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EFFECTS OF VARIOUS LATENCY PERIODS ON THE FERTILIZATION, HATCHABIILITY AND SURVIVAL OF *Clarias gariepinus*

AGBEBI, O. T., O. FASELUKA and A.A. IDOWU
Department of Aquaculture and Fisheries Management
University of Agriculture, Abeokuta, Ogun State, Nigeria.

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ABSTRACT

The latency period of post-ovulation of Clarias gariepinus has been demonstrated to affect the viability of its eggs and embryos. This study has examined the effects of various latency periods on the viability of eggs, fertilization, hatchability and survival of the African catfish Clarias gariepinus. Progenies were produced using eggs successively stripped from the African catfish at 10, 12, 14, 16, 18, 20, 17, 14, 21 and 22 hours of post-ovulation. Some eggs and sperm were delayed while others were used fresh. Low survival, hatchability and fertilization rates were observed in treatments 1 and 3, while an average percentage of fertilization, hatchability and survival rates were obtained in treatments 2 and 4. High rates of fertilization and hatchability as well as a considerable rate of survival of progeny after 21days of indoor rearing was obtained in 14-hour latency period at a temperature of 24.8^{o}C and was significantly different ($P<0.05$). Therefore, any attempt to improve fingerlings production in Clarias gariepinus must consider the effects of latency period in relation to water temperature, and the best latency period achieved in this study was 14 hours.

Keywords: Latency period, Fertilization, Progenies, Hatchability, Survival.

INTRODUCTION

Fisheries have been recognized as one of the fastest growing sectors in the world. Fish is the most heavily traded food commodity in the market; with the continuous declining of natural fish production, it is crucial to improve fish production from aquaculture as it is one sector that can significantly contribute to World Fish Production (Williams, 2001). The production of marketable fish begins with the stocking of fry or juvenile into a rearing environment. These fish can come from wild capture, however the fish cannot be guaranteed that adequate numbers can be captured and stocked in the time corresponding to optimum production conditions; the fish farmer then naturally turns to other means of obtaining his stock which is invariably an artificial method (Oyelese, 2006). African catfish *Clarias gariepinus* (Burchell, 1822) was one of the most suitable species in aquaculture, it has been considered to hold a great promise for fish farming; the African catfish having a high growth rate, resistant to handling and stress, being very well appreciated and having a high market value. One key constraint to its culture is the limited availability of quality fingerlings as seed material (Sahoo *et al*, 2007). Induced breeding may be a dependable alternative for obtaining high quality seed material. The species of induced breeding of *Clarias gariepinus* depends largely on the Latency period (Hogendoorn and Vismans, 1980; Zonneveld *et al*, 1988). Latency period is being described as the time interval

between injection of the female fish and stripping of eggs.

MATERIALS AND METHODS

The experiment was carried out towards the end of the wet season between September to October. A flow-through water system of twelve (12) hatching troughs was adopted for this experiment. Four (4) gravid females weighed 900 g each and (8) matured males weighed 1kg each of *Clarias gariepinus* broodstocks were acclimatized for one week. Broodstocks were injected with ovaprim hormone to induce ovulation. The males were also sacrificed for their testis.

Each of the broodstock injected were stripped according to their stipulated latency period and incubated in the flow through hatchery system,

20g of eggs were stripped for each replicate according to their time frame.

1g of eggs = 600 eggs.

Therefore, 20g of eggs = 12,000 eggs

RESULTS AND DISCUSSION

The results obtained in this experiment are presented in tables 3 to 6. The results from this study revealed that eggs and milt delayed for 4 hours yielded 50% fertilization, 46.5% hatchability and 71.97% survival. The least percentages were obtained in eggs and milt kept for 6 hours at 23^{o}C before fertilization, the result obtained here was 45% fertilization. 23% hatchability and a survival rate of 49.03% after 21 days of indoor rearing.

Treatment 2 which involves fertilization carried out between 18 hours and 22 hours after hormonal injection, where eggs were delayed for 2, 4, and 6 hours, and fertilized with fresh sperm at a temperature of 23^{o}C recorded the lowest percentages. It gave 28% fertilization, 41.9% hatchability and 64.77% survival indoors. The highest percentages were obtained when the eggs were delayed for 2 hours, 44.9% fertilization, 51.4% hatchability and 59.44% survival. This is a clear indication that viability is inversely proportional to post-ovulation time. The decrease in the viability of Eggs might be due to over ripening as obtained in high latency periods (17-23 hours) which resulted in poor fertilization and hatching rates (Ohata *et al*, 1996; Oyelese, 2006).

The latency periods of 10-14hours is unarguably the best latency period for *Clarias gariepinus.* At period lower than that, there will be insufficient action of the hormonal treatment leading to failed ovulation (Tan-Fermin *et al*, 1997). There was no statistical difference ($p<0.05$) in the treatments except the treatment of 14 hours latency period which was significantly different ($p<0.05$) in fertilization and hatchability.

