Effectiveness Of Alternative Feed Accelerated Maturity Of Male Gonads Of Sangkuriang Catfish (*Clarias* sp.)

Ridwan Salim[1], Farid Mudlofar[1] Suparmin[1], Rizal Akbar Hutagalung[1*], Sarmila[1], M. Taufik[2]
[1]Lecturer Staff, [2]Educational Laboratory Equipment for Fisheries Cultivation Workshop,
Aquaculture Study Program, Politeknik Negeri Pontianak
*Corresponding Author e-mail: rizalakbarhutagalung020503@gmail.com

Abstract

Sangkuriang catfish was one of the important economic value commodities, so it required the availability of high quality seeds that were determined by the maturity of female gonads, especially male gonads that had matured in artificial hatchery. The most important factor to accelerate the gonad's maturity, both female and male, was that the feed given for this purpose required an alternative feed to increase the gonad's maturity. The aim of the study was to obtain the effectiveness of a tool feed to increase optimal gonad maturity of male broodstock. This research lasted for 53 days used a Completely Randomized Design (CRD) with 4 treatments and 3 replications, the treatment of feed used in this study was treatment A: pellet feed, treatment B: snail feed, treatment C: shrimp feed, and treatment D : tamban fish feed. The main parameters measured were male Gonadal Maturation Stage (GMS) / Gonado Somatic Index (GSI), and supported parameters were weight growth, survival, fish health and water quality. The results of the main parameter showed that the highest GSI was treatment C which was given white shrimp feed that was an increase of 0.72%, followed by treatment D which was fed tamban fish by 0.66%, then treatment B which was given snail feed was 0.62% and that was the lowest in treatment A which was given a pellet feed of 0.55. Water quality maintenance an average temperature of 25°C to 30°C. pH 6.5 to 8 and dissolved oxygen> 3 mg / liter so as to support the growth and development of test fish.

Keywords: Gonado Somatic Index (GSI), Catfish Broodstock, alternative feed

Introduction

One of the catfish that was widely cultivated was the strain of sangkuriang, the advantage of this sangkuriang catfish was that it has a relatively fast growth rate, tasted delicious and tasty meat, and contains high enough protein so much in demand by the public (Nasarudin, 2014).

The demand for live and fresh catfish for catfish pecel stalls, restaurants and supermarkets continued to increase in the big cities. The needs for catfish would also continued to increase along with the growth of catfish processing businesses, such as catfish meatballs, catfish crackers, shredded catfish and catfish fillets. Catfish also began to be marketed in the form of durability, namely smoked catfish (Kordi, 2010).

As the productivity of the sangkuriang catfish farming business increases, the sangkuriang catfish seedlings certainly require sangkuriang catfish seedlings as production inputs which would result in increased demand for sangkuriang catfish seed needs. The provision of superior fish seeds was one of the main needs in increasing the productivity of sangkuriang catfish farming. To produce good quality sangkuriang catfish seeds, good quality of male and female broodstock was needed so that when mated / bred will produce superior seeds (Prasetya, 2013).

The success of sangkuriang catfish hatching both naturally (natural spawning) and artificial (induced breeding) was needed by male and female gonads that have matured. The most important factor to accelerate gonad maturity depended on the food provided (Nugroho, 2002).

During this time the fish farmers to ripen the gonadal broodstock catfish from artificial feed (pellets) which of course the price was more expensive for that natural food was needed as an alternative feed provided.

Studying this, a study was conducted to determine the level of gonad maturity of male sangkuriang catfish broodstock by providing natural food as an alternative that was found in many commercial or natural markets that can accelerate gonad maturity.

Materials and Methods

The research lasted for 53 active days, which began on September 23 until November 23, 2019. The research container used was a bulkhead in floating net cages.

Test fish used by male candidates for male sangkuriang catfish with an average weight of 250 to 350 g / head with ages of 6 to 8 months were obtained from fish farmers whose keepers were in one population. Test fish were used as many as 120 fish by sampling (10% of the population), a total of 12 fish as initial GSI sampling and initial growth. Furthermore, observations were made using a sampling method to obtain data on fish health and water quality carried out once a week morning and evening. while to obtain final GSI data and final growth and survival of sangkuriang catfish broodstock.

The research design used a Completely Randomized Design (CRD) with 4 treatments and 3 replications with Treatment A: Pellet Feed, B: Snail Feed, C: Shrimp Feed and D: Additional trash fish feed.

Gonad Somatic Index (GSI)

Gonad Somatic Index (GSI) data were obtained by sampling fish GSI at the beginning and end of the research. GSI was intended to measure the gonad maturity level of research success, with the GSI formula as follows:

$$GSI = \frac{Wg}{Wb}\ x\ 100\%$$

The higher the presentation value, the GSI value almost to 10%, the more mature gonads were ready to be breeded.

