Comparative Study on the Effect of Commercial Based Feed and Locally Formulated Feed on Growth Performances and Profitability of Catfish (*Clarias Gariepinus*) Farming

BY

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Abstract

This research was conducted in a Pond constructed specially for this purpose at the site of Science and Laboratory Technology Botanical Garden of Mai Idris Alooma Polytechnic Geidam in Yobe State, Nigeria. It compares the performances of two commercial base feeds and a locally formulated feed with the hope to create a possible substitute of the commercially base feeds with locally available and non-conventional protein source that is commonly used in feeding catfish (Clarias gariepinus). The commercial base feed were labeled as T_1 (Vital feed) and T_2 (Aquamax feed) while T_3 represent locally formulated feed containing desert locust (Schistocerca gregaria) as a substitute to fish meal. Nine concrete tanks of 1m^3 each were stocked with 20 catfish fingerlings each and fed 5% of their body weight for a period of Eight (8) weeks. The water in the tanks were drained every 3 days for proper water quality management while water pH, Temperature and Dissolve Oxygen were maintained within the of range 6.5 -7.7, 25 - 32^{o}C, and 5.5 - 6.5mg/l respectively. Ten fishes from each tank were randomly selected and measured for weight gain on weekly basis. The initial means weight of the fish were 5.52±0.35. T_1showed final means weight of 25.03±0.02g while $T_2$and T_3 showed final means weight of 22.06±0.06g and 18.23±0.26g respectively. T_1has the highest specific growth rate of 0.36±0.05g followed by T_2 with 0.29±090g and T_3 with 0.22±0.62g. The best Feed Conversion Ratio (FCR) was obtained in T_1 with 1.39±0.66. The least feed cost was observed in T_3 followed by T_2 and T_1. The result of this study suggested that T_1performed best while the locally formulated feed can be cost effective if used for catfish production.

Keywords: *Growth Performances; Profitability; Clarias gariepinus*

Introduction

Fish is considered as one of the most important high quality protein-containing foods in amount and proportion required for good nutrition. Food and Agricultural Organization (FAO, 2003) report estimated that fish provides 20% of protein intake in developed nations and exceeds 50% in poorest countries where domestic animals are expensive and scarce.

Fish is the most widely accepted nutrient rich food source because it is palatable, tender and of high nutritive value. The nutrients derivable from fish include vitamins, calcium, phosphorus and unsaturated fats. These nutrients can be provided naturally or artificially in aquaculture by enabling the fish to grow adequately for the enhancement of human health (Alegbeve *et al.,* 2012).

Catfish is regarded as one of the most important aquaculture inhabitants because of its ability to tolerate a wide range of environmental conditions, high stocking densities under culture conditions, fast growing rate, high yielding potential, air breathing characteristics and high market value (Babalola and Apata, 2006).

In order to bridge the ever increasing gab between fish supply and demand, farmers tend to feed their fish with commercial feeds so as to attain maximum profit in short time. But the high cost of fish feeds has been the major problem of fish farming in Nigeria. This high cost constitutes about 40 to 60% of the recurrent cost of most intensive fish farming ventures which negates the economic viability of the farm when cheaper alternatives are not available (Marimuthu *et al.,* 2011). Artificial formulation is usually expensive because the conventional feed ingredients are being competed by human and livestock. Therefore, there is the need to identify, explore and utilize cheaper non-conventional feed ingredients that are not only easily available but also attract less competition.

It is essential that the feed provides maximum production efficiency at a minimum cost. The relative importance of growth rate and feed conversion efficiency will depend upon the quality and cost of feed in relation to the market value of the farmed products (Shang and Costa- Pierce, 1983). The unit cost of various types of feed and cost of fish production using each of this feed as well as the unit profitability of each system of fish production must be compared before one type of feed is selected. It is therefore of great importance for the fish farmers to utilize their investment in feeds as optimal as possible.

The effect of locust as a source of protein on growth performance and survival rate of *Clarias gariepinus* fingerlings has not been exhaustively investigated. For this reason, the present study wishes to determine the best in term of cost, easy accessibility, less competitiveness and more easily producible of the two diets, commercial based feeds (Vital feed of Green leaf Ltd, Nigeria and Aquamax-feed com Ltd.) and locally formulated feed (desert locust as main source of crude protein) for growth performance, survival rate and profit marginalization on production of catfish (*Clarias gariepinus*).

Therefore, this study seeks to observe the growth performance, survival rate and feed utilization of catfish using two different feeds "commercial based feeds (Vital feed and Aquamax-feed) and locally formulated feed (Desert locust as C.P source). The Desert locust (*schistocerca gregeria*) is cheap and available in the study area.

