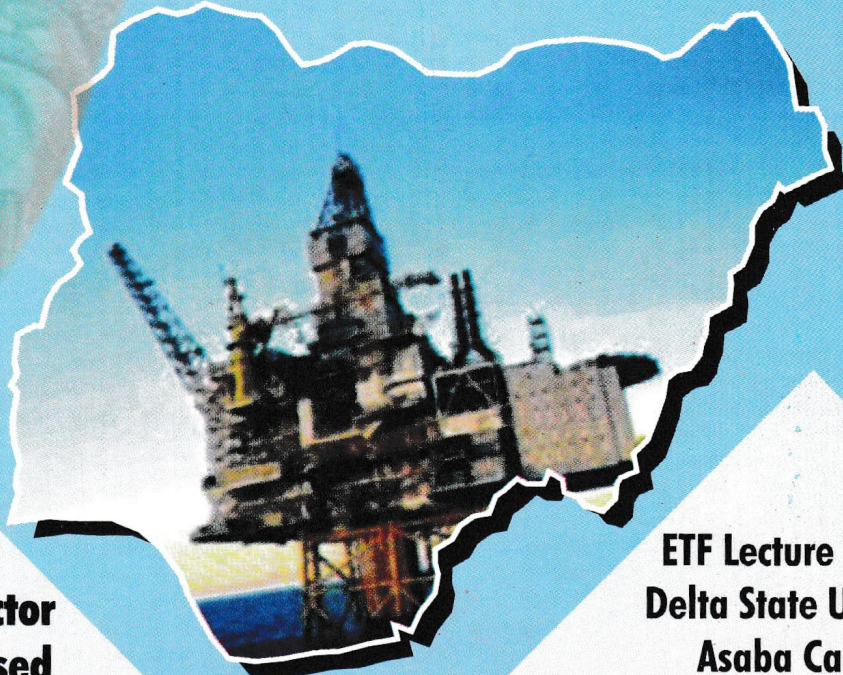


Proceedings of the  
**30<sup>th</sup>**  
**ANNUAL CONFERENCE**  
*of the*  
**FISHERIES SOCIETY OF NIGERIA**  
**(FISON)**  
**DELTA 2015**



**THEME**

**The Fisheries Sub-sector  
in a Declining Oil-based  
Economy:**

Paradigm Shift for Economic  
Diversification and Employment  
Generation

ETF Lecture Theatre,  
Delta State University,  
Asaba Campus,  
Asaba, Delta State.

---

22nd - 27th  
November, 2015

Proceedings  
*Of the*  
30<sup>th</sup> Annual Conference  
*of*  
**FISHERIES SOCIETY OF NIGERIA**  
**(FISON)**  
Held at  
ETF Lecture Theatre,  
Delta State University, Asaba Campus,  
Delta State

23<sup>rd</sup>-27<sup>th</sup> November, 2015.

**“DELTA 2015”**



Published by

Fisheries Society of Nigeria

Old College Road, Wilmot Point Road, Ahmadu Bello Way, Bar Beach Busstop, V.I, Lagos State, P.O.Box 2601, Apapa, Lagos.

Email: fison2011@yahoo.com. fison1976@gmail.com. www.fison.ng.org.

Tel: 08023325185, 08023515803, 08185477818

**Estimating Profitability of African catfish (*Clarias gariepinus*) fed Commercial Pelleted Feed Supplemented with Live Tilapia Fry (*Oreochromis niloticus*) in a Simulated Polyculture System**

