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Full Length Research Paper

Supplement usage and development of Clarias gariepinus fed to four different commercial feeds

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Several studies had been conducted on the nutritional requirements of African catfish, *Clarias gariepinus*. Nevertheless, currently there is a gap about the gross composition of feed ingredients required for formulation of commercial feeds. The aims of this feeding trial were to investigate whether fish fed four different commercial feeds have a significant growth rate and nutrient utilization. A total of 120 fish samples were stocked for a triplicate feeding trial (10 fish for each replication) in 4 separated tanks with 4 different feeds: Euro, Melick, Coppens and Durante (T1), (T2), (T3) and (T4) respectively. During all the trial, the water quality and growth parameters were determined according to standard methods and no significant differences were found among the water quality parameters determined. The mean weight gain (MWG) and specific growth rate of T3 were significantly higher than those of other treatments. Statistics showed that protein efficiency ratio (PER) of T3 was significantly higher than other treatments. Contrary to the above trend, the feed conversion ratio (FCR) of T2 was significantly higher than other treatments. According to the results of this study, fish fed with Coppens feed showed a significant growth rate and nutrient utilization.

Key words: Feeding trial, treatments, growth, nutrient utilization, commercial feeds.

INTRODUCTION

Fish nutrition is critical in fish farming because feed represents 40-50% of production cost (Craig and Helfrish, 2002). Growth performance and nutrient utilization of fish is determined by gross composition of the feed ingredients, processing and storage of the feed products. Globally, there is a great decline in aquaculture production, due to fish feed manufacturers substituting vital feed ingredients with alternative feed stuffs that cannot achieve fish nutritional requirements. One of the critical challenges faced by aquaculture is the high cost of fish feeds and more than 50% of the total cost of production is intensified in culture system (Ali et al., 2004). Fish feed enhances optimum growth and resistance to diseases when it contains proper proportion of proteins, carbohydrate, lipids, vitamins and minerals. Nevertheless, nutrients in fish feeds are optimally utilized when the feed stuffs are acceptable and palatable to the fish.

Cost of production can be reduced if growth performance and feed efficiency are increased in commercial aquaculture (Dada and Olugbemi, 2013).

Table 1. Proximate compositions of the four commercial feeds.

Parameter	T1	T2	T3	T4
Moisture content (%)	8.53	8.07	8.67	8.67
Protein (%)	46.36	45.64	48.10	47.67
Ether extract (%)	28.50	29.63	30.37	27.73
Ash (%)	9.38	8.53	8.67	7.77
Crude fibre (%)	7.23	8.13	6.83	7.57
Energy (Cal/kg)	209.24.23	190.12	250.67	230.45

In an attempt to go into feed mill business, many fish nutritionists have formulated and supplied fish feeds to fish farmers without disclosing the gross composition of the fish feeds formulated. In order to ensure optimum growth performance of cultured fish, there is need for farmers to know the proximate composition of the formulated feed. Global attention is needed to address the impacts of various commercial feeds produced by feed millers. However, the culture of African catfish, *C. gariepinus* has produced optimum crude protein required for growth of the populace. In Nigeria, the farming systems of *C. gariepinus* have produced means of livelihood for many people in the local communities and have equally generated revenue for the government. Little or no information has been known and reported on gross composition of fish feeds in Nigeria. The aim of this study was to investigate the effects of four commercial feeds on growth and nutrient utilization of African catfish, *C. gariepinus*.

MATERIALS AND METHODS

A total of one hundred and twenty *C. gariepinus* with average weight of 20.20±2.68 g were purchased from Fatutek fish farm, Ashi-Bodija, Ibadan, Nigeria. The fish samples were stocked inside experimental bowl of 40 litres capacity at thirty fish per treatment with ten in each replicate. Before the feeding trial experiment, the fish samples were acclimatized for 14 days in the laboratory. The fish were fed at 5% body weight with Euro (FEFAC aisbi Rue de la Loi, 223 Bte 3 B-1040 Bruxelles Belgium), Melick (75 Orchard Drive Catawissa, PA 17820), Coppens (Dwarsdijk 4 5705 DM Helmond, The Netherlands) and Durante (Nigerwest building, old Lagos road, challenge, Ibadan, Oyo State, Nigeria) and they were allotted treatments (T1), (T2), (T3) and (T4) respectively. The feeding rates of the fish samples were adjusted weekly after weight measurement of each treatment. The proximate composition of the feed (Table 1) was determined according to the methods described by AOAC (2005).

