EFFECT OF MELON SHELL AS A DIETARY CARBOHYDRATE SUPPLEMENT ON GROWTH PERFORMANCE OF NILE TILAPIA (*Oreochromis Niloticus* Linnaeus, 1758) JUVENILES

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ABSTRACT

The effect of feeding varying levels of melon shell meal in the diets of Oreochromis niloticus juveniles for growth performance was investigated. This study was carried out to supplement maize at different levels of inclusion for 8 weeks. Melon shell meal were used as maize supplement with varying levels at the rate of 0%(diet 1), 5%(diet 2), 10%(diet 3), and 15% (diet 4) to feed Oreochromis niloticus juveniles for 8 weeks (65days), melon shell was collected, dried using the air- drying method for 5 days, grinded into a coarse powder, stored in a glass container and kept under a good temperature until commencement of experiment. Melon shell meal (MSM) Was prepared. Fish feed was formulated and prepared using pearson's square method. The formulated feed was then separated into four places, A, B, C, and D. The melon shell meal (MSM) was then added into the fish feed A, B, C, and D at 0%, 5%, 10%, and 15% respectively. A Total number of 100 fish were randomly assigned to the four treatment diets. Each treatment contained 25 fish per tank and each treatment was triplicated in a completely randomised design (CRD). Fish were fed twice daily at 5% body weight in equal proportions. Data from each parameter were subjected to analysis of variance (ANOVA) and the means for various experimental diets were compared for significance difference at 5% level. Results showed no significant differences ($P<0.05$) for measured growth parameters. Fish fed diet containing 15% MSM had the highest mean weight gain (77.20g), there was no significant difference in the length in the experimental diets, best feed conversion ratio (FCR) was observed in 0% MSM level which is the control diet. while fish fed 0%(diet 1) MSM had the lowest values for MWG (10). The water quality parameters of the experimental tanks were recorded. The range of the pH was observed to be between 6.50±0.29 to 6.83±0.17. Dissolved oxygen ranged between 6.67±0.17mg/L - 6.83±0.17 mg/L, while temperature between 27.33±0.33 ^{o}C - 28.67±0.33 ^{o}C. The results indicate that melon shell meal when used as carbohydrate supplement exerted effect on the growth performance of Oreochromis niloticus. It further indicated that melon shell meal can favourably replace other carbohydrate sources upto 15% in diets of oreochromis niloticus for optimal growth performance. An active and well directed research can be carried out to improve the production and maintenance of melon shell peel which will help the further availability of local and inexpensive fish feed.

Keywords: Melon shell, Growth performance, weight gain and *Oreochromis niloticus*

INTRODUCTION

Aquaculture is the largest animal food production sector (SOFIA, 2022). Orire and Ricketts (2013) opined that the success of aquaculture largely depends on the capability of fish farmers to formulate nutritionally balanced diets that will meet the nutrient requirements of their cultured species at lower cost. Success in aquaculture depends on the ability of the farmer to cost effectively meet the nutritional demands of the cultured fish species, feeding nutritionally complete or balanced manufactured feeds to fish is Very important. This is because feed type as well as feed quality may have consequences on both growth efficiency and feed utilization, feed account for over 50%, of the production costs (Dwiardani *et al.,* 2021, Karlina *et al.,* 2013).

Energy-providing feed such as maize or corn carbohydrate sources are used for fish feed production. However, this feed stuff 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 are not readily available (Aderolu *et al*., 2011)). Maize is expensive and is scarce, thereby limiting the availability of the feed ingredients. 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.

Tilapia constitutes the second group of fish reared after carp with a World production of 4.2 million tones in 2016 (FAO, 2016). In Africa, Tilapia production from Egypt represent over 90% of the commercial Arab aquaculture production and ranks second to China in global level (FAO, 2018).

Melon is a cucurbit crop belonging to the family *cucurbitaceae (*Abiodun and Adeleke 2013), it is a plant species which originated from Africa and is wildly cultivated as fruit (Chomicki, and Renner, 2014). 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).

Residues such as husk, shell, back etc., gotten from most agricultural products have been identified as waste and constitute environmental hazards. Orire and Ricketts (2013) reported that these wastes could be utilised effectively as feed ingredients for fish and livestock feeds. Most of these crop residues have been found to contain good amount of fibre, ash, lipid and protein (Obi, *et al.,* 2012; Orire and Ricketts, 2013). Earlier studies had attempted to increase the use of Unconventional feed stuffs to replace conventional feed ingredients like maize, and fish meal in fish diets (Balogun *et al*, 2016, Azaza *et al.,* 2015). Melon seed contains mineral nutrients, oil and substantial amount of protein (ranging from 18-28%) (Obi *et al.,* 2014). Melon seed peel is common and usually seen as agricultural waste (Obi *et al.,* 2013). Melon (*Citrillus lanatus*) seed peel or husk which is usually discarded as a waste after shelling of melon seeds is a typical agricultural by-product which has not been utilized as fish feed. This study was designed to assess the feasibility of utilizing melon seed peel as an alternative dietary energy source on the growth performance and feed utilization in the diets of Nile tilapia. (*Oreochromis niloticus*).

