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Research Article

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Effect of Synthetic Hormone (Overprim) on Some Haematological Parameters of African Catfish *Clarias gariepinus* (BURCHELL, 1822)

Apollos TG*

Department of Fisheries and Aquaculture Adamawa State University Mubi, Adamawa State Nigeria.

***Corresponding Author:** Apollos TG, Department of Fisheries and Aquaculture Adamawa State University Mubi, Adamawa State Nigeria.

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Abstract

A study was carried out in the Department of Fisheries and Aquaculture Adamawa State University Mubi to determine the effect of injecting natural and synthetic hormone on *Clarias gariepinus* broodstock. Six broodstock of mean weight of 1.5kg and mean length of 27cm were used for the experiment. Two male and two female were injected with synthetic hormone while another one male and one female brooder serves as control The brooders were injected at the same time and placed in a holding tank with water at temperature of 270C. Blood samples were collected at 00 hours, 6 hours, 12 hours and 24 hours of injection from all the male and female brooders for haematological analysis. Data collected from Hb, PCV, RBC, WBC, MCV, MCH and MCHC were subjected to one analysis of variance (ANOVA) using SAS. From the results, the female Clarias gariepinus injected with Ovaprim (synthetic) hormone, recorded the highest of value of Hb, WCB, MCHC of 7.90 ± 0.10, 2.0 ± 0.00 and 35.25 ± 0.00 at 6 hours, 12 hours and 00 hours of injection. There is significant difference (p>0.05) among the male and female values of Hb, WCB and MCHC injected with synthetic (Ovaprime) hormone at various hours of injection. Male Claris gariepinus had the highest PCV and MCH value of 24.00±0.00% and 1.70± 0.00 at 12 and 24 hours of injection respectively. The RBC were not significantly different. It was discovered that synthetic hormone has effect on the haematological parameters of Claris gariepinus brood stocks during induced fish breeding at various hours of injection.

Key words: *Ovaprim hormone; Some haematological parameters Claris gariepinus and Mubi*

Introduction

Artificial propagation of fish is the most promising and reliable way of ensuring availability of good quality fish seed all year round for sustainability of the aquaculture industry. It involves the use of natural (hypophysation) or synthetic hormones to induce ovulation and spawning in farmed fishes (Ali *et al*., 2016). Fish are very susceptible to physical and chemical changes, which may be reflected in their blood components (Delinsky *et al*., 2010). Fish, exposure to chemical compounds can induced either increase or decrease in haematological levels. The injection of different spawning agents in fish is adopted for successful ovulation and collection of eggs. Traditional methods of induced spawning in fish are based on the injection of GtH-II from different sources, including extract of carp pituitary gland, partially purified fish GtH-II and mammalian GtH, especially human chorionic gonadotropin (HCG) (Lam, 1982; Donaldson and Hunter, 1983;; Zairin *et al*., 1992; Goswami and Sharma, 1997 and Peter *et al*., 2011). The GnRHa and domperidone are the

most popular compounds for induction of ovulation and spermiation in various fish species. Moreover, induced breeding techniques have significantly contributed a lot to the expansion and diversification of the aquaculture industry (Zohar and Mylonas, 2001). The introduction of GnRH analogues has been proven to be efficient in inducing maturation and spawning in many fish species (Tamaru et al., 1988; Zohar, 1988; Slater et al., 1995; Berlinsky et al., 1996). Therefore there is need to determine the effect of this chemical substances on fish haematology.

Materials and Methods

Six broodstock of an average weight of 1.5kg and mean length of 27cm of *Clarias gariepinus* three males and three females were purchased from a private fish farm in Mubi, Adamawa State. The broodstock were transported to the Department of Fisheries and Aquaculture in a 50 litre jerry can. The fish were acclimatized for the period of 3 days during which vital feed of 45% C.P was fed at 10% body weight. Two males and two females were injected with 0.25ml/kg body weight while female were injected with 0.5ml/kg body weight with the synthetic (Ovaprim) hormone. Conditioning of induced fish were done after the process of hormone administration and the fish were conditioned for ovulation.