Weight Growth Rate

Weight growth rate data by calculating absolute growth rate, was calculated using the following formula:

$$W = Wt - Wo$$

Information :
W = growth weight (g)
Wt = biomass weight at the end of the study (g)
Wo = biomass weight at the beginning of the study (g).
The growth rate of sangkuriang catfish weight was used to determine the weight gain of the fish during the study.

Survival Rate

Survival rate (SR) was calculated by counting the number of fish that live at the beginning of maintenance and end of maintenance, SR expressed in percent, can be calculated by the formula (Jatilaksono, 2007):

$$SR = \frac{Nt}{No} \times 100\%$$

Information :
SR = survival rate
N = final number (fish)
No = initial number (fish)

Fish Health

Monitoring the health of fish by visual observation of its morphology and behavior, if it showed abnormal symptoms, it indicated a sick test fish, to determine the type of disease that attacks by diagnosing the disease that attacks the fish.

Water Quality

Monitoring the measured water quality was the temperature parameters using a thermometer, the pH of the water with a pH meter and dissolved oxygen with a DO meter. Water quality measurements were carried out every day and average water quality data was taken. The main parameter data that has been obtained was the GSI data be processed by normality test and BNT test used SPSS Version 23 software tools, for supporting data such as growth, fish health, water quality and survival used descriptive analysis.

Results And Discussions

Indicators observed in this research include gonadal maturity with supporting data such as growth rate, survival rate, fish health and water quality during maintenance. During experimental, survival observations were made every day to find out the number of fish deaths during experimental. Whereas GSI observations and growth rates of sangkuriang catfish were conducted at the beginning till the end of experimental, supporting data on fish health, water quality and periodic sampling were carried out.

Gonadal Somatic Index (GSI)

Sangkuriang catfish as 120 test fish taken 10% of the population (12 fish), the sample was to represent the test fish population. Sampling results obtained as initial GSI data of

sangkuriang catfish can be presented in Table 1 as followed:

Table 1. Initial GSI Data of Sangkuriang Catfish During Experimental

Feed Treatment	Number of Test Fish Average (g)		GSI (%)
	Body weight	Gonadal weight	
A (Pellet)	253	0.47	0.19
B (Golden Snail)	253	0.47	0.19
C (White Shrimp)	253	0.47	0.19
D (Tamban Fish)	253	0.47	0.19
Total	1,012	1.88	0.74
Average	253	0.47	0.19

Source: Initial GSI calculation results (2019)

Sangkuriang catfish which had been kept for 2 months from the survival rate were taken final TKG sampling data. Final GSI calculation data was presented in Table 2.

Table 2. Final GSI Data of Sangkuriang Catfish During Experimental

Feed Treatment	Number of Test Fish Average (g)		GSI (%)
	Body weight	Gonadal weight	
A (Pellet)	510	2.82	0.55
B (Golden Snail)	470	2.9	0.62
C (White Shrimp)	577	4.17	0.72
D (Tamban Fish)	580	3.83	0.66
Total	2,137	13.72	2.55
Average	534.25	3.43	0.64

Source: Final GSI calculation results (2019)

The results obtained in treatment C which were given white shrimp feed increased the highest gonad from 0.47g to 4.17g, followed by treatment of tamban fish feed to 3.83g, then treatment B of golden snail feed was 2.90g and the lowest in treatment A pellet feed was 2.82g.

The treatment of alternative feeds that was natural food given such as golden snails, tamban fish and white shrimp has significantly increased gonad compared to artificial feed (pellets).

Illustration of the final GSI percentage graph during experimental can be seen in Figure 1 below:

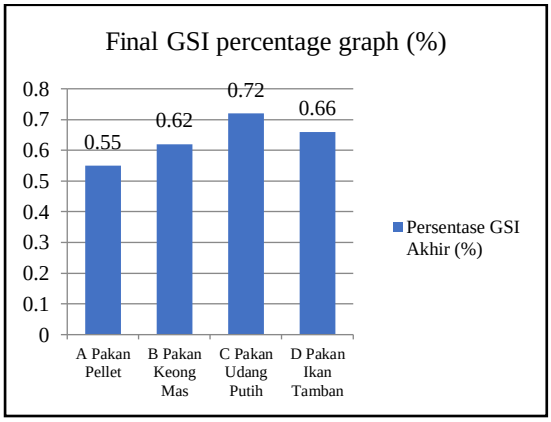

Figure 1. Illustration of GSI Levels During Research

Figure 1 showed the highest GSI was treatment C which was fed white shrimp that equal to 0.72%, then followed by treatment D which was fed tamban fish by 0.66%, then treatment B which was given golden snail feed was 0.62% and the lowest was on treatment A was given pellet feed of 0.55%.

