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GROWTH OF *Clarias gariepinus* JUVENILES FED FIVE COMMERCIAL FEED

AGOKEI, E.O., C. A. OPARAH, A. A. ARANYO, V. C. ALOZIE-CHIDI and U. A. APAPA
African Regional Aquaculture Centre, Aluu, Port Harcourt

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ABSTRACT

Clarias gariepinus juveniles 6.35 ± 0.22 g weight were fed five different commercial diets for 105 days to determine growth rates. Diets were hand distributed in triplicate groups of 30 fish once daily. The diets used were Coppens, Multifeed, Eurogold, Vittal and Ajanla feeds. At the end of the experiment, the final mean weight for Coppens, Multifeed and Eurogold were 181.54 ± 0.63 g, 179.92 ± 0.95 g and 139.92 ± 0.26 g respectively, while final mean weight for Vital and Ajanla were 110.11 ± 0.23 g and 119.03 ± 0.35 g respectively. The statistical analysis of the results showed that there were significant differences ($P<0.05$) in the mean final weights. Also there was no significant difference ($P>0.05$) in the mean final weight between Coppens and Multifeed. The specific growth rates (SGR) were 3.19% day^{-1} 3.18 % day^{-1} and 2.94% day^{-1} for Coppens Multifeed and Eurogold respectively and 2.71% day^{-1} and 2.78% day^{-1} respectively for Ajanla and Vital. There were significant differences ($P<0.05$) in SGR among treatments and no significant difference ($P>0.05$) between SGR of Coppens and Multifeed. Based on these findings, it was concluded that feed with macronutrient combinations of 45% CP, 12% crude fat, crude fiber, 1.5%, Ash 9.5% promoted better growth rates in *C. gariepinus* juveniles as compared with other combinations.

INTRODUCTION

Catfish (*Clarias* sp) are the major commercially cultured species in Nigeria for good market culture reasons. (Anetekhai *et al*., 2004). Since 2000 there has been a rapid expansion in urban aquaculture and a significant development in high density catfish culture. As a result of this intensification in catfish production, the aqua feed industry grew and moved from the days of research in fish nutrition and fish diet started at NIOMR (Nig. Inst. for Oceanography and Marine Research) where a laboratory size pellet mill was established for that purpose to a thriving industry of about 12 commercial aqua feed producers in Nigeria (Ayinla, 2007) and companies who import high quality floating feeds from SA, Netherlands, U.S.A and Europe (Hect, 2007). As such there is currently in the market an assortment of both imported and locally manufactured pelleted floating catfish feed brands. Fish feed alone accounts for at least 60% of the total cost of fish production (Jamu and Ayinla, 2003) and the nutrient composition of feed influences feed utilization and ultimately the growth of fish. Given that feed is the highest recurring cost in catfish culture, the catfish farmer who is now besieged with different catfish brand options will benefit from information gathered through feed trials which indicate the more efficient brands in terms of optimum growth in minimum time. Feed trials have been carried out on *Clarias gariepinus* to evaluate their growth response to different readily available local plant and animal protein sources (Otubusin *et al.*, 2009; Amisah *et al.*, 2009; Sotolu 2009; Fagbenro,1995; Achionye-Nzeh *et*

al., 2002, 2003, Ayinla, 1988). The growth response of *Clarias gariepinus* fingerlings to different alternative dietary vegetable lipid sources was investigated by Sotolu (2010). The effect of 2 chemo attractants and six different first feeds on the growth performance of C. gariepinus larvae was studied by Yimlaz (2005). Studies on the effect of feed frequency, rates and feed efficacy of *C. gariepinus* fingerlings and juveniles have been carried out by some researchers (Aderolu *et al*., 2010, Gabriel *et al.,* 2008).