MATERIALS AND METHODS

The study was carried out at the Department of Fisheries Technology, teaching and research farm chaha campus Federal College of Animal Health and Production Technology National Veterinary Research Institute Vom, Jos South local Government Area of Plateau State.

The experiment feed stuffs such as melon shell, fish meal, maize, soybean, groundnut cake premix, vitamins, bone meal, salt, were obtained from Bukuru Jos south Local Government Area of Plateau State.

Melon shell was collected from Angwan Rukuba Jos North Local Government Area of Plateau State. The peels were sundried for 3 days. Dirt was sieved out using a hand sieve. The peels was then grounded into powdered form with the aid of a grinding machine and stored in an air tight container. Proximate composition of the melon shell was determined following the formula of A.O.A.C (2010).

Four (4) diets (A, B, C and D) was formulated to yield 30% crude protein.

Melon shell meal (MSM) was included in the diets as alternative energy source to replace maize at different inclusion levels. The different inclusion levels of Melon shell meal used were 0%, 5%, 10% and 15%. The control diet had a 0% inclusion of Melon shell meal. Other feed ingredients used in the diet formulation includes soybean meal (SBM), groundnut cake (GNC), maize (M), fish meal (FM), bone meal (BM) vitamin/mineral premix, and salt. Pearson square method was used in the feed formulation. Samples of the experimental diets was sent to the laboratory for proximate analysis as described by A.O.A.C (2010).

Table 1: Composition (%) of experimental ingredients

Feed ingredients	**T1(0%)**	**T2(5%)**	**T3(10%)**	**T4(15%)**
MM	52.50	47.50	42.50	37.50
MSM	0	5	10	15
SBM	25.00	25.00	25.00	25.00
GNC	15.00	15.00	15.00	15.00
Premix	1.00	1.00	1.00	1.00
FM	5.00	5.00	5.00	5.00
Salt	0.50	0.50	0.50	0.50
BM	1.00	1.00	1.00	1.00
Total	**100**	**100**	**100**	**100**

MM=maize meal, MSM=melon shell meal, SBM=soya beans meal, GNC=groundnut cake, FM=fish meal, BM=bone meal

EXPERIMENTAL FISH

300 pieces of *Oreochromis niloticus* juveniles were obtained from Panyam fish farm in Mangu Local Government Area of plateau state. They were transported to the Department of Fisheries Technology, Chaha, Vom, Jos South Local Government Area in Plastic containers and were allowed to acclimatize for seven days while they were fed with commercial pelleted feed diets before the commencement of the experiment. This study lasted for a period of 8 weeks (2months)

EXPERIMENTAL DESIGN

Twelve (12) plastic bowls containing 60L of well aerated unchlorinated borehole Water was filled. Each plastic bowl contained 25 pieces of *Oreochromis nilocus* randomly selected; the initial weight and their growth performance was taken, using Iheanacho *et al*, (2018) formula. presented below.

$$\text{Specific Growth Rate (SGR)\%} = \frac{\text{final weight} - \text{initial weight}}{\text{Number of days}} \times 100$$

$$\text{Survival Rate (SR)\%} = \frac{\text{number of fish survived}}{\text{Number of fish stocked}} \times \frac{100}{1}$$

$$\text{Weight Gain (\%)} = \frac{\text{final weight} - \text{initial weight}}{\text{Initial weight}} \times \frac{100}{1}$$

$$\text{Length Gain (\%)} = \frac{\text{final length} - \text{initial length}}{\text{InitialLength}} \times \frac{100}{1}$$

Feed Utilization

$$\text{Conversion Ratio (FCR)} = \frac{\text{Total feed consumption}}{\text{Weight}}$$

$$\text{Feed Efficiency (FE)} = \frac{\text{Weight Gain}}{\text{Total feed consumed}}$$

Data Analysis

Data obtained from the growth performance indices of *Oreochromis niloticus* juveniles fed with different inclusion level of melon shell meal was subjected to one–way analysis of variance (one-way ANOVA). Analysis was performed using the completely Randomised design (CRD). Significant level was set at $p<0.05$ and values were expressed as SEM.

