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Effect of immersion time on latency period and hatchability of *Clarias gariepinus* (Burchell, 1822)

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Abstract

The study was carried out to determine the effect of delayed immersion in water on the ovulation and hatchability of *Clarias gariepinus.* Eighteen sexually matured *Clarias gariepinus* with mean weight 1.1+0.02kg were used for the experiment while synthetic hormone "ovaprim" as the inducing agent was administered intramuscularly at 0.5ml/kg body weight. Female fish were grouped into three treatments and were administered the hormone but the immersion into water were varied at zero hour (instant immersion), 60minutes and 120minutes coded as TA, TB and TC respectively. Each of the treatments was replicated trice. The injected female fish were put in separate hapa nets each measuring (1×1×1m) in an outdoor cistern. Results obtained from the experiments showed that TC gave the shortest latency period of about 8 hours after immersion in water and the least percentage hatchability of 57. 33% while TA recorded the best hatchability rate (87.78%) though with longer latency period of 11hrs. ($p<0.05$). This study has indicated that *Clarias gariepinus* can be spawned with delayed immersion in water for two hours at latency period of between 8-9hrs. after hormone administration but with decline hatchability rate compared to conventional method (instant immersion).

Keywords: Delayed immersion, *Clarias gariepinus,* Latency period, Hatchability.

Introduction

Latency period is described as the time interval between the injection of hormone on a female fish and spawning/stripping of eggs (Zonneveld *et al.*, 1988). The success of induce breeding of *Clarias gariepinus* depends to a large extent on the ovulation and latency period (Hogendoorn *et al.*, 1980). There are other factors to be considered simultaneously with latency period such as temperatures of pond water after hormone administration. Many authors have reported a reverse relationship between water temperature and latency period. According to FAO (1996), the maximum temperature required for fish to be ready for stripping after hormone administration within 11-13 hours is 25^{o}C.

The rate of fish consumption in tropical Africa especially in Nigeria has given catfish vantage position among other aquaculture products. Fish is often the cheapest source of animal protein especially with riverine people and therefore important in the diets of the lowest income earners. Its high content of poly- unsaturated fatty-acids has given it medical and health commendation (Widjaja *et al*., 2009; Adekoya, 2011).

The culture of catfish in Nigeria is relatively high because of the awareness created in aquaculture, availability of large water bodies and strong interest in providing food and making profit (Adebayo and Popoola, 2008; Owodeinde *et al*., 2011). In Nigeria, *Clarias gariepinus* is popular among fish farmers and consumers alike. They are reared all over the country especially in the South and have very good commercial value in Nigerian markets and beyond (Adewolu and Adeoti, 2010; Owodeinde *et al*., 2011).

The major problem hindering the promotion and development of aquaculture industry in Nigeria is the high cost and scarcity of fingerlings (George *et al*., 2010; Nwiro, 2012). The induced breeding of African catfish has been well documented but there is paucity of information on the effect of delayed immersion in water on the latency period of *Clarias gariepinus.* This study is therefore aimed at determining the latency period and hatchability rates of *Clarias gariepinus* hitherto administered hormone "ovaprim" with variation of immersion times.

Materials and Methods

The experiment was carried out within the

month of August 2013, at the Hatchery unit of the Department Fisheries Technology Federal Polytechnic Nekede Owerri, South East Nigeria.

Experimental fish: Eighteen sexually mature fish (9 male and 9 female) of average weight 1.1 +0.02kg were purchased from a reputable farm in Owerri, Imo State and were kept separately (i.e. females from the males) in two outdoor concrete ponds measuring 4×2×1m for two weeks acclimation; during which period, the broodstock were fed commercial feed (Copens= 50%CP) at 5% body weight daily shared between 8-9am and 5-6pm. The broodstocks were selected on the basis of their morphological or external sexual characteristics (Ayinla *et al.*, 1994).

Experimental design and hormone administration: Three treatments coded TA, AB and TC consisting of 3 fish each was allotted to the experimental set up such that TA served as control and fish therein was immersed in pond water immediately after hormone injection. Fish in TB and TC were kept in a dry plastic bowl after injection and left in the hatchery at prevailing temperature prior to immersion at 60 and 120 minutes respectively. Each treatment was replicated three times. Each of the female broodstocks was weighed prior to hormone administration at 0.5ml per kilogram body weight intra-muscularly via the caudal peduncle and after stripping using a weighing balance (Camry Emperor Model, China). All the trial fish were kept in separate hapas inside the same pond to avoid possible fluctuations in water temperature while other parameters were monitored to be within optimal range as described by Boyd (1979).