*Okoko, A. C., Ofor, C. O. and C. A. Uwem*

**Abstract**

A 10 month trial was conducted to assess the economic viability of nine hundred African catfish, (*Clarias gariepinus*) fingerlings of mean weight  $7.31 \pm 0.25$ g raised in a simulated polyculture system. Concrete tanks of  $2 \times 2.5 \times 1$ m<sup>3</sup> dimension were constructed and stocked at ten fingerlings/unit. The fish were fed diets of commercial pelleted feed (42% protein) supplemented with live tilapia fry at 0% (control), 0.5% (T<sub>1</sub>), 1.5% (T<sub>2</sub>) and 2.5% (T<sub>3</sub>) inclusion levels. The diets were fed thrice daily in triplicates. The indicators of the Profitability determined were; Net Present Value (NPV), Benefit Cost Ratios (BCRs) and Internal Rate of Returns (IRR). A sensitivity analysis on survival rates, cost of feed, cost of fingerlings and sales price were also conducted. The results revealed a survival rate of 100% and mean weight gain of  $1506.56 \pm 210$ g at 2.5% tilapia inclusion level. The economic analysis showed a positive NPV and IRR of 16.76, 17.15, 17.04 and 17.83 for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. The benefit/cost ratio of the project was 0.40, 0.88, 1.03 and 1.23 for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. The study recommended that commercial fish farms supplement fish feed at higher tilapia inclusion (1.5% - 2.5%) level to reduce feed cost.

**Key words:** *Clarias gariepinus*, internal rate of returns, live tilapia inclusion.

**Introduction**

Fish farming is expanding rapidly throughout the world and has a high potential for provision of valuable protein in less developed countries (Little and Edward, 2003). Due to population increase, demand for high quality animal protein, especially from aquatic sources is rising. Fish culture has been identified as the best alternative to bridging the gap between demand and supply of food fish in Nigeria. According to Samson (1997), fish farming will save the country huge foreign exchange of about N50 billion expended to import close to 700,000 metric tons of food fish annually to cushion the effect of inadequate local supply. Catfish is the most sought after species which is very popular with fish farmers and commands a very good commercial value in Nigerian markets. Catfish/tilapia polyculture has been practiced by fish farmers as a means of reducing feed cost. Studies have also been conducted to assess the profitability, viability and acceptability of catfish farming in Nigeria (Ashaolu *et al.*, 2006) and have been found to be a very good economic activity. However, no study has been conducted to provide information on profitability of catfish farming vis-à-vis live fish feed supplementation levels. This is despite the fact that research on consumption of live feed reveals that there is increased digestibility of pelleted feed when supplemented with live feed (Ofor and Odin, 2014). This still leaves serious questions as to the level of supplementation and profitability with live feed that is suitable for various scales of catfish production to achieve desirable growth (Adewuyi *et al.*, 2010). This study therefore, sought to provide findings that will address this gap with the specific objective to determine the profitability of catfish/tilapia in a simulated polyculture system under different tilapia inclusion levels.

**Materials and Methods**

The study was conducted at government fish farm and hatchery complex in Akwa Ibom State, Nigeria; located between latitude  $4^{\circ} 33'$ ,  $5^{\circ} 35'$  north and longitude  $7^{\circ} 35'$ ,  $8^{\circ} 25'$  east of the equator. Concrete tanks of  $2 \times 2.5 \times 1$ m<sup>3</sup> were constructed and stocked with 900 fingerlings at ten fingerlings per tank. They were fed commercial feed (42% protein) supplemented with live tilapia fry. The experiment was a complete randomized block design with three levels of live tilapia inclusions 0.5%, 1.5%, and 2.5% in triplicates.

Data analysis:

Descriptive analysis were used to achieve the following

Benefit cost ratio:

$$BCR = TR/TC$$

Where TR = Total Revenue

TC = Total cost

Internal rate of returns:

$$IRR = LDF + \text{DIFF BETWEEN THE TWO DFs} \left[ \frac{NPV@ LDF}{\text{ABSOLUTE DIFF * BETWEEN THE TWO NPVs}} \right]$$

LDF = Lower discount factor

\*where absolute difference is the sum of the values ignoring the signs attached.

