Profile of Gonad Development and Spawn Milkfish Broodstock, *Chanos chanos* Forskall G-1 with Hormonal Implantation Reared in The Controlled Tank

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Abstract

Tony Setia Dharma and Zafran. 2017. Profile of Gonad Development and Spawn Milkfish Broodstock, *Chanos chanos* Forskall G-1 with Hormonal Implantation Reared in The Controlled Tank. *Aquacultura Indonesiana*, 18 (1): 15-19. This research was conducted in Institute for Mariculture Research and Development (IMRAD) using on concrete tanks 150 m³. The objective of this research was to know the performance and gonad maturations development and spawn activities of first generation (G-1) broodstock from individual selection. The experiment test of milkfish broodstock with weight size of 3,891.67±344.99 g were reared on tank. Fish were reared at initial density of 60 individuals fish in 150 m³ concrete tanks. The treatments were: with hormone (A) and without hormone (B) implantation. The doze of LHRH-a implant hormone was 50 µg/kg. The broodstock were reared using of standard procedure operational (SOP) for spawning and gonad maturations. The result of the experiment showed that fish with hormone implantation gave the better results in gonad development on stage of reproduction than fish without hormon implantation. The gonad maturations and development on male and female broodstock diameter of oocyte and sperm were 450 µm and positive 2 and 3, respectively. The broodstock was spawn on the continue rear culture in the tank. The frequency of spawning were 8 times (with hormone) and 4 times (without hormone implantation) with total number of egg was 1,660,000 and 500,000 pc, respectively. The quality of eggs were 55-95% for fertilities and index activity survival (SAI) after hatching larvae was 4-5 days.

Keywords: Growth; G-1 selection; Milkfish broodstock; Spawn

Introduction

Milkfish, *Chanos chanos* is one commercial commodity and have the economically important for fish markets in Asia, has a wide spread area in the tropical Indo-Pacific ocean, and dominant in the Asian region, including the waters around Burma, Thailand, Vietnam, Philippines, Malaysia and Indonesia. Milkfish in Indonesia has been widely known in the East includes coastal waters of Sumatra, North of Java, Kalimantan, Sulawesi, Maluku, Papua, including Bali and Nusa Tenggara. Milkfish hatchery technology has been successfull since 1990 and starting in mid 1994, this technique has been adopted by the community in order to produce seeds. So in the development of production techniques, communities and governments make breakthroughs to increase production, starts with feeding the simple to the feed quality. A series of seed production can not be separated from the role of a complete hatchery (HL) which is able to provide eggs milkfish in sufficient quantities and continuously. Increased demand for seed milkfish for the domestic market is very high as well as their exports to several countries which also increased so the quality of the seed milkfish hatchery production of small scale hatchery be

considered, especially the management of feed and controlled environment, so the quality of seeds produced meet export standards.

Milkfish fry from hatcheries around the north coast of Bali over the last ten years have dominated the local and export market especially to the Philippines, then the quality of the seed that the market demands is highly preferred. It seems to be very closely related to the quality of the milkfish broodstock as a key element in the process of seeding, other than seed production techniques that have been developed. Besides there are many bussiness that utilize the production of feed pellets with lower quality protein and impressed potluck, so the production of eggs produced will decline, and the lower the quality. Milkfish broodstock production by the result of research selection (G1) has been conducted since 2011 on the location of the origin of the best seed and gradually started from seed selection, fingerling and young milkfish to be brood through individual selection in the pond.

This research activity was conducted in the Institute for Mariculture Research and Development. Selection of pre broodstock quality was continuously conducted, and then gonad

maturation and spawning were carried out using cultured broodstock in the controlled tank, so the need for seeds quality can be fulfilled continuously, ranging from seed production, fingerling and young milkfish on aquaculture development. The purpose of this study was to know the gonad maturation development and spawn activities of broodstock (G1) and its capability to producing eggs with the best quality.

