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GROWTH PERFORMANCE AND NUTRIENT UTILIZATION OF *CLARIAS GARIEPINUS* FED GRADED LEVELS OF MELON SHELL AS REPLACEMENT FOR MAIZE

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ABSTRACT: *This study to evaluate effect of replacing maize with graded levels of melon shell on growth of Clarias gariepinus fingerling was conducted for 16 weeks in the teaching and research farm of department of Fisheries, faculty of Agriculture Delta state university. Pearson square formula was used to formulate five different Diet with crude protein value of 40%. The Diets had 0%, 25%, 50%75% and 100% melon shell inclusion respectively. Four hundred and fifty fingerlings were randomly distributed into fifteen tanks (1mx1mx1m) and grouped in threes to form five treatments (D1a-c – D5a-c). Fishes in each tank was fed 3% body weight of diet corresponding to tank number twice daily. Weight of fish were taken fortnightly. Data collected were analyzed using Analysis of Variance (ANOVA), and means were separated using Duncan's Multiple Range Test. Result obtained showed significant difference (P<0.05) in Mean Weight Gain (MWG), Feed Conversion Ratio (FCR). However there was no significant different (P>0.05) in Specific Growth Rate (SGR). Fish fed diet two with 25% melon shell inclusion had the best FCR and highest Mean weight gain among treatments.*

KEYWORDS: Growth Performance, Nutrient Utilization, Clarias Gariepinus Fed Graded Levels, Melon Shell, Maize

INTRODUCTION

Energy-providing feed such as maize or corn carbohydrate sources are used for fish feed production. However, this feedstuff is stable food for many people. In Nigeria, maize is utilized for making snacks, drinks, roasted, boiled and eating with coconut or peer which is a delicacy by many people. Maize is expensive and is scarce, thereby limiting the availability of the feed ingredients. (Mutayoba, Dierenfield , Mercedes, Frances. and Knight 2011). Thus, there is competition for this feed ingredient between animals and humans, making them more expensive and their inclusion in aquaculture diet also increases the cost of fish production. Feed is the principle cost in the cultivation of most fish species and this cost has tended to increase with the rising competition of maize meal by other sector. (Mutayobaet al., 2011). This proportion has been on the increase as a result of the volatibility of the feed market and the competition for feed resources between human food sector and animal feed industries (Mutayoba et al., 2011). Fish feed ingredients can be supplemented with amino acids, but the amino acid sources are also scarce and expensive. Consequently, nutritionists and research scientists are turning attention to alternative sources of feed ingredients such as agricultural by-products.

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Melon is a cucurbit crop belonging to the family cucurbitaceae (Abiodun and Adeleke 2010). Melon (seed) crops are grown, harvested and processed in large tonnage in Nigeria. The seeds are removed from the fruit, washed, sun-dried and sold in large quantities (tonnage) annually for commercial purpose (as a special soup condiment). They are also used as domestic remedy for urinary tract infection, hepatic congestion, intestinal worms and abnormal blood pressure (Moerman, 1998). The freshly shelled seeds were reported contained 34.24% crude protein, 45.95% fat, 7.18% crude fiber, 4.05% ash, 8.03% moisture and 0.56% carbohydrate (Fagbohun, Lawal and Hassan 2011). However, large quantities of the melon shell are discarded and burnt, which pollute the environment. While the aquaculture industry is threatened with acute shortage of conventional feed ingredients leading to low productivity. It may be possible to utilize melon shell as non-conventional source of feed ingredient for fish feed production. There is little or no information on the use of melon shell as a feed ingredient for *C. gariepinus*.

The aim of this study therefore was to determine the proximate composition of melon shell. The main objective was to evaluate its potential as possible feed ingredient for *Clarias gariepinus*.

MATERIAL AND METHOD

Formulation of Experimental Feed

Proximate analysis of melon shell to be used as replacement for maize was conducted in Faculty of Agriculture Science Teaching and Research laboratory of Delta state University.

Pearson square method of feed formulation was used to formulate 5 diets having a crude protein of 40% each. The experimental diets contained varying inclusion levels of melon shell as replacement for maize at 0% diet one 25% diet two, 50% diet three, 75% diet four and 100% diet five. The ingredients were thoroughly mixed to form a dough. The dough formed for each of the diets was pelleted to a size of 2mm with a pelleting machine. To reduce the moisture, the pelleted feeds were oven dried at 50^{o}C until a constant weight was achieved and then packaged in clean, dry plastic containers. Proximate analyses were conducted on each of the diets according to AOAC (1990).

