

EFFECT OF AFRICAN FAN PALM (*Borassus aethiopum*) MEAL ON MILT QUALITY OF *Clarias gariepinus* BROOD STOCK

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ABSTRACT

Farmers are faced with challenges of fingerlings production and over the years plant source have been use to improve reproductive performance of animals. African Fan Palm Meal (AFPM) phytochemical analysis showed that steroid had 0.94g/mg, Saponin 1.20g/mg, Tanin 0.88g/mg, Anthraquinones 0.52g/mg, Flavonoids 0.52g/mg, Oxalate 0.30g/mg. The effect of processed AFPM on the reproductive indices of *Clarias gariepinus* brood stock was evaluated. Feed was formulated at 35% CP and divided into five treatments based on the inclusion level of AFPM. 60 male brood stock with mean weight of 618g were randomly distributed in concrete tanks (2 x 2 x 1) m at twelve fish/tank. Processed African Fan Palm meal was included into the brood stock diet at 0,0.5,1.0,1.5, and 2.0g/kg, designated into five treatment (D1,D2,D3,D4 and D5) and fish were fed for 56days. The results revealed a significant different in the milt volume and weight gain of testes with treatment D5 having the highest recording of milt volume (3.60ml) weight of right lobe (4.75g) and left lobe (2.92g). The sperm quality of brood stock fed different inclusion levels showed significant different with total motile sperm (TMS) highest level in D₂ (70), while the other treatments had 60 each. The sperm count increased with increasing inclusion levels, D5 had the highest sperm count (394 x 10⁶). The study shows that African Fan Palm Meal inclusion in brood stock fish feed will boost reproductive indices of male *Clarias gariepinus*.

Keywords: *Clarias gariepinus*; Milt; African Fan Palm

INTRODUCTION

Fish is the major source of protein for human, providing significant portion of nutrient to a large proportion of the people particularly in the developing world (Onyia *et al.*, 2011). The African Catfish *C. gariepinus* and *C. anguillaris* have been recently investigated as a potential aquaculture species (Hussein, 2012); the *Clariids* constitute an excellent food fish of high commercial value. It is very important for sustainability of aquaculture industry in Nigeria (Owodeinde and Ndimele, 2011). Aquaculture production is for a great part dependent on some supplementary or external feed, including fishmeal. African fan palm (*Borassus aethiopum*) is a member of the family *Arecaceae* and grows in the wild across Africa. The fan palm bears fruits massively (between 50-150 fruits per tree) in every 8 months (Ali *et al.*, 2010; Ouinsavi *et al.*, 2011). However, only about 30-40% of these available nutritious fruits are utilized as food (Ali *et al.*, 2010; Siaw *et al.*, 2014). The remaining 60 to 70% undergo losses via microbial decomposition. Losses of the African fan palm fruits greatly results from limited diversification of utilization as well as poor storage conditions. African fan palm fruit pulp as an accompaniment to foods is known to impart natural sweetness, aroma, and color (Adzinyo *et al.*, 2015). Fresh African fan palm fruit pulp is a rich source of minerals, fiber, sugars, vitamin A, vitamin C and moisture (Ali *et al.*, 2010).

MATERIALS AND METHODS

Study Area

This research experiment was conducted at the Teaching and Research farm, Department of Fisheries, Modibbo Adama University of Technology Yola, Adamawa state, Nigeria. Adamawa State is located at the North Eastern part of Nigeria. It lies between latitude 7° and 11° N of the equator and between longitude 11° and 14° E of the Greenwich meridian. It shares boundary with Taraba State in the South and West, Gombe State in its Northwest and Borno State to the North. Adamawa State has an international boundary with the Cameroon Republic along its eastern border. The State covers a land area of about 38,741 km². It is divided into 21 local Government Areas (Mohammed, 2020). It has a population of 3,168,101 (National Bureau for Statistics, 2007).

Experimental Set Up

A total of 60 matured males *Clarias. gariepinus* were purchased from Abdulfana fish farm Yola south LGA, Adamawa state with the same age of 7 months and average weight of 618g. They were acclimatized and fed

commercial feed for 7 days. The experiment was set up in a Completely Randomized Block Design as D1 (control), D2, D3, D4, and D5. Five isonitrogenous diets (D1, D2, D3, D4 and D5) were formulated from practical ingredients based on the formulation defined for African Catfish (*C. gariepinus*) Fagbenro and Adebayo (2005). The fishes were starved for 24 hours prior to commencement of the trial to allow utter digestion of any food in their stomach. The control (D1) diet was without processed African fan palm meal and the others had the following inclusion level of Processed African Fan Palm Meal (AFPM) at 0.5g, 1.0g, 1.5g, and 2.0g/kg respectively. The fish were randomly assigned to 12 fish per treatment with in a concrete pond of size of 2m x 2m x 1m. The fish were fed with the experimental diet for 56 days at 3% of their body weight twice daily morning and afternoon. The fish weight and length were taken bi-weekly and the quantity of feed was adjusted following the total body weight of the fish. The experimental diets were formulated to contain 35% crude protein. At the end of the study period, the fish were selected at random without replacement from each treatment and used for evaluation of the reproductive indices.

