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PRELIMINARY STUDIES ON URINES OF PREGNANT MAMMALS FOR INDUCING BREEDING IN *Clarias gariepinus*

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ABSTRACT

This research was aimed at evaluating the efficacies of natural and synthetic hormones in respect to percentages of fertilization (F), hatching (H) and survival (S) rates of induced breeding of Clarias gariepinus. A total of eight: four mature males and four gravid female brood stocks were used. The urines of pregnant cow, mare and human containing crude (not extracted) natural hormones were injected into three females each at dosage of 2ml/kg of live body mass while synthetic hormone (Ovaprim) was injected into a female as a control at 0.5ml/kg. After 11 hours of latency period the female catfish were stripped of their eggs and the weights of eggs were measured. Milts were obtained from the males and properly mixed with the eggs. The fertilized eggs were divided into three parts, spread evenly on hatching Kakabans in hatching tray. After two hours, the numbers of the green and white portions of the spread eggs were estimated as fertilized and unfertilized eggs respectively. Using quadrants the population of hatched larvae were estimated and based on average of 650 eggs per 1g of eggs, hatching rates were estimated. After a week, survival rates were calculated by counting the surviving frys. Results were cow (F=23.12%; H=59.70%; S=53.00%); mare (F=22.34%; H=44.76%; S=48.78%); human (F=53.90%; H=80.81%; S=77.49%) and Ovaprim (F=85.46%; H=92.45%; S=80.25%). Pregnant mammal's urines can induce breeding in C. gariepinus as alternatives to Ovaprim. However, further experiment is recommended for testing higher doses of the urines and the efficacies of extracted hormones from the urines.

Key words: Pregnant, Urine, Cow, Mare, Human, *Clarias gariepinus*, Induced breeding

INTRODUCTION

Fish is a good and cheap source of protein especially in rural areas. African catfish (*Clarias gariepinus*) are the most common type of fish species for aquaculture in Nigeria, thus resulting in the increased demand of the catfish (Muller *et al.*, 2018). Adequate supply of quality fish seed (fingerlings) has been a major problem in the attempts by many fish farmers to culture fish, and this is a fundamental pre-requisite for large scale fish production. Some farmers depend on fingerlings collected from the wild were most fishes are seasonal breeders. As a consequence, there is always a scarcity of fish seed for stocking when it is not breeding season.Today, many fish farmers in Nigeria are unable to produce their own fingerlings due to financial, technical and logistical demands and have relied on the government. However, induced spawning guarantees a reliable source of fish seed (Fingerlings) in quality and availability (Adewumi and Olalele, 2011).

Commonly used chemical for induced breeding is hormone and prominent synthetic hormone brands in Nigeria are Ovaprim, Ovatide and Ovuline (Olubiyi, *et al.*, 2005) but are not readily within the fish farmers' reach due to cost and supply chain. Natural hormones from fish pituitary glands and in urine of pregnant mammals have been used for inducing breeding in fish. *C. gariepinus* does not naturally breed in captivity, hence the need to artificially induce breeding of the species (Abdulkarim and Yusuf, 2015).

In fish farming, a key requirement for fish breeding is establishment of hatchery unit for seed production and multiplication which relies on the use of natural or synthetic hormones to induce spawning for artificial fertilization, incubation of fertilized eggs and subsequently feeding live feed

followed by dry feed (Hogendoorn, 1983). Abdulkarim *et al*. (2017) stated that most farmers and researchers seemingly are satisfied with the use of synthetic hormones and hardly investigate on the non-synthetic hormone leading to paucity of information on standard dosage of non-synthetic hormones. The aim of this research was to use natural and synthetic hormones and evaluate their efficacies in fertilization, hatchability and survival rates in artificial induced breeding of African catfish.

MATERIALS AND METHOD

Description of study area

The study was carried out at Omo chartes fish farm, Farin-gada Jos North, Plateau state, Nigeria. The farm lies within latitude 9^0 55' 56^0 N and longitude 8^0 53'N 31. 63'E. Jos has an annual range of temperature of 16 – 26ºC and annual mean rainfall of 1326mm (Zitta and Madaki, 2020).

Brood stocks and their management

A total of eight: four each of male and female matured catfish brood stocks were used for the research. The four gravid females with live body masses (826 – 926g) and four matured male catfish with body mass (831 – 930g) were acclimatized for the period of seven days. They were fed with 9mm commercial feed of 45% C.P at 5% of their total body weight.

