GROWTH PERFORMANCE OF EXOTIC *Oreochromis niloticus*, EXOTIC *Oreochromis aureus*, HYBRID AND LOCAL *Oreochromis niloticus* FED WITH PELLETED FEEDS IN FLOW-THROUGH SYSTEM

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ABSTRACT

Local, exotic and hybrid tilapia fingerlings were fed 45% crude protein diet containing 18% fish meal in a flow through system in triplicate and their growth and food utilization observed for 14 weeks.

At the end of the study, the hybrid (Exotic *Oreochromis niloticus* male x Exotic *Oreochromis aureus* female) fingerlings had higher growth rate and food conversion ratio (FCR) than the other treatments. This was followed by Exotic *Oreochromis niloticus* fingerlings. The exotic *Oreochromis niloticus* fingerlings came next while the local *Oreochromis niloticus* fingerlings were the least in growth performance. The survival rate of the local *O. niloticus* was however higher than the other treatments.

INTRODUCTION

Fish is known to be the cheapest source of animal protein. However its demand in developing countries is higher than the supply. Fish and fish production constitute ideal supplement for improving the often poor and monotonous diet of rural dwellers in many tropical and subtropical countries, and are especially valuable in combating dietary deficiencies in the very young (Clucas, 1981).

With the increasing problem of depletion due to over-fishing, pollution and seasonal fluctuation, freshwater fish culture is the best alternative for the supply of the much needed protein. Increased production of freshwater fishes through aquaculture can be achieved by the use of good quality fish seed and feed. The cheaper the feed source without sacrificing its quality, the better the return to the fish farmer (Sado, 1986).

Although *Oreochromis niloticus* seems to have all the qualities for pond culture, it still has the problem of frequent reproduction which leads to overcrowding and stunted growth. It is therefore necessary to produce Tilapia fingerlings that will not have this problem of too frequent reproduction for culture in fish ponds and other aquacultural systems.

The objective of this experiment therefore is to study the growth performance of four different types of Tilapia: Exotic *Oreochromis niloticus*, Exotic *Oreochromis aureus*, a hybrid of both Exotic *Oreochromis niloticus* (male) X Exotic *Oreochromis aureus* (female) and our local *Oreochromis niloticus*, all fed with pelleted feed in a flow-through system. The information will be useful to fish farmers who are interested in fast growing species of tilapia for culture.

MATERIALS AND METHOD

Experimental Unit

The experiment was carried out inside the hatchery complex of National Institute for Freshwater Fisheries Research using 12 troughs of the mini-

flow system for 14 weeks.

Experimental Fish
The fish fingerlings used for this study were: Exotic *Oreochromis niloticus*, Exotic *Oreochromis aureus*, hybrid of Exotic *Oreochromis niloticus* (male) X Exotic *Oreochromis aureus* (female) and local *Oreochromis niloticus*.

All the fingerlings were collected from the outdoor tanks of the hatchery complex and transferred to the indoor tanks where they were acclimatized for one week before commencement of the experiment.

Weighing and stocking of the fish
About 30 homogenous fingerlings of each species were selected, weighed with the aid of electric sensitive balance and stocked randomly in the twelve experimental troughs. After stocking the fingerlings were acclimatized in their respective troughs for another two days without feeding to empty their stomach content and force them to adjust to the new diet. The troughs were allocated to the experimental design which consist of four treatments and three replicates (Table 1).

Table 1: Allocation of Fingerlings to Troughs in the Mini-flow-through Systems

Treatments	Troughs	No. of fish stocked
Treatment I (Hybrid)	6, 7, 10	30 fingerlings each
Treatment II (Exotic *0.niloticus*)	2, 3, 8	30 fingerlings each
Treatment III (Local *0. niloticus*)	5, 9, 11	30 fingerlings each
Teatment IV (Exotic *0. aureus*)	1, 4, 12	30 fingerlings each

Feeding ingredients and feed preparation:
The feed ingredients used to prepare the experimental diet of 45% crude protein were: fish meal, soya bean meal, groundnut cake, yellow maize, fish oil, vegetable oil, bone meal and Vitamin and Mineral premix. Soyabean meal was prepared as recommended by Eyo (1990).

The composition of the experimental diet is shown in Table 2. The ingredients were ground and mixed thoroughly in a mixer with little water added. The moist ingredients were made into a dough and pelleted using a kitchen cranking machine. Pellets were sundried and ground into fine particles to ease uptake by the fish fingerlings. The were later weighed and stored in bottles.

