SURVIVAL AND RESPONSE OF *Oreochromis niloticus* TO DIFFERENT FEEDS

OGUNBONA, A.A., AJIBOYE, R.O., ONIGEMO, M.A. & ISHOLA, O.J.
Department of Animal Production and Fisheries, Lagos Polytechnic, Ikorodu

ABSTRACT ✓
The study determined the survival and the response of *Oreochromis niloticus* to different feeding compositions. 90 *Oreochromics niloticus* juveniles were fed different diets in triplicated treatments inside glass tanks. Treatment I comprised locally compounded diet; Treatment II, imported pelletized feed; and Treatment III - processed feathermeal based diet. Results showed that there was no significant differences (P>0.05) in the weight gain, feed intake, survival and feed conversion ratio. However, Treatment I had the highest feed intake, while treatment II had the highest weight gain and feed conversion ratio.

INTRODUCTION
One of the great advantages of tilapias for aquacultures is that they feed on a low tropic level. The members of the genus *Oreochromis* feed on algae, aquatic plant, small invertebrate, detrital material and the associated bacterial films. This provides an advantage to farmer because the fish can be reared in extensive system that depend upon the natural productivity of a water body or in intensive system that can be operated with lower cost feeds. Bowen (2001) showed that tilapia species may ingest animal material but usually doesn't constitute a significant proportion of the fish total food intake. The high cost of supplementary feed has been a source of concern to fish farmers and there is need to feed fish at lowest possible cost and ensure high conversation ratio at the same time in order to meet the need of fish species there is need to develop fish diets that will satisfy the nutritional and physiological requirement of fish species. The increasing costs have made it necessary to search for cheaper but equally efficient and readily available source as a substitute for fish meal. This study determines the response of *O. niloticus* to different types of feed - imported pelletized feed, locally compounded diet and feather meal-based diet.

MATERIALS AND METHODS
The experiment was carried out in three glass tanks, each replicated thrice, having a volume of 0.178m^3. The tanks were washed, cleaned and filled with water to about three quarter of its volume. 90 *O. niloticus* were used for the experiments. Each of the tanks replicate contained 10 juveniles of tilapias and were randomly assigned to experimental diets treatment. Physiochemical parameters were monitored and analyzed with Bauch and Lamb field analysis kit. pH, dissolved oxygen, temperature and ammonia were analyzed. An aerator was used for effective circulation of oxygen in all the glass tanks for the fishes. Also, changing of water was done every two days by siphoning and adding new water to prevent pollution. The fish was fed with the experimental diets daily for the duration of two months. And they were fed till saturation. Treatment One (control) contained locally compounded feed (fish meal inclusion), treatment two with imported feed and Treatment Three was locally compounded feed with feather meal inclusion (14.5%).The feed was served at a fixed point in the glass tank at each feeding time and was served twice daily. Total weight of feed consumed per each feeding trial and total body weight of fish was recorded every week. Complete randomized design (CRD) method was used. The experiment consists of three treatments each with three replicates.

Table 1: Composition of experimental diets

	Diet 1 (Local feed)	Diet 3 - Feather meal-based diet
Maize	10	12
Wheat Offal	5	5
Groundnut Cake	18	18
Soya Bean	36	36
Fish Meal	20	0
Blood Meal	5	5
Spaghetti	5	5
Salt	0.25	0.25
Fish Premix	0.25	0.25
Vitamin C	0.50	0.50
Feather Meal	0	18

Table 2: Proximate analysis of experimental diets

	Diet 1 Local feed	Diet 2 Imported feed	Diet 3 Feather meal-based diet
Crude protein	44.36	45	44.56
Energy (Kcal)	2806	--	2809.7
Fiber %	3.89	1.5	4
Fat %	3.74	12	4.09
Calcium	1.35	-	0.1
Phosphorus	0.88	1.2	0.33

Weight gain, feed intake, survival rate and feed conversion ratio were measured weekly to determine the effect of the experimental diet on the fishes. Also data were collected and analyzed using analysis of variance (ANOVA).

I. Weight Gain = Final Weight – Initial Weight

II. % Mortality = $\frac{\text{Number of Stock} - \text{Number of Remnant}}{\text{Number of Stock}} \times 100$

III. Feed Conversion Ratio =Weight Gain / Feed Intake.

RESULTS AND DISCUSSION

The water temperature ranged from 24 to 30^0 C for the treatment. The P_H ranged from 6.4 to 8.0 for the treatment. The dissolved oxygen ranged from 5.0 to 9.0 mg/l for the treatment. The average feed intake g/fish/week was shown in table 4.1.2 above. Fish on Treatment 1 (Local Feed) had the highest feed intake of 3.94g followed by T_2 and T_3 with the intake value of 3.06 and 2.38 respectively. Statistical analysis revealed that there was no significant difference ($P>0.05$) in the overall average feed intake of the fishes. It was noted that there was differences in the value with T3 having the lowest feed intake. This may be attributed to the low palatability of the feather meal which was earlier reported by Ayanwale (2006), who fed rabbit with feather meal based diet. There was no significant difference ($P>0.05$) in the overall average weight gain of fishes. Fish on Treatment 2 (imported feed) had the highest average weight gain of 3.39g per fish/week. Fish on Treatment 1 had mean weight gain of 2.91g while fish on T3 had the lowest weight gain of 2.06g.

