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Research Article

Growth Performance of *Clarias gariepinus* (Burchell, 1822) on Locally formulated and Imported Fish meal

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Abstract

Growth performance of *Clarias gariepinus* was assessed using locally formulated soybean and a commercially available imported fish meal. The locally formulated feed was processed from locally available raw materials following standard methods. Feeding was for four weeks during which the length, weight gained and specific growth rate were measured. Difference in weekly weight gained and specific growth rate were not significant ($p > 0.05$). The result suggested that the locally formulated soybean fish meal could be used as an alternative in the feeding of *Clarias gariepinus*.

Keywords: Growth performance; *Clarias gariepinus*; Feeding trial; Soybean meal

Introduction

Aquaculture contributes nearly 50 percent to global fish food supplies and the scenario is expected to continue in the decades to come to improve food and nutrition security globally [1]. The growth in aquaculture production is not uniform among the regions of the world. While there is significant annual growth in Asia, Latin America, and the Caribbean, it has slowed in Europe and North America in recent

years [1]. Though the contribution of aquaculture to the global fish food has been on the increase, only an insignificant proportion (less than 2 percent) comes from Africa while 92 percent is from Asia [2]. The constraints to the development of aquaculture in Africa include poor availability of inputs, limited government support, socioeconomic circumstance, weak extension services, limited coordination between research development sector and limited technologies. These could be hitches to the maintenance of the level of aquatic food consumption as the global population increase to nine billion in 2050 as projected [1].

Meanwhile, researches are on-going especially on feed formulation with the intention of substituting the often imported, expensive fish meal with readily available, cheaper alternative source of locally available feed. Fish nutrition is critical in fish farming because feed represents up to 50 percent of the production cost [3]. It is based on this that this study was conducted on the growth performance of *Clarias gariepinus* on commercially available and locally formulated feed. The objective of the study was to check the suitability of the locally formulated feed as an alternative replacement for commercially available imported feed.

Materials and Methods

Materials

Soybean seed, yellow maize grain, groundnut seed, fish bone and fresh leaves of *Telifera occidentalis* were purchased from a local food market in Abakaliki for the local feed formulation. Commercially available imported feed (2 mm equalis) was also purchased from fish feed dealer for the comparative study. The *Clarias gariepinus* used for the study were purchased from Regina Pacis fish farm in Abakaliki, Ebonyi State, Nigeria.

Methods

Feedstuff Processing: The soybean seed was parboiled and allowed for some hours to cool. It was then washed to remove the endocarp, dried under the sun, roasted and ground to powder. The groundnut and fish bone were also roasted before they were ground to powder. Yellow Maize seed was also ground to powder using a milling machine while the vegetable extract was gotten with juice extracting machine.

Feed Formulation: The feed was formulated by mixing the appropriate proportion of the constituent of the feed which was calculated using Pearson's Square method. Each of the constituent was weighed dry, mixed before adding hot water. The mixture was turned to obtain homogenous unleavened dough which was molded and made to pellets using a local pelleting machine. It was sun dried and stored in a sterile polyethene bag.

Determination of the proximate composition of feeds: The proximate compositions of the imported and locally

formulated feed were determined using the methods according to AOAC, 2000 [4].

Feeding Trial: Six plastic aquaria of thirty-liter capacity were used for the feeding trial. Five *Clarias gariepinus* juvenile were stocked in each of the aquarium. The set up was in triplicate, that is, set A being fed with imported feed while B was fed with locally formulated feed. Feeding was done twice a day at 5 percent of the body weight of the fish. The water was renewed at 48 hour and unconsumed feed removed. The feeding trial was for four weeks during which the weight and length of the fish were measured from the first day of week one.

Data analyses: The proximate composition of the feeds, weekly weight gained and length of the fish were summarized using descriptive statistics. Difference in mean weight gained and length of the fish during the feeding trial were compared using one-way analysis of variance and values were considered significance at ($p < 0.05$). Weight gained and specific growth rate of the fish were also computed. Data analysis was carried out using SPSS version 20.

Results

Proximate Composition of the Feeds

The proximate composition of the feeds showed that percentage crude protein (16.85 %), and fat (5.08 %) contents were higher in the imported commercial feed while carbohydrate ((61.58 %), ash (5.03 %), moisture (11.05 %) and fiber (7.12 %) were higher in the locally formulated feed (Figure-1). Difference in the proximate composition of the feeds was significant ($p < 0.05$).

