

Original Research Article

Impact of Three-Different Commercial Feed on the Growth and Survival of *Clarias gariepinus* Fry in Aquaria Glass Tanks.

ABSTRACT

Aims: To compare the growth response and survival rates of *Clarias gariepinus* fry fed artificially formulated fry feed using Artemia as control.

Study design: Randomized blocked design.

Place and Duration of Study: Wet laboratory of Nigeria Institute for Oceanography and Marine Research (NIOMR), Sapele, Nigeria in November 2014 for twenty-eight (28) days.

Methodology: Five hundred and twenty (520) post yolk absorbed *C. gariepinus* fry were randomly selected from NIOMR hatchery. Fry were stocked at 130 fry/m³ in each aquarium glass tank measuring 40cm x 30cm x 30cm and aeration of tanks was provided using RESUN Air-pump (ACD - 9800). Twelve (12) glass aquarium tanks were used for the experiment. Four (4) experimental fry diets namely Artemia salina shell free (AS), Coppens (CO), Durante (DU) and Luck Star (LS) were compared. Each experimental treatment was replicated three (3) times.

Results: Fry feed with Artemia and Lucky Star feed showed final mean weights of 1.06 ± 0.04g and 0.87 ± 0.06g respectively while 0.06 ± 0.03g and 0.06 ± 0.04g were obtained in fry feed with Coppens and Durante feed respectively. There was no significant difference ($P \neq .05$) in values obtained from fry feed Coppens and Durante feeds. Highest survival rates percentage of 91% and 88% was recorded in Artemia and Lucky star fed fry respectively while 69% and 67% was obtained for Coppens and Durante fed fry respectively. The monitored physiochemical parameters were not affected by the different diets during the 28 days feeding trial. The recorded mean values of all these parameters were within the acceptable limit for fish growth survival.

CONCLUSION: Artemia shell free which has been used with various level of success for fry rearing. In terms of cost, it is more expensive than lucky star feed. Substitution of commercial compounded diet for live feed is essential for lowering production cost and for sustaining production of high and constant quality fingerling. Our study showed that lucky star fry feed can compete favourable with Artemia in growth performance and survival of *Clarias gariepinus* fry if feed at recommend water quality parameter range. Therefore, lucky star fry feed can be employed in *C. gariepinus* fry feeding in place of artemia.

Keywords: Fry, Survival rate, Growth performance, Artemia, Formulated feed.

1. INTRODUCTION

Fish growth and survival rate depends on the kind of feed, feeding frequency, feed intake and the fish's ability to absorb the nutrients. African catfish (*Clarias gariepinus*) production in hatcheries largely depend on live feed such as rotifers and Artemia. Substitution of commercial compounded diet for live feed is essential for lowering production cost and for sustaining production of high and constant quality fingerling [1].

Major problem confronting fish breeders is to obtain a balance between rapid growth and optimum use of the supplied feed. Among these, feed particle size and nutrient composition is an important factor for the survival and growth of fish at the early stage [2, 3].

The quality of fry feed should be determined for individual feeds to carefully monitor the feed consumption and growth rate of the fry. Good quality feed and optimum feeding frequency may provide maximum utilization of diets and thus, fast

growth of the fry. However, poor quality fry feed lead to leaching of nutrients, reduction in feed conversion ratio and increase in input list, and also, accumulation of wastes that adversely affects the water quality [4, 5]. Therefore, it is important to standardize the quality of fry feed for the target species in aquaculture for optimum production. Although, there has been numerous experiments on feeding trial with commercial formulated diets using *Clarias gariepinus* which is the most popular and commercially culture fish species in Nigeria. However, reports on experiment regarding efficacy of different commercial fry feeds are very few. Therefore, this experiment was designed to compare the growth response, feed efficiency and survival rate of *Clarias gariepinus* fry fed on artificially formulated fry feed using Artemia as control.

