Thus, the hatchery can run more efficiently and sustainably (Figure 3).

Figure 3. Counseling Activities

After the presentation of the material, it was continued with a question and answer/discussion session. The question and answer/discussion activity was carried out after the presentation of the material ended, which was still located at the tilapia hatchery owned by one of the tilapia breeder in Embung Pas Hamlet. The participants remained the same as in the counseling activities, namely tilapia breeders in Embung Pas Hamlet and several lecturers from the Aquaculture Study Program, University of Mataram. The question and answer/discussion session was useful for participants to convey their curiosity or problems to the presenters related to the implementation of CPIB. In addition to getting information from the presentation of the material, participants also obtained additional information from this question and answer/discussion session which was useful for increasing knowledge and insight regarding the implementation of CPIB. Synergy activities with tilapia breeders such as this counseling are very important. The community service team in this activity tried to build communication with tilapia breeders as an initial stage before reaching a wider community.

3. Mentoring the Implementation of Good Fish Breeding Practices (CPIB)

This mentoring activity is mentoring related to the implementation of Good Fish Breeding

Practices (CPIB) (Figure 4) which is guided by the implementation instructions for Good Fish Breeding Practices certification stipulated by the Ministry of Marine Affairs and Fisheries through the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 35/PERMEN-KP/2016 Concerning Good Fish Breeding Practices (Peraturan Menteri Kelautan Dan Perikanan Republik Indonesia Nomor 35/PERMEN-KP/2016 Tentang Cara Pembenihan Ikan Yang Baik, 2016).

Figure 4. Mentoring the Implementation of Good Fish Breeding Practices (CPIB)

The CPIB criteria are regulated in detail in the Indonesian National Standard (SNI) 8035:2014 (SNI 8035:2014 Cara Pembenihan Ikan Yang Baik, 2014) which includes:

a. Technical
   i. Hatchery Location
   ii. Hatchery Infrastructure and Facilities
   iii. Production Process
      1) Broodstock Management Requirements
         • Broodstock Selection
         • Broodstock Quarantine Treatment
         • Broodstock Maintenance
         • Feed and Drug Administration
         • Broodstock Health Observation
      2) Fry Management Requirements
         • Fry Selection
         • Fry Acclimatization
         • Fry Maintenance
         • Feed and Drug Administration
         • Fry Health Observation
      3) Water Management Requirements
      4) Fry Harvest, Packaging, and Distribution Requirements
         • Harvest
         • Packaging
         • Distribution
   iv. Biosecurity Implementation
      1) Layout Arrangement
      2) Storage of Tools, Drug, and Feed
      3) Arrangement of Access to Location
      4) Sterilization of Containers, Equipment, and Rooms
      5) Sanitation in the Hatchery Unit
      6) Arrangement of Personnel/Employees
b. Management
   i. Hatchery Unit Management Organization
   ii. Documentation
c. Food Safety
d. Environment

4. Evaluation of Community Service Activity Results

The evaluation of the community service program (Figure 5) looks at the impact of the implementation of CPIB counseling and mentoring for the implementation of CPIB on tilapia breeders in Embung Pas Hamlet which can be felt, this condition is realized because of the involvement and active participation of tilapia breeders in the implementation of the community service program, starting from the many questions asked by tilapia breeders during the counseling to mentoring specifically related to Good Fish Breeding Practices (CPIB). It is hoped that after the implementation of this community service activity, it can have a positive impact on increasing the production capacity of tilapia fry by tilapia breeders in Embung Pas Hamlet.

Figure 5. Evaluation of Community Service Activity Results

If this community service activity has an impact in the form of increasing fish fry production,

it is also expected to be followed by a high level of openness of tilapia breeders to technology transfer and the application of the latest technology in the tilapia hatchery system from the traditional fish hatchery system to the semi-intensive and intensive fish hatchery system. The change in the tilapia hatchery system is expected to have a major impact on tilapia breeders in Embung Pas Hamlet by utilizing abundant and clean fresh water. So that from the implementation of counseling and mentoring, it is hoped that tilapia breeders in Embung Pas Hamlet can provide information on several things related to tilapia hatchery to other fish breeders in Lingsar District and West Lombok Regency, especially fish breeders around Embung Pas Hamlet.

Conclusion

Based on the community service activities for tilapia breeders in Embung Pas Hamlet, the conclusion obtained is that the counseling activities of Good Fish Breeding Practices (CPIB), mentoring the implemention of Good Fish Breeding Methods (CPIB), and evaluation of the results of community service activities have been delivered. From this activity, it is hoped that the target of tilapia fry production can be increased.

Suggestion

Further community service activities on increasing the production capacity of tilapia fry through the implementation of CPIB can be carried out not only in Embung Pas Hamlet, but also in other areas of Lingsar District and West Lombok Regency. More widely, it can be implemented in other regencies on Lombok Island and the Province of West Nusa Tenggara as a whole.

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