*African Journal of Applied Zoology & Environmental Biology. 2005. Vol. 7, 101 – 105*
ISSN 1119-023X
www.uniportjournals.com/ajazeb

# THE EFFECTS OF VARIOUS DOSES OF OVAPRIM ON REPRODUCTIVE PERFORMANCE OF THE AFRICAN CATFISH *CLARIAS GARIEPINUS* (BURCHELL) AND *HETEROBRANCHUS LONGIFILIS* (VALENCIENNES)

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## ABSTRACT

Artificial spawning of two African Catfish species viz: *C. gariepinus* and *H. longifilis* of 0.18 – 0.64kg and 0.53 – 1.63 kg respectively were carried out using various doses of Ovaprim with carp pituitary extract (C.P.E.) as the control. Oocyte maturation and ovulation were successfully effected with Ovaprim doses of 0.2, 0.25, 0.30, 0.35, 0.40 and 0.50ml/kg for *C. gariepinus* and 0.30, 0.35, 0.40, 0.45, 0.50ml/kg for *H. longifilis*. Latency period was between 8 – 11.5hrs at 26.3°C – 28.0°C but was indirectly influenced by temperature, species and type of hormone. Hatching was between 22 – 30 hrs at a temperature range of 25.45 – 26.1°C and was independent of hormone dosage. Percentage deformed try was relatively low and ranged from 0.16 ± 0.28 – 1.08 ± 0.36 in *C. gariepinus* and 0.52 ± 0.59 . 1.50 ± 0.73 in *H. longifilis*. Fry survival rate was high and ranged from 89.44 ± 0.27 to 93.47 ± 2.18 in *C. gariepinus* and 78.57 ± 11.12 to 90.7 ± 3.90 in *H. longifilis*. Physico-chemical parameters were within the desired range for catfish larval rearing in all the treatments.

## INTRODUCTION

The successful large-scale cultivation of any organism for human consumption demands that the resource be easily renewable (Harvey and Hoar, 1979). It is clearly disadvantageous to cultivate any organism when the supply of the young cannot be easily replenished. Among the numerous species of fish under cultivation in Nigeria, notably are: common carp (*Cyprinus carpio*) Catfish (*Clarias gariepinus*; *Heterobranchus* sp, Grey multet, (Mugil cephalus) and Tilapia Sp.

The culture potential of *Clarias gariepinus* and *Heterobranchus longifilis* have been discussed by a number of authors among whom are Micha (1973), Legendre (1983), Hogendoorn (1983, 1984), Harlor (1989) and Nwadsukwe (1992, 1995). Mass production of African Catfish has also been achieved through hypophysation. Hormone substances used in hypophysation include acetone dried carp pituitary at 4mg/kg and 6mg/kg for *C. gariepinus* and *H. longifilis* respectively (Hogendoorn and Visman 1980; and Nwadukwe *et.al.* (1993) or fresh pituitary gland by matching weight to weight in a recipient/ donor system (Hogendoorn and Visman *op. cit.*)

Other substances used are mammalian hormones of which Human Chorionic gonadotropin – HCG (most frequently used), some success has also been achieved using luteinizing hormone (LH) or Follile stimulating hormone (FSH), and deoxycorticosterone acetate (DOCA) which only induces pre-ovulation (Richter and Van den Hurk, 1982).

These spawning agents are either difficult to quantity (carp pituitary extract), ineffective (Deoxycorticosterone acetate) or of short shelf life (Human chorioric gonadotropin).

This study is therefore aimed at finding a better substitute (easy to quantify and effective) in Ovaprim a relatively new spawning agent. It is also important to note that the producer recommended the use of 0.5ml/kg body weight without the indication of environmental implication.

## MATERIALS AND METHODS

The study was carried out at the hatchery of the African Regional Aquaculture Centre (ARAC), Aluu, Port-Harcourt.

### Source And Management of Broodstock

Broodstocks were managed according to Nwadukwe *et al* (1993)- *Hormone Dosage and Latency Period* Hormonal treatment was done using Ovaprim (Syndel Laboratory Limited), which was injected intramuscularly into the dorsal muscle above the lateral line and below the enterior part of the dorsal fin. The selected gravid females of *C. gariepinus* and *H. longifilis* were injected with 0.5, 0.45, 0.4, 0.35, 0.3, 0.25, 0.2, 0.15, 0.1 and 0.5, 0.45, 0.4, 0.35 and 0.3ml Ovaprim/kg body weight respectively. The control received Carp pituitary extract (Argent Chemical Incorporation) injected intramuscularly at 4mg/kg weight for *C. gariepinus* and 6ml/kg for H. longifilis (Richter et al. 1982).

Each treatment was tried thrice. Before administering the hormone and just before stripping, temperature of water in the plastic basin (holding each female broodfish) was recorded, using a thermometer (Fisher brand) to determine the latency period

**PROCUREMENT OF MILT AND EGGS (STRIPPING)**

Milt from both *H. longifilis* and *C. gariepinus* were collected as described by Hogendoorn and Vismans (1980) Ayinla (1991) and Nwadukwe *et al* (1993).