Each treatment with three replications was calculated the level of male gonad maturity with a statistical test to determine differences in the results of the GSI percentage from each treatment. Data analysis was performed with the help of PASW.18.2014 one way ANOVA software to find out significant differences in each treatment

Anova test showed the output results that it was known that the P-Value was 0.05, which means that the P-Value $<\alpha$ (0.05). These results can be said that there was a difference in the average alternative feed treatment to the increase in fish GSI.

Knowing which alternative feeds had an effect on the increase in GSI, the Tukey test was continued, where from the results of the Tukey P-Value test of 0.05 assuming a P-Value <0.05, it appeared that alternative feed treatments had an influence on each GSI average each treatment. So it can be concluded that there are significant differences in each alternative feed treatment to the increase in GSI.

Growth Rate

Growth was an increase in size, both length and weight. Growth was influenced by

genetic, hormonal and environmental factors, although in general environmental factors play an important role in fish growth (Yushinta, 1999).

Weight growth was the weight and length increase of the number of sangkuriang catfish at harvest compared to the number of fish at stocking. The initial weight sampling results from the population stocked 120 fish with an average weight of 253 g / fish. Heavy growth during 2 months of maintenance can be seen in Table 3.

Table 3. Test Fish Growth Data During Experimental

Feed Treatment	Average of weight body (g)		Weight growth (g)
	Stock	Harvest	
A (Pellet)	253	510	257
B (Golden snail)	253	470	217
C (White shrimp)	253	577	324
D (Tamban fish)	253	580	327
Average	253	534,25	281,25

Source: Growth sampling results during the study (2019)

Table 3 showed that at the average stocking weight of test fish 253g / fish after being kept for 2 months sangkuriang catfish during harvest, the average weight was 534.25g so that the average fish that were kept experiencing weight gain was 281.25g. The results showed the highest growth was treatment D which was fed tamban fish which amounted to 327g from the initial weight, followed by treatment C of white shrimp feed 324g, treatment A of pellet feed 257g and the lowest in treatment B of cone feed 217g.

Illustration of weight growth graph during the study can be seen in Figure 2.

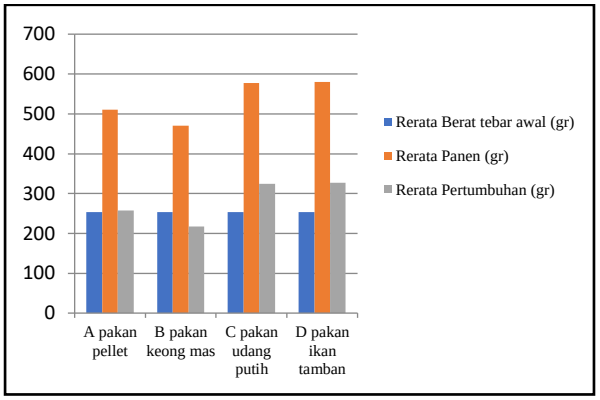

Figure 2. Illustration of weight growth graph during experimental

The results of the illustration from Figure 2 showed that the highest growth was treatment D which was given tamban fish feed which increased 129.5% from the initial weight, followed by treatment C white shrimp feed 128.06%, treatment A 101% pellet feed and lowest treatment. B golden snail feed 85.77%.

Survival Rate

Survival rate was the number of fish that survived at harvest compared to the number of fish planted (stocking). Survival rates during experimental can be seen in Table 4.

Table 4. Survival Rates During Experimental

No	Feed Treatment	Number of Test Fish		SR (%)
		Stock	Harvest	
1	A (Pellet)	30	23	76.67
2	B (Golden Snail)	30	26	86.67
3	C (White Shrimp)	30	24	80.00
4	D (Tamban Fish)	30	25	83.33
	Total	120	98	81.67

Source: Growth sampling results during experimental (2019)

Table 4 showed when stocking 120 fish after being maintained for 2 months sangkuriang catfish at the time of harvest 98 fish. The results showed the highest survival rate was treatment B which was given snail feed that was 26 fish, followed by treatment D 25 fish, then treatment C were fed white shrimp that survived 24 fish and the lowest in treatment A were fed pellets of 23 fish.

Illustration of graph of percentage of survival during experimental can be seen in Figure 3.