Collection of Blood Samples

Blood samples were collected from both male and female brooders before and after injection, at 6 hours, 12 hours and 24 hour of injection. 0.1- 0.2ml blood samples were collected from the cardiac puncture using 2ml disposal heparinised syringe treated with EDTA as anticoagulant. Blood analysis were determined according to the method described by Svoboda et al., (1991).

Determination of Packed Cell Volume (PCV)

The packed cell volume was measured after placing sealed micro-haematocrit tube in a centrifuge at 10,500 rpm using micro-haematocrit reader and expressed as percentage (Svoboda et al., 1991). Haemoglobin estimation

Haemoglobinometer was used for haemoglobin estimation based on acid haematin method (SAHLI).

$$\text{Haemoglobin} = \frac{(\text{value obtained})}{100} \times 17.2 \text{ mg/100ml}$$

Red Blood Cell (RBC), White Blood Cell (WBC) Count

Haemocytometer was used in both the red and white blood (RBC and total WBC) count. The blood diluting fluid was prepared as described by Svoboda et al (1991).

The blood cells was counted on the counting chamber of haemocytometer with the aid of compound microscope:

- RBC = No. of cells Counted × 3 × 10 × 200 ($106mm^3$)
- WBC = No. of cells Counted × 0 × 25 × 10 × 20 ($104mm^3$)

Mean Corpuscular Volume (MCV)

MCV was calculated from the haematocrit value (PCV % and the erythrocyte count ($Ermm^3$).

$$\text{MCV } (\mu^3) = \frac{\text{PCV}}{\text{Er}} \times 10$$

Mean Corpuscular Haemoglobin (MCH)

MCH was calculated from the result of Haemoglobinometer value (Hb % and the erythrocyte count and was expressed in picograms (Pg).

$$\text{MCH (Pg)} = \frac{\text{Hb}}{\text{Er}} \times 10^2$$

Mean Corpuscular Haemoglobin Concentration (MCHC)

This was obtained using the formula:

$$\text{MCHC (\%)} = \frac{\text{Hb}}{\text{Er}} \times 100$$

Data collected were analyzed using one way Analysis of Variance (ANOVA) using SAS while mean was separated using Duncan Multiple Range Test. (Duncan, 2006)

Result and Discussion

The result of the Hb (Heamaglobin estimate) in male injected with ovaprime (synthetic) hormone, recorded the highest PCV (packed cell volume) of 24.00 ± 0.00 at 12 hours of injections, and also highest Hb of 7.80 ± 0.31 was also recorded at the same time. Schalm, (1975) stated that the normal ranges of PCV of some domestic animals which include dog, 37-55; pig, 32-50; cat, 24-55; cow,24-46;

and sheep, 24-50. Nutritional deficiencies, stress, diseases, pollution, number of red cell in blood, plasma volume and body weight of fish usually affect the PCV range. Smith (1982) showed that there was significant decrease in blood cell parameters including PCV of rainbow trout during infection with infectious haematopoietic necrosis.

Male fish injected with synthetic (Ovaprim) hormone after 12 hours of injection, recorded the highest mean white blood cell count of 2.70 ± 0.24. It was observed that haematological indices have different sensitivity to various environmental factors and chemicals. The use of chemical in breeding of African cat fish affects it haematological parameters. Erythrocyte value of the present studies shows variation from 00 hours to 24 hours of injection with the highest value of 2.70 at 12 hour and 24 hours of injection in female to the least value of 2.20 at 6 hours of injection in male. The number of red blood cell per mm2 of blood varies among animal species, age, physical condition and activities. Firdaus et al. (1996) showed that haemotocritic values increase with dietary protein supplementation while the erythrocyte sedimentation rate (ESR) showed a marked decline in fresh water catfish. Haematological studies on the effect of nutrition, infectious diseases and pollutants also stated same in study of Rehulka, (2002). The result also revealed that erythrocytes are the major and reliable indicators of various sources of stress which is in line with the findings of Rainza-paiva et al., (2000); O'Neal and Werich, (2001).