TABLE 3 PERCENTAGE SURVIVAL

	T_1	T_2	T_3
Initial Stocking Rate of Juvenile per Tank	30	30	30
Final Stocking Rate/Number of Juvenile per Tank	18	27	25
Percentage survival (%)	60	90	83.3

Table 3 shows the survival rate of the fishes fed in the experimental diet. Fish on Treatment 3 had the highest survival rate of 28.5 followed by Treatment 2 and Treatment 3 with survival rate of 28 and 22.12 respectively while Treatment 2 had the highest % survival (Table 3). Statistical analysis revealed that there is no significant difference ($P>0.05$) among the treatment mean. Fish in Treatment 2 (imported feed) had high feed conversion ratio of 1.11 which was followed by T3 and T1 with average feed conversion ratio of 0.96 and 0.80, respectively. Statistical analysis revealed that there was no significant difference ($P<0.05$) in the feed conversion ratio of the fishes fed with the experimental diets.

Table 4: Production costs of experimental diets

VARIABLE	T1	T2	T3
Duration of the study (days)	56	56	56
Number of Fish/Treatment	30	30	30
Number of Fish/Replicate	10	10	10
Cost of 1 Juvenile fish (₦)	10	10	10
Cost/Kg of feed ₦/Kg	150	350	130
Cost/g of feed	0.15	0.35	0.13
Average Feed Intake/Fish (g)	3.94	3.06	2.38
Average Weight Gain/Fish (g)	2.91	3.39	2.06
Average Feed Conversion Ratio	0.8	1.11	0.96
Total feed Intake/fish (g)	31.52	24.48	19.04
Total Cost of feeding ₦	4.73	8.57	2.48
Other Variables ₦	2	2	2
Market Price per Kg (₦)	500	500	500
Market Price per g (₦)	0.5	0.5	0.5
Average Final Weight per fish (g)	23.31	27.1	16.47
Revenue ₦	11.66	13.55	8.24
Total Cost of production	12.15	12.35	12.13
Profit (₦)	9.66	11.55	6.24

Table 4 shows the production cost of experimental diet. Treatment 2 had the highest profit of N11.55 followed Treatment 1 with N9.66 while Treatment 3 had a profit of N6.24, this is as a result of the feather meal that was used to replace fish meal. Fish growth was influenced by various physiochemical parameters and nutrient availability in the water body. The level of nutrient may vary considerably. All fish species has different level of tolerance and lethal values to various environmental conditions prevailing in the ambient water body. Temperature plays a crucial role in fish production as high temperature help in high dissolve of oxygen. Huet (1972) recommended pH of 7.0-8.0 with less fluctuation is best for Tilapia. According to Boyd (1979) natural water that contains high alkalinity support more productivity than water of lower alkalinity. Tilapias are generally hardened and have a high tolerance level for alkalinity. Feed intake of the fish were not uniform from week 1 to 8, fish in Treatment 1 had the highest feed intake than those of Treatments 2 and 3. The high feed intake may be attributed to the protein requirement by juvenile tilapia which is within the range of 30-35% crude protein (Gunasekera *et-al*-1996).The weight gain of the fish in Treatment 2 was higher than Treatments 1 and 3; the high weight gain of the fish in Treatment 2 might be attributed to the palatability and the floating nature of the feed. (NRC 1987, Pompa 1982) reported that high level of anti-nutrient can result in low consumption and high utilization; while treatment 3 had the lowest weight gain this may be attributed to the low palatability as a result of feather meal inclusion in the feed. The feed conversion ratio in Treatment 2 was higher subsequently followed by T3 and T1. The considerable FCR recorded in this study agrees with result of (Maldonado et al (1979), Villarreal (1980) and Pastastico *et-al* (1982)) that fish reared in lower volume consumed less food and convert far less efficiently spending greater energy on surfacing resulting in low growth performance and vice versa. The survival was high in this experiment but the means were not significantly different [$P>0.05$]. The high survival was partly attributable to the tolerable range of the physiochemical measurements.

The result of production cost showed that Treatment 2 is economical than other treatment in terms of profit gain followed by Treatment 1, while Treatment 3 is lease profit gain because of the feather meal inclusion. However, feather meal is not as profit rewarding in production of tilapia in glass tank as fish meal but the survival rate is considerable. There was no significance difference ($P >0.05$) in the weight gain, feed intake and feed conversion ratio of fish fed with the experimental diet.

The highest feed cost was recorded in the imported pelletized feed while the lowest cost was observed in hydrolyzed feather meal inclusion feed. However, hydrolyzed feather meal cannot be used as an inclusion in Tilapia feeding ration as a source of protein because it is not economical in terms of production cost and also has low palatability. The result obtained with use of hydrolyzed feather meal as a fish meal replacer with aqua feeds for tilapia has been more controversial. However, Tacon *et al*, (1983), Viola and Zohar (1984) and Davies *et al*, (1989) all reported poor growth in tilapia when fed hydrolyzed feather meal base diet. While Bishop *et-al*, (1995) reported that Hydrolysed Feather Meal could replace up to 50% and 66% of the fish meal within diet for O. niloticus fingerlings and fry with no lost of growth performance. Moreso, Tilapia can be raised in glass tank because survival rate is bearable depending on the management.

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