The experimental bowls were aerated using an electronic aerator of model PAI. Water samples were collected weekly to determine water quality parameters (water temperature, dissolved oxygen, ammonia and pH). The pH of the water was determined using a digital pH meter Suntex (model TS-2). Water temperature was measured with mercury in glass thermometer. The reading was taken by dipping the thermometer in water to a depth of 0.5 m. Other water quality parameters were determined according to the standard methods of American Public Health Association (1992).

After the feeding trial experiment, the following nutrient utilization and growth parameters were determined: Mean weight gain was calculated by subtracting mean initial weight (g) from mean final weight (g). Specific growth rate= $(\ln W_2 - \ln W_1) / T_2 - T_1 \times 100$, where W_2 is the mean final weight, W_1 is the mean initial weight and T_2 is the final day of the feeding trial and T_1 is the initial day of the feeding trial. Feed conversion ratio=Feed consumed (g)/Weight gain (g). Protein efficiency ratio=Weight gain (g)/Protein intake. Survival rate=Fish quantity at the end of the experimental period/Fish quantity at the beginning of the experimental period × 100.

The data collected were analyzed using Statistical Package for Social Sciences (SPSS), Version 11, 2001 and Statistical Analysis Software (SAS), Version 8, 2001. Duncan's Multiple Range Test was used to compare the differences among the means. The significant level was set at 5%.

RESULTS AND DISCUSSION

The water quality parameters investigated in this study are presented in Table 2. All parameters (water temperature, dissolved oxygen, ammonia and pH) determined were not significantly different among groups ($p>0.05$). Moreover the values recorded for these parameters were within the recommended ranges for the culture of African catfish, *C. gariepinus* and experimental fish (Viveen et al., 1986; Loiselle, 1994). Table 3 shows the growth performance and nutrient utilization of *C. gariepinus* fed different commercial feeds. The results showed that the MWG by T3 was significantly higher ($p<0.05$) than other treatments. The SGR showed similar level of significance. The SGR of T3 was significantly higher ($p<0.05$) than other treatments. Dietary crude protein is vital in fish feeds and must be supplied for rapid growth (Jauncey 1982; Lovell, 1989).

The findings of this study revealed that increased crude protein levels and caloric content of the diet had a significant effect on the MWG and SGR. Tabachek (1986) reported similar findings while investigating the influence of dietary protein and lipid levels on growth, body composition and utilization efficiencies of Arctic charr, *Salvelinus alpinus* L. Statistics further showed that PER of T3 was significantly higher ($p<0.05$) than other treatments. The significant value of PER in this study was as a result of the level of fat in the diet. This trend was also reported by Murat and Ibrahim (2013) who studied

Table 2. Physico-chemical parameters of water in tanks during the feeding trial period.

Parameter	Initial	T1	T2	T3	T4
Water temperature (°C)	29.77±0.25	30.00±0.20	30.27±0.25	29.50±0.30	30.00±0.50
Dissolved oxygen (mg/l)	6.04±0.05	6.04±0.02	6.08±0.01	5.90±0.20	6.08±0.01
pH	6.67±0.06	6.90±0.01	6.80±0.10	6.83±0.06	6.67±0.06
Ammonia (mg/l)	0.01	0.02	0.01	0.01	0.02

Means with same superscript were not significantly different (p>0.05).

Table 3. Nutrient utilization and growth of *Clarias gariepinus* fed four different commercial feeds.

Parameter	T1	T2	T3	T4
MIW (g)	19.70±3.64	19.59±3.82	20.23±2.68	21.28±2.09
MFW (g)	36.98±1.58	28.69±9.29	48.05±8.68	41.01±7.85
MWG (g)	17.28±2.06^{c}	9.10±1.13^{d}	27.82±6.18^{a}	19.73±9.94^{a}
SGR (%)	1.15±1.05c^{b}	0.69±2.64^{c}	1.56±0.46^{a}	1.18±1.85^{b}
PER	0.20±0.89^{b}	0.14±4.63^{c}	0.24±2.67^{a}	0.20±4.36^{b}
FCR	0.11±0.03^{u}	0.16±0.03^{a}	0.09±0.05c	0.10±0.04^{u}

Means with same superscript were not significantly different (p>0.05). Key: MIW, mean initial weight, MFW, mean final weight, MWG, mean weight gain, SGR, specific growth rate, PER, protein efficiency ratio, FCR, feed conversion ratio.

the effects of different dietary protein and lipid levels and oil sources on the growth performance and body composition of rainbow trout (*Oncorhynchus mykiss*, w.).

