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SURVIVAL AND GROWTH RATE OF *Clarias gariepinus* FRY USING CYPRICO AND INERT DIET

*Egwenomhe M., Esume A.C. and Okundia I.E.

Department of Fisheries, Faculty of Agriculture, University of Benin, Benin City, Nigeria.

ABSTRACT

The growth and survival rate of *Clarias gariepinus* larvae fed with cyprico (D1), Inert diet (egg white + fish meal) (D2) and a combination of both diets (D3) were investigated for a period of forty two days (6 weeks).each treatment was applied to 50 post yolk sac fry in triplicate plastic tanks. The feed conversion ratio, mean feed intake, mean percentage weight gain, mean specific growth rate, mean weight gain values and the survival rate were calculated. Among the three treatments D2 had the lowest FCR value of (1.24 ± 0.37^{b}), mean feed intake of 0.21 ± 0.18 and lowest percentage weight gain of (220.00 ± 323.69^{a}). Diet D3 had the highest FCR value of (2.98 ± 2.38^{a}) and PWG of (1530.00 ± 323.69^{a}) but had the lowest survival rate of 36%. Meanwhile D1 had the highest survival rate of 60% and highest specific growth rate of (11.93 ± 8.95^{a}). It was therefore concluded that the combination of cyprico and inert diet is the best fed for *Clarias gariepinus* larvae culture.

Keywords: Clarias gariepinus, Inert diet, African catfish, live feed

INTRODUCTION

The African catfish, *Clarias gariepinus* is an important species in the aquaculture industry throughout the world. The species has several advantages such as good taste, fast growth, resistance to low oxygen and considerable ease in farming (Appelbaum and Kamler, 2000; Van de Nieuwegiessen *et al*., 2009). Production of *Clarias gariepinus* is increasing exponentially in Nigeria under semi-intensive pond culture as the most predominant system. To ensure optimal survival and growth, catfish larvae are reared in hatcheries where they are fed *artemia* for the first five days at onset of exogenous feeding. Thereafter, fish can be weaned onto dry fry feed. However, lack of affordable and quality feed is a major constraint to local fish production systems. The larval rearing methods for *C. gariepinus* still have several problems. The challenge therefore is to avail farmers with affordable quality feeds for a profitable business and increased production of fingerlings (Yilmaz *et al*., 2003).

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Larval fish nutrition in aquaculture is predominantly dependent on the use of brine shrimp (*Artemia* spp.), particularly for first feedings. However, the cost of brine shrimp is prohibitive for resource-poor farmers in the developing world, which has necessitated investigation into alternative feeds. Workers have used formulated feeds or combinations of formulated feeds and live feeds in feeding trials with different species of fish larvae (Panagiotis *et al*., 2004). In most studies, live foods (examples are *Artemia*, rotifers and copepods) produced better results in terms of growth and survival than inert diets (Dabrowski, 1984). Feeding trials using formulated diets have had little success and some workers recommend regular supplementation of formulated feeds with live feeds (Kruger *et al*., 2001).

MATERIALS AND METHODS

The study was conducted in the main laboratory, faculty of agriculture university of Benin, Benin City. Edo state, Nigeria for 42 days (6 weeks).

Preparation of Inert Diet

Fish crumb used in the production of inert diet was purchased from the market at 153 Murtala Mohammed Way, Benin City, Edo state. It was sun dried for two days to ensure that all moisture was drastically reduced after sun drying it was then milled into fine particles with a milling machine. After milling, the fishmeal was sieved with a net of small mesh size to ensure the bigger particle sizes being removed which further assures that indeed a uniform and fine particle size fishmeal was attained. In the preparation of inert diet raw eggs were bought and boiled for about 10 minutes after which the egg white was separated from the yolk. The egg white was then crushed to a very fine particle and then mixed with fishmeal earlier prepared.

Experimental Diets and Treatments

Three (3) experimental diets were used viz- cyprico starter (D1); Inert diet (fishmeal and egg white) (D2) and a combination of cyprico and inert diet (D3). Each experimental treatment was replicated three (3) times. All diets were administered manually three times a day between 8:00am and 18:00hr.The experiment was laid out in a complete randomized design. Proximate analysis of the experimental diet was performed at Faculty of Agriculture Main Laboratory.

Management Practice

The water was changed once every morning. Changing of the water was done prior to feeding in the morning. 15-20 minutes after each feeding in the morning and evening, the unconsumed feeds were removed by siphoning them out of the transparent plastic tanks into a drainage channel in the laboratory. Once every week, total changing of the water, washing of the tanks,

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weighing of the fry and determination of feed consumed was carried out. This helped to keep the water temperature, pH, dissolved oxygen, ammonia and nitrate under control.

Proximate analysis of experimental diet

Proximate analyses of the experimental diet were carried out. Moisture content, nitrogen, ether extract, crude fibre and nitrogen-free extract (NFE) were determined according to the procedures of Association of Official Analytical Chemists (A.O.A.C., 2000). A factor of 6.25 was used to convert the total nitrogen content to protein.

Growth parameters determined

Growth parameters were determined using both length and weight.

