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Determination of optimum latency period for *Clarias gariepinus* in the arid zone of Nigeria.

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ABSTRACT: Varying latency times, 6 hours – 16 hours (time between hormone injection and stripping) were investigated on *Clarias gariepinus* in the Arid Zone to determine the optimum effective latency time when the highest number of ovulated eggs were viable and thus fertilizable.

Breeders were collected from the broodstock tank of (5 x 10 x 1.8m) with a drag net and weighed individually. They were injected intramuscularly, just beside the dorsal fin with OVAPRIM at 0.5ml per kilogram of fish. At the expiration of the latency period, the female was carefully removed and hand stripped while the male was cut open to remove the testes for external fertilization and incubation.

The percentage egg fertilization at 9 hours latency time which was high suggest that 9 hours was the optimum latency time for the stripping of *Clarias gariepinus* eggs after hormone injection in the Arid Zone. That was the time when most of the eggs in the ovary had ovulated and were therefore fertilizable.

Key Words: Fish breeding; Latency period; *Clarias gariepinus.*

Introduction

Clarias species are in very high demand in the North east of Nigeria on account of their tasty flesh. The species are very popular with fish farmers and consumers and they command a very good commercial value in Nigerian markets (Ezanwaji, 1985; Ladosun *et al*., 1993; Ayinla *et al*., 1994). Economically productive aquaculture is heavily dependent on adequate supply of fingerlings with which to stock the ponds. To ensure this, induced breeding techniques have been developed for mass fingerling production for fish farmers.

The widespread use of induced breeding technique has permitted the breeding of a number of fish species that do not ordinarily spawn under confinement. The major contribution of the technique since its first application in Brazil in 1935, has been in the inducement of spawning in fishes that do not breed under conditions of confinement or doso only under specific environmental conditions.

Hormone-induced reproduction of the African catfish which do not readily reproduce in captivity using de-oxycorticosterone acetate, Human chorionic gonadotropin, Common Carp Pituitary and ovaprin sythetic

hormone has been carried out successfully (Hogendoorn and Wiene, 1976), (Hogandoorn and Vismans, 1980), Micha, (1976), (Kelleher and Vinke, 1976), ElVolock (1976) and Madu *et al*., (1988).

But improved techniques of this hormonally induced spawning are clearly necessary if the full potential of aquaculture is to be realized. One of such improved technique in which there is dearth of information is the optimum latency time for stripping of *Clarias* species in the Arid Zone after injection of hormone.

The aim of this study therefore is to determine the optimum latency time for the stripping of *Clarias gariepinus* which would be recommended to fish farmers in the Arid Zone of Nigeria.

Materials and Methods

Breeders were collected from the broodstock tank of (5 x 10 x 1.8m) with a drag net. The females were selected if few eggs were released when gentle pressure was applied on their abdomen. Rips males were selected on the basis of their reddish urinogenital papilla.

The breeders were weighed and injected intramuscularly, just beside the dorsal fin with OVAPRIM at 0.5ml kilogram of fish. After injection, the breeders were kept in an aerated plastic bowls, covered with chicken wire mesh and heavy weight to prevent the breeders from jumping out.

The male was dissected using a pair of scissors and forceps, and the testes were removed and kept in petri dish with 0.9% Saline solution.

Eleven latency times, 6 hours – 16 hours (time between hormone injection and stripping) were investigated. At the expiration of the latency period, the female was carefully removed and hand stripped manually for the eggs.

Fertilization

The testes were cut open using a pair of scissors to release the sperm (milt). Feather was used to mix the eggs with the milt (Dry Fertilization). The following parameters were determined:

(i) % Fertilization = $\frac{\text{Mean No. of fertilized eggs x 100}}{\text{Mean No. of eggs milted}}$

(ii) % Hatchability = $\frac{\text{Mean No. of fry hatched x 100}}{\text{Mean No. of eggs fertilized.}}$

(iii) % Productivity = $\frac{\text{Mean No. of fry hatched out x 100}}{\text{Est. Mean No. of eggs milted}}$

(iv) % Estimated total fry production = Mean No. of hatched eggs x No. of replicates.

Incubation

Under laboratory mean temperature of 30°C, two hundred fertilized eggs were placed in eleven (11) (40 x 40 x 40cm) small incubating tanks with flow through system. Each tank has shreds of Kakabans that served as egg collectors. Stripping was carried out at one hour intervals for eleven (11) hatches. This was repeated in three other breeding exercises which lasted for three weeks. Percentage fertilization for each batch of eggs was determined 5 – 7 hours after fertilization by sampling randomly with a siphon from various portions of the incubating tanks and counting the number of fertilized and unfertilized eggs.

Unfertilized eggs turned whitish in colour and opaque while the fertilized ones were light brown and transparent. The total number of hatchlings (Fry) obtained after incubation was also estimated five days after hatching when the yolk had already been absorbed and fry were moving and feeding vigorously. Altogether, eleven females were stripped and 20 males sacrificed.

Results

The result of the experiment shows that there was a positive response to manual stripping by the hormone injected females except for the 6 hours latency time. Eggs flew out freely as from 7 – 16 hours period. The ease of flow increased as the latency time increased and at 14 – 16 hours period, the eggs became watery and were flowing out spontaneously at the slightest struggle by the fish. The colour of the released eggs deepened from light brown to dark brown as the latency time increased.

Table 1 shows the effect of varying latency times on percentage fertilization and hatchability of *C. gariepinus*. The lowest percentage fertilization (00.0%) was obtained at the latency time of 16 hours while the highest (73.3%) was at 9 hours. There were however no significant differences ($P > 0.05$) in the percentage fertilization values at 7, 8, 9 and 10 hours latency times. Percentage hatchability was best (98.5%) at 15 hours.