A comparative study of two commercial brands of starter feeds on the growth response of *C. gariepinus* fry was conducted by Oyero *et al.,* (2009) and they concluded that fry fed Artemia INVE ® had better growth and survival rates. The effects of three different feed items including a commercial catfish feed on the growth and survival of the endangered riverine catfish *Rita rita* was investigated by Amin et al (2010) and they reported better growth performances where prawn and chicken viscera were supplied as feed respectively. Achienye-Nzeh (2010) investigated the growth response of juvenile *C. bidorsalis* to imported floating feed (Coppens) and its cost implication and recorded a mean weight gain of 242 g in 84 days.

There appears to be a paucity of information on the growth response of catfish to the myriad of available feed brands. It is against this back drop that the present investigation was done. More so as local farmers frequently requested for advice on the issue.

The objective of this experiment was to evaluate the effect of five commercial catfish feed on growth and survival of *C. gariepinus* juveniles under controlled conditions.

MATERIALS AND METHODS

Fish and Experimental Design

The experiment was done in the family testing unit of ARAC from the 21st of April to 26th of July 2010 (105 days).Some 500 nine week old. *C. gariepinus* juveniles were purchased from Belem fish farm Port Harcourt and transported to ARAC. In the lab a sample of the fish was weighed and measured (mean wt 6.35 ± 0.22 g, mean SL 8.50 ± 0.12 cm).

A completely randomized design was used with 5 treatments (commercial catfish feed) and 3 replicates per treatment. 30 fish/ tank were randomly stocked in 15 concrete tanks (1 m x 1 m x 1 m). Partial flow through water was supplied from a concrete reservoir during the study.

Sampling

Growth (Total Length (TL) Standard Length (SL) and Weight) of a random sample of fish (n = 5) from all the 15 tanks were measured monthly using a measuring board and sensitive electronic balance, Yamato lab top balance LE 180 g to the nearest 0.01 g and 0.01 cm respectively.

Water Quality

Measurements of dissolved oxygen (D. O.), pH, temperature and Ammonia were taken weekly in each tank using a La Motte fresh water aquaculture kit model (AQ-2 code 3633-03). Dissolved Oxygen concentration ranged from 4.5 – 5.6 mg/l, pH 6.7 - 7.5 temperature 28 ± 1 °C and ammonia 0.2 - 0.6 ppm. Total removal of the whole water took place every 3 days this helped in maintaining water quality.

Commercial Diets

C. gariepinus juveniles were hand fed once daily at an initial ration of 10% Body Weight daily and later 5% BW daily. The commercial feeds used in this study were: Coppens, Mutlifeed, Eurogold, Vittal and Ajanla feeds. Nutritional composition of each diet as listed on the manufacturers label is shown in Table 1. Pellet size was increased from an initial size of 2mm to 3mm in June and the feed ration was decreased to 5% BW. A new feeding rate was worked out based on the new biomass and feeding adjustments made after monthly growth samplings.

Calculations and Statistical Analysis

Specific growth rate (SGR) and survival were calculated using the following formulae:

Survival (S%) = $Ne/N_1 \times 100$

Where N_1 = Number of fish stocked

N_e = Number of fish at harvest

$$\text{SGR (\% day)} = \frac{\left[Ln(\text{final weight}) - Ln(\text{int ial weight})\, x100\right]}{\text{culture period (days)}}$$

Growth data (length, weight and SGR) were analyzed using one-way analysis of variance followed by LSD test at the 5% level of significance to detect differences among treatment means. All statistical analysis were performed by SPSS (Windows version 15.0).

RESULTS AND DISCUSSION

The growth performance values in terms of weight gain (g) length gain (cm) specific growth rate (SGR %day) and survival (%) of *C. gariepinus* juveniles in the different treatments are shown in Table 2.