The count of red blood cells is quite a stable index and the fish body tries to maintain this count within the limits of certain physiological standards using various physiological mechanisms of compensation. Vanvuren (1986) observed that when water quality is affected by toxicants, many physiological changes will be reflected in values of one or more of the haematological parameters. In the present study, there is no significant different in the RBC count for both fish that were injected with synthetic hormone and the control. White blood cell count of all the brooders shows no variation in all the hours of injection. Thus, animals with low white blood cells are exposed to high risk of disease infection, while those with high counts are capable of generating antibodies in the process of phagocytocis and have high degree of resistance to diseases (Soetan et al., 2013).also high white blood cell count enhance adaptability to local environmental and disease prevalent conditions (Kabir, et al., 2011; Okunlola, et al., 2012; Iwuji and Herbert, 2012; Isaac et al., 2013). There is variation in all the haematological parameters between male and female fish with the female fish having the highest value of almost all the haematological parameters during the course of the study. It will be concluded that synthetic hormone injection during breeding of African cat fish has effect on the haematological parameters of the fish.

Heamatological Indices of *Clarias gariepinus* Induced with Ovaprime Hormone

Parameters	Sex	Hours of 0 hours	Injection 6 hours	12 hours	24 hours
Hb (g/dc)	M	7.50 ± 0.21^{b}	7.20 ± 0.31^{c}	7.80 ± 0.31^{a}	7.60 ± 0.20^{b}
	F	6.70 ± 0.11^{c}	7.90 ± 0.10^{b}	7.40 ± 0.32^{a}	6.90 ± 0.30^{c}
PCV (%)	M	22.00 ± 0.60^{c}	23.00 ± 0.00^{b}	24.00 ± 0.00^{a}	23.00 ± 0.00^{b}
	F	19.00 ± 0.00^{c}	21.00 ± 0.00^{b}	22.00 ± 0.00^{a}	21.00 ± 0.00^{b}
WBC ($\times10^{12}$/L)	M	2.40 ± 0.31^{b}	2.30 ± 0.11^{c}	2.20 ± 0.13^{c}	2.50 ± 0.17^{a}
	F	2.30 ± 0.23^{b}	2.40 ± 0.28^{b}	2.70 ± 0.24^{a}	2.70 ± 0.21^{a}
RBC ($\times10^{12}$/L)	M	2.50 ± 0.17^{a}	2.50 ± 0.31^{a}	2.50 ± 0.11^{a}	2.40 ± 0.18^{a}
	F	2.50 ± 0.21^{a}	2.50 ± 0.24^{a}	2.40 ± 0.18^{a}	2.50 ± 0.20^{a}
MCV (FL)	M	78.50 ± 0.67^{c}	42.0 ± 0.21^{b}	96.00 ± 0.36^{a}	95.80 ± 0.21^{a}
	F	79.20 ± 0.48^{c}	80.70 ± 0.21^{b}	81.50 ± 0.41^{b}	84.00 ± 0.11^{a}
MCH (Pg)	M	26.00 ± 0.12^{c}	28.80 ± 0.21^{b}	31.20 ± 0.13^{a}	31.70 ± 0.23^{a}
	F	27.90 ± 0.21^{a}	27.00 ± 0.23^{a}	27.00 ± 0.17^{a}	27.60 ± 0.19^{a}
MCHC (%)	M	34.00 ± 0.17^{a}	31.30 ± 0.31^{c}	32.50 ± 0.14^{c}	33.00 ± 0.32^{b}
	F	35.20 ± 0.11^{a}	33.30 ± 0.21^{b}	33.60 ± 0.19^{b}	32.80 ± 0.18^{c}

Mean in the same raw having the same super script do not differ significantly ($P>0.05$)

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