2. MATERIAL AND METHODS

2.1 Study Area:

The experiment was conducted in wet laboratory of Nigeria Institute for Oceanography and Marine Research (NIOMR), Sapele, Nigeria. Twelve (12) glass aquarium tanks (40cm x 30cm x 30cm) were washed, cleaned and allowed to dry. Water was then poured into them up to the depth 20cm leaving 10cm freeboard to avoid the spilling of water. Five hundred and twenty (520) post yolk absorbed *C. gariepinus* fry were randomly selected from NIOMR hatchery, weighed and stocked at 130 fry/m³ in each aquarium glass tank, aeration of each tank was done using RESUN Air-pump (ACD - 9800).

2.2 Experimental Diets:

The following four (4) experimental fry diets were used - Artemia salina shell free (AS), Coppens (CO), Durante (DU) and Luck Star (LS). Artemia, Coppens and Durante fry feed were obtained from commercial fish feed seller. While Lucky Star fry feed was ordered from Taiwan. Artemia shell free which has been used with various level of success for fry rearing was used as control diet. Proximate analyses of the experimental diets are shown in Table 1.

2.3 Statistical Analyses:

Data collected were subjected to analysis of variance (ANOVA) using SPSS software (version 16.0). Mean separation was done using Duncan's Multiple Range Test. All test were carried out at 5% probability level.

3. RESULTS AND DISCUSSION

The study compared the growth response and survival rate of *Clarias gariepinus* fry to different commercial formulated fry feed a period of 28 days. Growth performance and survival rate of *C. gariepinus* fry fed is presented in Table 3. Average mean weight of fry used in each treatment was 0.03± 0.02g. Fry feed with Artemia and Lucky Star feed showed final mean weights of 1.06 ± 0.04g and 0.87 ± 0.06g respectively while 0.06 ± 0.03g and 0.06 ± 0.04g were obtained in fry feed with Coppens and Durante feed respectively. There was no significant difference ($P \neq .05$) in values obtained from fry feed Coppens and Durante feeds. Highest survival rates percentage of 91% and 88% was recorded in Artemia and Lucky star fed fry respectively while 69% and 67% was obtained for Coppens and Durante fed fry respectively. Pooling [6] showed that the use of Artemia in fry culture of African catfish (*Clarias burchell*) allowed excellent survival rates. The results obtained in Table 3 showed that acceptance of the formulated diet and growth performance of fry fed these depends on their composition, texture, flavor or mixture of these factors. Lovell [7] stated that protein quality of feed can affect the growth performance of fish and protein quality is affected by amino acid composition and digestibility. Although, Coppens and Durante feeds had higher crude protein (CP) content (CP = 56% and 57% respectively), least final mean weight and survival rates were obtained in them. However, Artemia and Lucky star feed (CP = 54% and 53.2% respectively) gave higher survival rates (96% and 88% respectively) and thus, better growth performance. This observation is in accordance with our previous work on feeding trial [4]. It is important to note that percentage of protein in feed determined by chemical analysis is not synonymous with the amount of protein available from feed stuff to the fish [4]. Our findings showed that the best crude protein content of fry feed should be between 53.2% - 54%.

Physiochemical water quality parameters such as Temperature, pH, dissolved Oxygen, Total ammonia and Ammonia nitrogen are shown in Table 2. The monitored physiochemical parameters were not affected by the different diets during the 28 days feeding trial. The recorded mean values of all these parameters were within the acceptable limit for fish growth survival [8, 9].

Table 1. Proximate Analyses of the Experimental Diets

80

Raw Materials	Artemia	Coppens	Durante	Lucky Star
Crude Protein	54%	56%	57%	53.2%
Crude Fat	-	0.6%	0.4%	12.8%
Crude Fiber	9%	15%	15%	1.8%
Ash	4%	8.9%	11%	12.01%
Moisture	5%	-	-	7.11%
Phosphorous	--	1.4	1.6%	-
Copper Sulphate (CuSO ₄)		-	8mg/kg	-