**ARTIFICIAL FERTILIZATION AND EGG INCUBATION**

For the purpose of this study only 0.5g of the ovulated eggs was taken from each female per treatment and were fertilized in a petridish as reported by Nwadukwe (1993) in a petridish. The fertilized eggs were then spread into a three (3) litre plastic bowl containing 2 litres of clean water for incubation. No substrate was introduced into the plastic bowls.

**ESTIMATION OF PERCENTAGE HATCHABIITY**

Twenty-six (26) hours after fertilization the dead unviable eggs, which have turned whitish, were carefully siphoned out to prevent infection and subsequent mortality of the fertilized eggs.

The unhatched eggs were counted physically and the percentage hatchability was expressed as follows:

$$\frac{\text{Total No. of Eggs incubated} - \text{No. of unhatched Eggs}}{\text{Total No. of Eggs incubated}} \times 100$$

## RESULT AND DISCUSSION

The efficacy of Ovaprim to induce oocyte maturation and ovulation in *C. gariepinus* and *H. longifilis* is clearly demonstrated in this study. The results indicated that a single dose of Ovaprim injection could effectively induced oocytes maturation and ovulation in female *C. gariepinus* and *H. longifilis* using a wide range of doses (between 0.2 – 0.5ml Ovaprim/kg of fish). (Table 1 & 2)

**TABLE 1: ARTIFICIAL SPAWNING OF *C. gariepinus* USING VARIOUS DOSES OFOVAPRIM AND 4MG/KG DOSE OF C.P.E.**

| Dosage Levels (ml/kg Body Weight) | Mean Wt of Female ± SD Before Strip- ping (gm) | Mean Wt of Egg Ovulated (gm) | Nature of Egg Ovulated |
|---|---|---|---|
| 0.5' | 400 ± 196.98 | 75 ± 35 | Mature |
| 0.45 | 360 ± 20 | 61.67 ± 15.28 | " |
| 0.4 | 320 ± 60 | 41.67 ± 23.1 | " |
| 0.35 | 273 ± 46.19 | 53.33 ± 5.77 | " |
| 0.3 | 200 ± 52.92 | 30 ± 10 | " |
| 0.25 | 426.7 ± 184.75 | 43.33 ± 27.54 | " |
| 0.2 | 320 ± 60.83 | 45 ± 30.41 | " |
| 0.15 | 340 ± 23.13 | | Immature |
| 0.1 | 320 ± 20.14 | | " |
| CPE 4mg | 400 ± 69.28 | 38.67 ± 6.11 | Mature |

**TABLE 2: ARTIFICIAL SPAWNING OF *H. longifilis* USING VARIOUS DOSES OF OVAPRIM AND 6MG/KG DOSE OF CARP PITUITARY EXTRACT**

| Dosage Level (ml/kg) | Mean Wt of Female Before Stripping (kg) | Total Mean Wt. of Egg ± SD Ovulated (gm) | Nature of Eggs Ovulated |
|---|---|---|---|
| 0.5 | 4.3 ± 3.7 | 329.5 ± 318.9 | Mature |
| 0.45 | 1.49 ± 0.91 | 27.5 ± 38.9 | " |
| 0.4 | 1.63 ± 0.78 | 101.67 ± 74.89 | " |
| 0.35 | 1.45 ± 0.5 | 80 ± 10 | " |
| 0.3 | 0.99 ± 0.4 | - | Immature |
| CPE 6mg | 1.57 ± 0.91 | 86.67 ± 68.98 | Mature |

Positive response has also been reported in Mrigal Carp induced with ovaprim at 0.3ml/kg indicating the high potency of this ovulation agent (Madnakudu *et al* 1990).

In contrast to Legendre (1986) observation wherein he reported that the minimal effective dose of Human chorionic gonadotropin determined for *H. longifilis* is lower than those determined for other Clariids including *C. gariepinus*, this study shows that *H. longifilis* minimal effective dose os Ovaprim is higher than *C. gariepinus* and this is in agreement with Richter *et al*; (1982), Delince *et al*; (1987), Ayinla (1991), and Nwaduke *et al*, (1993), which established that female *H. longifilis* require more quantity of Carp pituitary extract than *C. gariepinus* to attain oocytes maturation and ovulation.

Again Clemens and Sneed (1962), Harvey and Hoar (1980) and Legendre (1986) had observed in other fish species that the latency period is dependent both on temperature, species of fish and type of hormone. This is clearly shown in the inverse relationship between latency period and temperature; a 30 minutes difference in latency period between *C. gariepinus* and *H. longifilis* induced with either ovaprim or C.P.E. and one hour difference in latency period between *C. gariepinus* and *H. longifilis* induced with C.P.E. The 30 minutes difference in latency period between *C. gariepinus* and *H. longifilis* agrees with Adeyemo (pers. Comm.) using C.P.E. for induction. Similar report by Delince et *al.* (1987) comparing Human Chorionic gonadotropin with carp pituitary extract showed a longer latency period in Human Chorionic gonadotropin than in C.P.E.