Materials and Methods

The study was conducted in the container as much as 2 pieces of concrete tank with a volume of 150 m³. The milkfish broodstock samples used was the result of individual selection (G1) with an average total length of 72.90 ± 2.80 cm and a weight of 3.90 ± 0.35 kg, then reared with stocking density of 60 individuals fish/tank. The treatment in this study were A (with hormon implantation) and B (without hormone implantation). The milkfish broodstock implanted by LHRH hormone with a doze of 50 mg/kg body weight as much as 3 times, every month. Broodstock maintained in good environmental conditions and fed with standard pellet commercial protein content of about 35% and

to improve the quality of the feed is added with vitamin E at a dose of 3 g/kg of feed, fish oil 10 mL/kg of feed, egg yolks 20 g/kg of feed and honey 10 mL/kg of feed. The amount of feed given is 3% of biomass/day with a feeding frequency 2 times/day. Observations phenotype include growth and observation of gonad development were done every two months. Parameters observed were the length and weight growth, gonad maturity level (TKG) and water quality such as temperature, oxygen, salinity, and pH. Data were analyzed descriptively.

Result and Discussion

The results showed that the gonad development and the final growth (total length and weight) of broodstock with hormone implantation (A) were 76.13 ± 3.25 cm and 5.40 ± 0.32 kg, respectively, while broodstock without hormone implantation (B) were 75.04 ± 2.80 cm and 5.25 ± 0.35 kg, respectively. The observation of gonad development and spawning milkfish for research in Tables 1, 2, 3 and 4.

Table 1. Result of gonad and sperm development on milkfish broodstock, *Chanos-chanos* Forskall at the end of experiment.

Treatment	Month	Observation									
		Female gonadal broodstock					Male gonadal broodstock				
		Negative	PV	SV	MV	LV	Negative	+1	+2	+3	Remarks
25 broodstock sample have eight female and six male mature gonad											
With hormone (A)	February	-	-	-	-	-	-	-	-	-	
	March	-	-	1	1	-	-	1	-	-	
	April	-	-	-	-	-	-	-	-	-	
	May	-	2	1	-	-	-	1	1	-	
	June	-	-	-	-	-	-	-	-	-	
	July	-	2	3	2	-	-	1	2	1	
	August	-	-	-	-	-	-	-	-	-	
	September	-	2	3	3	-	-	2	2	2	
	October	-	-	-	-	-	-	-	-	-	
	November	-	1	3	3	1	-	1	3	2	
25 broodstock sample have eight female and six male mature gonad											
Without hormone (B)	February	-	-	-	-	-	-	-	-	-	
	March	-	1	-	-	-	-	-	-	-	
	April	-	-	-	-	-	-	-	-	-	
	May	-	1	1	-	-	-	1	-	-	
	June	-	-	-	-	-	-	-	-	-	
	July	-	1	3	-	-	-	1	2	-	
	August	-	-	-	-	-	-	-	-	-	
	September	-	2	3	1	-	-	1	3	-	
	October	-	-	-	-	-	-	-	-	-	
	November	-	2	2	2	-	-	1	3	1	

Remark of Stadia TKG:

Negative = Negative

PV = Pre vitelogenesis (egg diameter < 100 µ)

SV = Small vitelogenesis (egg diameter 100-250 µ)

MV = Medium vitelogenesis (egg diameter 250-450 µ)

LV = Large vitelogenesis (egg diameter >450 µ)

Positively 1, 2 and 3 = quantity of sperm

Table 2. Result of spawn on milkfish broodstock, *Chanos-chanos* Forskall at the end of experiment.

Parameters	With Hormone (A)	Without Hormone (B)
Spawning of broodstock		
- Frequensy (time)	8	4
- Number of eggs (pc)	1,660,000	500,000
- Floating of eggs (pc)	1,038,000	324,000
- Egg of diameter (μm)	1,090 $\pm$ 15	1,080 $\pm$ 20
- Hatching rate (%)	55-95	35-80
- Survival activity index (days)	4-5	3-4

Table 3. Result of proximate analysis on laboratorium fed on commercial fed of milkfish broodstock, *Chanos-chanos* Forskall at the end of experiment

No.	% Dry of weight	Mix of Commercial fed
1	Protein	32.97
2	Lipid	10.31
3	Ash	8.36
4	Crude water	6.88

Table 4. Result of value water quality for milkfish broodstock et the end experiment in tanks

Parameter	With Hormone (A)	Without Hormone (B)
Salinity (ppt)	33 - 34	33 - 34
pH	7.83 - 8.2	7.68 - 8.4
Oxygen (mg/L)	4.96 - 5.10	4.96 - 5.10
Ammonia (mg/L)	0.019 - 0.03	0.019 - 0.03
Temperature ($^{\circ}\text{C}$)	27.1 - 29.5	26.8- 29.2