CONCLUSION AND RECOMMENDATION

The success of artificial propagation of *Clarias gariepinus* through induced breeding under controlled environmental conditions, is mostly dependent on the latency period and humidity/temperature.

This study has indicated that if eggs are stripped before the optimum time, there will be low fertilization, hatchability and survival of the hatchlings in both indoor and outdoor hatcheries. Also, if the time of stripping (i.e. Latency period) is too high, there would still be loss of quality in the gonadal products.

In some cases, some sex products of *Clarias gariepinus* might be delayed for some time before fertilization. It might be due to some reasons, some of the reasons might be:

The eggs did not come out properly from the fish, so the fish will be given more time; hence, the already removed sperm will then have to be delayed.

The milt in the sperm sac/testis might not be sufficient, so in the process of obtaining another sperm, the eggs may be delayed (if it has been stripped) or the latency period might be extended (if the eggs has not been stripped). The death of one of the broodstocks will cause a delay in the already removed gonadal product, or an

extension in latency period. If the facilities to be used are not yet in place, latency period will be extended, or there will be a delay in either eggs or sperm.

If the gonadal products are retained in the body of the fish and the latency period is too high or too low, there will be loss in quality. Also, if the eggs or sperm are delayed for too long, there will be a deterioration in both gonadal products.

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Table 1: Time of stripping of eggs, sperm removal and fertilization for each treatment

	Treatments and replicates	Latency period (hours)	Time of egg stripping	Delayed gonadal product	Time of sperm removal	Delayed for	Fertilized at
1	T_1R_1	16	2am	Both	2am	2hrs	4am
2	T_1R_2	18	2am	Both	2am	4hrs	6am
3	T_1R_3	20	2am	Both	2am	6hrs	8am
4	T_2R_1	18	4am	Eggs	6am	2hrs	6am
5	T_2R_2	20	4am	Eggs	8am	4hrs	8am
6	T_3R_3	22	4am	Eggs	10am	6hrs	10am
7	T_3R_1	17	5am	Sperm	3am	2hrs	5am
8	T_3R_2	19	7am	Sperm	3am	4hrs	7am
9	T_3R_3	21	9am	Sperm	3am	6hrs	9am
10	T_4R_1	10	11pm	None	11pm	-	11pm
11	T_4R_2	12	1am	None	1am	-	1am
12	T_4R_3	14	3am	None	3am	-	3am

TREATMENT 1

Table 2: Delayed Eggs and Delayed Sperm

Replicates	Weight of sperm sac	No of eggs incubated	no of fertilized Eggs	% fertilization	% Hatchability	Unhatched eggs	Period of hatching	No of Hatchlings	Feeding rate (at 10%) per day	Number survived	% survival
1.16hours	2g	12,000	7,200	60	59.2	1500	12 hours	4263	1.8g	3241	76.02
2.18hours	2g	12,000	6,000	50	46.5	32.10	14hours	2790	0.9g	2008	71.97
3 .20hours	2g	12,000	5,400	45	23.0	4155	14 hours	1242	0.36	609	49.03

TREATMENT 2

Table 3: Delayed Eggs and Fresh Sperm

Replicates	Weight of sperm sac	No of eggs incubated	no of fertilized Eggs	% fer-utilization	% Hatchability	Unhatched eggs	Period of hatching	No of Hatchalings	Feeding rate (at 10%) per day	Number survived	% survival
1.18hours	2g	12,000	5388	44.9	51.4	2619	16 hours	2769	0.83	1646	59.44
2.20hours	2g	12,000	4320	36.0	50.0	2160	16hours	2160	0.65	1215	56.25
3.22hours	2g	12,000	3360	28.0	41.9	1950	18hours	1408	0.42	912	64.77

TREATMENT 3

Table 4: Fresh Eggs and Delayed Sperm

Replicates	Weight of sperm sac	No of eggs incubated	no of fertilized Eggs	% fer-utilization	% Hatchability	Unhatched eggs	Period of hatching	No of Hatchalings	Feeding rate (at 10%) per day	Number survived	% survival
1.16hours	2g	12,000	8,350	69.58	70.0	1670	14 hours	5845	2.004	4003	68.49
2.18hours	2g	12,000	6,300	52.5	61.1	2.450	14hours	3849	1.17	2387	62.02
3.20hours	2g	12,000	5,760	48.0	36.50	3,660	16 hours	2100	0.63	1940	53.89

TREATMENT 4

Table 5: FRESH EGG AND FRESH SPERM

Replicates	Weight of sperm sac	No of eggs incubated	no of fertilized Eggs	% fer-utilization	% Hatchability	Unhatched eggs	Period of hatching	No of Hatchalings	Feeding rate (at 10%) per day	Number survived	% survival
1.10hours	2g	12,000	5400	45	76.0	1620	16hours	4104	1.14	3203	78.05
2.12hours	2g	12,000	4800	40	80.8	920	16hours	3880	1.17	3377	87.08
3.14hours	2g	12,000	8400	70	83.9	1350	18 hours	7050	2.12	6115	86.76