Breeding Procedure

The urines of pregnant cow, mare and human containing crude (not extracted) natural hormones were injected into the three females each at dosage of 2ml/kg of body weight while synthetic hormone (Ovaprim) was injected into one female as a control at 0.5ml/kg of live body masses. These were left for the latency period (maturation period) of 11 hours. The female catfish were stripped of their eggs after the latency period and by a gentle press on the abdomen. The stripped egg were measured and recorded. The milt was then obtained from the males by sacrificing the males. The milt was properly mixed with the eggs using clean feathers. The fertilized eggs were then divided into three (3) parts to obtain the replicates of the treatment per fish per type of hormone used. Fertilized eggs were spread evenly on hatching Kakabans in hatching trays. After two hours the numbers of the green and white portions of the spread eggs were estimated as fertilized and unfertilized eggs respectively. Hatching success was recorded after 24 hours. The total hatching hours were 34 hours under 30ºC temperatures. Kakabans were removed after hatching period and other particles were siphoned out leaving the larvae in the nursing tanks. Using quadrants the population of hatched larvae were estimated and based on average of 650 eggs per 1g of egg hatching rates were estimated. Also, after a week the survival rates were calculated by estimating the surviving frys in the nursing tanks.

Water quality parameters

Temperature of the water was taken daily using mercury in glass thermometer while pH and dissolved oxygen were monitored using pH and dissolved oxygen meter respectively.

Statistical Analysis

Data obtained were subjected to one-way analysis of variance. Significant means were separated by least square difference.

$$\text{Fertilization rate} = \frac{\text{number of fertilized eggs}}{\text{total number of eggs}} \times 100$$

$$\text{Hatching rate} = \frac{\text{number of hatched (larvae) eggs}}{\text{total number of fertilized eggs}} \times 100$$

$$\text{Survival rate} = \frac{\text{total of larvae at 7 days after hatched}}{\text{total hatched larvae}} \times 100$$

RESULTS AND DISCUSSION

The percentages of fertilization, hatching and survival rates of eggs and hatchlings of gravid *C. gariepinus* induced with ovaprim, pregnant cow, mare and human urines are presented in Table 1. The

results showed that both synthetic hormone (ovaprim) and non-synthetic hormones in urines of pregnant cow, mare and human, successfully induced spawning in *C. gariepinus*. These corroborate with the findings of Adebayo and Popoola (2008) who observed successful spawning for *C. gariepinus* using frog pituitary extract, ovaprim and catfish pituitary extract. Similarly Muchlisin et al. (2014) reported that ovaprim and chicken pituitary extract induced spawning for *O. vittatus*. *C. gariepinus* treated with ovaprim had the highest fertilization, hatching and survival rates: 85.46%, 92.45% and 80.25% respectively and statistically significant ($P<0.05$). This was followed by samples treated with pregnant human urine. This indicate that use of ovaprim in spawning *C. gariepinus* was more effective and gives higher fertilization, hatching and survival rates than non-synthetic hormones based on the dose of urines containing natural hormones used in this research.

However, higher doses and probably if the non-synthetic hormones were concentrated by extraction, the trends of the efficacies might be different for the natural hormones compared to the synthetic ovaprim. Babalola et al. (2021) observed non-significant difference ($P<0.05$) in fertilization and hatching rate of *C. gariepinus* induced with ovaprim and chicken pituitary extract which was in contrast with this study. Adebayo and Popoola (2008) found that the fertilization rate of *C. gariepinus* induced with ovaprim was 84.50% which was in agreement with this study while hatching and survival rates in this study was higher than those reported by Adebayo and Popoola (2008). The effectiveness of ovaprim over cow, mare and human urine was probably due to its composition and amount of reproductive hormones it contains as stated by Muchlisin *et al*. (2014). Therefore, a combined synergistic effects of the natural hormones might yield similar results with ovaprim. It could also be as a result of inappropriate doses of non-synthetic hormone as high or low dosage affect ovulation, fertilization and subsequent hatching of the fish.

Table 1: Percentages of fertilization, hatching and survival rates of *C. gariepinus* induced with different hormones

	Synthetic Hormone	Natural Hormones from urines of pregnant mammals		
Parameters	**Ovaprim**	**Cow**	**Mare**	**Human**
Fertilization rate (%)	85.46^{a}	23.12^{c}	22.34^{cd}	53.90^{b}
Hatching rate (%)	92.45^{a}	59.70^{c}	44.76^{d}	80.81^{b}
Survival rate (%)	80.25^{a}	53.00^{c}	48.78^{d}	77.49^{b}

Values with same superscripts across rows are not significantly different statistically.

CONCLUSION

Pregnant cow, mare and human urines have natural hormones that induce breeding in *C. gariepinus* hence; they can be used as alternatives to synthetic hormone (Ovaprim). However, further experiment is recommended for testing higher doses of the urines and for testing the efficacies of the hormones in the urines if concentrated by extraction.

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