Journal of Fish Health
Volume 5, Issue 2, May 2025
https://doi.org/10.29303/jfh.v5i2.6366

Silver Barb (*Barbonymus gonionotus*) Broodstock Maintenance Techniques at the Technical Implementation Unit of the Fish Seed Service Central Aikmel, East Lombok

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Received:
February 18th, 2025
Accepted:
May 30th, 2025

Keywords:
Broodstock, Maintenance, Growth, Silver Barb, Water Quality

ABSTRACT

The development of the marine and fisheries sector is a mainstay sector to improve the Indonesian economy (Blue Economy), where aquaculture is a fairly productive and growing sub-sector. Not only sea waters, Indonesia also has very good freshwater potential for development based on aquaculture. Silver barb *(Barbonymus gonionotus*) is a native freshwater fish from Indonesia and is one of the economical consumption fish that is affordable for the community. The data collection techniques used are primary data and secondary data. This technique is carried out by Primary data, namely data obtained in the field from observations during the implementation of research. Primary data can be in the form of direct observation or observation, namely directly observing the activities carried out such as observing fish growth by looking at the increase in length and weight. Secondary data, namely data obtained from various books, journals, statistical data, articles, and others. Maintenance of silver barb broodstock is carried out by preparing the pond first starting from drying, liming, fertilizing, filling with water, then maintaining the broodstock. Maintenance of silver barb broodstock for 28 days resulted in SR (Survival Rate) values for males of 100% and females of 99%, then FCR (feed conversion rate) for males of 1.64 and females of 1.72. Water quality measurements were carried out 5 times a week and the range obtained was temperature 28-32 ^{o}C, pH 8–8.6 and DO (Dissolved oxygen) 8–9.7 mg/l.

INTRODUCTION

The development of the marine and fisheries sector is a mainstay sector to improve the Indonesian economy (Blue Economy), where aquaculture is a fairly productive and growing sub-sector. Not only sea waters, Indonesia also has very good freshwater potential for development based on aquaculture. Silver barb (*Barbonymus gonionotus)* is a native freshwater fish from Indonesia, and is one of the economical consumption fish that is affordable for the community. This silver barb is an herbivorous fish that eats plants and algae

so it is profitable for traditional cultivators. Statistical data on silver barb cultivation production increased in 2016-2022 with a total of 39,100 tons/year (KKP, 2022).

Silver barb is a fish that has long been cultivated because it is suitable for Indonesia which has a tropical climate. So, this fish can be cultivated all year round. As a consumption fish, silver barb also has a weakness, namely having many bones on meat. Silver barb can reproduce at a relatively young age with a spawning frequency of once a month. With these advantages, silver barb cultivation is expected to provide additional income for farmers (Winata et al., 2018). Broodstock management is the selection of quality broodstock for the breeding process so that it produces good quality seeds. Broodstock procurement is an activity carried out by the fish breeding unit in selecting broodstock fish to be spawned so that the quality of the seeds produced can be better. Broodstock procurement must be selected properly, so that the sustainability of the breeding business can run more effectively. Choosing good broodstock, it is necessary to pay attention to the physical form of the broodstock fish, such as its ideal size for spawning, its color is not pale, its movements are agile and the age of the broodstock is good for spawning. The selection of prospective broodstock is based on fish that grow faster and have normal morphology. Prospective broodstock that have been selected are kept in a separate pond from other fish. Things that need to be considered in the selection of prospective broodstock fish are that between prospective female broodstock and prospective male broodstock must not come from the same lineage (Lukman *et al*., 2021).

Central Fish Seed Center (BBIS) Aikmel, East Lombok, maintenance of silver barb broodstock is one of the main focuses in maintenance activities carried out to obtain superior broodstock and quality seeds that are also good in quantity. Therefore, the purpose of this research is to gain knowledge about maintenance techniques for silver barb (*Barbonymus gonionotus*) broodstock at the Aikmel Central Fish Seed Center, East Lombok.

