Journal of
Fisheries and Aquatic Science

ISSN 1816-4927

Academic
Journals Inc.

www.academicjournals.com

Journal of Fisheries and Aquatic Science 9 (5): 382-386, 2014
ISSN 1816-4927 / DOI: 10.3923/jfas.2014.382.386

Growth Response of Nile Tilapia (*Oreochromis niloticus*) Fed Graded Levels of Sundried Cassava Peel Meal

[1]A.S. Ojukannaiye, [2]O.Y. Mogaji and [2]F.P. Asuwaju
[1]Department of Fisheries Technology, Federal Polytechnic, Nekede, Owerri, Imo State, Nigeria
[2]National Institute for Freshwater Fisheries Research, P.M.B. 6006, New Bussa, Niger State, Nigeria

Corresponding Author: O.Y. Mogaji, National Institute for Freshwater Fisheries Research, P.M.B. 6006, New Bussa, Niger State, Nigeria

ABSTRACT

A study was conducted at the farm section of the Department of Fisheries Technology, Federal Polytechnic Nekede, Owerri in 2012. Factorial design of five treatments of cassava peel meal at 0, 25, 50, 75 and 100% graded level were formulated. The cassava peel meal was sundried for 48 h, ground and added to the feed fed to 150 fingerlings of *Oreochromis niloticus* into 10 tanks in triplicates and fed twice daily at 5% body weight for 60 days. The result shows that fish fed with 100% cassava peel meal had the highest mean weight gain of 10.46±0.01 and specific growth rate of 1.23±0.04. The second best result was shown in fish fed with 75% cassava peel meal with weight gain of 9.93±0.03, Feed Conversion Ratio (FCR) of 1.75±0.04 and specific growth rate of 1.24±0.02. The poorest result was shown by fish fed 25% cassava peel meal with the lowest survival rate, weight gain, feed intake and specific growth rate, respectively. This connotes that diet with 100% fed graded level of sundried cassava peel meal can best be utilised at a ratio of 75 to 15% CPM and second best diet with 75% fed graded level of sundried cassava peel meal could also be utilized at 11.25% inclusion due to its survival rate parameter over the best. Moreover, this proportion should be utilised for improve growth of Nile tilapia (*Oreochromis niloticus*) for profit maximization.

Key words: Cassava peel meal, Growth response, *Oreochromis niloticus*

INTRODUCTION

The importance of fish as a valuable source of animal protein in human diets cannot be over-emphasized (Ofuoku *et al*., 2008). The expansion and intensification of aquaculture production has been recommended towards ensuring increase in food fish production in order to meet up with the global demand, since capture fisheries have continued to be on the decline over decades (New, 1987; Delgado *et al*., 2003). According to FAO (2006), fish supplies from capture fisheries will, therefore, not be able to meet the growing global demand for aquatic food. Therefore, there is need for the recruitment of other suitable ingredients that can be used as energy sources that are protein saving in replacement of maize towards ensuring profitable fish farming. The need to solve the problems of feeding in aquaculture has been demonstrated through various researches in the utilization of vegetable sources and agricultural wastes such as plantain peel meal (Falaye and Oluruntunyi, 1998), poultry offal (Fasakin, 2008), fermented shrimp head waste meal (Nwanna, 2003), maggot meal (Faturoti *et al*., 1998; Fasakin *et al*., 2004) and water hyacinth meal (Sotolu, 2008) have been emphasized in the formulation of least cost fish feed towards ensuring

profitable fish business. Cassava peel meal is a highly digestible product, with reported values of 78 and 81% for DM and OM total tract digestibility respectively (Baah *et al*., 1999).

This study, therefore, aimed at evaluating the effect of graded level of sundried cassava peel meal on growth performance of *Oreochromis niloticus*.

MATERIALS AND METHODS

Experimental site and fish: The experiment was conducted at the farm section of the Department of Fisheries Technology, Federal Polytechnic Nekede, Owerri, Imo state, Nigeria. A total of 150 *Oreochromis niloticus* fingerlings were sourced from African Regional Aquaculture Centre (ARAC), Port Harcourt River State. They were then acclimatize for 3 days to empty their gastrointestinal tract preparing them for the test diet.

Source and preparation of test ingredients: Fresh cassava peels of the sweet variety were gotten from Nigeria Starch Mills, Uli, Ihiala Local Government Area of Anambra State. It was sundried for 48 h and was grounded to obtain its powdery nature. It was also sieved to obtain the finest powder of cassava peel used in the feed formulation.

Diet and feed formulation: The ingredients were obtained from Fidelity Agro Services Nigeria, Imo State. They were then ground to homogenous size with hammer mill. The diet was formulated at 35% crude protein level using Pearson square method to obtain five treatments containing 0, 25, 50, 75 and 100% of sundried cassava peel as shown in Table 1. It was mixed thoroughly in a bowl and hot water was added at interval to gelatinize starch. It was pelleted in a mechanically operated pelletize of prostan GX 160 5.5hp. The moist pellets were spread and sundried for 26 h, packaged in tagged air tight polythene and in a plastic bucket stored in a dry place at room temperature.

