Journal of
Fisheries and Aquatic Science

ISSN 1816-4927

Academic
Journals Inc.

www.academicjournals.com

Journal of Fisheries and Aquatic Science 9 (5): 425-429, 2014
ISSN 1816-4927 / DOI: 10.3923/jfas.2014.425.429

Effect of Feeding Frequency on Growth and Survival Rate of *Clarias gariepinus* Fingerlings Reared in Plastic Bowls

[1]F.P. Asuwaju, [2]V.O. Onyeche, [2]K.E. Ogbuebunu, [2]H.F. Moradun and [2]E.A. Robert
[1]Federal College of Freshwater Fisheries Technology, P.M.B 1060, Baga, Bornu State, Nigeria
[2]National Institute for Freshwater Fisheries Research, P.M.B 6006, New Bussa, Niger State, Nigeria

Corresponding Author: F.P. Asuwaju, Federal College of Freshwater Fisheries Technology, P.M.B 1060, Baga, Bornu State, Nigeria

ABSTRACT

The effects of feeding frequency on feed intake, growth and survival rates were determined in *Clarias gariepinus*. Twenty fish per tank (bowl) were stocked in triplicate. They were fed once (1D), thrice (3D) and five times daily (5D), respectively. The 5D group growth rates were observed significantly different ($p<0.05$) from fish fed on 1 (1D) and (3D) feeding frequency. All the treatments containing 1D, 3D and 5D were observed to have significant difference ($p>0.05$) in terms of Final Weight (FW). There was also a noticeable increased trend in final weight (5D>3D>1D). Feed Conversion Ratio (FCR) of 3D and 5D treatments were higher than 1D treatment ($p<0.05$). According to the results, feeding *Clarias gariepinus* 1 time daily (1D) did not influence the growth; however, 5 times daily reduced mortality and improved the Feed Conversion Ratio (FCR) of *Clarias gariepinus*.

Key words: Feeding frequency, feed conversion ratio, growth, survival rate

INTRODUCTION

Food is the source of energy for fish to carry out basic biochemical functions such as growth, reproduction and movement. Fish growth is influenced by feed availability and intake, genetics, age and size, environment and nutrition. Of these factors, feed intake is perhaps the principal factor affecting growth rate of fish (Li *et al*., 2004). Feed management in terms of optimization of feeding rate and frequency has become one of the crucial areas of research in the field of aquaculture. Overfeeding and leftover food disrupts the water quality (Ng *et al*., 2000) while inadequate food supply has direct impact on production cost (Mihelakakis *et al*., 2002). Different species of fish have been shown to have different optimum feeding frequencies; young salmon fed continuously for 15 h day^{-1} (Shearer, 1994).

Clariidae is very popular in Nigeria due to its culture characteristic which has endeared it to many fish farmers. The Food and Agriculture Organization (FAO, 2004) cited that 90% of the catfish supply in sub-saharan Africa in the year 2000 occurred in Nigeria. To improve the culture of *Clarias gariepinus* there is need for more information on the management method in the area of feeding and feeding frequency in order to produce fish within a shortest possible time and at minimum cost with good quality. This study was therefore aimed to determine the effects of feeding frequency on the Feed Conversion Ratio (FCR) and Weight Gain (WG) of *Clarias gariepinus*

fingerlings; the effect of feeding frequency on the survival rate of *Clarias gariepinus* fingerlings and suggesting an aquaculture practice that will minimize losses and maximize profit in rearing these fish.

MATERIALS AND METHODS

Source of frys: The 3 weeks old frys of *Clarias gariepinus* were purchased from a commercial fish farm (Peace Water, Maiduguri) and transported to the hatchery complex of Federal College of Freshwater Fisheries Technology Baga, Borno State.

Experimental conditions: Twenty frys were stocked per plastic bowl. They were fed on Coppens feed 0.5 mm and finally 0.8-1.2 mm and 2 mm at 5% of their body weight. The different feeding frequency on the growth and survival rate of *Clarias gariepinus* fingerlings were set up using nine plastic bowls with 25 L of water in each plastic. The experiments consisted of three treatments with replicates each designed for daily feeding; once, thrice and five times, respectively. Each plastic bowl was supplied with compressed air from Koi Air pump (50 k) through an air stone. The experiment lasted for seven weeks (49 days).

Sampling: Sampling was done weekly to access the response in growth, survival rate and mortality. Water quality parameter like dissolved oxygen, pH and temperature were determined using pH meter (sigma-Z351105) and thermometer, respectively.

