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EFFECT OF REPLACING MAIZE MEAL WITH SWEET POTATO PEEL MEAL ON GROWTH PERFORMANCE AND BODY COMPOSITION OF TILAPIA FINGERLINGS (*Oreochromis niloticus*)

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ABSTRACT
A 56-day feeding trial was conducted to evaluate the effect of sweet potato (*Ipomoea batatas*) peel meal as a replacement for maize meal in the diet of *Tilapia* fingerlings. Five isonitrogenous diets of 30% crude protein were formulated to contain 0, 25, 50, 75 and 100% sweet potato peel meal (Diets 1-5) to replace maize meal in the tilapia diet. The diet containing 0% sweet potato peel meal served as the control. *Tilapia* fingerlings were raised in net happas of 0.25m × 0.25m × 0.43m in concrete ponds of 1.46m x 1.46m x 0.63m. Each dietary treatment was tested in triplicate groups of 20 fingerlings per happa. The results of the growth and nutrient utilization responses show that there were no significant ($p>0.05$) differences among the fish fed diets 1, 2 and 5 (0, 25, and 100% sweet potato peel meal) but were significantly ($p<0.05$) different from fish fed on diet 3 and 4 (50 and 75% sweet potato peel meal) which had lower growth and feed utilization values. There were no significant ($p>0.05$) differences in the carcass composition of *Tilapia* fingerlings fed experimental diets. The current results show that sweet potato peel meal has good potential to replace maize meal in the diet of *Tilapia* fingerlingsup to 75% level without compromising growth.
Key words: Sweet potato peel meal, Feed utilization, Growth Performance, Tilapia.

INTRODUCTION
Aquaculture is the farming of aquatic organisms and plants in fresh, brackish or salt water. A wide variety of aquatic organisms are produced through aquaculture. These include: fishes, crustaceans, molluscs, algae, and aquatic plants. Unlike captured fisheries, aquaculture requires deliberate human intervention in the organisms' productivity which results in yields that exceed those from the natural environment alone. Such interventions are stocking water with seed (fingerlings), fertilizing the water, feeding the organisms, and maintaining water quality (FAO, 2011). Aquaculture productions have increased in the last decade. Presently, world food fish production of aquaculture has expanded by almost 12 times, at an average annual rate of 8.8% (Oluwatobi *et al.*, 2017).

Fish feed is the most expensive input in aquaculture operations (Omoregie *et al.,* 2009). Much of the high cost of feed arises from extensive reliance on protein sources, such as fishmeal and shrimp meal (Omoregie, 2001; Omoregie *et al.,* 2009).

Sweet potato peels contain adequate amount of calories in form of vitamin B and C as well as useful amount of other micronutrients such as Iron. The carbohydrate of sweet potato peels is highly digestible and soluble. It consists predominantly of starch with 4-7% occurring as sugar. However, the amino acid is observed to be short in tryptophan and total sulphur when compared to the amino acid profile of other crops. (Solomon *et al*., 2015).

Experimental site / Set- up
The experiment was carried out at the Water Resources, Aquaculture and Fisheries Technology Research farm Bosso Campus and Laboratory of Federal University of Technology Minna, Gidan Kwano campus, Niger State. It is located within latitude 09^0 30′ and 09^0 45′ and longitude 06^0 30′and 06^0 045′E with an altitude of 1475m above sea level. The vegetation type mainly of southern guinea savannah grassland. The mean annual rainfall is 1200mm-1300mm (*www.nigisservices.com*)

Preparation of Experimental Diets
The sweet potato peel after it was sundried and grounded into powder form was thoroughly mixed with other ingredients in varying levels. Five (5) dietary experimental diets were formulated such that T1 (0% Sweet Potato

Waste Meal (SWPM)), T2 (25% SWPM), T3 (50% SWPM), T4 (75% SWPM), T5 (100% SWPM) replacement of maize meal. Feed was compounded at 30% crude protein

Experimental Design

A complete randomized experimental design (CRD) was used. The 300 fingerlings were allocated randomly into the 5 dietary treatment with each treatment having three replicates with twenty fingerlings per replicate making a total of 60 per treatment and overall total of three hundred (300) fingerlings.

Growth Performance and Feed Utilization Parameters Formula

The formulae used to calculate the parameters are explained below;

Mean Weight Gain (MWG) = Mean Final Weight (MFW) – Mean Initial Weight (MIW)

$$\textbf{Specific Growth Rate (SGR)} = \frac{\text{Ln MFW} - \text{Ln MIW}}{\text{Time (days)}} \times 100$$

$$\textbf{Protein Efficiency Ratio (PER)} = \frac{\text{Weight gain of fish}}{\text{Protein fed}}$$

$$\textbf{Percentage Mean Weight Gain (PMWG)} = \frac{\text{Mean Weight Gain}}{\text{Mean Initial weight}} \times 100$$

$$\textbf{Feed Efficiency (FE)} = \frac{\text{Weight gain of fish}}{\text{Weight feed consumed}}$$

Statistical Analysis

Variables of water quality, growth parameters and carcass compositions was analyzed using one – way analysis of variance (ANOVA) at 5% significant level to test for significant differences between the various treatments using Minitab Software Student version 17.

Results/Discussion

Table. 1.0 Growth Performance of *Oreochromis niloticus* fingerlings fed experimental diet for 56 days.

