IJABR Vol. 5(1): 55 - 61 (2013)

GROWTH RESPONSES OF AFRICAN CATFISH, *CLARIAS GARIEPINUS*, FINGERLINGS TO IMPORTED AND LOCAL FEEDS

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Submitted: March 20 2013; Accepted: December 16, 2013; Published: January 14, 2014.

ABSTRACT

The comparative growth responses of African catfish fingerlings (*Clarias gariepinus)* fed with three local (Chivita, aquaplus, Vital) and three imported (Skrettings, Multifeeds, Coppens) feeds was studied under laboratory conditions, September and October, 2009 with the aim of establishing the best quality feed in terms of specific growth rate, total weight and percentage survival rate, for a period of 8 weeks. One hundred and twenty (120) fingerlings of *Clarias gariepinus* and six commercial feeds with varying crude proteins namely, Chivita, Aquaplus, Vital, Skrettings, Multifeeds and Coppens, were used for the experiment. Some water quality parameters analyzed indicated temperature varied from 25.5^{0}C to 28.0^{0}C while pH and dissolved oxygen ranged from 6.6 to 7.2 and 6.3mg/l to 8.2mg/l respectively. The treatment shows significant difference in terms of mean weight gain, specific growth rates and survival rate ($P<0.05$). In terms of weight gain Chivita gave the best growth of 53.21g, followed closely by Coppens 52.21g, while Aquaplus had the lowest 12.67g. SGR showed Coppens 0.89 with the best growth followed by Chivita 0.87 while Aquaplus gave the lowest 0.31. Although fish fed with Chivita and Coppens showed the best growth compared to other treatments, economically Vital feed performed well reflecting that local fed equally gave optimal growth and cost benefits.

Key words: African catfish, local feeds, imported feeds.

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INTRODUCTION

Feed, being part of the general input of production in extensive and semi-intensive

sustainable aquaculture system, has been reported to account for 40-60% of the total recurrent cost of production (Falaye, 1992). The culture of fish is receiving a lot of attention in Nigeria with the result that new cultivation techniques are being introduced and adopted. Over the last decade, spectacular growth has taken place in aquaculture in Nigeria. Fish farming activity in Nigeria started about 50 years ago (Olagunju *et al.*, 2007) and as at now aquaculture in the country is in the developing stage, because it has not been able to meet the demand of the ever increasing population (Ojutiku, 2008). Fish feeds are used in aquaculture to increase production and maximize profit. Feeds in intensive fish culture consume about 60% of the capital cost (Eyo, 2001). For aquaculture to be highly successful in Nigeria there is need for good quality and affordable feed, which can also encourage small scale farmers in the field of aquaculture for sustainable production and also meet the demand for fish. Presently, in Nigeria, there are different fish feeds with different compositions ranging from Coppens, Eurofeeds and others but there is competition among them more so they are imported. The amount of feed consumed, age, body size and temperature are the most important factors that limit maximum growth of fish (Machiels and Henken, 1985). The present work assesses the growth response of *Clarias gariepinus* fed six local and imported feeds, to test and compare which could equally give best yield in response to the increasing demand.

MATERIALS AND METHODS

Experimental Fish

One hundred and fifty fingerlings of *Clarias gariepinus* were obtained from Kune Integrated Farm, Funtua, Katsina state. The fish were transported to the Fisheries Laboratory, Department of Biological Sciences, Ahmadu Bello University, Zaria in 50 litres plastic bowls and acclimatized for one week. During the period of acclimatization the fish were fed *ad libitum* (Anibeze and Eze, 2000) at 5% body weight twice daily (Okoye *et al.,* 2001) with a formulated diet of 35% crude protein. Feed not consumed and faecal matter were siphoned out every two days interval.

At the end of the acclimatization period, the fish were randomly selected and stocked into 12 glass aquaria with each aquarium holding 10 fish. Feeding was suspended 24 hours before the feeding trial to increase appetite and reception for new diet (Madu and Akilo, 2001).

Experimental Diet

Three imported (Skrettings, Multifeeds, Coppens) and three local (Chivita, Aquaplus, Vital) commercial feeds were obtained. The feeds contained four different levels of crude protein-38.0%, 40.0%, 42.0% and 45.0 % (Table 1). Each test diet was fed to duplicate groups for 8 weeks. The feed/experimental diets were analysed for proximate composition according to A.O.A.C (1999).

Experimental Procedure

The temperature, pH and dissolved oxygen of the aquaria were monitored on weekly basis. The initial weight of the fish at the commencement of the experiment and final weight was determined using Metler weighing balance (model P168). Biweekly weight measurements were taken to monitor weight gain. The Specific Growth Rate (SGR) was calculated as described by Herper (1998):

$$SGR = \frac{\log_e W_2 - \log_e W_1}{t} \times 100\%$$

Where W_1 = Initial body weight

W_2 = Final body weight

t = time (days)

e = the base of Natural Logarithm (10).

Data Analysis

Mean values of the water quality parameters measured was calculated. Mean values of weight measurements were subjected to Analysis of variance (ANOVA) and tested for significance difference at P=0.05(5% probability level). Duncan Multiple Range Test (DMRT) was used to rank the means.

