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AS Namadina
Department of Fisheries Technology, College of Agriculture, Hassan Usman Katsina Polytechnic Katsina, Katsina State Nigeria

Correspondence
AS Namadina
Department of Fisheries Technology, College of Agriculture, Hassan Usman Katsina Polytechnic Katsina, Katsina State Nigeria

Comparative analysis of ovaprim and African catfish pituitary extract in facilitating eggs hatchability in African catfish (*Clarias Gariepinus*)

AS Namadina

Abstract
Different hormones for facilitating egg hatchability in Katsina state of Nigeria need to be compared and evaluated in order to bring out the most economic and efficient to be used by Nigerian fish farmers with which to facilitate fish production. Due to above reason, the study on comparative analysis of ovaprim (artificial hormone) and African Catfish pituitary extract (ACPE) natural hormone in facilitating egg hatchability was focused to compare the two hormones in terms of their efficiency. Six pairs of broodstock (catfish) with three pairs each for ovaprim and ACPE were selected. The females were subjected to different treatment with ovaprim (0.5ml/kg) and pituitary gland extracts (1ml/kg ACPE hormones). The data obtained was analyzed and, the result has shown that the artificial hormone has more advantages over the natural hormone. Were hatchability rate was (90.5%) as compared to (66.0%) in natural hormones, cost was ₦25, 000 and ₦20,000, mortality rate (9.5%) and (35%) for artificial and natural hormone respectively. Therefore, artificial hormone has more advantages over natural hormone and hence recommended for use by our Nigerian fish farmers.

Keywords: Ovaprim, pituitary extract, hatchability, African catfish

1. Introduction
Aquaculture is growing in Nigeria, striving to satisfy a growing market for food fish. It is currently one of the fastest growing subsectors in agriculture, due to the increase in demand for healthy, tasty and affordable fish protein source to feed the teeming population (Mann, 2011) [5].

It is clearly disadvantageous to cultivate any organism when the supply of the young cannot be easily replenished. Among numerous species of fish under cultivation in Nigeria, notable are: common carp *(Cyprinus carpio*), Catfish (*Clarias gariepinus*; *Heterobranchus* Sp. Grey mullet (*Mugil cephalus*) and Tilapia Sp. Olubiyi *et al*. (2005) [8].

A dependable source of quality fish seed (fingerlings) is a fundamental pre-requisite for large scale development of fish culture. Adebayo and Popoola, (2008) [1]. They further added that the scarcity of fish seed is a major factor that affects all tempts to fish culture. Many of the fish farmers are presently unable to produce their own fish seed because they lack both the techniques and logistics to do so. As a result, fish farmers depend on very few privately owned hatcheries.

Artificial breeding otherwise known as hypophysation is practiced with the involvement of reproductive hormones. Induced breeding through hormone treatment and artificial incubation of fertilized eggs has advantages of better rate of fertilization and hatching, better conditions for growth and survival of larvae to fingerlings and better protection of larvae against unfavorable environmental condition and predators (Woynarovich and Horvath, 1980) [9]. However, most of the hormones that are generally used for induced breeding are deficient in various ways, such as Deoxycorticosteroid Acetate (DOCA) causes severe ulcer on the injected females; Human Chronic Gonadotropin (HCG) is very expensive; Common carp (*Cyprinus carpio*) pituitary gland material are not easily accessible to small scale fish farmers, although Ovaprim (Salmon Gonadotropin Releasing Hormone) had recorded numbers of success but the price is very high (Olaniyi and Akinbola, 2013) [7]. They reported hatchability rate of 46.3% and 25.99% of ACPE while survival rate of 82.98% of ACPE and lower survival rate of 50.14% of Ovaprim.

The objectives of the Study are to assess the egg hatchability rate and mortality rate in Catfish production using Ovaprim and pituitary extract and to determine the cost involved using Ovaprim and pituitary extract in catfish propagation.

2. Materials and Methods

2.1 The Study Area

The experiment was conducted at the hatchery unit of the Department of Fisheries Technology, College of Agriculture Hassan Usman Katsina Polytechnic Katsina, Katsina State. Katsina State lies between latitude 11°.7 ' and 13° 22 ' north, and longitude 6° 52 ' and 9° 2 ' east. It has a total land area of about 23,930km^{2,} with an estimated human population of about 10million peoples of which majority lives in the rural areas. The state extents to three major savannah vegetation zones: drier Sahel zone in the north and Sudan and guinea savannahs in the middle and southern zones respectively. The mean annual rainfalls in the zones are 300 – 400mm and 600 – 800mm 900 – 1100mm respectively. Rainfall last from April to September depending on the zone.

2.2 Data Collection

2.2.1 Brood selection

Six matured spawners (broodstock) were selected and subjected for the trials. The cost involved during the trials was recorded. The males and females were kept in separate holding tanks and adequately aerated. However, no feeding was conducted during the conditioning period.