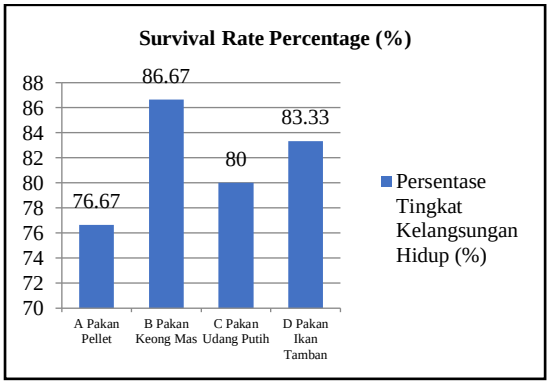

Figure 3. Illustration of survival rate during experimental

The results of the illustration from Figure 3 showed 81.67% survival, the highest survival was treatment B which was given golden snail feed with 86.67% survival, then followed by treatment D with 88.33% survival feed, while treatment C white shrimp feed with a percentage of 80% and the lowest survival rate in treatment A was 76.67% pellet feed.

Water Quality

Monitoring water quality during the maintenance of sangkuriang catfish was done by measuring water quality parameters. The parameters observed were dissolved oxygen (DO), temperature and pH. Water quality parameters suitable for the maintenance of prospective catfish broodstock refer to SNI 6484.3. 2014. Sangkuriang Catfish (*Clarias* sp.) part of broodstock production. The results of monitoring of average water quality data during experimental can be seen in Table 5.

Table 5. Data on Average Water Quality During Experimental

Parameters	Time	Treatment			
		A	B	C	D
DO (mg/l)	Morning	5	5	5	5
	Evening	6	6	6	6
Temperature (^{0}C)	Morning	26	26	26	26
	Evening	26	27	27	26
pH	Morning	7	7	7	7
	Evening	7.5	7.5	7.5	7.5

Source: Results of monitoring of water quality during experimental *(2019)*

The results of water quality monitoring studied by measuring dissolved oxygen (DO), temperature and pH parameters were then compared to the matrix as listed in Table 6 to state that the results of water quality measurements were appropriate or not suitable for the growth of catfish that were kept during experimental.

Table 6. Matrix of Conformity of Water Quality Parameters During Experimental

No	Parameters	Standard	Suitable (S)	Not Suitable (N)
1	Temperature	25^o C – 30^o C	25^o C - 30^o C	<25^o C and > 30^o C
2	pH	6.5 - 8	6.5 - 8	<6.5 and > 8
3	DO	minimal 3	minimal 3	<l 3

Source: Results of water quality data processing during experimental (2019)

The results of the analysis of water quality showed water quality during experimental of the condition of the water was feasible for the maintenance of sangkuriang catfish, so that it supported the growth and development of test fish. The recommended dose of feeding on fish was adjusted to the size of the fish, water temperature, density of fish biomass, abundance of natural feed and inversely proportional to the size of the fish. The maximum fish feed consumption at 22^{o}C was only 50-60% of the maximum feed consumption at 26^{o}C.

This given an illustration that in the morning when the water temperature was relatively low the dose of feed given was lower than that of the afternoon and evening (Gusrina, 2008).

Fish Health Monitoring

Monitoring of fish health was carried out if possible during experimental of an attacking disease. The results of diagnosed disease were

seen from clinical observations both from the morphology and behavior of sangkuriang catfish (behavior) from sampling of catfish taken in the absence of a type of disease that attacks.

The results of the study even though the catfish were not sick but there were some test fish that experienced death (mortality) which caused fights because the sangkuriang catfish was inclined to cannibal so that weak fish would be attacked by strong fish or large size differences would attack smaller sized ones.

Conclusions And Recommendations

Conclusions

Based on the results and discussion of the research on the effectiveness of alternative feeding to accelerate the maturity of the sangkuriang catfish (*Clarias* sp.) male gonads, the following conclusions can be drawn:

1. The type of feed has a significant effect on the level of gonad density of male sangkuriang catfish with the highest GSI value was treatment C which was fed white shrimp which was equal to 0.72%,
2. Observation of survival of sangkuriang catfish during experimental 81.67%, the highest survival was treatment B which was given golden snail feed with 86.67% survival,
3. The highest growth was treatment D which was fed with tamban fish which has increased 327g from its initial weight.
4. The results of the analysis of water quality showed the quality of water during experimental of the condition of water suitable for maintenance of sangkuriang catfish, with the results of measurements of 25^{o}C to 30^{o}C. pH 6.5 to 8 and dissolved oxygen> 3 mg / liter.

Recommendations

Reviewing the research results from observing the effectiveness of alternative feeding in order to accelerate the maturity of the sangkuriang catfish (*Clarias* sp.) male gonads, it can be suggested that further studies of white shrimp feed dose and types of nutrient content play the most role in increasing the GSI of male sangkuriang catfish.

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