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COMPARATIVE STUDY OF LOCAL AND COMMERCIAL FISH FEEDS ON THE GROWTH OF *Clarias gariepinus* FINGERLINGS

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ABSTRACT
A feeding trial was conducted to compare the performance of Clarias gariepinus on three commercial catfish feeds and an on-farm local (made) aqua feed. The three catfish commercial diets were Chi, Multi, Skretting and local farm made. 10 fingerlings of Clarias gariepinus (0.87 ±0.02g) were randomly distributed in a round plastic bowl of 20 litres capacity in triplicate. The feeding trial was run for 56 days. The results obtained indicated no significant difference (P>0.05) between the commercial catfish feeds and the on-farm local made aqua feed. The conclusion is that farmer can feed his fishes with appropriate formulated local on-farm feed without any detrimental effects on the growth of the fishes.
Key Words: *Aquaculture feeds, Cost, Production*

INTRODUCTION
Nigeria has a high potential in aquaculture and aquaculture is capable of providing high quality protein, employment and income generation (Ayinla and Ezenwa, 1998). However, as aquaculture production becomes more and more intensive, fish feeds will be a significant factor in increasing the productivity and profitability of aquaculture. Feed accounts for 60-80% of total cost of input in fish farming (NRC, 1983a; NRC, 1983b; Balogun and Ologhobo, 1989). The cost is further increased due to the fact that majority of fish farmers feed their fingerlings on foreign feeds. At present, the high cost and low quality of fish feeds are major factors limiting the development of aquaculture in Africa and are likely to remain so in the near future (Jamu and Ayinla, 2003). Feed ingredients used in commercial tilapia diets in many developing countries are mostly imported. In the production of tilapia feeds, feed manufactures are constantly faced with the need to reduce feed cost to match cost of imported feed ingredients; this greatly cuts into the profit margin of local tilapia growers. Since fish feeds can account from 45-85% of the farm prices of tilapia, there is currently great interest to reduce feed costs by using locally available or alternative feed ingredients (Ng and Cheong, 2006). In line with vast opportunity in aquaculture and the challenges posed by fish feed, this research seeks to investigate into the development of local feeds that could compete adequately with the imported ones with the overall objective of lowering the cost of aquaculture production.

MATERIALS AND METHODS

The research was carried out at the laboratory of the Department of Aquaculture and Fisheries University of Ilorin. Clarias gariepinus fingerlings (0.87 ± 0.02g) were obtained from Kwara state Ministry of Agric fish hatchery, New-Yidi road, Ilorin. The fishes were transported in an oxygenated plastic container. On the arrival at the laboratory, they were acclimated in a fibre glass flow through tank for 3days before the commencement of the feeding trial.

Experimental setup

The fishes after acclimatization were randomly distributed in rounded plastic bowls of 45cm x 30cm of 20 litre capacity of a circulatory system. 10 fishes were allotted randomly in triplicate in the plastic bowl.

Experimental feeds

Four different feeds were used for the feeding trial. Three were commercial catfish feed and an on-farm local made catfish feed. The diets were designated as diet 1 to 4 as shown in table 2. The formulated on-farm made feed is shown in table 1. The on-farm local aqua feed was compounded using fish meal, pigeon pea (*Cajanuscajan*), Maize meal, vitamin-mineral premix and palm oil. The formulation was done using the Pearson square method and the compounded diet was analysedyyhh for its proximate composition using the AOAC (2000) method (Tables 1 and 2)

Table 1: Formulated on-farm local made diets

Ingredients	Percentage inclusion
Fishmeal	38.68
Pigeon pea meal	38.67
Maize meal	12.66
Palm oil	5.00
Vitamin-mineral premix	5.00

Table 2: Proximate composition of experimental diets

Proximate	Diet 1	Diet 2	Diet 3	Diet 4(local}
Composition (%)	(Chi)	(Multi)	(Skretting)	(Farm made)
Crude protein	45	45	45	42.38
Lipid	15	12	10	10.58
Fibre	0.5	2.5	12	5.58
Ash	9.7	8.5	9	12.03

NB: The proximate Composition for feeds 1-3 were as provided by manufactures

Experimental procedure

The feeding trial was run for 56 days. The initial weight of each fish was taken and the feeding rate was determined and fixed at 3% body weight which was fed thrice daily