Determination of Growth Parameters

The growth parameters were measured according to the methods described by OlevaNovoa et al., (1990) which include Mean Growth Rate, Daily Growth Rate (DGR), Specific growth rate (SGR) (%/day), and Feed conversion ratio (FCR). Condition factor (k) was also determined for each treatment Milt quantity assessment

Milt Volume

These were determined by making a small incision in the lobes of the testes then squeezing out the milt into a Petri dish. A syringe was used to measure the milt in ml.

Motile Sperm

The motility of spermatozoa was determined using the methods described by Canyurt and Akhan (2008). The percentage of motility for active, sluggish, and dead was calculate

Sperm Count

The counts were carried out using of haemocytometer according to the method described by Mims (1991)

RESULTS AND DISCUSSION

The results revealed that the fish fed with diet having 2.0g/kg (D5) of AFPM had the highest milt volume of 3.73ml when compared to D1(1.7) D2(3.5) D3(3.47) D4(3.55). In the weight gain of testes, D5 had the highest weight of right lobe (4.75g) and left lobe (2.92g). The sperm quality of F1 broodstock fed different inclusion levels showed that the total motile sperm (TMS) was highest in D₂ (70), while the other treatments had 60 each. Milt volume was highest in D5 (3.60ml), followed by D4 (3.40ml), D2 (3.30ml) while the least was in D1 (1.80ml). The sperm count increased with increasing inclusion levels. D5 had the highest sperm count (394 x 10⁶).

Table 1. Phytochemical Composition of African FAN Palm Meal

Phytochemical composition	Qualitative	Quantitative
Saponins	+++	1.20
Tannins	+	0.88
Steroids	++	0.94
Glycosides	—	—
Anthraquinones	+	0.52
Flavonoids	++	0.52
Oxalate	+	0.03

In this study, sperm quality and egg quality of fish fed varied inclusion levels of African fan palm meal were influenced by the inclusion levels of the plant. The higher percentage of total motile sperm cells was observed in fish fed treated African fan palm meal diet. This is an indication of the viability of sperm cells with possibly higher fertilizing capacity. The values for sperm concentration in this study is higher than what was reported by Abu *et al.* (2013) that fed varied dietary levels of *Moringa oleifera* leaf meal. This is an indication that the influence of African fan palm meal in increasing testosterone production in fish earlier reported in this work might have positively influenced sperm quality, and egg quality.

Table 2. Mean Sperm Quality of *Clarias gariepinus* fed different Inclusion Levels of Processed African Fan Palm meal for 1st Breeding

Parameters	D1	D2	D3	D4	D 5
Weight of fish (g)	808.3 ^c	951.67 ^a	853.33 ^{bc}	936.67 ^{ab}	863.33 ^b

Length of fish (cm)	48 ^b	50 ^{ab}	47.33 ^{bc}	51.33 ^a	47 ^{bc}
Weight of right lobe (g)	1.49 ^{bc}	2.41 ^b	2.42 ^b	2.50 ^a	2.47 ^{ab}
Weight of left lobe (g)	1.40 ^{bc}	2.85 ^{ab}	2.87 ^{ab}	2.72 ^b	2.92 ^a
Length of right lobe (cm)	5.00 ^a	5.00 ^a	4.73 ^{ab}	4.67 ^b	4.75 ^{ab}
Length of left lobe (cm)	5.17 ^a	5.00 ^a	4.20 ^{ab}	4.03 ^b	4.00 ^b
Milt volume (mls)	1.72 ^c	3.50 ^b	3.47 ^{bc}	3.55 ^{ab}	3.73 ^a
Sperm count 10 ^{x6}	110 ^c	340 ^{bc}	341 ^b	352 ^{ab}	394 ^a
Sperm motility					
Active	40 ^b	40 ^b	40 ^b	40 ^b	50 ^a
Sluggish	20 ^b	30 ^a	20 ^b	30 ^a	20 ^b
Dead	40 ^a	30 ^b	40 ^a	30 ^b	30 ^b
Total Motile Sperm (TMS)	60 ^b	70 ^a	60 ^b	70 ^a	70 ^a

Means of data on the same row with different superscript are significantly different (p<0.05).

CONCLUSION

African Fan Palm Meal has been identified that with 2.0g/kg inclusion level in feed of *Clarias gariepinus* gave the best performance in term of sperm quality, percentage fertilization and hatchability. Milt volume and sperm count increase all through during the study period. The study revealed that AFPM could be used as fertility enhancer in *C. gariepinus* brood stock and can reduced dependence in synthetic hormones if incorporated in fish diets.

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