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Table 1. Percentage Composition of A-Posteriori Experimental Diets

Ingredient	0%	25%	50%	75%	100%
Fish meal	14.69	14.69	14.69	14.69	14.69
Groundnut cake	29.33	29.33	29.33	29.33	29.33
Soya bean meal	29.33	29.33	29.33	29.33	29.33
Maize	21.67	16.25	10.84	5.42	-
Melon shell	-	5.42	10.84	16.25	21.67
Bone meal	2.0	2.0	2.0	2.0	2.0
Oil	2.0	2.0	2.0	2.0	2.0
Lysine	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Total (kg)	100	100	100	100	100

Culture Trial Using the Experimental Diets

The experimental Design was a Complete Randomised Block Design (CRBD) having 5 treatments with two replicates. 500 *Clarias gariepinus* fingerlings were purchased from a commercial fish farm in Asaba and transported in a jerry-can to the research site. Here they were kept in a 1m x 1m x 1m concrete tank and fed with fish meal to satiation for three days to acclimate. The fingerlings were thereafter randomly distributed in 30's into 15 concrete tanks of dimension 1m x 1m x 1m. The fifteen tanks were grouped in 3's to form 5 treatments (A1 – A3, B1 – B3, C1 – C3, D1 – D3, E1 – E3). Fish in the treatment tanks were starved for 48hours to prepare their appetite for the formulated diets. Feeding trial of the fish samples lasted for 12 weeks. Fingerlings in each treatment tank were fed twice daily at body weight of 3%.

Measurement of Experimental fish

Before commencement of the study, the standard length (cm), total length (cm) and weight (g) of the fingerlings in each tank were measured using a meter rule and an electronic weighing balance respectively. These parameters were subsequently measured fortnightly between the hours of 07.00 – 14.00 hr. Data collected were used as growth indices to determine Specific Growth Rate (SGR), Mean Weight Gain (MWG), Mean Length Increase (MLI), Food Conversion Ratio (FCR), Survival Rate (SR), and Condition Factor (K).

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Statistical Analysis of Experimental Data

The data collected were analyzed Statistically using analysis of variance (ANOVA) and the differences among means were tested for significance ($P<0.05$) using Duncan multiple range test (SPSS 16.0).

RESULT AND DISCUSSION

The content of the experimental diets is a reflection of the nutritive value of the materials present. Table 2 shows Proximate composition of melon shell revealed that melon shell has crude protein content 10.2, close to that of maize 10.0. the percentage protein of melon shell in the current study is slightly differ from the findings of Obi et al (2011) that found higher crude protein (13.83) of melon shell and the findings of Orire et al., (2013) who report lower percentage crude protein (6.56) of melon shell. The variation could be attributed to melon shell variety used. Diet containing 100% melon shell replacement of maize showed higher content of lipid (17.40%), Ash (4.0%), and crude protein (40.2%) in compounded diets compare to control and other treatment diets. This implies that if these nutrients are adequately utilized, they could improve the well being of the fish. In general 10 – 20% lipid in fish diets gives optimal growth rates without producing excessive fatty carcass (Kerema and Green 2006). This levels of lipid fall within the range of values for lipid in the analyzed diets of this study.

Table 2. Proximate Composition of Experimental Diets

	Sample Diet	% Moisture	% Ash content	% Crude fiber	% Ether Extract	% Crude protein	%Nitrogen free extract (NFE)
1	Control	10.30	2.9	8.52	7.96	39.96	30.36
2	25%	8.97	3.0	10.4	13.42	39.97	24.24
3	50%	8.52	3.9	11.0	15.42	39.98	21.18
4	75%	8.46	4.0	12.00	16.41	39.99	19.14
5	100%	7.62	4.0	12.98	17.40	40.02	17.99
6	Melon Shell	8.90	6.90	4.50	16.08	10.02	53.60

Growth Performance of Experimental fish

The growth performance of *Clarias gariepinus* fingerlings fed the experimental diets in terms of weight gain (WG), specific growth rate (SGR), survival rate (SR) and feed conversion ratio (FCR) is presented in table 3. Figure 1, Shows the trend in growth responds of fish fed experimental diets for the entire growth period, were generally high among treatments, indicating positive response of fish to diets. Mean weight gain (MWG) ranged between 23.58g in diet two and 14.51g in fish fed diet four. The specific growth rate (SGR) ranged between 1.20 %/day in fish fed diet four and 1.56%/day in fish fed diet three. Survival rate (SR) ranged between 55.37 in fish fed diet two to 68.04 in fish fed diet three which is significantly different from fish fed diet two but differ insignificantly from other diets. Food conversion ratio (FCR) ranged between 1.16 in fish fed diet one and 0.85 in fish fed diet four. Growth and Nutrient

