# ANALYSIS ON THE COST BENEFIT OF *CLARIAS GARIEPINUS* (BURCHELL, 1822) HATCHLINGS FED BAKER'S YEAST, EGG YOLK AND MILK POWDER AS STARTER DIETS

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**ABSTRACT**

*Analysis on the cost benefit of Clarias gariepinus hatchlings fed baker's yeast, egg yolk and milk powder as starter diets was carried out at the National Biotechnology Development Agency, Katsina state for the period of three (3) months. The aim was to evaluate the cost benefit analysis of Clarias gariepinus fry fed Fed baker's yeast, egg yolk and milk powder in the form of a feed. Feeding trial involved using four different food items: shell-free Artemia as control ($T_0$), baker's yeast ($T_1$), chicken egg yolk ($T_2$) and powdered milk ($T_3$). The results showed that treatment 2 (T2-egg yolk) showed relatively higher mean yield cost/fry similarly it has the highest profit index compared with the control, T1 and T3 respectively. Production costs of C. gariepinus fry across all the treatment was (₦/fry) 2.80. Higher weight gain was observed in the control (1.52g) followed by treatment 3. Clarias gariepinus hatchlings shown to have higher growth potentials by average cost of production when fed egg yolk at early stage of development.*

**Key words: Artemia, Cost, Feed, Hatchlings and Models**

## INTRODUCTION

Aquaculture plays an important role in food security and poverty alleviation worldwide because of its ability to provide freshwater fish, which, although mainly consisting of low-value species in terms of market value, provide food on the table and increases nutritional variety. Aquaculture could play an important role in meeting the needs of people in terms of food now and in the future. Fish farming is mainly practiced by smallholders with an average production in 2011 of around 3 tons/ha (Rothuis *et al.*, 2011). The number of farmers practising aquaculture on a commercial and intensive scale is expected to rise as the government continues to encourage adoption of aquaculture as an income generating activity.

The cost-benefit analysis of African mud catfish farming is a topic that has garnered significant attention in recent years. While some argue that the economic benefits outweigh the potential environmental costs, it is essential to consider the long-term consequences of this practice.

According to Mafra *et al* (2017) it is important to first understand potential costs and benefits as well as possible challenges in aquaculture. Increasing demand for fish in global markets and the complex networks that affect the supply and prices of fish are influencing aquaculture production both at national and local levels. Countries are now faced with challenges to improve efficiency and effectiveness of their production. Therefore, there are both opportunities and challenges which need to be addressed (Mwamunye *et al.*, 2012).

## MATERIALS AND METHODS

### Study Area

The study was carried out at the hatchery room of the Aquatic Bio-Resources unit of the National Biotechnology Development Agency (Bio-resources Development Centre) Katsina, Katsina State. The state lies between latitude 11° 7' and 13° 22' north and longitude 6° 52' and 9° 2' east. It has a total land area of about 23,930 km², with an estimated human population of 5.2 million of which majority live in the rural areas. The fry for experiment were bred at the hatchery room of Aquatic Bio-Resources unit of

the Bio-Resources Development Centre, Katsina. The fry were 4 days old at the commencement of the feeding trial.

**Experimental Diets**

The feeding trial involved using four different food items: shell-free *Artemia* which served as the control ($T_0$), baker's yeast ($T_1$), and chicken egg yolk ($T_2$) and powdered milk ($T_3$). The shell-free *Artemia* used for this study was obtained from feed suppliers at Katsina, while the baker's yeast, chicken egg and powdered milk were all purchased from the Katsina Central Market.

**Experimental Design**

Each of the diets were fed to *C. gariepinus* fry (n = 1,200; 0.28±0.0g) in triplicate making a total of 12 plastic hatchery tanks (semi flow - through system) i.e. (n = 100 per tank). Water quality parameters such as; pH, dissolved oxygen (DO), temperature and ammonia were monitored weekly. Fry were fed 6 times daily between the hours of 07:00 and 23:00 at regular interval for a period of 28 days at a fixed feeding rate of 10% body weight as recommended by Ukwe *et al.* (2018). The initial body weight of each set of fry was measured using a digital weighing balance before stocking and subsequently bulk weighing of fry in each tank was done after every 7 days, the growth performance parameters were monitored, while the cost benefit was evaluated.

