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EVALUATION OF MILKFISH (*Chanos chanos*) BREEDING ACTIVITIES AT THE BALAI BESAR PERIKANAN BUDIDAYA AIR PAYAU (BBPBAP) JEPARA

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ABSTRACT

Cultivation of milkfish in Indonesia plays a central role in the fisheries sector, covering an expansive area of approximately 600,000 hectares and achieving a production of 621,393 tons in 2014. Milkfish-producing regions are distributed across various areas, including Sulawesi, Kalimantan, and Java, employing diverse cultivation technologies. Milkfish holds a crucial role in meeting food needs and contributing to the economic well-being of communities. Despite the predominantly traditional cultivation practices, yielding between 500 kg to 1 ton per hectare per year, there are also semi-intensive cultivation methods with yields reaching 3 tons per hectare per year. The high demand for milkfish seeds necessitates optimal water quality and strict supervision, serving as decisive factors in attaining optimal production outcomes. This research aims to acquire knowledge and skills related to milkfish breeding techniques, particularly at the Balai Besar Perikanan Budidaya Air Payau (BBPBAP) in Jepara. Data collection methods involve observation, active participation, and direct interviews. The results of this study indicate that the management of feed, broodstock maintenance, and feed management in milkfish breeding at BBPBAP Jepara are well-executed, supporting the success of milkfish breeding. The implications of this research can contribute positively to the development of milkfish cultivation techniques, focusing on milkfish breeding to achieve optimal production outcomes.

INTRODUCTION

Milkfish cultivation in Indonesia has become an integral part of the fisheries sector, covering a cultivation area of around 600,000 hectares. In 2014, total milkfish production reached 621,393 tons, reaching 82.8% of the production target of 750,000 tons. Significant milkfish producing areas include South Sulawesi, Southeast Sulawesi, West Sulawesi, East Kalimantan, West Java, East Java and Central Java. Although the majority of milkfish cultivation still adopts traditional technology, there are also a small number that apply semi-intensive technology, with yields varying between 500 kg to 1 ton per hectare per year for traditional technology, and 3 tons per hectare per year for semi-intensive technology.

Milkfish (*Chanos chanos*) is not only a source of animal protein that is affordable for the lower middle class, but also provides a diversification of processed products that continues to grow, as stated by Ramadhani (2019). The existence of milkfish in this context not only provides high nutritional value, but also contributes significantly to improving the nutrition of society as a whole. Therefore, as a fishery commodity with high economic value, milkfish has great potential for further development through cultivation activities.

Support for the economic potential of milkfish is further strengthened by the fact that grow-out and hatchery technology has been successfully mastered and developed in society. Malik (2010) emphasized that the life requirements of milkfish do not require high suitability criteria, because this fish has good tolerance to changes in environmental quality, so it is a potential source of fish protein to meet nutritional needs and increase people's income.

However, despite its great potential, competition in world trade, especially in the fisheries sector, demands that milkfish seeds, whether intended for local or international markets, must meet high quality standards. Water quality at the cultivation location is a crucial factor that influences the metabolism of milkfish. Apart from that, good and correct broodstock maintenance and good feed management are also determining factors for the success of milkfish cultivation (Andrila et al., 2019).

In this context, this research will explore and analyze the supervision of milkfish cultivation hatchery activities. Research activities were carried out at the Balai Besar Perikanan Budidaya Air Payau (BBPBAP) Jepara, Central Java, to ensure that the conditions of Feeding Management and the environment in milkfish cultivation biota support optimal growth and produce production with maximum profits.

METHODOLOGY

This research was conducted in March-April 2023 at the Balai Besar Perikanan Budidaya Air Payau (BBPBAP) Jepara, Central Java Province. The data collection method is observation and interviews with 4 competent sources, as well as carrying out production activities from container preparation to harvesting. The research approach used is descriptive, referring to the method of Lailiyah et al. (2018), namely observing and following all production activities at the data collection location. Data collected during this research activity was sterilization of rearing media water, container preparation, broodstock rearing, feed management, and water quality management.

RESULTS

Water Sterilization

Sea water as a raw water medium for rearing milkfish seeds needs to be sterilized before being used as a medium for rearing or rearing milkfish in each phase to prevent the entry of pathogens that cause disease or other substances that can endanger the life of the milkfish seeds being reared. Sterilization of maintenance media water is carried out by supplying water from the sea and then pumping it to the cultivation site and providing a water filter (sand filter), then the water will be directly channeled to the milkfish seed rearing pond.