RESULT

GROWTH PERFORMANCE OF OREOCHROMIS NILOTICUS

The below table 2: Shows the growth performance of oreochromes niloticus fed different level of inclusion with melom shell (*Citrullus lanatus*) thumb. The result showed that feed diet 4 with 15% inclusion level has a high mean final weight, mean length Gain, mean final length, feed Intake, survival rate and Specific Growth Rate except for feed conversion ratio with a lower value of **7.25±2.03** followed by diet 3,2 and 1 respectively.

Table 1: Growth performance of *Oreochromis niloticus* fed different level of inclusion with melon shell.

Parameters	TD1 (0%)	TD2 (5%)	TD3 (10%)	TD4 (15%)
MIW (g)	120.00 ± 0.30^{a}	123.00 ± 0.30^{ab}	123.00 ± 0.20^{b}	122.80 ± 0.10^{c}
MFW (g)	130.00 ± 6.03^{c}	153.00 ± 6.00^{d}	178.00 ± 6.10^{c}	200.00± 6.30^{b}
MWG (g)	10.00 ± 2.01^{d}	30.00 ± 2.00^{c}	55.00 ± 2.03^{b}	77.20 ± 2.00^{d}
FI (g)	300.00± 0.00^{b}	420.00 ± 0.01^{ab}	500.00 ± 0.10^{a}	560.00 ± 0.01^{a}
FCR	30.00 ± 2.06^{a}	14.00 ± 2.01^{b}	9.00 ± 2.06^{c}	7.25 ± 2.03^{ab}
SGR	15.38 ± 0.30^{ab}	46.15 ± 0.03^{c}	84.61 ± 0.02^{d}	118.76 ± 0.30^{b}
MIL (cm)	15.00 ± 0.63^{ab}	16.00± 0.63^{b}	16.40 ± 0.60^{a}	17.00 ± 0.62^{c}
MFL (cm)	17.00 ± 0.15^{c}	18.20 ± 0.13^{ab}	20.00 ± 0.01^{b}	22.00 ± 0.10^{a}
MLG (cm)	2.00 ± 0.50^{ab}	2.20 ± 0.03^{d}	4.20 ± 0.20^{a}	5.00 ± 0.30^{c}
% Survival rate	50	60	70	76

Means along each row that do not share at least a superscript are significantly different (P<0.05)
Keys: MIW = Mean Initial Weight, MFW = Mean Final Weight, MWG = Mean Weight Gain**,** **FI** = Feed Intake, FCR = Feed Conversion Ratio, SGR = Specific Growth Rate**,** MIL = Mean Initial Length, MFL = Mean Final Length, MLG = Mean Length Gain

DISCUSSION

Melon shell meal has been reported to be a good dietary energy source in the diets of Nile tilapia (*Oreochromis nilotocus*) (Orire and Rickett, 2013)

This work aimed at ascertaining the effects of differents dietary inclusion levels of melon shell meal as a carbohydrates supplement on the growth performance of Nile tilapia (*orecochromis nilotocus*).Diet 4(15% MSM) significantly imcreased (p<0.05) the growth of the fish with regards to the Final weight, weight gain, specific growth rate, feed intake, length gain compared to other diets treatment and the control. This may be to the availability of nutrients and sufficient energy needed for metabolic activities and growth. However, diet 3 (10%MSM) expressed second best in terms of growth performance followed by diet 2(5%MSM) and diet 1(0%MSM) respectively. There was no significant difference between the growth length in the experiment diets which is in accordance with the work of Iheanacho *et al*., (2017) who reported an increased growth when *O. niloticus* juveniles were fed with melon shell meal for 56 days feeding trial. Orire and Ricketts (2013) also reported better good performance when *O. niloticus* were fed Melon Shell Meal supplemented diets. The FCR ratio of the experimental diets differs significantly (p>0.05), Diet 1(0%MSM) recorded a higher FCR value of 30.00 followed by diets 2,3 and 4. Diets 4(15% MSM) recorded the lowest FCR of 7.25 Which is in accordance with the work of Iheanacho *et al.,* (2017).

CONCLUSION

Research for alternative energy source in fish diet has become imperative as the conventional feedstuffs are expensive and farmers can no longer afford their use in fish diets. This work clearly shown that melon shell meal increased growth performance of fish, results showed that *O. niloticus*

effectively utilized feed formulated with different dietary inclusion levels of Melon shell meal (MSM) based diet, especially diet 4(15% MSM). This implies that MSM is a viable option that can be efficiently used to replace maize as a carbohydrates source in the diet of *Oreochromis niloticus*. Fish farmers are encouraged to explore this opportunity as it will reduce drastically the cost of fish production and enhance growth of fish as well.

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