Feeding trial and data collection: Ten hapas of 1×1×1 m were set in a concrete tank (6×4×1.5 m) containing 5 treatment and triplicates of 10 fingerlings in the hapas. Fingerlings of tilapia of average weight 1 g were stocked into the hapa and fed twice daily at 5% of their body weight. Samplings were done every two weeks to determine the growth response and survival rate.

Proximate composition of test ingredient: The cassava peel meal, used in this study, was subjected to laboratory analysis in order to obtain their chemical composition according to Association of Analytical Chemists Method (AOAC, 1990).

Table 1: Proximate composition of cassava peels

Parameters	Composition (%)
Ash	11.00
Moisture content	11.21
Crude protein	11.57
Fat	4.03
Fiber	6.33
CHO	55.86

Biological evaluation:

Biological evalution was performed by following equations:

$$FCR = \frac{\text{Feedintake}}{\text{Weight gain (g)}}$$

where, FCR is feed conversion ratio

$$MGR = \frac{\text{Weight gain (g)}}{\text{Time (days)}}$$

where, MGR is mean growth rate

$$SGR = \frac{\log \text{ final weight} - \log \text{ intial weight}}{\text{Time (days)}} \times 100$$

where, SGR is specific growth rate

$$PEF = \frac{\text{Weight gain}}{\text{Protein intake}}$$

where, PEF is protein efficiency ratio

$$\text{Weight gain (g)} = \text{Final weight} - \text{Initial weight}$$

$$\text{Protein intake} = \text{Feed intake} \times \text{Crude protein intake (\%)}$$

Experimental design: The data collected throughout the experimental period were subjected to Analysis of Variance (ANOVA).

RESULTS AND DISCUSSION

The data of the proximate value of cassava peel meal and composition of experimental diets are duly represented in Table 1 and 2, respectively. Also, the data of the proximate composition of experimental feed diets and growth response and nutrient utilization of *Oreochromis niloticus* fingerlings fed various level of cassava peel meal diet are represented in Table 3 and 4, respectively.

There was no significant difference ($p>0.05$) in the initial weight of the fish. There was significant difference ($p<0.05$) in the growth parameter tested for with treatment 5 recording the highest (0.13±0.03), compared to other treatments which recorded no significant difference to one another and diet 2 recording the least. The highest mean weight gain was recorded in diet 5 (10.46±0.01), though all treatment exhibit significant difference in their mean weight gain with the least value in treatment 2 (7.67±0.03). In the feed conversion ratio of all the diets, treatment 4 and 5 recorded significant difference ($p<0.05$) with increased inclusion of cassava peel meal (1.75±0.04 and 1.75±0.01, respectively) compared to treatment 1, 2 and 3 of no significance.

Table 2: Gross composition of experimental diet (dry matter)

	Diet (%)				
Ingredient	0	25	50	70	100
Cassava peel meal	0	3.75	7.5	11.25	15
Maize	15	11.25	7.5	3.75	0
Soybean	35	35	35	35	35
Groundnut cake	35	35	35	35	35
Fish meal	10	10	10	10	10
Bone meal	2	2	2	2	2
Oil	2	2	2	2	2
Premix	0	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100

Table 3: Proximate composition of experimental feed diet

	Diet (%)				
Parameter	0	25	50	70	100
Ash	13.00	10.00	9.56	11.03	8.68
Moisture	9.60	9.31	10.15	9.86	11.00
Crude protein	34.54	34.16	31.56	32.98	33.88
Fat	4.25	5.21	5.24	5.14	5.13
Fibre	7.02	6.42	5.56	5.62	6.21
NFE	31.59	34.76	37.93	35.40	42.93

NFR: Nitrogen Free extract

Table 4: Growth response and nutrient utilization of *oreochromis niloticus* fingerlings fed various level of cassava peel meal based diets

	Diet (%)				
Parameter	0	25	50	70	100
Mean initial weight	0.93±0.06^{a}	0.95±0.05^{a}	0.90±0.07^{a}	0.96±0.06^{a}	0.97±0.21^{a}
Mean final weight	9.53±0.08^{c}	8.70±0.16^{a}	9.26±0.06^{b}	10.82±0.06^{d}	11.44±0.21^{e}
Mean weight gain	8.44±0.11^{c}	7.67±0.03^{a}	8.31±0.05^{b}	9.93±0.03^{d}	10.46±0.01^{e}
Growth rate	0.08±0.03^{a}	0.08±0.06^{a}	0.08±0.00^{a}	0.08±0.10^{a}	0.13±0.03^{b}
Specific growth rate	1.16±0.02^{ab}	1.13±0.30^{a}	1.17±0.02^{ab}	1.24±0.02^{c}	1.23±0.04^{bc}
Feed conversion ratio	2.04±0.00^{b}	2.03±0.01^{b}	2.04±0.02^{b}	1.75±0.04^{a}	1.75±0.01^{a}
Feed intake	17.48±0.06^{c}	15.54±0.20^{a}	17.07±0.02^{b}	17.45±0.20^{c}	18.23±0.04^{e}
Protein efficiency ratio	1.42±0.03^{a}	1.44±0.02^{a}	1.53±0.10^{b}	1.73±0.03^{d}	1.61±0.01^{c}
Protein intake	6.03±0.02^{c}	5.33±0.11^{a}	5.36±0.05^{a}	5.73±0.01^{b}	6.51±0.01^{d}
Survival	95.33±1.53^{d}	79.67±1.15^{a}	98.00±1.00^{e}	89.33±6.58^{c}	83.15±0.71^{b}