DC	MIW(g)	MFW (g)	MWG (g)	PMWG (%)	SGR (%)	TFI (g)	FE	PER	PR (%)
D1	1.16^{a}	7.77^{c}	6.61^{b}	569.71^{c}	3.40^{c}	8.59^{b}	0.77^{b}	2.32^{b}	38.32^{b}
D2	1.14^{b}	7.79^{b}	6.65^{b}	583.10^{b}	3.43^{b}	8.67^{b}	0.77^{b}	2.32^{b}	38.16^{b}
D3	1.13^{b}	8.86^{a}	7.74^{a}	684.45^{a}	3.68^{a}	9.79^{a}	0.79^{a}	2.38^{a}	38.94^{a}
D4	1.13^{b}	8.95^{a}	7.83^{a}	692.68^{a}	3.70^{a}	9.97^{a}	0.79^{a}	2.37^{a}	38.65^{a}
D5	1.16^{a}	7.76^{c}	6.60^{c}	568.62^{c}	3.39^{c}	8.67^{b}	0.76^{b}	2.30^{b}	37.76^{c}

Mean values in the same row with different superscript letter are significantly different from each other

D1 = 0% Inclusion (control)
D2 = 25% Inclusion of SPWM
D3 = 50% Inclusion of SPWM
D4 = 75% Inclusion of SPWM
D5= 100% Inclusion of SPWM

WG= Weight Gain
SGR= Specific Growth Rate
TFI= Total Feed Intake
FE= Feed Efficiency
PMWG= Percentage Mean Weight Gain

PER= Protein Efficiency Ratio
FW = Final Weight Gain
IW = Initial Weight
PR= Protein Retention

Table 1 Showed growth performance indices of the fish fed experimental diets. Fish fed D4 diet had the highest values in FWG and SGR followed by fish fed D3 diet however there was no significant difference ($P<0.05$) between both feed while, those fed with D1,D2 and D5 had the lowest value but has significant difference ($P>0.05$) from those fed D3 and D4. There was no significant difference ($P<0.05$) in the percentage survival among all the fish fed the experimental diets. Although fish fed D3 and D4 had the highest TFI value among all the fish fed the experimental diets, there was no significant difference between fish fed D3 and D4 and those fed D1, D2 and D5. Fish fed D1 had the lowest value and was significantly lower than fish fed D4 but was not significantly different from fish fed D2 and D5 ($P>0.05$). Fish fed D3 and D4 had the highest significant FE value and was significantly different from fish fed other experimental diets ($P<0.05$), fish fed D1, D2 and D5 had the lowest FE value but was not significantly different from fish fed D3 and D4, while fish fed D3 was significantly higher than those fed D5. The PER and PR followed the same pattern, with fish fed D3 and D4 significantly higher than the other fish fed other experimental diets ($P<0.05$). Fish fed D5 had the lowest value and was significantly lower than fish fed D1, D2 and D4, however there was no significant ($P>0.05$) different in the PER and PR values between fish fed D1, and D2.

Fish fed the five (5) different diets responded well with no deleterious effect on growth when compared with control diet throughout the feeding trial. Similar to Dan-Kishiya (2015), Omoregie *et al*; (2009) as significant difference ($p>0.05$) higher values were observed for MFW, MWG, SGR, and PER. However diet 3 and 4 containing 50% and 75% inclusion of SWPM replacement level of maize meal. Solomon *et al*; (2015) had the highest growth level and high survival rate of the experimental fish might be as a result of proper management of happas to ensure neatness at all time. There was no sign of disease or mortality as a result of dietary deficiency.

Conclusion

This study shows that sweet potato peel meal can be used to replace maize meal at an inclusion level of 50 – 75% to improve the growth performance and nutrient utilization of *Oreochromis niloticus* fingerlings without adverse effect. Further research work should be carried out on the hematology of the fingerlings fed experimental diets and amino acid profile of the diets.

References

Dan-Kishiya, A. S. (2013). Length-weight relationship and condition factor of five fish species from a tropical water supply reservoir in Abuja, Nigeria. *American Journal of Research Communication*, *1*(9), 175-187

FAO (2011). *The State of World Fisheries and Aquaculture 2010.* Rome: FAO Fisheries and Aquaculture Department.

Oluwatobi, A. A., Mutalib, H. A., Adeniyi, T. K., Olabode, J. O., & Adeyemi, A. (2017). Possible aquaculture development in Nigeria: evidence for commercial prospects.

Omoregie, E. (2001). Utilization and nutrient digestibility of mango seeds and palm kernel meal by juvenile Labeo senegalensis (*Antheriniformes: Cyprinidae*). *Aquaculture Research*, *32*(9), 681-687.

Omoregie, E., Igoche, L., Ojobe, T. O., Absalom, K. V., & Onusiriuka, B. C. (2009). Effect of varying levels of sweet potato (Ipomea Batatas) peels on growth, feed utilization and some biochemical responses of the cichlid (*Oreochromis Niloticus*). *African Journal of Food, Agriculture, Nutrition and Development*, *9*(2), 700-712.

Solomon, S. G., Okomoda, V. T., & Oloche, J. A. (2015). Evaluation of Sweet Potato (Ipomea batatas) peel as a replacement for maize meal in the diet of *Clarias gariepinus* Fingerling. *Journal of FisheriesSciences. com*, *9*(4), 63.