Studies on Comparison of the Most Efficient Fish Culturing Facilities between Collapsible (Tarpaulin) and Concrete Fish Tanks

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ABSTRACT

The Comparison of the Most Efficient Fish Culturing Facilities between Collapsible (tarpaulin) and Concrete Fish tanks were carried out from January, 2023 to April, 2023. The experiment was conducted using two concrete ponds and two tarpaulin tanks. The concrete ponds measured 8 X 4 X 3 and 8 X 4 X 3 feet and the tarpaulin ponds measuring 5 X 4 X 2 and 6 X 4 X 3 feet were used throughout the experiment. The concrete and the tarpaulin ponds were not limed nor fertilized and were stocked with 500 fingerlings each averaging 4.18g and 3.92cm in weight length respectively and the fish were fed at 5% body weight and were randomly sampled monthly. The results indicated that the mean weight gain and the mean length gain of the tarpaulin ponds and concrete ponds were 27.04g, 13.92g and 13.92cm, 9.44cm respectively. The t-cal and t-tab in terms of weight gain were 22.6 and 1.734 and since the t-cal is greater than t-tab there was significance difference on the weight of the cultured fish in the tarpaulin and concrete tanks at $P \geq 0.05$ and the t-cal and t-tab in terms of length gain were 1.13 and 1.734 respectively and the results indicated that t-tab was greater than t-cal and it means there was no significance difference on the length of cultured fish in the tarpaulin and concrete tanks at $P \geq 0.05$.

Key Words: *Comparison, Efficient, Collapsible, Concrete and Fish Tanks.*

INTRODUCTION

It has been projected that aquaculture production can increase production by 60 million metric tonnes by 2050 (Tacon and Forster, 2001). With increase in human population, global per capita consumption of fish is expected to amplify from current rate of 16 kg to 21 kg in 2030 (FAO, 2001 and United Nations, 2005); aquaculture has great potentials of meeting this increased demand. The sector is being regarded as the fastest growing segment of food production in the world with an average annual growth rate of 8.9 % over the last three decades, surpassing both terrestrial livestock meat production and capture fisheries (Dey, *et al.* 2006). It can therefore, contribute to food security in the developing world especially the malnourished population in Africa.

In the entire African region only Egypt has achieved the scale of change observed in Asian countries (FAO, 2006). Nigeria is reported to have maintained its leading position in terms

of volume (30,677) tonnes of US$77,253,000 (Hecht, 2005). FAO reported that fish production in Nigeria increased tremendously from 18,104 tonnes in 1994 to over 85,087 tonnes in 2007 (FDF, 2007). The observed shifts have been attributed to changes in market demand (Shimang, 2006). Within the country much variation can be found in terms of production, consumption, technology, ecosystem type and institutional characteristics. The choice of system used and species grown is increasingly influenced by the emergence of a growing middle-class, urbanization and growth of the export trade in fish and fish products.

METHODOLOGY

Study Area
The project was sited at the Agro Resource Centre of the Department of Agricultural Education of the School of Secondary Education, Federal College of Education (Technical) Omoku. Rivers State.

Research design
The study adopted Randomized Complete Block Design (RCBD) with two treatments replicated four times. The treatments included two sets of fish culturing facilities; Collapsible (tarpaulin) and Concrete Fish tanks. The same type of feed was given to the fish species.

Sample and sampling technique
This consisted of a set of collapsible tarpaulin tanks and a set of concrete fish tanks that were stocked with 500 fingerlings per set, totalling 1000 fingerlings. The fingerlings were fed with the same type and quantity of feed for the culturing period and they were randomly sampled and weighed to determine the weight of the fishes.

Fish species used
African catfish (*Clarias gariepinus*)

Measurement
The weight of fish was determined using sensitive weighing balance and meter rule. The fish were weighed in gram and length measured in centimetres, respectively.

Growth performance parameters
Mean Weight Gain (MWG) in gram
MWG = Wt2 – Wt1

Where

Wt1= initial mean weight
Wt2= final mean weight

Mean Length Gain (MLG) in cm
MLG = Fl2 – Fl1

Where

Fl1 Initial mean length of fish
Fl 2 is the final length of fish
Source: Eyo and Ekanem (2011)

Data Analysis
The data were analysed using t-test at 0.05 significant level.

RESULTS AND DISCUSSION

Table 1: Mean weight (g) of African catfish cultured in tarpaulin fish tanks From January, 2023 to April, 2023.

