HAEMATOLOGICAL CHARACTERISTICS OF AFRICAN CATFISH (*Clarias gariepinus* Burchel, 1822) FED AFRICAN STAR APPLE KERNEL DIETS

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ABSTRACT

Effect of feeding African Star Apple Kernel (*Chrysophyllum africanum*) based diets on haematological characteristics of African catfish (*Clarias gariepinus*) for 8 weeks was studied. One hundred and thirty five African catfish fingerlings (mean weight= 2.8g) were allotted to three diets (CP=40%) in which African Star Apple Kernel meal substituted maize at 0%, 50% and 100% dietary levels respectively and fed at 5% biomass daily. Other water quality parameters were maintained throughout the duration of the study. Blood samples were collected from fish in replicates and analyzed for haematological parameters Result on blood analyses showed significant differences ($p<0.05$) in the values of haemoglobin, also, red blood cell and packed cell volume of the trial fish were low compared with the control group. There was no significant difference in the leucocytes count among the groups.

Keywords: African Star Apple Meal, diets, *Clarias gariepinus*, blood analysis.

INTRODUCTION

In recent time, a good amount of fish consumed by Nigerians is from aquaculture because the conventional fish catch from ocean and rivers are continually declining due to over fishing and environmental hazards (FAO, 2006). As aquaculture production becomes more and more intensive in Nigeria, fish feed will be a significant factor towards increasing the productivity and profitability of aquaculture enterprises (Akinrotimi *et al.*, 2007). According to Olurin *et al.* (2006), maize is the major source of metabolisable energy in most compounded diets for catfish species. This is because it is readily available and digestible. However, the increasing and prohibitive cost of this commodity has necessitated the need to search for an alternative source of energy. Recently, FAO(2006) reported shortages in the production of cereals, a serious issue in many countries including Nigeria; this perhaps resulted in reporting the use of cereal products, especially maize in fish feed as becoming increasingly unjustified in economic terms (Tewe, 2004). This current reality on the use of alternative feed resources mainly to reduce cost of feed and fish has made it imperative to study the effect of feeding non-conventional feedstuff such as *Chrysophyllum africanum* often reported to contain some anti-nutrients such as alkaloids, saponins, Trypsin inhibitors, Tannin and phytate on the physiological status of the cultured fish (Agbabiaka et al., 2013a). This experiment therefore, evaluated the haematology of African catfish fed graded levels of *Chrysophyllum africanum* meal diets.

MATERIALS AND METHODS

Sample preparation and experimental feed

The sample (African Star Apple kernnel) used in this experiment were picked in the Polytechnic environment at Owerri, Imo State. The seed were dehulled to expose the mesocarp which was sun-dried for six days and ground into powder to form African Star Apple Kernel Meal (ASAKM) in order to facilitate pelleting. Sample of ASAKM was analysed for proximate composition as stipulated by AOAC (2000). Three diets were formulated at 40% crude protein in which ASAKM replaced maize at 0%, 50% and 100% coded as T_1, T_2 and T_3 respectively , while the control diet (0%) contained no ASAKM. The pelleted feeds were sundried to crispy for five days and thereafter packed in waterproof bags and labelled accordingly before storage at room temperature.

Experimental fish and design One hundred and thirty five African Catfish (*Clarias gariepinus*) fingerlings with average of 2.8g body weight were purchased and fed with commercial feed for the period of seven days while undergoing acclimatization. Subsequently, they were randomly assigned to the three treatment diets at 45 fish per treatment in hapa nets measuring 1×1×1m suspended in outdoor concrete tank. Each treatment was replicated trice with fifteen fish per replicate. The experimental diets were fed to the fish at the rate of 5% body weight per day, shared twice between the hours of 8-9am and 5-6pm. The experiment lasted for the period of 8 weeks.

Data collection and Haematological evaluation

At the last day of the feeding trial, two fish were taken from each of the replicates and put in separate water in bowls labeled accordingly. 150mg/liter of tricane methane sulphonate (MS222) was administered to the fish to tranquillize them as stated by Osuigwe *et al. (2005).* Blood samples were collected with hypodermic syringes (2ml) using heparinized tubes respectively. The blood samples collected were taken to the laboratory for haematological assessment according to Campbell (1988). Data from blood analysis for the three groups were subjected to Analysis of variance (ANOVA), where significant difference was detected, mean were separated using Duncan new multiple range test as outlined by Obi (1990).