2.2.2 Extraction and preparation of pituitary suspension

Three (3) males were sacrificed and the head region was dissected vertically. The lower soft part and other succulent part were removed through the use of a knife. The brain area was opened towards the ventral side and the pituitary gland was extracted through the use of needle. The pituitary gland was crushed and 0.9% saline solution was added to it to make the pituitary suspension.

2.2.3 Brood stock injection

Commercially available Ovaprim and African catfish pituitary extract (ACPE) were used as inducing agents. The body weight (g) of each brooder was measured on electric balance ohaus (CS200) to estimate the required amount of ACPE (1ml/kg) and Ovaprim (0.5ml/kg) for the induction. The brooders were divided into group of four females and two males of *C. gariepinus* each, and then subjected to hormone treatment: one group was injected using ACPE and the second group using Ovaprim. The ACPE was administered at 1ml/kg of body weight for females and on the other hand, Ovaprim was administered at 0.5ml/kg of body weight. Only the females were injected with both ACPE and Ovaprim. The hormones were administered by intra-muscular injection on muscles beneath the dorsal fin slightly above the lateral line. After the injection, the brood stocks were kept in separate breeding tanks for each treatment.

2.2.4 Breeding and placing the fertilized eggs into the tanks

After the injection, the brooders were found to ovulate after a period of about 12 hours at a temperature of about 25 ^{0}C. The brooders were then transferred from the breeding tanks into hatching trays, while all the precautionary measures were observed to avoid bacterial/fungal contaminations during the egg collection process. The number of eggs released into each tray was estimated using gravimetric methods adapted from Legender (1986) [4] and reviewed by Lagler (1992) [3]. Thereafter, a continuous aeration is maintained to ensure that environmental conditions were optimal for hatching process.

2.2.5 Determination of hatching and mortality rates

Hatchability and mortality rates were calculated using the formulas below

$$\text{Hatchability rate} = \frac{\text{No of hatched egggs}}{\text{Total No of eggs in a batch}} \text{x } 100$$

$$\text{Motality rate} = \frac{\text{Initial No of hatchlings} - \text{final No of hatchlings}}{\text{Initial No of hatchlings}} \text{x } 100$$

2.2.6 Statistical analysis

The data collected were analyzed using Graphpad Prism 5 software.

3. Results and Discussion

3.1 Hatchability, Mortality rates and Economic Performance of Ovaprim and ACPE

Table 1 showed that ovaprim has the highest hatchability rate (90.5%) compared with pituitary extract having (66.0%). Similarly, the survival rate is higher in ovaprim which has the lowest mortality rate of (9.5%) while pituitary has (34.0%) mortality rate. This is similar with that of Nayak *et al*., (2001) [6] who reported higher hatching rate of (96%) using Ovaprim. Whereas this is different from Belal Hossain *et al*., (2012) [2] who reported that hatching rate of 76.9% in eggs spawned from *Ovaprim* induced individual fish compared to 72.7% in ACPE induced fish. Also similar with that of Adebayo and Popoola (2008) [1] who reported high hatching rate ranging from 51.1-73% in the different treatment {*Clarias* pituitary extract (CPE), Frog pituitary extract (FPE) and Ovaprim} This is also different with the finding of Olaniyi and Akinbola (2013) [7] who reported higher survival rate from pituitary gland extract. The variation could be as a result of seasonal temperature variation between Katsina and Ogbomoso or the Ovaprim used was adulterated. The cost of production revealed that ovaprim has the highest cost of N25, 000 while least was pituitary extract having a cost of N20, 000.

Table 1: Hatchability, Mortality rates and economic performance of fish treated with Ovaprim and pituitary extract (ACPE).

Parameter	Hormone	Mean (%)	Value
Hatchability rate	Pituitary Ovaprim	66.0 90.5	NA NA
Mortality rate	Pituitary Ovaprim	34.0 9.5	NA NA
Cost of production	Pituitary Ovaprim	NA NA	20,000 25,000

NA = Not Applicable

4. Conclusion and Recommendation

The study observed the hatching and mortality rates of fries treated with African Catfish Pituitary Extract (ACPE) and Ovaprim. It also study the cost involved in fish hypophysation in *C. gariepinus* using the two treatments.

Based on the result, *Ovaprim* induced treatment has the highest hatchability rate 90.5% and lower mortality rate of (9.5%), but has the highest cost of production while pituitary gland extract has the lower hatchability rate (66.0%) and higher mortality rate of (34.0%), but it has lower cost of production.

Based on the findings, it is recommended that if the farmer is financially buoyant. He/she should go for ovaprim, due to the fact that there was higher success rate recorded, which means the financial gain will be more. However, if the farmer cannot afford the use of ovaprim, the farmer can also go for pituitary, though the financial returns will not be as high as in ovaprim.

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