Milt extraction: The nine male fish were brought out of the pond and made unconscious by stunning them with an iron rod. They were dissected using a pair of sterile scissors from the genital papillae up to the upper abdomen close to the operculum to expose the testes. The testes were removed with the help of a pair of sterile forceps and were thoroughly cleaned to remove blood and blood vessels attached to them with saline water (Ofelia *et al.,* 2012); thereafter, the testes were then lacerated to get the milt.

Stripping and fertilization of eggs: This was proceeded by first drying (mopping) the fish of water with neat, clean and dry towel while stripping involved the gentle pressing of the abdomen with the thumb at the anterior end towards the posterior direction, that is, from the pectoral fin towards the genital papillae. Eggs from the female fish were stripped out after ovulation into separate dry plastic bowls labeled accordingly. Milt from the testes of individual treatment males was used to fertilize eggs hitherto stripped for each treatment groups. Each treatment eggs in the bowls was added some quantity of 10% saline solution and then mixed thoroughly by using feather to gently stir/mix the eggs and milt.

Incubation and hatching: Nine hundred fertilized eggs counted using the method by Ofelia *et al.,* (2012) were taken from each treatment and shared into the three batches of 300 eggs per replicate and incubated separately in 15 liter hatchery troughs. Water parameter such as temperatures and pH were taken and recorded using mercury-in-glass thermometer and pH meter respectively. Eggs were hatched between 24-48 hours and the larvae counted as a measure of fertilization.

The percentage hatchability was calculated using the formula by Ofelia *et al.*, (2012):

$$\% \text{ hatchability} = \frac{\text{Number of hatched eggs}}{\text{Number of fertilized eggs}} \times \frac{100}{1}$$

Statistical analysis: Data collected were processed and subjected to one-way analysis of variance while treatment means were separated using least significant difference according to Steel and Dickey (1999).

Results and Discussion

The latency periods recorded in this experiment ranged between 8-11 hours; TC recorded the shortest latency period (8±0.15hrs.) while the longest was obtained from control fish in TA (11± 0.25hrs.). There were significant differences ($p<0.05$) among the treatments. The latency period observed in TA agrees with FAO (1996) and Agbabiaka (2010) that reported a range of 10-12hours for African catfish when water temperature is 25-26^{0}C but negates observation in this study in which TB and TC recorded a range of 8-9hrs. latency periods respectively ($p>0.05$). However, these time frames above disagreed with Sahoo *et al.* (2008) who reported 14-17hrs. when *Clarias batrachus* was injected with Human Chorionic Gonadotropin (HCG). The variation may be attributed to differences in genetic composition and physiological status of the fish species coupled with variation in type/concentration of hormones. Nevertheless, the hatchability rate was best in TA (87.78%) in spite of the relatively long latency period while the inverse was the case in TC (57.33%). The comparatively poor hatchability rates in TB and TC (69.10 and 57.33%) respectively may be due to physiological stress occasioned by delayed immersion which perhaps triggered the Oxytocin in the fish with insufficient secretion of gonadotropin hormone (GTH) responsible for ovulation , coupled with insufficient time for ovulation thereby causing fish to shed some premature/unripe eggs during spawning/stripping hence, the resultant low hatchability rates when

compared with the TA(control); this agrees with findings of Kraad *et al*. (1998) and Smith (1999) that under ripeness or over impress of eggs hinder maximum fertility and hatchability of eggs.

Table (1): Latency period of experimental fish at different immersion periods

Treatment	Latency period(hrs.)	Water temperature	pH
TA	12 ±0.25 [a]	26± 0.15^{0}C	5.9±0.30
TB	9± 0.15 [b]	26± 0.15^{0}C	5.9±0.30
TC	8 ± 0.15 [b]	26± 0.15^{0}C	5.9±0.30

[abc] Means with different superscripts on column are significantly different (p< 0.05)

Table (2): Hatchability rates of experimental fish with variations in immersion time

Treatment	No. of incubated eggs	No of eggs hatched	% Hatchability
TA	300	263.33[a]	87.78[a]
TB	300	207.30[b]	69.10[b]
TC	300	172.00[c]	57.33[c]

[abc] Means with different superscripts on column are significantly different (p< 0.05)

Conclusions

This study has indicated that *Clarias gariepinus* can be spawned with delayed immersion in water for two hours at latency period of between 8-9hrs. after hormone administration but with decline hatchability rate compared to conventional method (instant immersion).