In contrary to the above trend, the FCR of T2 was significantly higher ($p<0.05$) than other treatments and T3 was significantly lower than other treatments. It was very clear in this study that FCR decreased with increased crude protein level. This assertion supported the findings of El-Dahhar et al. (2000) reporting the effect of protein and energy levels in commercial diets on growth performance of juvenile nile tilapia (*Oreochromis niloticus*). In the investigation of the growth parameters of the fish samples in this study, it was very apparent in the values recorded that Coppens (T3) gave the best growth performance and nutrient utilization compared with other treatments. This report also agreed with Jamabo et al. (2013), who also reported Coppens to give the best growth performance among other commercial feeds.

Conclusion

In the study, it was established that Coppens gave the best nutrient utilization and growth performance in *Clarias gariepinus.* By the results, it emerged a need for feed manufacturers to provide information on gross composition of fish feeds. The information provided should be used by farmers to choose the best feed for their fish.

Conflict of Interest

The author(s) have not declared any conflict of interests.

REFERENCES

APHA (1992). American Public Health Association. Standard Methods For the Examination of Water and Wastewater. 18th ed. Washington. D.C. 2005 pp.

Ali FM, Abdus-Salam BA, Ahmad KS, Qamar M, Umer K (2004). Seasonal variations of physico-chemical characteristics of River Soan water of Dhoak pathan of bridge (Chakwal). Pak. Int. J. Agric. Biol. 1:89-92.

AOAC (2005). International Official Methods of Analysis . 18th ed. AOAC International, Gaithersburg, MD.

Craig S, Helfrish LA (2002). Understanding Fish Nutrition, Feeds and Feeding. Department of Fisheries and Wild Life Sciences, Virginia Tech., pp. 420-456.

Dada AA, Olugbemi BD (2013). Dietary effects of two commercial feed additives on growth performance and body composition of African catfish, *Clarias gariepinus* fingerlings. Afr. J. Food Sci. 7(9): 325-328.

El-Dahhar AA, Zeweil H, El-Tawil N (2000). Effect of protein and energy levels in commercial diets on growth performance of juvenile nile tilapia (*Oreochromis niloticus*). Egypt J. Aquat. Biol. Fish. 4(2):267-285.

Jauncey K (1982). The effect of varying dietary protein level on the growth, food conversion, protein utilization and body composition of juvenile tilapias (*Sarotherodon mossambicus*). Aquaculture 27:43-54.

Jamabo NA, Echeonwu ME, Uzukwu PU (2013). Effects of different commercial feeds on growth and survival of African catfish, *Clarias gariepinus* (Burchell, 1822). J. Aquatic Sci. 28(2):135-143.

Loiselle PV (1994). The Cichlid Aquarium. Tetra-Press, Neptune City, Germany, 447 pp.

Lovell T (1989). Nutrition and Feeding of Fish. An AVI Book, Van Nostrand Reinhold, New York. P. 260.

Murat B, Ibrahim AK (2013). The effects of different dietary protein and lipid levels and oil sources on the growth performance and body composition of rainbow trout (*Oncorhynchus mykiss*, W.). 1st Annual International Interdisciplinary Conference, AIIC 2013, 24-26 April, Azores, Portugal, pp. 807-816.

Tabachek JL (1986). Influence of Dietary Protein and Lipid Levels On Growth, Body Composition, and Utilization Efficiencies of Arctic Charr (*Salvelinus alpinus*). J. Fish Biol. 29:139- 151.

Viveen WJAR, Richter CJJ, Van Oordt PG, Janssen JAL, Huisman EA (1986). Practical manual for the culture of the African catfish, *Clarias gariepinus*. The Hague, Netherlands: Section for Research and Technology, Agricultural University of Wageningen.