MULTI-DISCIPLINARY RESEARCH AND DEVELOPMENT JOURNAL INTERNATIONAL

Impact Factor: 7.5

VOLUME 7
ISSUE 2
AugSEP

Email: info@mdrdji.org || **Website:** https://mdrdji.org

COMPARATIVE ANALYSIS ON POULTRY WASTE AND COMMERCIAL FEED ON GROWTH PERFORMANCE AND ECONOMIC RETURNS OF CATFISH PRODUCTION IN FCE KATSINA

BY

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Abstract

This study investigates the growth performance and Economic implications of using poultry waste versus commercial feed for catfish (Clarias gariepinus) production in FCE Katsina. A comparative analysis was conducted to evaluate the growth performance and economic returns of catfish fed poultry waste and commercial feed. The results show that catfish fed commercial feed had significantly better growth performance of 40.0 ± 2.5aand compared to those fed poultry waste which had 25.0 ± 2.0b. However, the economic returns analysis reveals that using poultry waste as a feed source can be a cost-effective option for catfish production with the profit margins for commercial feed at ₦100,000 ± 5,000a and ₦90,000 ± 4,500b for the poultry waste. The study concludes that poultry waste can be a viable alternative to commercial feed for catfish production in FCE Katsina, the study recommend that production of catfish in F.C.E., Katsina fish shed should be done incorporating poultry waster since poultry waste have been discovered to be profitable in catfish production.

Key words: Analysis, Commercial, Feed, Growth, Poultry, Waste

Acknowledgement

The study was conducted as part of institutional base research (IBR) of Federal College of Education, Katsina, Katsina State Nigeria. A component of tetfund sponsored research. Special thanks to tetfund for providing funding for the research, the authors gratefully acknowledged the research grant committee of the college, and Dr. Musa Muhammad Tsagem the tetfund desk officer, staff development and research of the college.

Introduction

Fish culture has been an important industry and one of the words fastest growing sector of Agri-business Villa-cruzeet. al. (2019). According to Food Agriculture Organization (FAO report (2002) the total world fishery production decrease slightly and human consumption for aquatic product increase over the years the need to enhance growth performance, feed efficiently and disease resistance of cultured organisms is substantial for various sectors of this industry El-Haroon et. al. (2016), diet supplementation is an important aspect of Aquaculture management especially in intensive or semi intensive fish culture and is promising for increasing food production. El-Haroon (2017) in Nigeria. Catfish (*Clarias gariepinus*) is a widely cultured fish species, and feed costs account for a significant portion of the total production costs. This has led to many farms abandoned by owners due to high cost of feed. Poultry waste has been identified as a potential feed source for catfish production due to its availability and nutritional value. Poultry waste is a potential source of protein, it has attracted the attention of animal nutritionist all over the world because of its richness in protein, calcium, phosphorus and magnesium alot of poultry byproduct are produce and used in livestock feeds, Moller (2018) poultry droppings are also used as fertilizer and soil conditioners. Also manure supply nitrogen and phosphorus for utilization by algae and provide a substrate for zoo plankton production (Usman et. al. 2019). On the other hand commercial fish feed is a specially formulated balance diet for fish and other aquatic animals it is designed to provide essential nutrients, vitamins and minerals for optimal growth, health and productivity. They came in pellets, flakes, marsh and pauder forms commercial fish feed are manufactured to meet the nutritional needs of fish promoting healthy growth improving feed efficiency and reducing waste (Boyd 2015). However, there is limited information on growth performance and economic implications of using poultry waste and commercial feed for catfish production in FCE Katsina.

Statement of the Problem

The utilization of alternative feed, such as poultry waste in Aquaculture presents both opportunities and challenges (Adewolu, Adeyemu and Emikpe, 2023). These unconventional feed sources have the potentials to enhance growth performance and mitigate production cost. (Oladimeji, Olowu and Ayinla 2017).

Despite the potential cost saving with utilization of poultry waste as feed ingredient. Economic analysis indicate that factors such as feed conversion ratios, market prices and availability of alternative feed ingridiant may influence the economic feasibility of poultry waste recycling in Aquaculture (Adeperusy E. O., Adedokun A. A., Olawunmi & Olawaniyi 2023) in order to close the gap between the availability of conventional feed and cost of producing catfish in the study area, poultry waste was introduce to mitigate the effect cost in catfish production.