METHODS

This research was carried out from November 4 to December 4, 2024 at the Technical Implementation Unit of the Service (UPTD) of the Central Fish Seed Center (BBIS) Aikmel, East Lombok Regency, West Nusa Tenggara Province. The tools used in this research are hoes, DO meters, buckets, hapa, cameras, bags, rulers, pH meters, thermometers, and scales, while the materialsused are silver barb (*Barbonymus gonionotus*), pellet feed, quicklime, and manure from chicken manure.

The methods used are primary and secondary data collection techniques. Primary data is data obtained in the field from observations during the implementation of research. Primary data can be in the form of direct observation or observation, namely directly observing the activities carried out such as observing fish growth by looking at the increase in length and weight, Secondary data is data obtained from various books, journals, statistical data, articles, and others (Sari & Zefri, 2019).

RESULTS

Maintenance of male and female silver barb broodstock is carried out in pond B2-1 which is rectangular in shape with a pond size of 352.73 m^2. Before maintenance is carried out, male and female silver barb broodstock are selected first, where selection greatly affects

the success rate of superior and quality seeds that will be obtained. The initial weight and length of the silver barb broodstock can be seen in Table 1.

Table 1. Initial Weight and Length of Silver Barb Broodstock

Fish	Initial Lenght	Initial Weight
Male	28.27 cm	292 g
Female	30.65 cm	409 g

The amount of daily feed and the total amount of feed during maintenance of silver barb broodstock can be seen in Table 2.

Table 2. Amount of Feed During Maintenance

Day	Feed/Day	Total
1-14	3.330 g	46.620 g
15-28	4.238 g	50.856 g
Total Feed		97.476 g

The results of the growth in length and weight of the silver barb broodstock after 28 days of maintenance can be seen in Table 3.

Table 3. Growth of Silver Barb Broodstock

Data	Male	Female
Day 1 weight	292 g	409 g
14 th Day Weight	361 g	526 g
28 th Day Weight	446 g	621 g
Stocked Amount	100 fish	200 fish
Harvest Amount	100 fish	199 fish

FCR Results (Feed Conversion Ratio) and SR (Survival Rate) during broodstock maintenance silver barb can be seen in Table 4.

Table 4. FCR and SR Results

Data	Male	Female
FCR	1.64	1.72
SR	100%	99%

The results of the water quality data during the maintenance of silver barb broodstock can be seen in Table 5.

Table 5. Water Quality Measurement

Parameter	Measurement	Optimal Range (SNI, 2017)
Temperature (^oC)	28-32	20-30
pH	8-8.6	6.5-8.5
DO (mg/L)	8-9.7	>5

DISCUSSION

Fish Pond Preparation

Pond preparation is the initial step that has quite an influence on the silver barb cultivation process, the purpose of this pond preparation is to create optimal environmental conditions, kill microorganisms or pathogens, and grow natural feed so that it can be beneficial for the survival of the fish. The pond used is pond B2-1 with an area of 352.73 m^2. The pond preparation process includes the drying process, giving quicklime, giving manure, repairing the inlet and outlet channels and the final stage, namely filling with water. Sholikha *et al*. (2021) stated that the pond preparation process consists of the drying process, turning the soil, liming and filling with water.

a. Drying

The pond drying process is carried out by closing the inlet channel and opening the outlet channel of the pond which aims to stop the flow of water and utilize exposure to sunlight to kill microbes or pathogens. The function of drying is not only to kill pests but also to remove the remains of ammonia and toxic gases from previous cultivation by exposing them to direct sunlight for 3-7 days until the soil structure cracks as in Figure 1. Kalesaran & Lantu (2016) stated that pond drying is carried out with the aim of killing pests and disease germs in the pond. Sunlight will kill most pathogenic microorganisms and another drying effect is torelease toxic gases that settle at the bottom (Hasibuan et al., 2021).

Figure 1. Pond Draining
(Source: Personal Documentation, 2024)

b. Liming

Liming is a step taken to improve the acidity level of the soil (soil pH), improve the soil structure to increase the productivity of organisms and is able to kill pests, thus creating environmental conditions that are sterile for the survival of pet fish. The type of lime used is quicklime (CaO) which acts as a pH neutralizer, fertilizes the soil, kills pests and diseases. The function of quicklime is to neutralize the pH in the sedimentation pond water (Prisitama *et al*., 2023).