The Feed Conversion Ratio (FCR) was calculated:

$$\text{FCR} = \frac{\text{Diet fed (g)}}{\text{Weight gain}}$$

RESULTS

Table 1 shows the results of physiochemical parameter measured during the experimental period. The ranges of pH measured throughout for all the treatments are 7.08 and 7.14. Temperature ranges between 28.82 and 29.34. Dissolved oxygen (DO) ranges between 8.05 and 8.25.

Table 2 shows the weight gain and feed conversion ratio for 49 days. Treatment 1D had the lowest value of percentage weight gain (82.25%) while Treatment 5D had the highest value of

Table 1: Mean values of physicochemical parameters of water in the experimental plastic bowl

Parameters	A (1D)	B (3D)	C (5D)
DO (ppm)	8.25	8.11	8.05
pH	7.08	7.14	7.10
Temperature (°C)	29.01	28.82	29.34

Table 2: Growth response and feed utilization of *Clarias gariepinus* fed at different frequency

Treatments	IW (g)	FW (g)	WG (g)	FCR	PWG (%)
A (1D)	0.22±0.06^{a}	1.23±0.52^{a}	1.01±0.53^{a}	0.88±0.60^{a}	82.25
B (3D)	0.17±0.25^{a}	2.65±0.31^{b}	2.48±0.30^{b}	2.30±0.27^{b}	93.70
C (5D)	0.16±0.02^{a}	4.19±0.03^{c}	4.02±0.05^{c}	3.36±0.04^{c}	96.11

Means with same superscript on same column are not different significantly ($p>0.05$), IW: Mean initial weight, FW: Mean final weight, WG: Mean weight gain, FCR: Feeding conversion ratio, PWG: Percent weight gain, 1D: Feeding once daily, 3D: Feeding thrice daily and 5D: Feeding five times daily

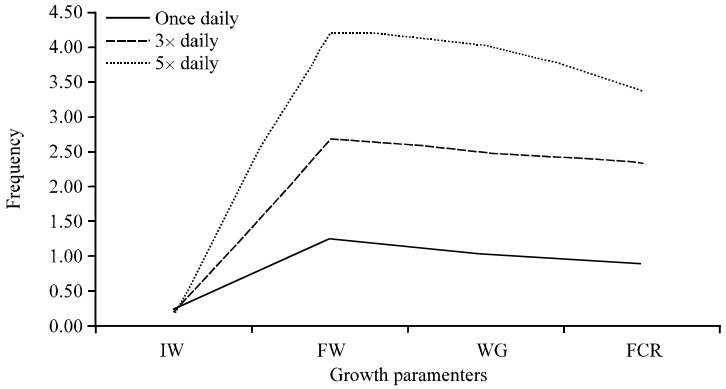
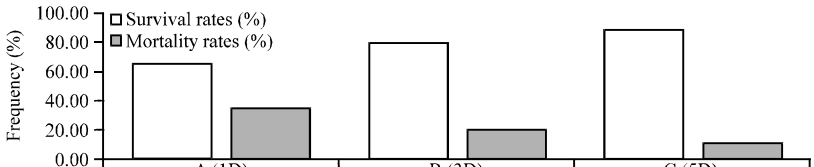


Fig. 1: Weight gain of *Clarias gariepinus* fingerlings fed at different frequencies over 49 days



	A (1D)	B (3D)	C (5D)
Survival rates (%)	65.00	80.00	90.00
Mortality rates (%)	35.00	20.00	10.00

Fig. 2: Survival and mortality rate of *Clarias gariepinus* feed at different frequency

percentage weight gain (96.11). Table 2 also indicates the Food Conversion Ratio (FCR) for 1D (0.88) as the least value, while 5D Treatment (3.36) showed the highest followed by 3D Ttreatment (2.30). Treatment 5D had the highest weight gain (4.02±0.05), followed by 3D (2.48±0.30) and the least 1D (1.01±0.53).

In Fig. 1, it is observed that 3D Treatment (3× daily) had a Weight Gain (WG) of 2.48 g and feed conversion ratio of 2.30 indicating that the energy obtained from the feed may be sufficient for its metabolic activities while the 1D treatment (once daily) had the lowest WG of 1.01 g and 0.88 FCR; this may also suggest that the energy obtained from the feed was low or insufficient. Conversely, the 5D Treatment (5× daily) had 3.36 FCR indicating that the energy obtained from the feed may be high and sufficient enough for its metabolic activities.

Figure 2 shows the value for percentages survival and mortality rate of *Clarias gariepinus* fingerlings fed at different frequencies. Treatment A (1D) was observed with the least survival (65%) and mortality rate (35%). The 90 and 10% were observed as the highest values for survival and mortality rate, respectively in Treatment C (5D). Constant availability of feed will reduce the susceptibility of fish to high rates mortality and cannibalism; this is clearly shown in the above result.