(09.00, 13.00 and 18.00). The fishes were bulk weighed fortnightly and feeding rate adjusted accordingly (Jauncey and Rose, 1982). At the commencement of the feeding trial, 6 fingerlings were used for the initial carcass analysis and at the end of the trial 5 fishes from each of the replicate were sacrificed for final carcass analysis according to AOAC (2000). During the feeding trial, water quality parameters were monitored for dissolved oxygen (11.3 mg/l) according to wrinkler's method (Lind, 1979, APHA, 1980), pH (6.58) was measured using a KENT-EIL 7045/46 pH-Meter in the laboratory at room temperature, and mean temperature was measured (26.00°C – 28.29°C) using JENWAY 4010 probe.

STATISTICAL ANALYSIS

The data generated were analysed for one-way ANOVA for significance levels and mean separation using minitab release 14.

RESULTS

Table 3 shows results which indicated significant differences ($P<0.05$) in the mean weight gain (MWG), specific growth rate (SGR), food conversion ratio (FCR), protein efficiency ratio (PER) and apparent net protein utilization (ANPU) of the four diets fed to the fingerlings of *Clarias gariepinus* for a period of 56days. There were no significant difference ($P>0.05$) between diets I and II. However, diet III showed highest weight gain (1.84g) while diet IV gave the lowest weight gain (0.23g). The specific growth rate (SGR) also showed significant differences ($P<0.05$) among the treatments. Diet III was significantly ($P<0.05$) higher than other diets while diet IV showed the lowest SGR value. Moreover, there was no significant difference ($P>0.05$) between diets I and II. Diet III was low ($P<0.05$) in feed conversion ratio (FCR), while diet IV gave the highest FCR value, however, there was no significant difference ($P>0.05$) between diets I and II. The protein efficiency ratios (PER) also indicated significant differences ($P<0.05$) among the treatments. Moreover, diet III was highest in PER value while diet I was the lowest. The apparent net protein utilization (ANPU) showed insignificant differences ($P>0.05$) among diets I, II and III while diet IV showed lowest ANPU value.

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Table 3: Growth Parameters of *Clarias gariepinus* fingerlings fed various commercial and local farm-made feeds for 56 days

Growth Parameters	Diet I	Diet II	Diet III	Diet IV
MIW (g)	$0.90^{a}\pm0.01$	$0.856^{b}\pm0.01$	$0.86^{b}\pm$ 10.01	$0.84^{c}\pm0.01$
MFW (g)	$1.98^{b}\pm0.01$	$1.95^{b}\pm0.01$	$2.69^{a}\pm0.01$	$1.46^{c}\pm0.01$
MWG (g)	$1.07^{b}\pm0.01$	$1.09^{b}\pm0.01$	$1.84^{a}\pm0.01$	$0.23^{c}\pm0.01$
SGR (%/Day)	$1.34^{b}\pm0.01$	$1.40^{b}\pm0.01$	$2.05^{a}\pm0.01$	$1.10^{c}\pm0.01$
FCR	$0.37^{b}\pm0.01$	$0.37^{b}\pm0.01$	$0.22^{c}\pm0.01$	$0.46^{a}\pm0.01$
PER	$3.33^{c}\pm0.01$	$6.79^{b}\pm0.01$	$11.32^{a}\pm0.01$	$5.30^{c}\pm0.01$
ANPU (%)	$35.50^{a}\pm0.01$	$35.45^{a}\pm0.01$	$36.10^{a}\pm0.01$	26.00b±0.01

Table 4: Carcass composition of *Clarias gariepinus* fingerlings fed various commercial and farm-made feeds for 56 days

Carcass Composition (%)	Diet I	Diet II	Diet III	Diet IV	
Moisture	$64.30^{a}\pm0.01$	$59.24^{a}\pm0.01$	$62.22^{a}\pm0.01$	$61.92^{a}\pm0.01$	$61.92^{a}\pm0.01$
Crude protein	$40.95^{a}\pm0.01$	$39.87^{a}\pm0.01$	$36.42^{a}\pm0.01$	$29.55^{b}\pm0.01$	$27.21^{b}\pm0.01$
Lipid	$2.17^{b}\pm0.01$	$3.18^{a}\pm0.01$	$1.97^{b}\pm0.01$	$1.99^{b}\pm0.01$	$1.65^{b}\pm0.01$
Ash	$8.13^{a}\pm0.01$	$7.36^{a}\pm0.01$	$6.40^{a}\pm0.01$	$3.36^{b}\pm0.01$	$2.10^{b}\pm0.01$