The ANOVA results indicated significant differences in weight, length and SGR among treatments ($P<0.05$). LSD tests showed that fish fed with Coppens and Multifeed were significantly longer and weighed more than those fed the other three diets. The significantly highest growth was observed in Coppens (181.54 ± 0.63 g) followed by Multifeed (179.92 ± 0.95 g) and the lowest growth was observed in Ajanla (103.76 ± 0.23 g). Coppens and Multifeed did not differ significantly in terms of fish growth ($P>0.05$). SGR was highest for fish fed Coppens (3.19%/day) but was not significantly different ($P>0.05$) for fish fed Multifeed (3.18%/day). SGR of fish fed Euro, Ajanla and Vital were significant different from SGR of Coppens and Multifeed ($P<0.05$). SGR was lowest (2.71%/day) in fish fed Ajanla. Mortality was really low during the experiment. Survival for all the treatments was 93.35% and not affected by diet. The results indicate that all the diets promoted growth in *C. gariepinus* juveniles, but fish grew significantly larger on those feed containing the highest protein and lipid levels (45%, 12% respectively).

These growth rates compare well with the results of comparative feed trials conducted in the riverine catfish *Rita rita* by Amin *et al.,* (2000) who recorded significantly higher growth rates in juveniles fed chicken viscera (47.58% CP) as compared to local prawn (45. 7% CP) and formulated feed (43.5% CP). 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.,* (2002) who reported an increase in body weight gain and SGR in post larvae in *Clarias* hybrid fed increased level of protein in a study conducted using 250, 300, 350, 400g (CP) kg^{-1} dry matter.

Going by the different manufacturer's label, the constituent macronutrients for all the commercial feed used in this study varied, though that of Coppens and Multifeed was almost identical. These differences most likely accounted for the observed difference in growth rate. In addition an apparent sensory difference among the five feeds used was in their odour. Coppens, Multifeed and Euro emitted stronger fishy odours as compared with Vital and even less Ajanla. *C. gariepinus* like most catfish feed mostly using olfactory senses this may have made the former three feeds more noticeable and attractive than the latter two although all the feeds were readily consumed by the fish.

CONCLUSION

Based on the data gathered from this study, it can be concluded that macronutrient combinations with 45% CP, crude fat, 12%, crude fire 1.5% and Ash

9.5% will promote higher growth rates than other combinations in juvenile *Clarias gariepinus*.

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Table 1: Macronutrient composition of dried diets (Manufacturers label)

	Coppens	Multifeed	EuroGold	Vital	Ajanla
Feed size	3mm	3mm	3mm	3mm	3mm
Protein	45%	45%	42%	38%	42%
Lipid	12%	12%	10%	9.5%	8%
Ash	9.5%	8.5%	8%	—	8%
Moisture	—	—	—	12%	—
Fiber	1.5%	2.5%	3%	3.5%	3%

Table 2: Growth and Survival of *Clarias gariepinus* fed with different commercial feed (TYPES)

Parameters	Coppens	Multifeed	Euro-Gold	Ajanla	Vittal
Initial weight (g)	6.35±0.22a	6.35±0.22a	6.35±0.22b	6.35±0.22b	6.36±0.22b
Final weight (g)	181.54±0.63a	179.92±0.95a	139.26±0.36b	110.11±0.23	0.35±119.03b
Weight gain (g)	175.19±0.63a	0.91±173.57a	0.36±132.91b	0.23±103.76b	0.35±112.67b
Initial length (cm)	0.12±8.50a	0.12±8.50b	0.12±850b	0.12±8.50b	0.12±8.50b
Final length (cm)	1.24±25.6a	0.85±25.98a	0.99±24.0b	0.67±22.82b	0.96±20.98b
Length gain (cm)	16.75±1.54a	17.62±1.08a	15.88±1.18b	14.6±1.40b	14.83±0.56
SGR (% day)	3.19±00a	3.18±00a	2.94±00b	2.71±00b	2.78±00b
Survival (%)	93.35%	93.35%	93.35%	93.35%	93.35%

All values are reported as mean standard error (± SE) of the mean. Figures in the same row having the same superscripts are not significantly different (P>0.05) having different superscripts are significantly different (P<0.05).