The percentage egg fertilization at 9 hours latency time which is high suggest that 9 hours was the optimum latency time for the stripping of *Clarias gariepinus* eggs after hormone injection in the arid zone. That was the time when most of the eggs in the ovary had ovulated and majority were not yet "Over – riped" and therefore were fertilizable. 8 hours, 10 hours and 11 hours latency times were encouraging in their percentage fertilization values when compared with that of the 9 hours latency time. Smallest quantity of eggs was stripped at 6 hours latency time because only very few eggs might have ovulated as at that time.

The decrease in percentage fertilization after 9 hours latency time suggest that some of the ovulated eggs might have started over ripening (over staying) and could, therefore, not be fertilized, Woynaravich and Horvath (1980). This could be attributed to the positive effect of high temperature on ovulation in the arid zone of Nigeria.

The latency period of 9 hours obtained for *C. gariepinus* in this study agrees with the value (8 – 9 hours) obtained by Madu (1989) for *C. anguillaris* at a water temperature of 27°C – 28°C in a different ecological zone.

Discussion

The 9 hours latency period obtained for the highest percentage egg fertilization suggest that it was the optimum latency time for the stripping of *C. gariepinus* between 30 – 32°C water temperature in the arid zone of Nigeria. That was the time when most of the eggs in the ovary had ovulated (follicles keeping the eggs fixed to the walls of the ovary dissolved and the eggs fell into the ovarian cavity). Majority of the eggs were not yet overriped and were therefore fertilizable. 8 hours, 10 hours and 11 hours were also found to be equally alright because there was no significant difference ($P > 0.05$) in their percentage fertilization values when compared with that of the 9 hour latency time.

Few quantities of eggs were stripped at 6 hour latency time because only few eggs might have ovulated as at that time. This was confirmed by the observation that the ease of egg flow increased with latency time.

There was decrease in percentage fertilization after 9 hour period and this suggest that some of the ovulated eggs might have started "Over-ripening" (over staying) and could therefore not be fertilized. This could be attributed to the effect of high temperatures on ovulation in the arid zone. According to Woynarovich and Horvath (1980) there is an approximate time after ovulation within which 50% of the eggs in the ovary of a fish become "over-ripe" and unfertilizable.

The latency period of 9 – 12 hours obtained for *C. gariepinus* in this study agrees with the value 8 – 9 hours obtained by Viveen et. Al., (1986) for *C. gariepinus* at a water temperature range of 27°C – 28°C. Woynarovich and Horvath (1980) also obtained latency period of 16 – 18 hours for Common Carp at a water temperature of 21 – 22°C but observed that the latency period became shorter (12 – 13 hours) if the fish were treated with one or more preparatory doses before the final injection. According to the authors, the latency time in one dose injection is usually higher since egg development in that case will involve both pre-ovulation and ovulation. For the three Chinese carps (Grass carp, Silver carp and Big head carp) a common Latency period of 10 – 11 hours was observed at 21 – 22°C water temperature (Woynarovich and Horvath, 1980).

Table 1: Effect of Varying Latency Times on Percentage Fertilization and Hatchability of *C. gariepinus* (Paper 1049).

A	B	C	D	E	F	G	H	I	J	K	L
Wt. Of Female Spawner (g)	Latency Time (h)	Water Temp. °C	Replicates	Mean Wt. Of egg hatches Stripped(g)	'Est. Mean No. of eggs Milted (1g = 700 eggs).	'Mean No. of ' eggs fertilized	% Fertiliza-tion	Mean No. of fry hatched out	% Hatcha-bility	% Productivity	Est. Total fry production by the female
550	6	30.5	3	8.9	6230	3500	56.2	3300	94.3	53.0	9900
710	7	30.0	3	15.9	11130	7212	64.8	5500	76.4	49.4	16500
670	8	31.2	3	16.5	11550	7550	65.4	6240	82.6	54.0	18720
870	9	30.8	3	21.4	14980	10980	73.3	8520	77.6	56.9	25560
454	'10	32.0	3	12.8	8960	5900	65.8	4200	71.2	46.9	12600
450	11	30.6	3	10.9	7630	3540	46.4	2800	79.1	36.7	8400
740	12	31.5	3	18.8	13160	6200	47.1	5640	91.0	42.9	16920
640	13	30.4	3	16.2	11340	3500	30.9	2950	84.3	26.0	8850
550	14	32.0	3	17.8	12460	2800	22.5	2500	89.3	20.0	7500
580	15	30.1	3	14.3	10010	2010	20.1	1980	98.5	19.8	5940
610	16	30.5	3	20.6	14420	00.0	00.0	0000	00.0	00.0	00.0

1g. of *C. gariepinus* eggs = 700 eggs (Viveen et al., 1986)

$H = \frac{G}{F} \times 100$, $J = \frac{I}{G} \times 100$, $K = \frac{I}{F} \times 100$, $L = I \times D$.

Latency period did not directly affect egg hatchability since the administered hormone had no direct effect on egg incubation but on egg ovulation and spawning. Percentage hatchability was, hence, relatively uniform when calculated in terms of fertilized eggs that hatched. Percentage productivity was, however affected by latency time since production in terms of the number of fry that hatched out, depended very much on the number of eggs fertilized. The same could be explained for the variation in the estimated total number of fry produced by a female fish. Fry production by a female depended on the number of eggs ovulated that were actually fertilized.

There was no definite pattern of relationship between female body weight and the total weight of eggs stripped or the percentage of egg weight to body weight. Total weight of eggs stripped from a female depended on the number of eggs ovulated at the time of stripping and hence was not a true representation of the total quantity of eggs obtainable from a female fish.

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