RESULT AND DISCUSSION

The haemoglobin concentration ranged within 6.80-9.50g/dl. These values were slightly below the value of 9.60g/100ml recorded by Omitoyin (2006) for African catfish juvenile fed poultry litter and 10.62g/100ml obtained by Osigwe *et al.* (2005) who fed *Clarias gariepinus* with Jackbean meal based diets. The packed cell volume (PVC) was highest in the control group (28.0%) while the least value of 23.0% was recorded in catfish group fed ASAKM at 100% dietary inclusion ($P<0.05$). These values were in agreement with Musa and Omoregie (1999) who recorded a PVC range of 27.58 - 35.50% for catfish. There was no significant difference ($p>0.05$) in white blood cell count among the treatments. Generally, there was increased body weights of the fish from the commencement of the study to the end of the trail, this means that the diets were adequate in nutrients required for growth of the Clariid catfish especially the crude protein recommended to be 35-40% (Faturoti *et al.*, 1986; Fagbenro *et al.*, 1992; NRC, 1997). The erythrocytes count of 2.78 – 4.60 x 10^6/mm^3 recorded is above the range of (2.3 - 2.9 x 10^6) and (1.5 x 10^6/mm^3) described for catfish by Gabriel *et al.* (2004) and Adeyemo *et al.* (2003) respectively. Similar observation was noted by Osigwe *et al.* (2005) who recorded (1.45 x 10^6/mm^3) but within the value of 3.50 ± 0.35 x 10^6/µl reported when ethanoic extracts of *Garcinia kola* seeds were fed to *Clarias gariepinus* broodstock by Dada and Ikuerowo (2009). The haematological values of the experimental fish presented in Table 2 generally showed that red blood cell, packed cell volume and haemoglobin respectively were low in the fish fed ASAKM diets compared with control; this may be due to the presence of phytin phosphate and phytic acid in Star Apple Kernel meal (Agbabiaka, *et al.*, 2013a). These substances have been reported to chelate divalent metals such as iron, calcium and magnessium that are necessary for blood formation (Osuigwe *et al.*, 2005; Agbabiaka, *et al.*, 2013b). However, low feed intake can also be responsible for inadequate nutrient intake and resultant under utilization for blood formation and other metabolic activities. However, the mean cell haemoglobin concentration (MCHC) reported in this study ranged between 29.60-30.00%, this is in agreement with Agbabiaka et al. (2013b) who reported MCHC value of 29.9 ± 0.2% when tigernut based diets were fed to *Clarias gariepinus* but is slightly below the value of 33.97% recorded by Adeyemo (2003) and Docan *et al.* (2010) for African catfish and *Silurus glanis* (European catfish) juvenile respectively. This may be due to species differences and age of the fishes that greatly influences value of blood profile and/or haematological indices (Docan *et al.* (2010). Nevertheless, there was no mortality throughout the duration of the study. This shows that ASAKM was not lethal to the fish though it did not support appreciable blood profile comparatively, hence, may be recommended for ornamental fish feed fomulation instead of aquaculture fish species necessary to be fattened within a short period.

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Table 1: Proximate Composition of the ASAKM Based Diets

	Dietary treatments		
Parameter	T_1	T_2	T_3
Moisture content	6.40	8.26	8.10
Ash	13.99	11.85	12.68
Crude Protein	39.93	37.37	36.77
Crude Fat	9.24	12.85	10.32
Crude Fibre	8.23	6.77	6.11
Nitrogen Free Extracts	22.21	24.90	26.02

Table 2: Haematology of African Catfish fed ASAKM based diets

PARAMETERS	DIETARY TREATMENTS		
	T_1	T_2	T_3
Haemoglobin (g/dl)	9.50^{a}	7.20^{ab}	6.80^{b}
Packed Cell Volume (%)	28.00^{a}	24.00^{b}	23.00^{b}
Red Blood Cell ($\times10^{6}$/mm^{3})	4.60^{a}	3.45^{a}	2.78^{b}
White Blood Cell ($\times10^{3}$/mm^{3})	11.50^{a}	12.40^{a}	10.90^{a}
Mean Cell Volume (fl)	8.94^{a}	7.46^{a}	6.92^{b}
Mean Cell Haemoglobin (Pg)	3.10^{a}	2.10^{a}	2.50^{a}
Mean Cell Haemoglobin Conc. (g/dl)	30.00^{a}	30.00^{a}	29.60^{a}
Lymphocytes (%)	95.00^{a}	90.00^{b}	93.00^{ab}
Monocytes (%)	5.00^{a}	10.00^{b}	7.00^{c}
Basohpils (%)	0.00	0.00	0.00
Esinosphils (%)	0.00	0.00	0.00
Neutrophils (%)	0.00	0.00	0.00

^{abc} Means within rows with same superscript are not significantly different (P>0.05).