References

Adebayo, O.T., and Popoola, O.M. 2008. Comparative Evaluation of efficiency and cost of synthetic and non-synthetic Hormone for artificial breeding catfish (*Clarias gariepinus* Burchell, 1822). J. Fish Aquaculture Sci., 3: 66-71.

Adekoya, A.E. 2011. Reproductive Performance of African Clariid catfish, *Clarias gariepinus* broodstock on varying material stress. J. Fish Int., 1: 17-20.

Adewolu, M.A and Adeoti, A.J. 2010. Effects of mixed felding and feed utilization of *Clarias gariepinus* (Burchell, 1822) fingerlings. J. Fish Aquaculture Sci., 5: 304-310.

Agbabiaka, L.A. 2010. Aquaculture and Pond management in the Tropics. Vintage Books Limited, Owerri. 111pp.

Ayinla, O.A.; Kayode, O.J.; Idoniboye-Obu, O.J.E.; Oresegun, A. and Adidu, V.E. 1994. Use of tadpole meal as substitute for fish meal in the diet of *Heterobranchus bidorsalis*. J. Aquaculture Trop., 9(1): 25-33.

Boyd C.E 1979. Water quality in warm water fish ponds. Auburn University, Alabama Agric. experimental Station, 359pp.

FAO, 1996. Artificial Reproduction and Pond Rearing of African catfish *Clarias gariepinus* in Sub-Saharan Africa. A handbook. Food and Agriculture Organization of the United Nations 73pp.

George, F.O.A,.; Olaoyem, O.J.; Akande, O.P. and Ogbobase, R.R. 2010. Determination of Aquaculture Fish Seed Production and Development in Ogun State Nigeria. J. Sustain. Develop. Africa, 12(8): 22-34.

Gupta S.K. and Gupta, P.C. 2006. General and Applied Ichthyology (Fish and Fisheries). S. Chand and Co. Ltd, Ram Nagar, New Dehli, 1045-1068.

Hogendoorn, B. 1980. Hypophysation of Indian Major Corps. Satish Book Enterprise Motikatro Agra – 3 India, 146pp.

Kraad, G.V.D.; Chang, J.R. and Janz D.M. 1998. Reproduction, In: Evan D.H. ed., The Physiology of Fishes, 2nd ed., CRC press, USA.

Nwoiro, E. 2012. Fish Farming a lucrative Business. http//www.thirdaylive. com.article/fish farming –a-lucratio.business/119253/. (Accessed 20-10-2012).

Ofelia, G.O.; Olanrewaju, I.; Olawale, O.; Praise, A.; Tijesunimi, O.; Sunday, A. and Odofin, W. 2012. Cryopreservation of the sperm of the African catfish for the thriving aquaculture industry in Nigeria. In: Igor Kathou ed., Current Frontiers in Cryopreservation.

Owodeinde, F.G. and Ndimele P.E. 2011. Survival Growth and Feed utilization of two Clariid catfish *(Clarias gariepinus and Hetrobanchus bidorsalis)* and their Reciprocal Hybrids. *J. Applied Ichthyol,* 27: 1249-1253.

Sahoo S.K.; Giri. S.S.; Chandra, S. and Mohapatra, B.C. 2008. Evaluation of breeding performance of Asian catfish *Clarias batrachus* at different dose of HCG and latency period combination. Turkish J. Fish Aquaculture Sci., 8: 249-251

Smith, L.S 1999. Reproduction, In: Introduction to Fish Physiology. Naranda Publishing House. Delhi, 266pp.

Steel, R.G. and Dickey, D.A. 1999. Principles and procedures of Statistics. A Biometric Approach. McGraw Hill Companies Inc. New York, USA.

Widiaja, W.P.; Abdulamir, A.S.; Saavi, N.B., Abubaha, B. and Ishak, Z.B. 2009. Fatty acids profile of tropical Bagrida catfish *(Mysitus numericus*) during storage. J. Food Technol., 4: 90-95.

Zonneveld, N.; Rustidja, W.J.; Viveen, A.R. and Maduna, W. 1988. Induced spawning and egg incubation of Asian catfish *Clarias bratrachus*. Aquaculture, 74: 41-47.