RESULTS

The results of this study indicate that the mean temperature of water in the aquaria ranged from 25.5^{0}C to 28.0^{0}C (Table 2). Mean dissolved oxygen varied from 6.3 to 8.2mg/l. The data on growth response, of *Clarias gariepinus* fingerlings to the diet is shown in Table 3. In terms of total weight gain, Chivita gave the best growth (53.2g) followed closely by Coppens (52.2g), while Aquaplus had the lowest weight gain (12.61g). The highest SGR (0.89) was obtained in *C. gariepinus* fed Coppens followed by Chivita, Aquaplus gave the lowest SGR. The SGR of fingerlings fed with Chivita and Coppens were significantly different from those fed with Aquaplus feed ($P<0.05$).

Table 1: Proximate analysis of the experimental diets

Feed	Protein (%)	Fibre (%)	Fat (%)	Ash (%)	Phosphorus (%)
Chivita	45.0	3.0	8.0	8.0	0.8
Aquaplus	40.0	3.0	3.5	-	1.0
Vital	38.0	3.5	9.5	-	2.0
Skrettings	45.0	0.9	14.0	8.5	1.3
Multifeeds	45.0	2.5	12.0	8.5	1.2
Coppens	42.0	1.8	13.0	7.4	1.0

Table 2: Weekly water quality parameters measured during the experiment.

Week	Temperature (°C)	pH	Dissolved Oxygen (mg/l)
1	27.0±0.50	7.1±0.30	6.3±0.05
2	26.5±0.10	6.7±0.10	6.8±0.10
3	28.0±0.30	7.1±0.20	8.2±0.50
4	26.5±0.20	6.9±0.04	6.5±0.30
5	26.0±0.10	7.2±0.20	7.1±0.30
6	25.5±0.30	6.6±0.03	6.9±0.030
7	25.9±0.50	6.8±0.30	7.3±0.20
8	27.4±0.10	7.1±0.40	7.5±0.30

Note: Values are Mean±SE of physic-chemical parameters determined during the experiment.

Table 3: Growth performance of *Clarias gariepinus* fingerlings fed different commercial feeds in the laboratory.

Feed	MIW(g)	MFW(g)	TWG(g)	DWG(g)	SGR(%d^{-1})
Chivita	25.50	78.71	53.21	0.95	0.87^{a}
Aquaplus	25.59	38.25	12.67	0.23	0.31^{b}
Vital	28.98	69.12	40.14	0.72	0.69^{ab}
Skrettings	25.64	65.59	39.95	0.71	0.70^{ab}
Multifeeds	24.58	57.22	32.64	0.59	0.65^{ab}
Coppens	24.31	76.52	52.21	0.89	0.89^{a}

MIW=Mean Initial Weight, MFW=Mean Final Weight, TWG=Total Weight Gain, DWG=Daily Weight Gain, SGR=Specific Growth Rate. Means having the same superscript are not significantly different (P>0.05)

DISCUSSION

The water quality parameters showed little variation. The range of temperature (25.5˚C-28.0˚C), pH (6.6-7.2) and dissolved oxygen (6.3mg/l-8.2mg/l) obtained is favourable for fish culture, they are within the range described as optimal by Boyd (1979) and this agrees with similar work by Balogun *et al*., 2004. Agokei *et al.* (2011) reported a higher SGR value of 3.19%d^{-1} using Coppens, Multifeed, Eurogold, Vittal and Ajanla feed, which may be due to feeding frequency and the type of feed. The high growth rate recorded in fingerlings fed Chivita and Coppens may be attributed to the high nutritive value of the feeds and tolerable physico-chemical parameters against the lesser values in Multifeeds and Aquaplus which could be due to the anti nutritive elements present in the feeds, this is also in line with Dada and Gnanados, 1983 who obtained high values for Chivita and Coppens. The growth of fish depends upon the ingredients and its percentage in the formulated feed (Glencross *et al., 2007*). The results also compare well with comparative feed trials of Rahman *et al*. (1997) and Henken *et al*. (1986) who recorded best growth results for feed containing 40% and 58% CP respectively in *Clarias* spp. The results agree with that of Giri *et al*. (2003) who reported an increase in body weight gain and SGR in post larvae of *Clarias hybrid* fed increased level of protein.

CONCLUSION AND RECOMMENDATION

Based on the results of the study, Chivita and Coppens are the best feeds that supported the growth of *Clarias gariepinus* cultured in

glass aquaria tank. Economically vital feeds also performed well and is the cheapest in terms of price as such its preferred for most optimal growth and cost benefits.

Therefore, local feeds (Chivita and Vital) are equally recommended for use in feeding of fingerlings of *Clarias gariepinus* in Nigeria as they are locally manufactured and readily available. Further investigation should be carried out on other fish species under different culture conditions either in earthen and concrete ponds.

ACKNOWLEDGEMENTS

Our gratitude goes to Mr. S. Uteno and Mr. Luka Ibrahim for their technical assistance.

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