Water Draining

The initial stage in preparing containers for rearing milkfish seeds in Unit I of the BBPBAP Jepara milkfish hatchery begins with draining the water which is carried out after the seeds have reached harvest age so that the milkfish seeds can be harvested. The aim of draining the water is to remove all remaining suspended material, whether in the form of leftover feed or dirt, by opening the outlet inside the pond and removing the outlet pipe in the pond.

Giving Chlorine

After the maintenance pond has gone through the draining and drying stages, 500 grams of chlorine is mixed with 100 liters of water and then distributed throughout the maintenance pond along with the aeration hose, inlet and outlet pipes. Then, the chlorine solution is left for 12-24 hours to maximize the disinfection process or destroy toxic bacteria and viruses.

Pond Washing

The next stage of sterilization is the process of washing the pond which has been given a chlorine solution and left for 12-24 hours. Then the pond is drained again, then rinsed and followed by brushing the pond to remove the chlorine content and remaining dirt in the pond from the previous process thoroughly, both on the inside of the pond as well as the inlet pipe, outlet and aeration hose. Next, the pond and other equipment that have been thoroughly washed are rinsed using water until there is no remaining dirt and chlorine left, then the pond is allowed to dry for 1 day before being ready to be filled with media water.

Water Filling

After all stages of sterilization of the maintenance pool have been completed, the next stage is filling the water. The milkfish hatchery in Unit I at BBPBAP Jepara uses seed rearing media in the form of a 10 ton concrete pond with a volume of water used of 5 tons/pond. The water filling for this maintenance medium is seawater which has undergone a raw water sterilization process and is transferred directly from the storage tank via a transfer pipe. The pipe is equipped with a Bag Filter, where the function of the Bag Filter itself is to filter dust particles originating from the water tank, so that the water used for rearing larvae becomes clearer.

Broodstock Maintenance

Broodstock maintenance activities are carried out by being given feed in the form of pellets once a day with a protein content of 38%, fat 5%, crude fiber 6%, ash 12%, water content 11%. Then, the feed is enriched with the following ingredients: vitamins (5 gr), honey (100 mL), Natur-E (10 caplets), and egg yolk/egg stimulant (5 gr) for 15 kg of pelleted feed. Feed enrichment is only done twice a month.

Feed Management

In the process of rearing milkfish seeds to produce quality seed candidates, the milkfish hatchery at Unit I at BBPBAP Jepara uses natural feed in the form of rotifers which are cultured for 4-5 days to reach a certain density as needed. The rotifers are given food in the form of nanochloropsis, apart from that there is also additional food in the form of scrumble pellets and also egg yolk mixed with rice flour which aims to increase the length of the seeds and help strengthen the seeds' body defenses. Feed is given at an intensity of 3 times a day at 08.00 am, 13.00 noon, 15.00 pm using an arbitrary feeding method.

Siphoning

Siphoning of seed rearing ponds is one of the important things that must be done to reduce dirt and leftover feed which can cause the growth of fungus which is dangerous for the milkfish.

In rearing activities for milkfish larvae, siphoning is carried out twice a month, and this frequency depends on the water quality conditions in the cultivation container. The first siphoning of the cultivation container is carried out to clean the egg shells of the larvae that have hatched at the bottom of the tank. The tool used is a pipe equipped with a 5/16 inch hose. The aim of siphoning the shells is to ensure that the shells do not grow and spread to other eggs, thereby causing a deterioration in water quality.

Water Quality Measurement

Water quality measurements at BBPBAP Jepara include DO (Dissolved Oxygen), Nitrate (NO_3), Nitrite (NO_2), pH, salinity and temperature. Measurement of dissolved oxygen levels at BBPBAP is carried out twice a day, namely in the morning and evening using a DO meter. Dissolved oxygen is the main factor for the survival of milkfish seeds, supplying dissolved oxygen needs through aeration which is continued through pipes and aeration hoses. The values for dissolved oxygen levels when rearing milkfish seeds at BBPBAP Jepara are presented in Table 1 below.