Although Eding *et al.*, (1982) observed hatching of *C gariepinus* eggs 30 – 40 hours after fertilization at 30°C, hatching in this study was between 22.30 hours at a mean temperature range of 25.45 ± 0.35 to 26.1 ± 0.42 and this was independent of hormone dosage (Table 4 & 5)

In conclusion unlike the other hypophysation agents which are complex to use and laborious (if fresh pituitary is to be extracted from donor(s) problem of quantification i.e. weighing in preserved pituitary extract ineffectiveness in Deoxycorticosterone acetate (DOCA) and short shelf life of Human Chorionic gonadotropin (HCG). The study has demonstrated a cost into effective dosage of lower than that recommended by the producer Syndel Laboratory Limited.

**TABLE 3: COMPARATIVE OPTIMUM DOSAGE AND COST OF OVAPRIM AND CARP PITUITARY EXTRACT REQUIRED FOR COMPLETE MATURATION AND OVULATION OF *C. gariepinus* AND *H. longifilis***

| Type of Hormone | Total Qty Of Hormone | Doses (ml/kg) | Maximum kg of Fish Possible For Spawning | | Cost/Kg N |
|---|---|---|---|---|---|
| | | | *C. gariepinus* | *H. longifilis* | |
| Ovaprim | 100 ml | 0.5 | 200 | 200 | 200 |
| | | 0.45 | 222 | 222 | 180 |
| | | 0.4 | 250 | 250 | 160 |
| | | 0.35 | 285 | 285 | 140* |
| | | 0.3 | 333 | - | 120 |
| | | 0.25 | 400 | - | 100 |
| | | 0.2 | 500 | - | 80** |
| CPE | 1000mg | 4mg | 250 | - | 140 |
| | | 6mg | - | 166 | 210 |

X - Optimum Dosage for *H. longifilis* XX - Optimum Dosage for *C. gariepinus*
1995 Cost: Ovaprim - N40,000.00 CPE - N35,000.00

**TABLE 4: PERCENTAGE HATCHABILITY OF EGGS OF *C. gariepinus* INDUCED WITH VARIOUS DSES OF OVAPRIM AND 4 MG/KG DOSE OF C.P.E.**

| Dosage Level (ml/Kg) | Mean Wt of Egg Incubated Per Treatment (gm) | Time range of Hatching (hrs) | Mean Temp. at Hatching (C) | Mean Percentage Hatchability |
|---|---|---|---|---|
| 0.5 | 0.5 | 22 – 30 | 25.5 ± 0.28 | 76.47 ± 4.95 |
| 0.45 | 0.5 | " | " | 82.95 ± 3.08 |
| 0.4 | 0.5 | " | " | 90.59 ± 5.6 |
| 0.35 | 0.5 | " | 25.45 ± 0.35 | 88.66 ± 1.9 |
| 0.3 | 0.5 | " | " | 87.58 ± 3.82 |
| 0.25 | 0.5 | " | 25.5 ± 0.28 | 94.6 ± 2.79 |
| 0.2 | 0.5 | " | 25.45 ± 0.35 | 90.89 ± 9.16 |
| CPE 4mg | 0.5 | " | 25.55 ± 0.21 | 93.52 ± 2.21 |

**TABLE 5: PERCENTAGE HATCHABILITY OF EGGS OF *H. longifilis* INDUCED WITH VARIOUS DOSES OF OVEPRIM AND 6MG/KG OF CPE**

| Dosage Level (ml/kg) | Mean Wt. of Egg Incubated per Treatment (gm) | Time range of Hatchability (hr) | Mean Temperature at Hatching (C) | Mean Percentage Hatchability |
|---|---|---|---|---|
| 0.5 | 0.5 | 22 – 30 | 26.1 ± 0.42 | 81.71 ± 11.39 |
| 0.45 | 0.5 | " | 26.1 ± 0.42 | 56.18 ± 14.75 |
| 0.4 | 0.5 | " | 25.45 ± 0.35 | 67.50 ± 11.5 |
| 0.35 | 0.5 | " | 25.55 ± 0.21 | 42.16 ± 34.10 |
| CPE 6mg | 0.5 | " | 25.5 ± 0.28 | 55.04 ± 8.03 |

Finally, with the established optimal dosage (0.2 and 0.35ml Ovaprim/kg) *C. gariepinus* and *H. longifilis* respectively can induce twice or two third number kilogram of fish than the carp pituitary extract of 4mg and 6mg/kg body weight for *C. gariepinus* and *H. longifilis* respectively (Table 3).

Again from the comparative cost analysis vis a viz the optimum dosage it is cheaper to use Ovaprim in Nigeria than Carp pituitary extract.

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