Materials and Methods

The experiment was conducted in the Science and Laboratory Technology (SLT) botanical garden of Mai Idris Alooma Polytechnic Geidam. Nine (9) concrete tanks of $1m^3$ capacity each were used. The

tanks were filled with fresh water from overhead tank which received water from bore hole. The chemical and biological qualities of the water were determined for suitability of the fish culture prior and after stocking. The treatments were leveled as T_1 (Vital fish feed-Grand cereals Ltd.), T_2 (Aquamax fish feed-uac Nigeria plc.) and T_3 (formulated Desert Locust meal). Each tank was stocked with 20 fingerlings which were obtained from reliable source. The fish were acclimatized for two weeks with Coppens feeds prior to the experiment. All fingerlings were ensured to be of the same age group.

Before the commencement of the experiment, the mean initial weight of each of the fish was measured and recorded using sensitive weighing balance. The average mean weight were measured after every week for 2 months after stocked; each treatment was fed at 5% of their body weight daily. The water quality parameters such as temperature, pH and water transparency were measured and recorded daily throughout the experimental period.

For the purpose of determining specific growth rate and feed conversion ratio, 10 fish were randomly selected every week from each experimental tank and measured for their total weight while survival percentage was also determined at the end of the experiment.

The following formula given by (Aderolu *et al.,* 2010) was used in measuring the experimental data.

Specific Growth Rate (SGR)

$$\mathbf{SGR} = \frac{\mathbf{WG}}{\mathbf{t}}$$

WG = Weight Gain (g)

where;

t = Duration

$$\boldsymbol{FCR} = \frac{\mathbf{TFC}}{\mathbf{TWG}}$$

Food Conversion Ratio (FCR)

where;

TFC = Total Feed Consumed in dry (g)

TWG= Total Weight Gain by fish in wet (g)

$$\mathbf{PSR} = \frac{\mathbf{Nh}}{\mathbf{Ns}} \times 100$$

where; N*h*= Total number harvested.

N*s*= Total number stocked.

Data Analysis

Data generated from the experiment were subjected to Analysis of Variance (ANOVA) where significant differences exist and means separation determined using Duncan's Multiple Range Test (DMRT).

Result

The proximate analysis of the various treatments differed slightly in crude protein content, which showed T_1 contain higher protein content of 40.98% followed by T_2 38.92% and T3 32.77% respectively. The crude lipid were also higher in T_1 (12.05%) than those of T_2 (11.59%) and T_3 (9.85%).

The result of growth performance and cost effectiveness of *Clarias gariepinus* fed in different feed treatments is presented in table 2.

The means initial weight of 5.55 ±0.01, 5.50 ±0.03 and 5.53 ±0.11 for T_1, T_2 and T_3 which attained the mean weights of 25.03 ±0.02(T_1), 22.06 ±0.06(T_2) and 18.23 ±0.26

(T_3) respectively. The significant highest growth was achieved in T_1 followed by T_2 and T_3. The highest specific growth rate (SGR) of 0.36 ±0.05 was recorded for T_1 and this was followed by T_2 (0.29 ±0.90) and T_3 (0.22 ±0.62).

The survival rate of fish for the different treatments was 91.66%, 88.33% and 86.66% for T_1, T_2 and T_3 respectively. There was significant difference in the survival rate of the fish among the different feed treatments.

The mean feed conversion ratio (FCR) in different treatments was 1.39 ±0.66 for T_1, 1.69 ±1.02 for T_2 and 1.97 ±0.07 for T_3. The highest FCR was recorded in T_3 and the lowest in T1. The highest costs of feed per kilogram (Kg/N) were recorded in (N T_1 466.66) and T2 (N 433.33) while the lowest was in T3 (N 195.05).

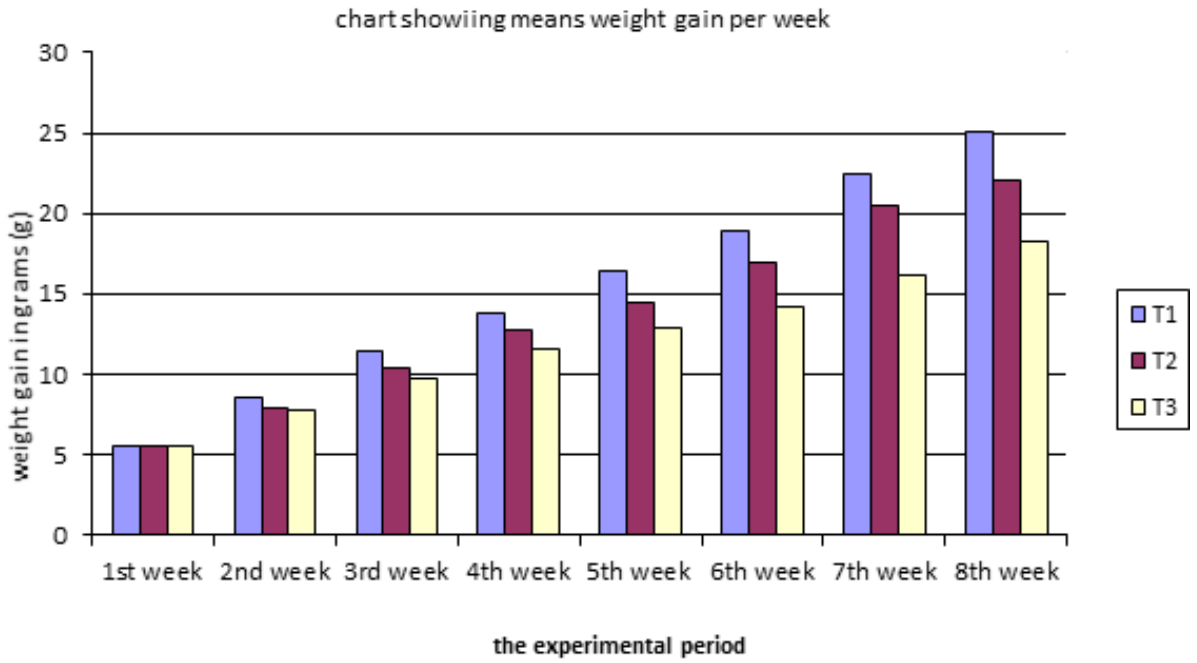
Table 1: proximate composition of the experimental diets (g/100g)

