

## Comparative Growth Performance of *Clarias gariepinus* Fingerlings Feed with Coppens and Dizengoff Feed

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### Abstract

Growth performance of African catfish, *Clarias gariepinus* dizengoff feed was carried out as a comparative study with Coppens commercial feed for 28 days in plastic tanks. Two group of 50 finger lings with a mean weight of  $1.68 \pm 0.4$  and  $1.64 \pm 0.3$  g were stocked in two circular plastic tanks, of 30 l capacity labelled D<sub>1</sub> and D<sub>2</sub>. Fish in unit D<sub>1</sub> were fed Coppens feed while fish in tank D<sub>2</sub> were fed dizengoff feed twice daily at 3% of their body weights. Growth performance indices showed that weight gain (g), growth rate (GR), specific growth rate (SGR) and mean growth rate (MGR) of *C. gariepinus* fed dizengoff feed was not significantly different ( $P > 0.05$ ) from fish fed Coppens feed. Protein efficiency ratio (PER) for Coppens was  $1.60 \pm 0.02$  and that of dizengoff was  $1.40 \pm 0.01$ . Food utilisation indices showed that fish fed dizengoff feed consumed significantly ( $P < 0.05$ ) more feed 2.65 kg than fish fed Coppens feed 2.60 kg whereas food conversion ratio (FCR) was not significantly different ( $P > 0.05$ ). Proximate analysis of the dry matter of the two experimental feeds showed that moisture content, fat content, crude fibre content, ash content, carbohydrate and Caloric value (C/V) were significantly different ( $P < 0.05$ ) while crude protein content was not significantly different ( $p > 0.05$ ). The cost analysis also shows that dizengoff feed is less cost than coppens feed. Physicochemical parameters including water temperature (°C), pH, dissolved oxygen (mg/L) and ammonia (mg/L) were controlled within the acceptable range for fresh water fish culture. Based on these findings, it was concluded that dizengoff has competed favourably with Coppens feed in growth performance and food utilisation of *C. gariepinus*. Dizengoff feed is recommended on the basis of list cost and affordability as a substitute for Coppens commercial feed for *C. gariepinus* production.

**Keywords:** Coppens feed; Dizengoff feed; Growth performance, *Clarias gariepinus*; Cost analysis and Makurdi

### Introduction

African mud catfish, *Clarias gariepinus* [1], a member of the *Clariidae* family is one of the hardy and simplest fish to propagate. This species is scale less with rounded caudal fin and poorly developed eyes. It is an economically important fish food; the most cultured and studied aquacultural species in Nigeria. African cat fish has been farmed in Nigeria for a long time now Adebisi and Anthony [2] reported that evaluation of growth parameters and nutrient utilization of fish was based on weight gain, protein intake, protein efficiency ratio, specific growth rate, nitrogen metabolism and carcass analysis. Best growth and nutrient utilization are obtained with the control diet.

Traditional fish farming used extensive methods where the animal obtained their entire nutrient from the aquatic environment in which they were culture. By early in the twentieth Century, the culture techniques had progress to stocking fish at densities higher than could be supported by the natural productivity. The nutrients inputs into the culture system were limited to fertilizers and crude agriculture and animal products or by-products. Recently, as a result of high demand for fish and fish products, fish farmers employed modern facilities, equipments, and technology to obtained significant higher yield per unit area. High production levels depend on good nutrition as well as proper culture management. The quality and quantity of feed used are the major factors in determining profitability because feed represent the largest single expenditure in semi-intensive or intensive culture operation. Fish feed has constantly remained the single most expensive item in fish production this situation is further aggravated by the soaring price of the commercially prepared fish feeds [3]. Thus, economic production depends on availability of least-cost nutritionally balanced diet. According to Manissey et al. [4], nutrient value of feed plays a major role in reproductive and growth performance of fish. Muchlisin

et al. [5] also reported that growth performance of fish is dependent on feed. Different brand of feed have been used to feed *Clarias gariepinus*, some of the feed brand include Yubao feed, Shangpin feed, weiyie feed, clever feed etc. The two brand of feed commonly used in Nigeria today are coppens and dizengoff feed. Cost of fish feed is one of the major operational cost in fish farming, and its account for over 60% of the total cost of fish production. Therefore there is need to evaluate the use of either coppens or dizengoff feed for feeding *Clarias gariepinus*.