Growth Parameters	Samples	Total	Mean	MWG
Tarpaulin tanks				
Initial weight	3.51, 3.41, 3.61, 3.4, 3.9, 3.67, 3.2, 3.8, 3.9, 3.66	36.06	3.61	
Final weight	30.55, 29.78, 31.02, 32.01, 31.02, 30.72, 30.55, 27.52, 31.95, 30.37	305.49	30.55	
MWG				27.04g

Table 2: Mean weight (g) of African catfish cultured in Concrete fish tanks From January, 2023 to April, 2023.

Growth Parameters	Samples	Total	Mean	MWG
Concrete tanks				
Initial weight	1.92, 2.59 ,2.91 ,3.41, 2.92, 2.83, 2.58, 2.35, 2.23, 2.54	26.18	2.62	
Final weight	16.5, 16.7, 17.1, 17.02, 16.24, 16.9, 15.92, 15.3, 15.63, 18.06	165.37	16.54	
MWG				13.92

Table 1 shows the initial and final weight gain of African catfish cultured in tarpaulin fish tank from January, 2023 to April 2023. The initial mean weight gain was 3.61g and the final weight gain after the three months' culture period was 30.55g and the Mean Weight Gain (MWG) was 27.04g.

Table 2 shows the initial and final weight gain of African catfish cultured in concrete fish tanks from January, 2023 to April, 2023. The initial mean weight gain was 2.62g and the final mean weight gain was 16.54g and the Mean Weight Gain (MWG) was 13.92g

Table 3: Mean length (cm) of African catfish cultured in Tarpaulin fish tanks From January, 2023 to April, 2023.

Growth Parameters	Samples	Total	Mean	MWG
Tarpaulin tanks				
Initial length	3.9, 4.2, 4.1, 4.1, 4.4, 4.2, 4.2, 4.1, 4.4, 4.2	41.8	4.18	
Final length	14.4, 14, 15.2, 15.3, 15.1, 14.9, 15.2, 14.8, 15.3, 16.1	150.3	15.3	
MLG				13.92

Table 4: Mean length (cm) of African catfish cultured in Concrete fish tanks From January, 2023 to April, 2023.

Growth Parameters	Samples	Total	Mean	MWG
Concrete tanks				
Initial length	3.9, 3.8, 3.7, 3.8, 3.6, 3.7, 3.4, 3.5, 3.6, 3.5	36.5	3.65	
Final length	11.75, 12.2, 13.5, 13.4, 13.5, 13.2, 13.4, 12.9, 12.8, 14.2	130.85	13.09	
MLG				9.44

Table 5: T-test on the significant difference of Tarpaulin and Concrete Fish Tanks on the weight of African catfish cultured from February, 2023 to April, 2023.

Weight growth	$\overline{X}$	SD	N	df	Standard error	t-cal	t-tab
Tarpaulin	30.55	1.04	10	18	0.3	22.6	1.734
Concrete	16.54	0.32	10				

Table 6: T-test on the significant difference of Tarpaulin and Concrete Fish Tanks on the length of African catfish cultured from February, 2023 to April, 2023.

Length growth	$\overline{X}$	SD	N	df	Standard error	t-cal	t-tab
Tarpaulin	15.3	0.32	10	18	0.045	1.13	1.734
Concrete	13.09	0.5	10				

Tables 3 and 4 show the mean length of African catfish on both tarpaulin and concrete tanks. The mean length gain of the tarpaulin and concrete tanks were 11.12 and 9.44 cm respectively. It

shows that the catfish cultured in tarpaulin tanks have more length than the one cultured in the concrete tanks.

Tables 5 and 6 show both t-test calculation and t-test tabulation, comparing the t-Cal (22.6) and t-Tab (1.734), since the t-calculation is greater than the t-tabulation, that shows there was significant difference on the weight gain using tarpaulin fish tanks compared to concrete fish tanks. We can therefore conclude that tarpaulin fish tanks were more efficient in fish culture in terms of weight gain.

The mean weight (27.04g) gained by fishes reared in tarpaulin ponds was almost twice that of fishes in concrete ponds (13.92g). This may be due to increased natural foods made more easily available in the tarpaulin ponds over the concrete ponds by the activities of phytoplankton, zooplankton and benthos finding their niche naturally in the tarpaulin ponds on which fish thrive on as supplemental diets (Robinson *et a*l, 1998). The study also indicates that despite higher weight gain of tarpaulin ponds over the concrete ponds there was no significance length increment of tarpaulin pond over the concrete ponds. And the more growth performance recorded on the tarpaulin ponds may be due to the stress free movement and softness of the tarpaulin ponds over the concrete ponds.

CONCLUSION

From the study we observed that the fish cultured in the tarpaulin ponds performed better than the fish cultured in concrete ponds. As such more studies on the cost implication of the two fish culturing facilities should be investigated in order to make a better choice of the facilities.

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