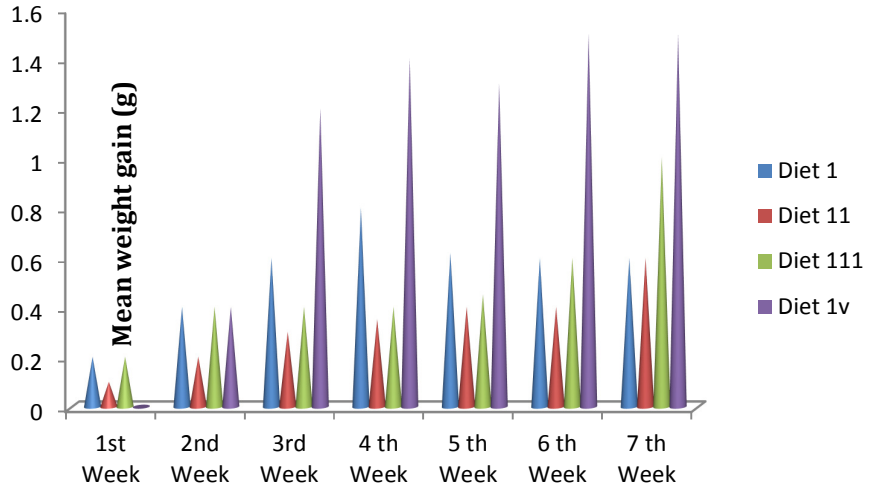

Fig. 1: Growth response of *Clarias gariepinus* fingerlings fed various commercial diets and an on farm local made diet for 56 days

DISCUSSION

The mean initial weight (MIW) of the fishes used in the experiment did not differ significantly ($P>0.05$), this indicated that the sizes of the fish were homogeneous and this was desirous for a feeding trial. All the four feeds performed well including the farm made local formulated feed which was the reference feed on

growth of the fish. It was observed that the fish readily accepted the four feeds and they responded positively as revealed in the growth parameters measured. This implies that the feeds contained all the ingredients required for desired growth of *Clarias gariepinus* as the diets were as good as the reference diet (diet IV) serving as the standard. This was in accordance with the work of Akiyama (1991) who reported that the growth rate of the experimental animal should be at least 85% of an acceptable standard. Figure 1 also showed the weekly performance of the feeds on the fish. Diet IV peaked faster than any other diets, while Diet II was slowest at eliciting response in terms of growth in the fish. This could be as a result of the low crude protein of the diet (35%). From week 0-2 represented the slow growth phase and thereafter week 4-7 represented the marginal growth phase. This was in line with natural growth situation, as growth in fish is exponential (Sadiku, 1991). There were significant relationships observed in the correlation table between growth parameters, i.e. the correlation table followed the normal relationship pattern. It was observed that FCR, FCE, MFW, MGW correlated significantly ($P<0.05$) with SGR and FCR. It was obvious that all the feeds fed to the experimental fishes were efficiently utilized for tissue development that resulted in steady increased growth rate as seen in figure 1. However, it was observed that there was a significant positive correlation between MFW and SGR ($r=0.99$) which implied that FCE, ANPU and PER correlated directly and significantly with SGR ($r=0.97$) ($P<0.05$). The positive correlation observed between growth parameters in a nutritional requirement study (Parker, 1987).

The negative significant correlation observed between FCR, SGR, FCE, MFW and MWG was an expression of inefficient utilization of feed. This implied that as the fishes grow bigger the rate of conversion of feed to flesh decreases. This was not good enough especially at fingerlings stage hence the fish was still going through the lag phase. Table 3 showed carcass composition which showed insignificant difference ($P>0.05$) in the moisture, and lipid in all feeds. The protein and ash contents of the four diets differed significantly from one another ($P<0.05$) particularly Diet IV despite the fact that feed performed well among others. The performance of the diet will have effect in the flesh of the fish and was quite in agreement with the work of Jauncey (1998) that stated carcass composition should reflect in the diet.

CONCLUSION

Based on the outcome of the result of the feeding trial fish farmers can raise fingerlings on local farm made feed and other commercial feeds

without compromising the growth of the fish.

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