### Material and Methods

#### Acclimatization

One hundred and fifty fingerlings of *Clarias gariepinus* of initial weight of  $1.68 \pm 0.4$  and  $1.64 \pm 0.3$  g were used for the experiment after acclimatizing them for seven days in a dechlorinated tap water at Fisheries and Aquaculture farm of Federal University of Agriculture Makurdi. The fingerlings were given fish meal throughout the period of the acclimatization.

#### Diet test

Fifty fingerlings were stocked in two plastic tanks of 30 litres

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capacity each, and labelled D1 and D2, after conducting the proximate analysis of the diets. The fingerlings were fed coppens for D1 and dizengoff for D2 at 3% body weight twice daily for the period of twenty eight days. Growth parameters Such as Weight gain, feed intake, Specific Growth Rate (SGR), Protein Efficiency Ratio (PER), and Feed Conversion Ratio (FCR) were taken weekly and calculated as described by the formulae used by Brown [6], Omitoyi [7]. Data collected were subjected to statistical analysis (SPSS version 2.0)

### Water quality parameters

Daily water quality parameters were also monitored during the course of the experiment. Water quality parameters such as Dissolved oxygen, temperature, Ammonia, and conductivity were obtained using the methods described by APHA.

### Cost analysis

Cost price and economic analysis of each diet used for the experiment were also recorded and calculated., mean were also separated using Duncan multiple range test at 5% level of significant, Duncan [8-11].

### Result and Discussion

Proximate analysis of the experimental diet is shown in Table 1. At the end of 28 days period of the experiment, the mean total body weight of fish fed with coppens at 3% body weight increase from 1.64 ± 0.03 to 6.30 ± 0.02 g, and the 1.68 ± 0.4 to 6.10 ± 0.03 g. Mean total weight increase was 3.00 g and 2.50 g for D1 and D2 respectively. The mean total length increase from 7.13 ± 77 to 10.10 ± 13 cm and 7.11 ± 80 to 9.99 ± 14 cm for D1 and D2 Table 2. There is an increase of 3.61 cm and 3.56 cm for D1 and D2 respectively.

The analysis of growth performance of the two tested diet is shown in Table 3. Growth performance indices showed that weight gain (g), growth rate (GR), specific growth rate (SGR) and mean growth rate (MGR) of *C. gariepinus* fed dizengoff feed was not significantly different (P>0.05) from fish fed Coppens feed. Protein efficiency ratio (PER) for Coppens was 1.60 ± 0.02 and that of dizengoff was 1.40 ± 0.01. Food utilisation indices showed that fish fed dizengoff feed consumed significantly (P<0.05) more feed 2.65 kg than fish fed Coppens feed 2.60 kg whereas food conversion ratio (FCR) was not significantly different (P>0.05).

Parameters	Coppens (D1)	Dizengoff (D2)
Moisture	12.4	12.2
Crude protein	44.22	43.4
Ether extract	12	11.9
Ash	4.5	4.7
Crude fibre	2.7	2.9

Table 1: Proximate analysis of the experimental diet.

Treatment	Total Body weight(g)	Standard length(cm)	Total Length (cm)
D1 (week1)	1.68 ± 0.05 <sup>a</sup>	6.20 ± 90 <sup>a</sup>	7.13 ± 77 <sup>a</sup>
D2 (week1)	164 ± 0.03 <sup>b</sup>	6.10 ± 77 <sup>b</sup>	7.11 ± 80 <sup>b</sup>
D1 (week2)	2.72 ± 0.04 <sup>b</sup>	7.12 ± 78 <sup>a</sup>	7.67 ± 87 <sup>b</sup>
D2 (week2)	2.65 ± 0.03 <sup>a</sup>	6.98 ± 91 <sup>b</sup>	7.44 ± 88 <sup>a</sup>
D1 (week3)	3.83 ± 0.04	8.10 ± 12 <sup>a</sup>	9.11 ± 23 <sup>a</sup>
D2 (week3)	3.91 ± 0.03 <sup>a</sup>	7.80 ± 03 <sup>b</sup>	8.98 ± 12 <sup>b</sup>
D1 (week4)	4.92 ± 0.03 <sup>a</sup>	9.12 ± 23 <sup>a</sup>	10.10 ± 13 <sup>a</sup>
D2 (week4)	4.82 ± 0.02	8.90 ± 11 <sup>b</sup>	9.99 ± 14 <sup>b</sup>