The results showed that the use of hormones in the broodstock of selection results produce a faster level of gonad development when compared with no hormones. Total broodstock mature gonads was 14 pc from total observation sample 25 pc, with the total length reached 76.13 ± 3.25 cm and a weight of 5.40 ± 0.32 kg. Gonad maturity index (TKG) generated oocyte diameter of 450 μ , where the male broodstock have sperm with positive stadia level 1, 2 and 3 in July, September and November (Table 1). Furthermore, the broodstock milkfish continue reared until spawn. The broodstock with hormone implantation spawned eight times and produced eggs as many as 1,660,000 eggs, while the broodstock without hormone implantation spawned four times and produced eggs as many as 500,000 eggs. The hormone implant by LHRH-a more precocious gonad to have happened the process of gonad maturation in brood fish, and further contribute to the increase in hormone producing organs in hypothalamus is expected of brood fish for naturally spawning. Lee *et al.* (1986), Priyono *et al.* (1993) and Watanabe *et al.* (1995), stated that in the process of gonad maturation and nurseries are not influenced by the seasons such as groupers, the bottom fish. Some types of fish, such as Sea bass and Nassau grouper, *Epinephelus striatus* on the

size and weight of 3.70 to 5.50 kg can spawn properly after being injected with hormone LHRH-a and 17- α MT. Fish every month can spawn naturally, not following the spawning season in the dark and the bright moon. Increased weight gain of the broodstock along its growth also increases the sperm count and the level of gonad development. Effendi (1979) and Mayunar *et al.* (1991) suggested that the reproduction process is largely the result of metabolism used for development of the gonads. Results of research Crime *et al.* (1985) in Tamaru *et al.* (1987) and Priyono *et al.* (2004) stated that the organs that contribute to the process of gonad maturation in fish affected by their hormonal and seasonal changes, besides the giving of additional materiati such as vitamin mix into commercial pellet. Giving feed with feed additive such as hormones and vitamin ingredients, egg yolk and fish oil can boost the level of maturity of the gonads. It can be seen that the gonad produced no increase and has not produced eggs starting in July, September and November (Table 1). Furthermore, based on histological analysis showed that the total stem length 76.13 ± 3.25 cm and a weight of 5.40 ± 0.32 kg can already be mature gonads.

The results of proximate analysis of feed given to the milkfish broodstock has fat content about 10.31% (Table 3). Suwirya (1994) have stated that the levels of fat in the diet plays an

important role in helping the development of cell of oocyte and sperm in the gonad of female and male broodstock. Besides the feed quality, size and age of the broodstock is also an important effect on the spawning process. This is consistent with the results of the research Priyono *et al.* (2004) and Tridjoko *et al.* (2002), that gonad broodstock can develop well when there will be spawning. Priyono *et al.* (2011) and Chen and Martinich, (1975) have stated that fish will be cultivated at least 4 years of age.

Development of the gonads oocyte diameter increased to 450 μ , that the increased level of maturity of their gonads and have synchronizing the spawning process is sperm and ovulation a male and female resulting in stimulation of ovulation then have spawning. The observation of water quality during the study showed that during the maintenance period of the broodstock, water quality is still in the normal range. This is consistent with observations Priyono *et al.* (1993) and Setiadharmas *et al.* (2002) that the range of water quality of each treatment is relatively common and its still within normal limits for the life of the broodstock because the amount of water changes during maintenance in 24 hours more than 200%. Levels of dissolved oxygen in the water to support life organisms in water at least 2 ppm. If dissolved oxygen in water decreases, fish movement becomes slow and almost all organism will move to the surface of the water. To get the oxygen needs of the fish, there usually cultivated by balance water changes so the water quality in steady condition. When the rate of metabolism increase, the organisms will consume more oxygen (Djawad, 1997). Oxygen is also a limiting factor. Effendi (2003) stated that the ideal value of DO in marine waters is approximately ± 7 mg/L. The range values are still well preserved because it has always done the control change of water. This is done to guard against the accumulation of food remains that can inhibit growth.

Conclusion

The results showed that implantation of hormone LHRA-a resulted in gonad development and spawning of milkfish broodstock. The hormone implanted broodstock spawn as many as eight times and the number of eggs produced was 1,660,000 eggs, where as without hormone produced eggs four times as many as 500,000 eggs. Fertilization rate (FR) ranged 55-95% and

resistance days after hatching larvae (SAI) was 4-5 days.

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