**Cost - Benefit Analysis of *C. gariepinus* Hatchlings Fed baker's yeast, egg yolk and milk powder**

The cost - benefit analysis of the *C. gariepinus* fry diet (**baker's yeast, egg yolk and milk powder**) were calculated using the method of Sogbesan and Ekundayo (2014) as follows:

$$\text{Investment cost analysis (ICA)} = \text{cost of feed (₦)} + \text{cost of fry stocked (₦)}$$

$$\text{Profit index (PI)} = \text{net profit (₦)}/\text{cost of feed (₦)}$$

$$\text{Incidence of cost (IC)} = \text{cost of feed (₦)}/\text{weight of fish produce (g)}$$

$$\text{Benefit cost ratio (BCR)} = \text{net profit (₦)}/\text{investment cost analysis}$$

Cost benefit analysis was based on the following:

i. A major assumption was that all other operating costs for the *C. gariepinus* fry production remained the same for all the dietary treatments. Thus, cost of feed was the only economic criterion (expenditure) considered in this study.
ii. Cost of feed was based on the prevailing market prices of the *C. gariepinus* fry feed as at the time of purchase (that is time of commencement of the experiment).
iii. Value of *C. gariepinus* fry produced (cost of fish cropped) depends on the selling price of *C. gariepinus* fry per gram (10/g) in the markets around Katsina as at the end of the experiment.
iv. Cost of producing baker's yeast, egg yolk and milk powder diet depended on the cost of obtaining the baker's yeast, egg yolk and milk powder.
v. Total weights of *C. gariepinus* fry produced were obtained from the total weight of fish recovered at the end of the feeding trial.

**Statistical Analysis**

The data collected were analysed using the cost benefit analysis models and the results were presented in tables.

**RESULTS**

Table 1 below explored the results of costs analysis of C. gariepinus fed different diet. Among the three (3) treatments, treatment 2 (T2-egg yolk) showed relatively higher mean yield cost/fry similarly it has the highest profit index compared with the control, T1 and T3 respectively. In other hand the production cost of C. gariepinus fry across all the treatment was the same (₦/fry) 2.80. Higher weight gain was observed in the control (1.52g) followed by treatment 3.

**Table 1: Benefit Cost Analysis of *Clarias gariepinus* Fry Fed baker's yeast, egg yolk and milk powder**

| Parameters | $T_0$ | $T_1$ | $T_2$ | $T_3$ |
|---|---|---|---|---|
| Mean cost of feed/g (₦) | 4.30 | 2.90 | 2.90 | 3.50 |
| Cost of fry (₦/fry) | 2.80 | 2.80 | 2.80 | 2.80 |
| Investment cost analysis (₦) | 7.10 | 5.70 | 5.70 | 6.30 |
| Mean final weight (g/fry) | 1.52 | 1.18 | 1.50 | 1.48 |
| Cost of fry/g (₦) | 10.00 | 10.00 | 10.00 | 10.00 |
| Mean yield cost/fry (₦) | 15.20 | 11.80 | 15.00 | 14.80 |
| Mean net profit (₦) | 8.10 | 6.10 | 9.30 | 8.50 |
| Profit index | 1.83 | 2.10 | 3.20 | 2.42 |
| Incidence of cost (₦) | 2.82 | 2.45 | 1.93 | 2.36 |
| Benefit cost ratio | 1.14 | 1.07 | 1.63 | 1.34 |

$T_0$ - Shell-free *Artemia*
$T_1$ - Baker's yeas
$T_2$ - Chicken egg yolk
$T_3$ - Powdered milk

## DISCUSSION

**Benefit Cost Analysis of *Clarias gariepinus* hatchlings Fed baker's yeast, egg yolk and milk powder was presented in** in Table 1. Hatchlings fed egg yolk (T2) feed has the highest profit index (3.20) similarly benefit cost ratio T1 (Baker's yeast) was the lowest value of 1.14 and highest is T2 1.63.

The benefit cost ratio values; 1.07 – 1.63 obtained from this study were less than the values; 1.41 – 1.55 reported by Mohammed *et al.* (2020) for masculinising *Oreochromis niloticus* using camel testicles - based diet. The least (better) incidence of cost value; Cost of fry/g (₦) production across the whole treatments were ₦10 was recorded from the fry fed diet $B_2$, while the highest (poor) value; (₦2.78) was recorded from the fry fed diet $B_4$. The incidence of cost values; ₦1.93 – ₦2.82 obtained from this study were higher than the values; ₦0.61 – ₦0.84 reported by Ali (2022) for *Clarias gariepinus* fingerlings fed dietary β - glucan additive diet. The variation in the values may be ascribed to the variance in the cost of feed ingredients and other input cost used in the studies. According to Babale (2016) if the benefit cost ratio is greater than one or equal to one it indicated a profit, but less than one shows lack of viability or unprofitability of the venture. Since the ratio in all the diets is greater than one, therefore it is considered that, the incorporation of using any of the treatments for raising hatchlings of *Clarias gariepinus* profitable, although Treatment 2 showed more effectiveness in terms of past growth and profit index.

## CONCLUSION

In conclusion using egg yolk to raise hatchlings is expensive but the growth (weight gain) was relatively higher after the control (free shell Artemia) which implies that past growth efficiency and availability of the egg yolk as an advantage. *Clarias gariepinus* hatchlings shown to have higher growth potentials by average cost of production when fed egg yolk at early stage of development.

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