DISCUSSION

During the experimental period, Treatment C had the lowest DO (8.05 ppm) and the highest temperature (29.34°C) values when compared to other treatments (Table 1). This may suggest an increase in toxicity probably as a result of excessive feeding. The results of growth response of *Clarias gariepinus* fingerling fed under different feeding regime are presented in Table 2.

Treatment C (five times daily) had the highest mean weight gain (4.02±0.05) and a corresponding highest percentage weight gain (PWG) (96.11%). This performance was followed by Treatment B (thrice daily) with (2.48±0.30) and (93.70%) as the values for mean weight gain (MWG) and percentage means weight (PMG) respectively. The least mean weight (1.01±0.53) and percentage mean weight gain (82.25%) values were recorded for treatment A (once daily). Treatment C (five times daily) was also observed to have the highest value for feed conversion ratio (3.36±0.04) followed by Treatment B (2.30±0.27) and A (0.88±0.60), respectively. Feed conversion ratios are important calculations for the fish growers which can be used to determine if feeds are being used as efficiently as possible (Goddard, 1996). The FCR's of 1.5-2.0 are considered "Good growth" for most fish species (Ndome *et al*., 2011). When fed a given weight of feed, fish cannot exhibit the same amount of growth in weight because they must use some of the energy in feed for metabolic heat, digestion, respiration, nerve impulses, salt balance, swimming and other life activities (Craig and Helfrich, 2009). The result obtained from the feed conversion ratio shows that treatment 'B' had the best feed conversion ratio (2.30±0.27) with respect to feed utilization. Treatment C (5D) had the least conversion ratio in terms of feed utilization. The finding of this work is in line with the result of Marimuthu *et al*. (2010). The authors worked on the optimum feeding frequency on growth and survival of *Clarias gariepinus* fingerlings. They discovered that the highest growth performance was in group of *Clarias gariepinus* fingerlings fed at two times daily as compared to feeding two times every other day (2EOD) and once daily.

Feed conversion ratios will vary among species, sizes and activity levels of fish as well as the environmental conditions and culture systems used. In the present study, the FCR (<2.0) values obtained in fish once daily indicate poor growth for fingerlings fed at this frequency.

CONCLUSION

Fish require adequate food to grow and survive. The results in this present studies shows that frequency of feeding is proportional to weight. Five time daily feeding had the highest mean weight gain (4.02±0.05) as compared with (1.01±0.53) recorded as the lowest for feeding once daily. Therefore growth and survival of fingerlings can only be sustained with the availability of adequate feed.

In view of this, I want to suggest that fingerlings should be fed at least twice daily to minimize losses and maximize profit in rearing *Clarias gariepinus* fingerlings. Also more research should be carried out to investigate the performance of *Clarias gariepinus* fingerlings.

REFERENCES

Craig, S. and L.A. Helfrich, 2009. Understanding fish nutrition, feeds and feeding. Virginia Cooperative Extension, Virginia Polytechnic Institute and State University, pp: 240-256. http://pubs.ext.vt.edu/420/420-256/420-256.html.

FAO, 2004. World aquaculture supply of catfish and tilapia. Appendix F of FAO Fisheries Report No. 733, Food and Agriculture Organization, Rome, Italy, pp: 23-35.

Goddard, S., 1996. Feed Management in Intensive Aquaculture. Chapman and Hall, New York, USA., Pages: 194.

Li, M.H., B.B. Manning and E.H. Robinson, 2004. Effect of daily feed intake on feed efficiency of juvenile channel catfish. N. Am. J. Aquacult., 66: 100-104.

Marimuthu, K., A.C. Cheen, S. Muralikrishnan and D. Kumar, 2010. Effect of different feeding frequency on the growth and survival of African catfish (*Clarias gariepinus*) fingerlings. Adv. Environ. Biol., 4: 187-193.

Mihelakakis, A., C. Tsolkas and T. Yoshimatsu, 2002. Optimization of feeding rate for hatchery-produced juvenile gilthead sea bream *Sparus aurata*. J. World Aquacult. Soc., 33: 169-175.

Ndome, C.B., A.O. Ekwu and A.A. Ateb, 2011. Effect of feeding frequency on feed consumption, growth and feed conversion of *Clarias gariepinus* ? X *Heterobranchus longifilis*? hybrids. Am. Eurasian J. Sci. Res., 6: 06-12.

Ng, K.W., K.S. Lu, R. Hashim and A. Ali, 2000. Effects of feeding rate on growth, feed utilizationand body composition of a tropical Bagrid catfish. Aquacult. Int., 8: 19-29.

Shearer, K.D., 1994. Factors affecting the proximate composition of cultured fishes with emphasis on salmonids. Aquaculture, 119: 63-88.