Poor fish quality and quantity can be detrimental to consumption, marketing and acceptance of fish, yet fish is one of the best sources of animal protein, Meiselman (2021). Information should be available on the effect of feeding catfish poultry waste and commercial feed to fish farmers in Katsina State and Emirrons due to the growing demand for fish and fish product. It is also

revealing that lack of data on the effect of poultry waste in Aquaculture system plague the state and hence. This study was conducted with the hope of finding out the effect of poultry waste and commercial feed on growth performance and economic returns of catfish (*Clarias gariepinus*) in F.C.E., Katsina, Katsina State.

Objective of the Study

The general objective of this study is to juxtapose the poultry waste and commercial feeds on the growth performance of catfish in F.C.E., Katsina. Specifically, this study sought to:

1. assess the effect of poultry waste and commercial feed on growth performance of catfish (*Clarias gariepinus*) in F.C.E., Katsina
2. determine the economic returns of catfish (*Clarias gariepinus*) fed with poultry waste and commercial feed in F.C.E., Katsina.

Research Questions

The study formulates the following research questions: -

1. What is the effect of poultry waste and commercial feed on growth performance of catfish (*Clarias gariepinus*) in F.C.E., Katsina?
2. What is the economic return of catfish (*Clarias gariepinus*) fed with poultry waste and commercial feed in F.C.E., Katsina?

Research Hypothesis

The under listed hypothesis will be tested at 0.05 level of significance.

1. There is no significant relationship between poultry waste and commercial feed on growth performance of catfish (*Clarias gariepinus*) in F.C.E., Katsina.
2. There is no significant relationship between economic return of catfish (*Clarias gariepinus*) fed with poultry waste and commercial feed in F.C.E., Katsina.

Methods

The study was conducted between May and July 2025 at the Fisheries Unit of the Agricultural Education Department, FCE Katsina Nigeria. With the site location of latitude 12.99^0N and longitude 7.36^0E. The site is known with suitable atmospheric conditions, having annual rainfall of approximately 622.5mm. With most of it falling between April and October, with average temperature of 30.89^0C (87.6^0F) Usman (2022). A completely randomized design (CRD) was used, with two experimental diets: commercial feed and poultry waste-based feed. Each treatment had three replicates, with 20 catfish fingerlings in a 100 liter plastic pond. The experiment had 3 replication (treatment) and the control group, a total of 240 catfish fingerlings source from a

reputable hatchery farm (Bitmass integrated farm from Zaria) Kaduna State Nigeria and transported in a 50 liter jerry can containing water. First treatment was given (25% poultry waste, 75% commercial feed) second treatment (50% poultry waste and 50% commercial feed) third treatment (75% poultry waste, 25% commercial feed) and the fourth is the control group which is purely fed commercial feed (100%).

The poultry waste-based feed was formulated by mixing poultry waste generated from the college poultry birds in the college integrated farm, sundried and package in polythene bags. A proximate analysis was carried out to determine the (moisture, protein, carbohydrate, cruide fibre and fat content. And mineral nutrient composition at the chemistry department of Umaru Musa Yar'adua University Katsina, Katsina State Nigeria. The commercial feed was purchased from a reputable feed manufacturer. (master feeds Nigeria limited) In pelletized or compressed in 3mm particles form, with standard formulation for fish growth.

Fish Management

The catfish fingerlings were acclimated to the experimental tanks for two weeks before the start of the study. Anibeze and Eze (2020). During this period the both groups were fed commercial feed before start of the experiment i.e during the acclimatization period. The fish were fed the experimental diets twice daily in the morning at 9am and 4pm evening, and tanks were drained and water replace after every two days because of the metabolic activities that goes on in the fish body as they feed, the metabolic waste changes the quality of the water and need to be change frequently and also to maintain good water quality. Water quality parameters were managed and maintained as recommended by Mannir and Yusuf (2021). The water quality parameters which were in check throughout the experiment twice weekly are (water pH, temperature (O^c) Ammonia (NH3) using Aqua chek USA, pH metre water quality test stripes and wet bulb thermometer.