Table 2: Mean Standard Length, Total Length and Weight Gain of *Clarias gariepinus* Fingerlings Feed with Coppens and Dizengoff feed.

Parameters	D1	D2
Mean initial weight(MIW)	1.68 ± 0.05	1.64 ± 0.03
Mean final weight(MF)	4.92 ± 0.03	4.82 ± 0.02
Mean weight gain(MWG)	3.24 ± 0.02	3.64 ± 0.01
Specific growth rate(SGR)	3.84 ± 0.02	3.75 ± 0.01
Feed conversion ratio(FCR)	0.20 ± 0.01	0.21 ± 0.02
Protein efficiency ratio(PER)	1.60 ± 0.02	1.40 ± 0.01
Economic gain(total cost in kobo of food consumed by fish per weight gain)	40.12 kobo/mg	26.94 kobo/mg

Table 3: Analysis of the Growth Parameters of *Clarias gariepinus* fed with Coppens and Dizengoff feed at 5% Biomass for 28 days.

Week	Temperature	pH	DO (ml/l)	Ammonia	Conductivity (Ucms <sup>-1</sup> )
1	29.20 ± 0.20	6.10 ± 0.10	4.90 ± 0.30	0.034 ± 0.10	54.36 ± 0.23a
2	30.00 ± 2.00	6.67 ± 0.12	5.70 ± 0.10	0.033 ± 0.13	54.23 ± 0.32b
3	29.40 ± 0.40	7.01 ± 0.23	5.80 ± 0.20	0.032 ± 0.21	54.34 ± 0.33a
4	28.9 ± 0.80	6.30 ± 0.12	5.60 ± 0.20	0.033 ± 0.11	53.54 ± 0.11b

Table 4: Weekly Record of Mean Water Quality Parameters.

Base on the economic analysis of the two feeds, the total coppens consumed by the fish is 2.60 kg.

Cost of coppens is ₦500/kg

$$\text{From the formula } \frac{\text{Total cost of feed consumed}}{\text{Mean weight gain}} = \frac{260 \text{ kg} \times 500}{3.24 \text{ kg}}$$

Express the values in kobo and milligram we have

$$\frac{13,0000 \text{ kobo}}{3240 \text{ kg}} = 40.123 \text{ kg / mg}$$

Express the value in naira and grams we have 0.40/fish

For dizengoff, 2.65 kg was used.

Cost of 1 kg of dizengoff is ₦370/kg

$$\text{From the formula } \frac{\text{Total cost of feed consumed}}{\text{Mean weight gain}} = \frac{2.65 \text{ kg} \times 370}{3.64 \text{ kg}}$$

Express the values in kobo and milligram we have

$$\frac{98050 \text{ kobo}}{3640 \text{ kg}} = 26.94 \text{ kobo}$$

In naira we have ₦0.27/fish

The current market price of coppens feed per kg is ₦500.00 than the price of dizengoff feed per kg ₦370.00. However, dizengoff being cheaper than coppens feed can give almost the same performance in hatchery condition as coppens.

Physicochemical parameters including water temperature (°C), pH, dissolved oxygen (mg/L) and ammonia (mg/L) and conductivity were controlled within the acceptable range for fresh water fish culture Table 4.

### Conclusion

Dizengoff feed can be use in hatchery for fingerlings production since the growth performance of fingerlings feed with dizengoff feed is almost the same with that of coppens feed. Also from the cost analysis, dizengoff feed is cheaper than coppens feed so farmers can maximised their profit using dizengoff feed.

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