Figure 2. Liming the Pool Bottom
(Source: Personal Documentation, 2024)

c. Fertilization

Fertilization is a step taken after liming. Fertilization is done by spreading it evenly throughout the bottom of the pond. This can help the growth of natural feed as a food supply for fish. The type of fertilizer used is manure from chicken manure. Fertilization in ponds is done to optimize the amount of nutrients in the soil that play a role in soil fertility and help the growth of phytoplankton as natural food for fish. This is reinforced by Sari *et al*. (2024) which states that to obtain maximum results and high productivity, it is very important to fertilize the soil and water quality. Fertilizing ponds for fish growth proves that fish growth is positively correlated with an increase in the amount of natural food (zooplankton and phytoplankton).

Figure 4. Pond Fertilization
(Source: Personal Documentation, 2024)

d. Water Filling

After fertilization is complete, the next step is to refill the pond with water. The pond that has been given lime and fertilized is then filled with water gradually. The initial stage of the pond is filled with water with a height of 30-60 cm so that the natural food in the pond grows, an indicator of the growth of natural food is that the pond water turns green and this stage is carried out for 2-3 days before the broodstock is put into the pond. Then the second stage of the silver barb broodstock is put into the pond along with filling the water to a height of 1-1.2 m.

Figure 6. Filling the Pool with Water
(Source: Personal Documentation, 2024)

Broodstock Maintance

Maintenance of male and female silver barb broodstock is carried out in pond B2-1 which is rectangular in shape with a pond size of 352.73 m^2. Before maintenance is carried out, male and female silver barb broodstock are selected first, where selection greatly affects the level of success of superior and quality seeds that will be obtained. The criteria for broodstock to be maintained are, not defective, healthy and not injured. This is in line with Iskandar *et al*. (2021); Cahyanti *et al.* (2022) that the broodstock that is kept is a healthy broodstock that is not deformed and has complete morphology. The number of stocking densities in the maintenance pond is 300 consisting of 100 male silver barb and 200 female silver barbs, with a sampling of 20% males and 10% females from the total biomass so that the average weight at the beginning of maintenance for male fish is 292 grams and for females is 409 grams. According to Tamirrino *et al.* (2023), the selection of broodstock is carried out to select broodstock of silver barb that are ready to be spawned. The selection of broodstock comes from broodstock that are not of the same descent and have a healthy physique. The minimum size of the male broodstock is 200 g and the minimum size of the female broodstock is 300 g. The broodstock must be at least 1 year old for males and 1.5 years old for females.

Feeding

Feed is an important part in the maintenance of silver barb broodstock, broodstock kept at BBI Aikmel are fed using floating feed, the advantages of this floating feed are low contamination of feed, longer water stability while maintaining its nutrition, higher digestibility and high level of convention. The protein content of this feed is 26% with the amount of feed used being 3% and the frequency of feeding silver barb broodstock is 2 times a day, namely in the morning 7:30-8:00 and in the afternoon 16:30-17:00 ad satiation (limited feeding which refers to limiting the amount of food). According to Zulfira *et al*. (2024) which states that artificial fish feed is feed that is made by humans themselves and has a nutritional composition content. Adding fish feed nutrients generally consists of protein, fat, carbohydrates, minerals and vitamins. Based on the calculation of feed weight which can be seen in Table 2. This calculation is done based on the weight of the broodstock biomass and the specified feed dose. The feed weight is divided into two so that the feed can be distributed more evenly to all silver barb broodstock. Accurate feed weight management ensures efficient feed use and helps control water quality in the pond. This is reinforced by Sari & Ayu (2024), the nutritional content in feed plays a role in the metabolic process in the fish's body.