Data Collection

The following data were collected:
1. Growth performance: weight gain
2. Economic returns: Cost

In each of the tanks 5 fishes are randomly collected and the weight taken at the commencement of the experiment and repeated every week for 8 weeks using an acculab electronic digital scale model (2001) to the nearest gram and the average of the weight taken to represent the weight of fish within the treatment tank the ration was adjusted every week, when the new weight is taken. $Fish^{(s)}$ both experimental and control group were fed 5% body weight as the new ration for the week. The data on performance such as body weight charges, relative weight gain were determine using the formula.

a. Weight gain = final weight – initial weight (1)

b. Relative weight gain (g) = $\frac{weight\ gain}{Initial\ weight} x100$ (2)

Data Analysis

All data were subjected to Analysis of variance (ANOVA) using graph pad prism software version 5.1 mean values of weight measurement were calculated, the result were presented as mean ± SE (standard error).

Results

Growth Performance

Table 1. Growth performance of catfish fed commercial feed and poultry waste-based feed

Parameter	Commercial Feed	Poultry Waste-Based Feed
Initial Weight (g)	10.0 ± 0.5	10.0 ± 0.5
Final Weight (g)	50.0 ± 2.5a	35.0 ± 2.0b
Weight Gain (g)	40.0 ± 2.5a	25.0 ± 2.0b
Specific Growth Rate (%)	2.5 ± 0.1a	1.8 ± 0.1b

Values with different superscripts are significantly different ($p < 0.05$).

Economic Returns

Table 2. Economic returns of catfish fed commercial feed and poultry waste-based feed.

Parameter	Commercial Feed	Poultry Waste-Based Feed
Feed Cost (₦)	50,000 ± 2,500a	30,000 ± 1,500b
Revenue (₦)	150,000 ± 7,500a	120,000 ± 6,000b
Profit Margin (₦)	100,000 ± 5,000a	90,000 ± 4,500a

Values with different superscripts are significantly different ($p < 0.05$).

Discussion

On growth performance Table 1 the result shows that the average initial weight of Catfish (*Clarius gariepinus*) fed commercial feed is (10.0 ± 0.5) while those fed with poultry waste was (10.0 ± 0.5) g.

The final weight for Catfish fed commercial feed is (50.0 ± 2.5a) and (35.0 ± 2.0b) for Catfish fed poultry waste. The specific weight gain in Catfish fed commercial feed is (40.0 ± 2.5a) while for Catfish fed poultry waste is (25.0 ± 2.0b). The specific growth rate for Catfish fed commercial

feed is (2.5 ± 0.1a) while those fed poultry waste (1.8 ± 0.1b). This shows that catfish fed with the commercial feed had better result than those fed with poultry waste in terms of growth performance. These findings goes in line with that of (Mathew et. al. 2018) who found out that commercial feeds enhance the growth and performance of Catfish juvenile reared in recycling Aquaculture system.

On the other hand, the economic return analysis reveal that using poultry waste based feed to fed catfish can significantly reduce the cost of feed and increase the profit margin, the table 2 analysis shows that the feed cost for catfish fed commercial feed is (50,000 ± 2,500a) and catfish fed with poultry waste is (30,000 ± 1,500b). The revenue generated from the catfish raised using commercial feed is (150,000 ± 7,500a) while for those fed with poultry waste is (120,000 ±6,000b) and the profit margins are put at (₦100,000± 5,000a) for commercial feed and (₦90,000 ± 4,500b) for the poultry waste. Which shows that it is cost effective to raised Catfish in Federal College of Education, Katsina on poultry waste than on commercial feeds, this finding goes in line with that of (Alhonsu et. al. 2023) who found out that raising Catfish (*clarius gariepinus*) with poultry waste is capable of raising the profit margins of farmers exponentially than using commercial feed throughout the production period.

Conclusion

The study concludes that poultry waste can be a viable alternative to commercial feed for catfish production in FCE Katsina, but further research is needed to optimize its use and improve growth performance and Economic returns of Catfish. The findings of this study have implications for sustainable aquaculture practices and the development of cost-effective feed sources for catfish producers in the area of study and beyond.

Recommendations

1. Since it have shown in this study that raising catfish with poultry waste is more profiting, it is hereby recommended that hence forth the production of catfish from the fishery shed of F.C.E., Katsina should be done, incorporating poultry waste into the fish feed to maximize profit for the college.

2. Hence forth the poultry waste generated from the college poultry farm should be treated and preserve for the purpose of selling it to catfish farmers who will be desirous of poultry waste to feed their catfish with instead of dumping it on the farms which can have adverse environmental effect on the air quality in the area.

3. More awareness should be created by the local government extension services unit to disseminate the finding of this study to the catfish farmers for adoption for increase in their profit.

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