Table 1. Water Quality Analysis Results

Parameter	**Observation Time**	
	Morning	**Afternoon**
DO (mg/l)		
Week 1	6,7	5,6
Week 2	7	6,4
Week 3	6,8	6,6
Week 4	6,8	6,2
Temperature (°C)		
Week 1	29,4	30,3
Week 2	29,3	31,8
Week 3	28,6	27,7
Week 4	28,5	28
Salinity (ppt)		
Week 1	24	27
Week 2	29	23
Week 3	29	25
Week 4	31	29

Based on Table 1, it can be seen that the range of dissolved oxygen levels in the morning from the first to the 4th week is 6.7 to 7 mg/L. Meanwhile, oxygen levels in the afternoon from the first week to the 4th week were 5.6 to 6.6 mg/L. The dissolved oxygen values obtained did not have a significant difference, but there were changes in dissolved oxygen levels in the morning and evening.

For aquatic biota, temperature is one of the water parameters that can influence the life of milkfish seeds, such as appetite and metabolic rate. Temperature measurements for rearing milkfish seeds at BBPBAP Jepara are carried out every day using a DO Meter to provide the best conditions during the growth process of milkfish seeds where data on the water temperature conditions of the media for rearing milkfish seeds at BBPBAP Jepara is presented in Table 1. The results of temperature measurements show that in the morning it is around 28.5-29.4^oC from the first to 4th week, while in the afternoon it ranges from 28-31.8^oC.

The salinity or salt content in seawater as a medium for raising milkfish seeds is measured every day using a refractometer where salinity is an environmental parameter that can influence the biological activities of cultivated biota such as growth rate, feed conversion and survival rate. The higher the salinity level, the higher the osmotic pressure that needs to be carried out through the osmoregulation process so that it requires more energy to adjust. The salinity level of the water in the milkfish seed rearing media at BBPBAP Jepara is presented in Table 1. The salinity range in the morning is 24-31 ppt, while in the afternoon it is 23-29 ppt.

The pH content or degree of acidity in the rearing water media is known to influence the survival of milkfish seeds, such as appetite and stress levels. Measurement of pH levels at BBPBAP Jepara is carried out once a week using pH paper. To monitor pH conditions to remain stable and minimize potential stress. The following data on measuring pH levels for rearing shrimp broodstock is presented in Table 2. The pH value from the first week to the fourth week is 6. The pH value obtained is considered optimal.

Table 2. Nitrate, Nitrite and pH Levels of Water Quality in the Rearing of Milkfish Seeds at BBPBAP Jepara

Observation Time	Nitrate (NO_3) (mg/l)	Nitrite (NO_2) (mg/l)	pH
Week 1	0,01	0,002	6
Week 2	0,031	0,012	6
Week 3	0,043	0,024	6
Week 4	0,054	0,029	6

Checking the nitrate and nitrite water quality parameters at BBPBAP Jepara is carried out once a week at the Chemical Physics Laboratory. The water quality data on nitrates and nitrites when rearing milkfish seeds at BBPBAP Jepara can be seen in Table 2. The range of nitrates in the first week to the 4th week is 0.01-0.054 mg/l. Meanwhile, for nitrite from the first week to the 4th week, it is 0.002 to 0.029 mg/l.

Breeding

The milkfish hatchery activity at BBPBAP Jepara begins with sampling of female broodstock who have matured eggs with signs of eggs filling the thick orange-white dorsal area. Next, the female broodstock whose eggs have matured is transferred into the male broodstock tank for mating. Checking of mature eggs and broodstock that have been successfully fertilized is carried out twice a day, namely at 06.00 and 16.00 WIB. It is known that there are two types of breeding process, namely natural breeding and artificial breeding. At the Balai Besar Perikanan Budidaya Air Payau (BBPBAP) Jepara itself does not have a pond or special container for milkfish broodstock breeding, so broodstock breeding is done naturally in rearing tanks. The water level was lowered in the morning until around 60 cm remained from the bottom of the maintenance tank. Then the water was raised again at 10.00 WIB in the morning. This aims to increase the water temperature to stimulate breeding.

DISCUSSION

Syukri et al. (2020) stated that after the tub was cleaned by washing, then dried, it was then filled with 80% sea water. The tub is equipped with a PVC pipe to channel the incoming water and a drain at the bottom of the container, the hose installation, and the aeration stone are arranged in such a way that it is hoped that the air from the aeration can flow evenly throughout the tub. Meanwhile, the activity of providing chlorine during container preparation is in line with the statement from Nugrahadi et al. (2021) that 20 grams of chlorine is given to kill bacteria that can affect water quality.