81

82

83

84

Table 2. Water Quality Parameters

Treatments	Temperature	pH	Parameters		
			Dissolved Oxygen	Total Ammonia	Ammonia Nitrate
T ₁	28.13 ± 0.06 ^a	7.55 ± 0.03 ^a	4.70 ± 0.03 ^b	0.2 ^a	0.8 ^a
T ₂	28.03 ± 0.06 ^a	7.56 ± 0.03 ^a	4.50 ± 0.03 ^a	0.2 ^a	0.8 ^a
T ₃	28.16 ± 0.03 ^a	7.57 ± 0.03 ^a	4.50 ± 0.03 ^a	0.2 ^a	0.8 ^a
T ₄	28.47 ± 0.06 ^b	7.56 ± 0.03 ^a	4.50 ± 0.03 ^a	0.2 ^a	0.8 ^a

85

86

87

88

89

90

Mean values ± Standard error of means of three experiments

T₁ = Artemia, T₂ = Coppens, T₃ = Durante, T₄ = lucky Star

Table 3. Growth performance and survival rate of *Clarias gariepinus* fry in treatments with different fry feed types.

Treatments	Initial Weight (G)	Final Weight (G)	Survival Rate (%)
T ₁	0.03 ± 0.02 ^a	1.06 ± 0.04 ^b	96
T ₂	0.03 ± 0.02 ^a	0.06 ± 0.03 ^a	69
T ₃	0.03 ± 0.02 ^a	0.06 ± 0.04 ^a	67
T ₄	0.03 ± 0.02 ^a	0.87 ± 0.06 ^c	88

91

92

93

94

95

96

97

98

99

100

101

102

103

104

4. CONCLUSION

Artemia shell free which has been used with various level of success for fry rearing. In terms of cost, it is more expensive than Lucky Star feed. Our study showed that Lucky Star fry feed can compete favourable with Artemia in growth performance and survival of *Clarias gariepinus* fry if feed at recommend water quality parameter range. Therefore, Lucky Star fry feed can be employed in *C. gariepinus* fry feeding in place of Artemia.

105

106

107

108

109

110

111

112

113

114

115

116

117

REFERENCES

- Bai SC, Young TC, Xiaojie W. A preliminary study on the dietary protein requirement of Larval Japanese Flounder, *Paralichthys olivaceus*. North American J Aquac. 2001;63:92–98.
- Hung LT, Tuan NA, Lazard J. Effects of frequency and time of feeding on growth and feed utilization in two Asian catfishes, *Pangasius bocourti* (Sauvage, 1880) and *P.hypophthalmus* (Sauvage, 1878). J Aquac Trop. 2001;16 (2): 171–184.
- Dwyer KS, Brown JA, Parrish C, Lall SP. Feeding frequency affects food consumption, feeding pattern and growth of juvenile yellowtail flounder (*Limanda ferruginea*). Aquac 2002;213 (1–4): 279 – 292.
- Yakubu AF, Okonji VA, Nwogu NA, Olaji ED, Ajiboye OO, Adams TE. Effect of stocking density on survival and body composition of Nile tilapia (*Oreochromis niloticus*) fed multi feed and NIOMR feed in semi flow-through culture systems. J Nat Res. 2013;3(14):29-37.

UNDER PEER REVIEW

- 118 5. Neoske TA, Spieler RE. Circadian feeding time affects growth of fish. *Rhythmicity in Fish*. 1984;113:540-544.
- 119 6. Pooling L, Schoonbee J, Prinsloo H, Wild AJB. The evaluation of live feed in the early larval growth of the sharptooth
120 catfish (*C. gariepinus*). *Water South Africa*. 1988;14:19-24.
- 121 7. Lovell RT. Nutrition and feeding of fish, An AVI Book, Van Nostrand-Reinhold, New York. 1989:260pp.
- 122 8. Boyd CE. Water quality in warm water fish ponds. Auburn University Agriculture Experiment Station, Auburn, Alabama.
123 1979.
- 124 9. Mazik PM, Hinman ML, Winkleman DA, Kleine SJ, Simco BA. Influence of nitrite and chloride concentrations on
125 survival and hematological profiles of striped bass. *Transactions of the American Fisheries Society*. 1991;120: 247-254.

126