Feeding
Fingerlings were fed at 3% of their body weight, twice daily (9.00am and 4.00pm) with the daily rations divided into two halves. The feed was broadcast into the trough after carefully removing the chicken-wire cover which prevents the escape of the cultured fish.

Fingerlings were sampled fortnightly and during this period, the trough were cleaned and reconnected to the flow through system. The weight of the feed was adjusted to the new weight of the fish after each sampling.

Physico-chemical parameters
The physico-chemical parameters measured during this study include: temperature, dissolved oxygen and pH.

The temperature was taken daily with a mercury glass thermometer. The dissolved oxygen was measured weekly using Wrinkler's method. The pH was measured weekly using pH calorimetric method and bromothymol blue as indicator.

The temperature recorded during the study ranged from 27.66 - 29^{o}C. This is within the tolerable range as recommended by Boyd and Lidithoppler (979).

The dissolved oxygen ranged from 5.4mg/l to 6.5/l fell within the good range for culture purpose, Boyd (1982).

The pH ranged from 7.3 to 7.5 and this is within the recommended range of 5 - 11 (Balarin, 1979).

RESULTS AND DISCUSSION

Table 3 shows the mean weight gain, survival rate and % weight gain. The best growth performance was observed in the hybrid fingerlings (Exotic *O. niloticus* (male) X Exotic *O. aureus* (female) which was significantly different ($P > 0.05$)from other fingerlings fed similar diet. Next in growth performance were Exotic *O. niloticus* fingerlings although the growth performance was not significantly difference from that of Exotic *O. aureus* fingerlings ($P > 0.05$)The mean weight gain of local *O. niloticus* was the lowest among all the fingerlings tested. This study further goes to confirm the faster growth rate of hybrids over the pure breeds, earlier reported by Hickling (1966) and Guerrero (1983).

The exotic tilapia performed better than the local *O. niloticus*. This was not expected since the local *O. niloticus* have acclimatized to the prevailing environmental conditions having been growing in this environment. Perhaps one explanation could be a possible contamination of the genetic endowment of the fingerlings over time. However, this could not be proved phenotypically unless confirmed through genetic engineering. The high survival rate of the local *O. niloticus* fingerlings shows that *O. niloticus* have acclimatized to the environment better than the exotic tilapia fingerlings.

The feed evaluation parameters is shown in Table 4.
Again the hybrid fingerlings recorded the highest specific growth rate and the highest FCR. The high FCR of the hybrid fingerlings which was statistically significant indicated that the faster growing fish were not necessarily the most efficient in feed utilization. This agrees with the findings of Lovell (1982).

Table 2: Composition of the experimental diet

Ingredients	Composition
Fish meal	18
Soyabean meal	38
Groundnut cake	34
Yellow maize	6
Fish oil	1
Vegetable oil	1
Bone meal	1
Premix	1

Table 3: The mean weight gain, survival rate, and % weight gain.

Treat-ments	Initial mean weight (g)	Final mean weight gain (g)	Mean weight gain (g)	Survival rate %	% weight gain (g)
1	2.90^{a}	7.63^{a}	4.73^{a}	92.22%	163%
2	2.38^{a}	5.76_{b}	3.38^{b}	84.44%	142%
3	2.93^{a}	5.60_{b}	2.67^{c}	93.33%	91.13%
4	2.29^{a}	5.50_{b}	3.21^{b}	86.67	140.19%

Figures followed by the same superscript in each column are not significantly different ($P>0.05$)
Key: Treatment 1: Hybrid (Exotic *O. niloticus* (male X Exotic *0. niloticus*
Treatment 2: Exotic *O. niloticus*
Treatment 3: Exotic *O. aureus*
Treatment 4: Local *O. niloticus*

Table 4: Feed evaluation Parameters

Treatment	Specific Growth Rate (SGR)	Food Conversion Ratio (FCR)
1	0.98^{a}	6.99^{a}
2	0.90^{a}	4.62^{b}
3	0.66^{b}	3.31^{c}
4	0.89^{b}	4.62^{b}

Figures followed by the same superscript in each column are not significantly different ($P > 0.05$)

Key: Treatment 1 hybrid (Exotic *O. niloticus* X Exotic *O. aureus*. female
Treatment 2 Exotic *O. niloticus*
Treatment 3 Local *O. niloticus*
Treatment 4 Exotic *O. aureus*

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