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utilization was significantly affected by the graded level of melon shell in diet fed (P<0.05). MWG, FCR, SR were significantly difference (P<0.05) among treatments. However, SGR was significantly similar (P>0.05) among treatments This observation is in line with the work of Orire *et al*, (2013), who reported significant different in mean weight gain of hybrid catfish fed Diet containing melon shell as energy source. Also Alegbeleye Oresegun, and Ajitomi, (2008) reported a significant different in weight gain was observed when maize was replaced with corn flour (*Colocassia esculenta*) in the diet of *C. gariepinus* fingerling. . Fish fed diet two with 25% melon shell inclusion had the best FCR and highest Mean weight gain among treatments.

Table 3. Summary of Analysis of Variance for Growth Parameters *Clarias gariepinus* Fed Graded Level of Melon Shell

Parameter	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Initial weight	1.26	1.33	1.32	1.44	1.36
Final weight	21.18	24.91	18.43	15.95	19.66
Weight gain	19.92±0.79^{b}	23.58±2.46^{a}	17.11±2.38^{b}	14.51±1.27^{c}	18.30±2.51^{b}
SGR	1.40±0.07^{a}	1.49±0.00^{a}	1.56±0.49^{a}	1.20±0.07^{a}	1.34±0.02^{a}
Survival rate	59.48±14.664^{ab}	55.37±15.430^{b}	68.04±15.612^{a}	64.82±8.946^{ab}	65.56±16.608^{ab}
FCR	1.16±0.13^{b}	0.85±0.02^{c}	1.23±0.23^{ab}	1.42±0.54^{a}	0.88±0.13^{c}

NB: a, b Means in the same row with different superscript are significantly different (P<0.05)

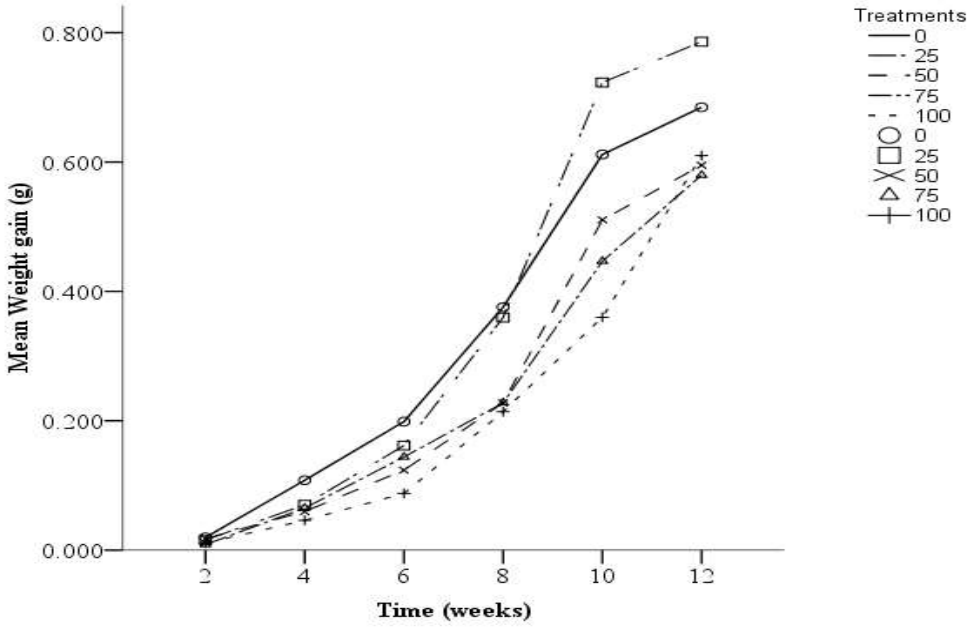

Figure 1 Mean weight gain of *Clarias gariepnus* fed the treatment diet for twelve weeks

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CONCLUSION

All tested diets were actively fed upon and accepted by *Clarias gariepinus* all through the experimental period. Melon shell is a cheap source of non-conventional feed ingredient, which can be used favorably to replace maize in diets of *Clarias gariepinus*

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