Water Quality

Every fish farming water quality measurement is very important to do; this aims to create a good environment for the growth and health of the fish. According to Ardita *et al*. (2015), optimal management and monitoring of water quality will influence the survival rateThere are several parameters that are measured including temperature, pH and DO. Each of these parameters has a very important influence on both fish physiology and pond ecosystem. The quality data acquisition can be seen in table 5. From the data in the table, it can be seen that the value, temperature, DO, and pH are still considered normal for each category. Arif *et al.* (2023) stated that silver barb has an optimal range, namely, dissolved oxygen >5 mg/L, temperature 25-33^{0}C, and pH 6.3-7.3. The pH value obtained is not included in the optimal range of silver barb growth, but the pH value obtained is still within the optimal range of fish growth according to SNI (Indonesian National Standard). The spike in pH value from the optimal range of silver barb growth can be caused by high rainfall, organic and inorganic waste pollutants suspended in the waters, and instrument error factors. Anticipate the high pH value in BBIS by opening the inlet channel larger so that more water enters the pond and the water circulation in the pond is smooth, besides that you can also use leaves Ketapang. Ketapang leaves contain saponin, tannin, and flavonoid compounds that can lower the pH of water (Sine *et al*., 2016).

Harvest

Fish harvesting is done in the morning by closing the inlet channel and opening the outlet channel and providing a filter in the form of a wire mesh. Then after the bottom of the pond begins to be visible, a filter in the form of a hapa is added to minimize fish that come out of the pond as well as to catch fish that are carried away by the current of the pond outlet flow. It is known that the total average initial weight of male silver barb is 292 grams and female silver barb 409 grams, then the fish obtained after harvest have an increase in weight with an average final weight of maintenance, namely male silver barb 446 grams and female silver barb weight 621 grams. The total number of live fish obtained from the harvest is 100 males and 199 females.

Feed Conversion Ratio

FCR is a measure that states the ratio of the amount of feed needed to produce meat. Feed effectiveness depends on the level of feed conversion ratio (Sumardiyani *et al*., 2020). Based on the research that have been carried out, based on table 5 On days 1-28, the FCR results were obtained, namely in male silver barb broodstock of 1.64 and in female silver barb broodstock of 1.72 Based on the FCR data, it can be seen that in male fish 1 kg of feed can produce 1.64 kg of meat, while in female silver barb 1 kg of feed can produce 1.72 kg of meat. According to Iskandar & Elrifadah (2015), the smaller the feed conversion value means the level of feed utilization efficiency is better, conversely if the feed conversion is large, the level of feed utilization efficiency is less good. Mata *et al.* (2022) argues that the value Feed Conversion Ratio (FCR) which is quite good ranges between 0.89-1.7.

Survival Rate

Based on Table 5 from the results of observations during 28 days of maintenance, the silver barb experienced quite optimal growth. The Survival Rate (SR) value obtained for male silver barb was 100% while for female silver barb it was 99% with this survival rate of course influenced by the condition and quality of the water but the death rate can also be caused by pests and diseases that play an important role in the survival of silver barb. According to Arsad *et al*. (2017), the survival rate categorized as good if mark SR >70%, for medium category SR 50-60%, and in low category mark SR <50%. In addition, according to Subandiyono et al.

(2018), water quality, especially pH, plays an important role in determining the survival rate of fish.

CONCLUSION

The conclusions obtained from the results of the research at the Technical Implementation Unit (UPTD) of the Central Fish Seed Center (BBIS) Aikmel:

1. Maintenance of the silver barb broodstock is carried out by preparing the pond first, starting from drying, liming, fertilizing, filling with water, then maintaining the broodstock.
2. Maintenance of silver barb broodstock for 28 days produces SR (Survival Rate) 100% male and 99% female, then FCR (feed conversion rate) males 1.64 and females 1.72
3. Water quality measurements were carried out 5 times a week and the range obtained was a temperature of 28-32^{o}C, pH 8-8.6 and DO (Dissolved oxygen) 8–9.7 mg/L.

ACKNOWLEDGEMENT

I would like to thank the Aquaculture study program, Mataram University for providing the opportunity in this reseach activity which was guided directly by the lecturers of Aquaculture. In addition, I would like to thank the Central Fish Seed Center Aikmel who accepted me as an intern by giving me many opportunities and time to gain practical knowledge about the maintenance techniques of silver barb (*Barbonymus gonionotus*) broodstock.

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