NPV= Net Present Value

**Results and Discussion**

Data on survival rate is presented in Figure 1. The values for survival rate obtained ranged from 86.67±5.77% (T<sub>0</sub>, T<sub>1</sub>) within 0.5% and 1.5% pelleted feeding level respectively to 100% (T<sub>0</sub>, T<sub>3</sub>) in 0.5, 1.5 and 2.5% pelleted feeding level respectively. In survival rate, only 1.5% pelleted feeding level (PFL), was observed to have significant difference (p<0.05). This implied that the use of live tilapia fry as supplementary feed in the diet of *C. gariepinus* had effect on the survival of the catfish. This was in contrast with the findings of Ofor and Odin (2014) who reported that although mortalities were encountered, the effect of treatment on survival rate was not significant (P > 0.05).

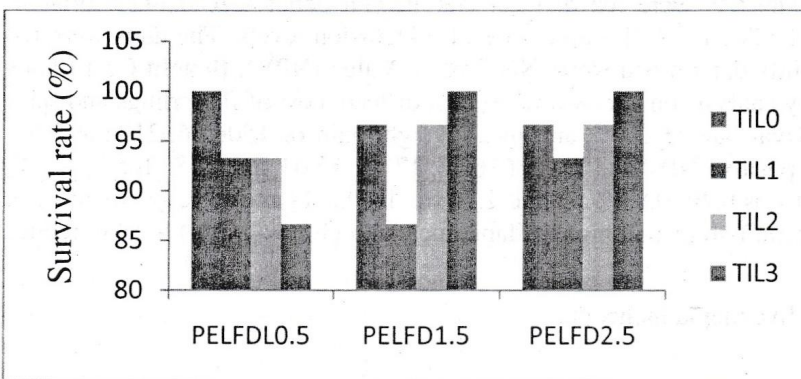


Figure 1: Survival rate of *C.gariepinus* fed commercial pelleted feed supplemented with live tilapia fry in concrete tanks.

Mean final weight is presented in Figure 2. The lowest mean final weight was found in T<sub>0</sub> (459.98±51.87<sup>c</sup>) in 0.5 pfl and was significantly different (p>0.05) from the highest value (1506.56±210.37<sup>a</sup>) observed in T<sub>3</sub> at 2.5PFL. These values were quite higher than those reported by Ofor and Odin (2014) considering the duration, but similar to those recorded by Torrans and Lowell (2001) in the use of live blue tilapia as forage food for catfish. This study demonstrated that the combined diets of commercial pelleted feed and live tilapia fry during feeding trials influenced growth performance, nutrient utilization and efficiency in African catfish (*C.gariepinus*). Unsurprisingly progressive increment during feeding trial gave significant improvement in the growth performance. The best growth for all treatments was observed in fish fed at higher live tilapia inclusion levels (T<sub>3</sub>) within 2.5% pelleted feeding levels.

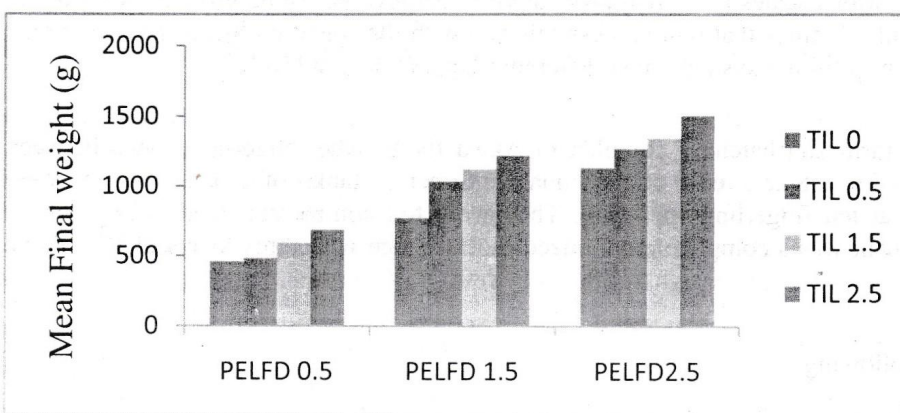


Figure 2: Mean Final weight of *C.gariepinus* fed commercial pelleted feed supplemented with live tilapia fry in concrete tank.