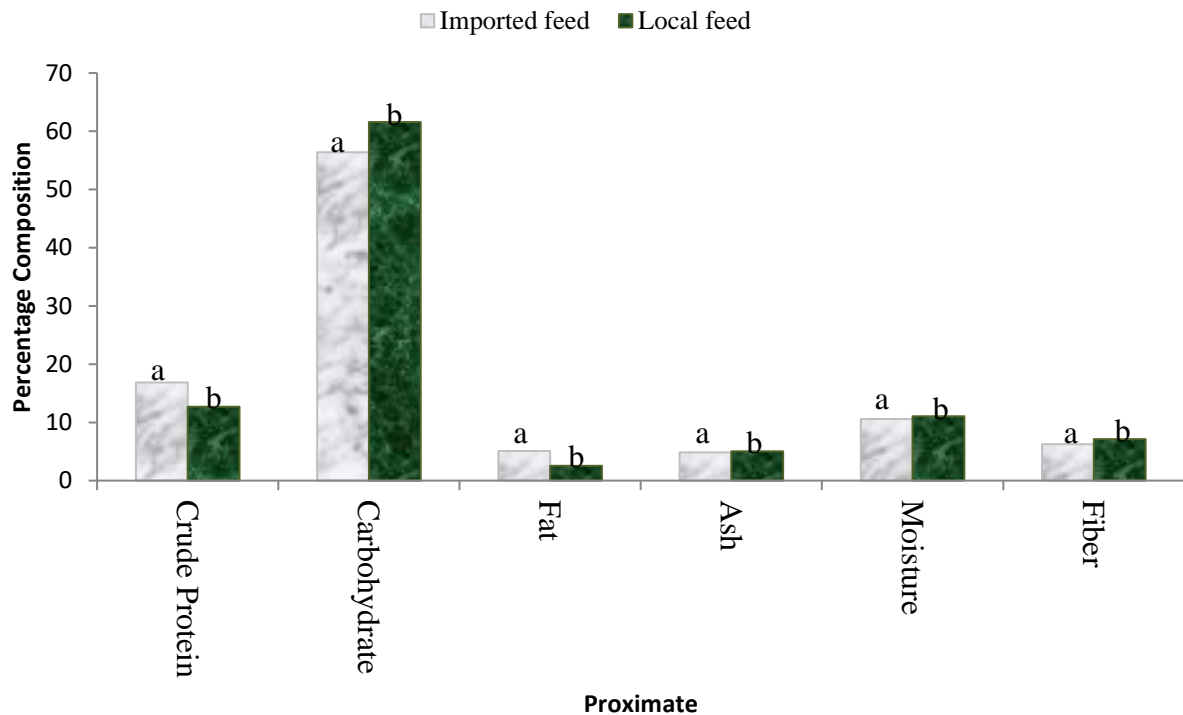


Figure 1: Proximate composition of the locally formulated and imported commercial feed.

Mean length and weight of Fish feed formulated and imported feed

The mean length of the fish fed with the formulated feed ranged from 10.40 cm to 15.03 cm while those fed with imported fish meal varied from 11.71 cm to 15.28 cm

(Table-1). The mean weight increased from 11.71 g to 16.43 g in fish fed with the locally formulated feed while that of fish fed with the imported feed varied from 12.35 g to 17.03 g (Table 1). Difference in mean length was significant ($p < 0.05$)

Duration (Week)	Locally formulated feed		Imported feed	
	Mean length (cm)	Mean weight (g)	Mean length (cm)	Mean weight (g)
0	10.40±0.56	11.71±0.62	11.17±0.44	12.35±0.37
1	10.77±0.49	12.33±0.68	11.73±0.46	12.97±0.41
2	11.85±0.35	13.58±0.42	12.33±0.49	13.91±0.43
3	12.80±0.60	15.03±0.47	13.60±1.10	14.86±0.86
4	15.03±0.03	16.43±0.36	15.28±0.03	17.03±0.03

Table 1: Mean length and weight of Fish feed formulated and imported feed.

Specific Growth Rate

The specific growth rate of the fish fed with the locally formulated feed was highest (0.71)

on week three. On the other hand, those fed with the imported feed had the highest specific growth (0.86) on week four (Table 2).

Weeks	Locally formulated feed	Imported feed
1	0.27	0.29
2	0.57	0.43
3	0.71	0.43
4	0.57	0.86

Table 2: Specific Growth rate per Week

Discussion

Efforts to have alternative fish feed to the imported ones have been vigorously pursued by some concerned individuals, fish nutritionist, zoologist and aqua culturists [5-9]. Their efforts have yielded positive results which have led to the formulation of different meal for fish feed locally in most developing nations. However, their prospect to make fish production cheaper by ensuring that feeds are easily formulated by the farmers is being hampered by lack of fund and machinery that could have enhanced the efficiency of the production process.

From the study, locally formulated soybean meal used in the feeding trial was not significantly different in the proximate composition compared to imported feed. Meanwhile the locally formulated feed had higher percentage of carbohydrate content compared to the imported feed which showed that the raw material used were good source of energy. The carbohydrate content compared favourably to that of Bambara nut, mucuna beans, and cotton seed cake which have also been used in feed formulation [10]. The protein content of the locally formulated feed was on the other hand lower compared to that

of the imported feed and this could be attributed to the heating process used during processing which may have affected the protein content of the raw material.

Despite these, there was no significant difference in the weight gained by the fish fed with the locally formulated and imported feeds. Balogun, et al. 2004 [11] reported an increase in weight gained in *Clarias gariepinus* fed with *Delonix regia* seed meal. There was also an increase in the specific growth rate in fish fed with the locally formulated and the imported feeds and difference in the specific growth rate was not significant.

Conclusion

This study compared the growth performance of *Clarias gariepinus* fed with locally formulated and imported fish meals. It was observed that difference in the growth parameters measured in fish fed with the locally formulated feed and those of imported feed was not significant. These observations suggested that the locally formulated soybean feed meal could be used as a replacement for the imported fish feed.

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