Protein efficiency ratio was best in treatment 4 (1.73±0.03) followed by treatment 5 (1.61±0.01) of significant ratio ($p<0.05$). Cassava meal was found to be more palatable than wheat, soybean meal and cottonseed meal (Pereira-da-Silva and Pezzato, 2000). Treatment 5 with 15% inclusion of cassava peal meal recorded the best result among the other four diets in respect to its mean final weight, growth rate, feed conversion ratio and protein intake which connote acceptability of cassava

peel meal diet to *Oreochromis niloticus* fingerlings. However, treatment 4 also poses good and closely related results to treatment 5 at an inclusion level of 11.25% cassava peel meal. Therefore, the inclusion level of both treatment especially treatment 5 could be adopted for optimum performance and food utilization in the diet of *Oreochromis niloticus* fingerlings.

CONCLUSION

Results obtained in this study have shown that cassava peel meal yielded significance growth performance of *Oreochromis niloticus* fingerlings at an inclusion level of 25% when substituted for maize in the fish diet.

REFERENCES

AOAC, 1990. Official Methods of Analysis of Assocication of Official Agricultural Chemists. 15th Edn., AOAC, Washington DC., USA.

Baah, J., R.M. Tait and A.K. Tuah, 1999. The effect of supplementation with ficus leaves on the utilization of cassava peels by sheep. Bioresour. Technol., 67: 47-51.

Delgado, M.R., H.M. Locke, V.A. Stenger and J.A. Fiez, 2003. Dorsal striatum responses to reward and punishment: Effects of valence and magnitude manipulations. Cognit. Affective Behav. Neurosci., 3: 27-38.

FAO, 2006. State of world aquaculture 2006. FAO Fisheries Technical Paper No. 500, FAO, Rome, Italy, pp: 1-134.

Falaye, A.E. and O.O. Oloruntunyi, 1998. Nutritive potential of plantain peel meal and replacement value for maize in the diets of African catfish *Clarias gariepinus* fingerlings. Trop. Agric. Trinidad, 75: 448-492.

Fasakin, E.A., A.M. Balogun and O. Edomwadogbon, 2004. Aspects of chemical and biological evaluation of dried maggot meals in production diets for Clarid catfish, *Clarias gariepinus*. World J. Biotechol., 5: 753-762.

Fasakin, E.A., 2008. Fish as food yesterday, today and forever. Inaugural Lecture Series 48, The Federal University of Technology, Akure, pp: 52.

Faturoti, E.O., S.O. Obasa and A.L. Bakare, 1998. Growthand Nutrient Utilization of *Clarias gariepinus* (Burchell 1822), Fed Live Maggots. In: Sustainable Utilization of Aquatic/Wetland Resources, Selected Papers from 9-10th Annual Conference, Otubusin, S.O., N.G.O. Ezeri, O.A. Ugwumba and A.A.A. Ugwumba (Eds.)., Nigerian Association for Aquatic Sciences, Nigeria, pp: 182-190.

New, M.B., 1987. Feed and Feeding of Fish and Shrimp: A Manual on the Preparation and Presentation of Compound Feeds for Shrimp and Fish in Aquaculture. United Nations Development Programme, Food and Agriculture Organization, Rome, Italy, Pages: 275.

Nwanna, L.C., 2003. Nutritional value and digestibility of fermented shrimp head waste meal by African catfish *Clarias gariepinus*. Pak. J. Nutr., 2: 339-345.

Ofuoku, A.U., N.F. Olele and G.N. Emah, 2008. Determinants of adoption of improved fish production technologies among fish farmers in delta State, Nigeria. J. Agric. Educ. Extension, 14: 297-306.

Pereira-da-Silva, E.M. and L.E. Pezzato, 2000. [Response of Nile tilapia (*Oreochromis niloticus*) to the attraction and palatability of the used ingredients in the feeding of fishes]. Revista Brasileira Zootecnia, 29: 1273-1280, (In Portuguese).

Sotolu, A.O., 2008. Nutrient potentials of water hyacinth as a feed supplement in sustainable aquaculture. Obeche, 26: 45-51.