**Table 1: Cost and Returns Structure, Internal Rate of Returns/Suitable Farm Production Scale of *C. gariepinus* fed Commercial Pelleted Feed Supplemented with Live Tilapia At 0.5%, 1.5% and 2.5% Feeding Level**

PFL+TIL(%)	Fish weight(Kg)	Cost (N)	Net returns	NPV 19%	NPV 16%	BCR	IRR	Suitable farm size/production scale
0	44.48	70,764.00	44,076	44076	29312	0.4	16.76	Subsistence scale fish farms
0.5	48.03	32,611.00	3,793	3477.04	161.56	0.88	17.15	Small scale fish farms
1.5	53.46	31,245.16	845.84	651.58	2011.98	1.027	17.04	Small scale fish farms
2.5	62.93	37,758.00	7024.78	4547.42	5240.45	1.23	17.83	Large scale fish farms

The cost and returns structure, internal rate of returns and suitable farm production scale is presented in Table 1. The analysis of benefit cost ratio revealed that the BCR were 0.40, 1.03 and 1.23 at 0% - 2.5% tilapia inclusion levels respectively. This ratio is one concept of discount method of project evaluation. Accordingly in the study of Ashaolu *et al.* (2006), it was reported that any business with BCR greater than 1, equals to 1 or less than 1 indicated profit, break even or loss respectively. From the Table, the break-even point was established at 1.5% pelleted feeding level. The farmer did not gain neither did he suffer loss. The higher the inclusion levels of live tilapia, the better the BCR. By implication, the project was profitable. The internal rate of returns further determines the total percentage of investment that can be obtained when a farmer ventures into this project (Ebong, 2007). The IRR was observed to be 16% which indicated that the business can borrow at interest rates below 16% and be able to repay while the B/C ratios at 1.5(1.027) and 2.5(1.23) supplementation levels showed increasing profitability from the enterprise. The feeding levels also serves as a guide to farmers to choose a suitable farm production scale and goals as seen in this study.

**Conclusion and Recommendations**

The study revealed that catfish production using live tilapia fry as supplemental feed at varying levels is viable at 1.5 – 2.5% presenting varying returns on investment. It was capable of reducing feed cost and enhancing profit depending on production goals. Government should guarantee direct lending institutions to reduce interest rate for fish farming to 10% or less to encourage more investment in the sub-sector. The use of live tilapia fry as supplemental feed depending on farmer’s production goals is recommended. Various levels of operations and their economic implications were ranked for farmers to make informed decisions.

**Acknowledgement**

The authors are grateful to AkwaIbom state Ministry of Agriculture and Natural Resources for partially funding the project.

**References**

Ashaolu, O.F., Akinyemi, A.A., Nzekwe, L.S.O. (2006).Economic viability of homestead fish production in Abeokuta metropolis of Ogun state, Nigeria. *Asset Series A*, 6(2): 209-220

Adewuyi, S.A., Phillip, B.B., Ayinde, I.A., and Akerele, D. (2010).Analysis of profitability of fish farming in Ogun State, Nigeria. *Journal of Human Ecology*, 31(3): 179-184

Ebong, V.O. (2007). Agribusiness Management in a developing economy in Nigeria. *A publication of Department of Agric. Eco/Ext, University of Uyo, Nigeria.*

Little, D.C. and Edwards, P. (2003). Integrated Livestock-fish Farming Systems. *Inland Water Resources and Aquaculture. FAO.*

Ofor, C.O. and Odin, U.E. (2014). Growth and supplemental feed conversion of *Heterobranchus longifilis* fed simultaneously with artificial feed and live prey, during early grow-out. *Journal of Applied Aquaculture*,26:3, 225-231, DOI: 10.1080/10454438.2014.937658

Samson, Y.A. (1997). Introduction to Aquaculture and Fisheries Management in Nigeria. Abeokuta: *Good Education Publishers. Pp. 5 – 7.*