Parameters	Vital feed (T_1)	Aquamax feed (T_2)	Locally formulated feed (T_3)
Crude protein	40.98±*1.35*	38.92±*2.25*	32.77±*0.26*
Moisture	7.01±*0.06*	8.13±*0.50*	10.13±*026*
Crude fibre	3.52±*0.33*	4.5±*0.11*	10.30±*0.16*
Lipid	12.05±*0.11*	11.59±*0.20*	9.85±*0.45*
Ash	3.52±*1.25*	4.0±*0.01*	6.91±*0.25*

Table 2: Growth performance and feed utilization of *Clarias gariepinus* fed different treatment diets

Parameters	T_1	T_2	T_3
Means initial weight	5.55±6.01^a	5.50±0.03^a	35.53±0.11^a
Means final weight	25.03±0.02^a	22.06±0.06^b	18.23±0.26^c
Weight gain (g)	20.53±1.06^a	16.56±1.03^b	12.70±0.94^c
Total feed consumed (g)	28.67	28.08	25.12
Feed conversion ratio	1.39±0.66^c	1.67±1.02^b	1.97±0.07^a
Growth rate (g)	0.36±0.05	0.29±090	0.22±0.62
Survival rate (%)	91.66	88.33	86.66
Unit cost of feed /Kg	466.66	433.33	195.05
(N)Unit cost of fish / Kg(N)	648.57	732.27	384.20

value are Means±SEM. Values with different superscript in the same row are significantly different ($p<0.05$)



Discussion

Water quality parameters such as temperature, pH and turbidity measured for different treatments throughout the experimental period were found to be similar and were within the acceptable limit for fresh water fish culture (Boyd, 1998). This implied that there was no influence of water quality parameters in the trial. This may be due to daily replacement of water in trial tanks.

In the present study of different feeds treatment, highest weight gain was observe in treatment T_1 followed by T_2 and the least was T_3 which may be attributed to the better composition of Vital feed which contains about 40.98% crude protein, while Aquamax contains 38.92% crude protein and locally formulated feed contains 32.77% crude protein. This observation is similar to Agokei *et al.,* (2011) who reported that commercial fish feeds like Vital, Multifeed, Aquamax, Coppens and Euro emit stronger fishy odors and considering the fact that *Clarias gariepinus* uses olfactory senses during feeding. Another possible causes for better growth performance of fish in commercial base fish feed might be the quality of protein and the amino acid balance. Generally, fish meals bears nutritional quality and biological value, and is well balanced in amino acid profile, yet lack anti-nutritional factors, thus it is the most wanted protein source for most aqua feed producing industries (Aanyu *et al.,* 2012; FAO, 2010).

The lowest mean food conversion ratio value was observed in T_1 followed by T_2 while T_3 has the highest Food Conversion Ratio. Therefore, the lower Food Conversion Ratio value is an indication of better food utilization efficiency. However Ekanem *et al.,* (2010) stated that growth and feed conversion ration of a fish is a remarkable tool to compute the acceptability of artificial feed. In the present study the Food Conversion Ratio of the commercial base feed and the locally formulated feed was significantly different.

The survival rate in the present study was high in commercial based feeds (T_1 and T_2)

and low in T_3, thus acceptance of formulated feeds depend on the feed composition, size, texture and flavor as with the case in sophisticated industries where these are highly bounded and crushed thus not easily disintegrated. Whereas locally formulated feeds are easily disintegrated and can lead to the pollution of the tank water easily.

The finding showed that the highest fish production was observed in T_1 followed by T_2 but from simple economic analysis T_3 generate maximum income to a farmer due to its low feed cost and relatively reliable weight gain.

Conclusion

Increasing cost of feed is the major constraints to most farmers. Therefore substitution of commercially based feed is essential for lowering production cost. However, this study showed that commercially based feed performed better in term of growth performance and survival rate while locally formulated feed are more economical and profitable. This study also recommends the use of locally formulated feed by substituting fish meal with desert locust for fish farmers in the studied area.

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