The aim is to enrich the feed so that the milkfish broodstock can produce quality eggs. According to Marzuqi et al. (2015) premature feed is feed that plays a role in supporting the broodstock milkfish by providing nutrients in quality and quantity to support the reproductive process of the broodstock milkfish. Vitamins and minerals are important factors that are closely related to gonad maturity, the number of eggs produced, and the quality of eggs and larvae. Pellet feed supplemented with vitamin E can increase fertilization and hatchability of milkfish eggs, then vitamin C is one of the micro nutrients needed by broodstock in the reproductive process.

The use of rotifer feed as natural food for milkfish seeds aims to maximize and fulfill nutrition in the development process so as to produce quality seeds, Wullur et al. (2017) stated that natural rotifer food is known to be good for the growth of milkfish larvae because its nutritional content is good for the growth of fish larvae. In general, the protein content of rotifers is in the range of 28 to 63% and the lipid content is around 9 to 28% of the dry weight of the rotifer. The carbohydrate content ranges from 10.5 to 27% dry weight consisting of 61–80% glucose (with the main component glycogen), 9–18% ribose and 0.8–7.0% galactose, mannose, deoxyglucose, fucose and xylose.

According to Makmur et al. (2018) aeration is a device that is able to maintain dissolved oxygen levels in high density shrimp rearing containers which is useful in the metabolic process and development of shrimp, apart from that aeration can also support the breakdown of suspended material so that it does not become bad nutrients.

The different changes in oxygen levels between morning and evening are known to be due to an increase in temperature which causes dissolved oxygen levels to decrease. Susanti et al. (2022) states that. Dissolved oxygen (DO) that is too low will stop fish eating activity and growth. Another effect of weak oxygen conditions is that the health of the fish decreases, making them more easily infected with diseases or parasites.

The pH value in this study was 6 and was included in the optimal category for rearing milkfish. This is in line with Mustafa (2016) statement, which states that the optimum value of acidity (pH) for the survival of milkfish seeds is between 6.08-8.64. pH measurements in unit I of the milkfish hatchery at BBPBAP Jepara were carried out using pH paper so the values obtained were not as accurate as using a pH meter. Septiningsih et al. (2020), stated that large changes in water pH in a short time will cause physiological disorders. The effect of pH can also affect the level of ammonia toxicity and the presence of natural food such as plankton, moss and kelekap.

The difference in salinity in the morning and evening is caused by a leak in the pond, so water is often added in the morning. Misbah (2018) stated that salinity is one of the water quality parameters that affects survival, feed efficiency, growth and health of crabs. Even though adult mud crabs are aquatic organisms that are euryhaline, they are able to adapt to media with a wide salinity range, namely between 1 and 42 ppt.

Haser et al. (2018) stated that temperatures that are too high can cause fish eggs to die, while temperatures that are too low take a long time to hatch. Therefore, optimizing the temperature in the cultivation media is very necessary to increase the survival percentage (survival of the larvae), so that this can increase seed production. Based on this, research is needed to determine the optimal temperature range to increase milkfish survival.

From the nitrate and nitrite data in Table 2, it can be said that the values obtained are considered quite optimal. Furthermore, Garmania (2018), stated that if the nitrite value is close to 0.1 in waters for a long period of time this can cause stress, illness, and slowed fish growth and if the nitrite value is more than 0.1 ppm this can cause fish death occurs.

Mukhlis et al. (2020) argue that breeding is stimulated by manipulating environmental temperature by lowering and raising the water level in rearing tanks. Milkfish will spawn naturally at night, namely around 24.00-04.00 in the morning, where the egg and sperm cells meet and the mating process occurs. This is in line with the opinion of Evendi et al. (2017), that milkfish usually spawn at night and in the morning the eggs are moved to an aquarium where the eggs are stored by flowing water from the breeding tank into the aquarium because milkfish eggs are pelagic where milkfish eggs float on the water surface.

CONCLUSION

The conclusion of this research is that hatching of milkfish (*Chanos chanos*) is carried out by sterilizing the rearing media water using a sand filter, and disinfecting using chlorine. Maintaining the water quality of the rearing media through draining the media water by 100% to remove residual feed and metabolic waste from milkfish. Water quality monitoring is carried out twice a day with measurements of DO, Temperature and Salinity parameters where the values obtained during 30 days of observation show optimal results for all parameters and are still able to support life and the development of activities in the milkfish hatchery.

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