1. Weight gain (g) = Final weight – initial weight,
2. Percentage weight gain (PWG) = $\frac{\text{weight gain}}{\text{initial weight}} \times 100$
3. Specific growth rate (g/day) = $\frac{100 \times [\text{In(Final weight)} - \text{In(Initial weight)}]}{\text{Rearing period in days}}$

   Where ''In'' represent natural logarithm.
4. Survival rate (SR %) = $\frac{\text{Total number of fish harvested}}{\text{Total number of fish stocked}} \times 100$
5. Performance index = $\frac{\text{survival rate} \times \text{weight gain}}{\text{culture duration in days}}$

Statistical Analysis

Data obtained were analysed using one way analysis of variance and differences in means were compared using Least Significance Difference at P=0.05. Analysis was done using a statistical software programme (GenStat version 12.5).

RESULTS

The result obtained in this research is presented in Table 1 below

Growth parameter	Diet 1	Diet 2	Diet 3	SED
FCR	2.34±1.35^{a}	1.24±0.37^{b}	2.98±2.38^{a}	0.54
Feed intake	0.31±0.16^{a}	0.21±0.18^{a}	0.24±0.17^{a}	0.06
PWG	1243.00±2696.00^{a}	220.00±323.69^{a}	1530.00±323.69^{a}	847.30
SGR	11.93±8.95^{a}	9.94±7.52^{a}	9.97±10.08^{a}	3.03
Weight gain	0.10±0.06^{b}	0.14±0.07^{ab}	0.17±0.11^{a}	0.03
Survival rate (%)	60^{a}	56^{a}	36^{b}	

Values with similar superscripts are not significantly different (P>0.05).

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The mean weight gain ranged from 0.10±0.06 for Diet 1 to 0.17±0.11 for Diet 3. There was significant difference (P<0.05) in the mean weight gain across all Diets. The mean feed intake across all Diets ranged from 0.21±0.18 for Diet 2 to 0.31±0.16 for Diet 1. There was no significant difference (P>0.05) in the mean feed intake across all Diets.
The percentage weight gain observed was highest in Diet 3 with a mean PWG of 1530.00±323.69 while Diet 2 observed the lowest PWG (220.00±323.69). There was no significant difference (P >0.05) in the mean PWG across all Diets.

The Specific Growth Rate in descending order followed the trend: Diet 1 (11.93±8.95) >Diet 3 (9.97±8.95) > Diet 2 (9.94±7.52). There was no significant difference (P>0.05) in the SGR across all Diets.

The survival rate ranged from 36% for diet 3 to 60% for diet 1. There was significant difference (P<0.05) in the survival rate in all diets studied.

DISCUSSION

The Feed Conversion Ratio (FCR) is the ratio of feed ingested to weight gain. FCR gives an indication of how efficient a feed or feeding strategy might be. From the study it was observed that Diet 2 had the best FCR value (1.24) while Diet 3 had the highest value of 2.98. The FCR value observed for Cyprico *Artemia* was higher than the values observed by Adebayo and Akin-Obasola (2013) for hybrid catfish (*Heterobranchus bidorsalis x Heterobranchus longifilis*) fry (1.50) and Singh *et al*. for *Deccan mahseer* (2.71). . Factors that influence FCR include feed wastage, nutrient density, genotype of organism, environment and feed form.

In nature, *Clarias gariepinus* larvae feed on rotifers, cladocerans, diatoms, cyclops and copepods in their first development stages. With the intensification of aquaculture, these natural foods are been substituted by artificial/commercial diets. Diet 1 had the highest feed intake with a value of 0.31 while the least feed fed on was Diet 2 (0.21). The high intake of Diet 1 might be due to its palatability as compared to other diets which could be attributed to the fine texture of the feed and the attractiveness of the feed to the fish as a result of the flavour of feed which makes the acceptability high.

As stated by Nyina-Wamwiza *et al*. (2007), at the onset of exogenous feeding, larvae of the African catfish are able to eat, digest, absorb, and metabolize nutrients with their sizeable mouth and digestive system. Percentage Weight Gain and Weight Gain were higher in Diet 3 as compared to other diets while the highest Specific Growth Rate was observed in Diet 1 with an SGR value of 11.93. In contrast to what was observed in this study, Singh *et al*. (2013) observed that *Deccan mahseer* fry fed with inert diet had higher Percentage weight gain and weight gain

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as compared to other diets. The SGR observed in this study was higher than the value (4.47) obtained by Akinyemi et al., (2013) for Cyprico feed.

One major problem in intensive larviculture of freshwater fish is inadequate food quality which leads to mortality, reduced growth and deformities. Fry fed with cyprico feed had the highest survival rates as compared to fry fed with other diets. The survival rate observed in this study for Cyprico feed was higher than the value (13.33%) observed by Akinyemi et al., (2013).This could be attributed to the fact that there was less pollution in the tank with cyprico treatment but due to excess feed and pollution in the tank combined with inert diet and cyprico there was a higher level of mortality.

Artemia cysts have been reported as a good starter diet for freshwater and marine fish (Lavens and Sorgeloos, 2000; Lim *et al.,* 2002; and Harzevilli *et al.* 2004), because of its balanced nutritional composition however, development of suitable formulated larval diets can alleviate immediate problem of transition from endogenous to exogenous feeding in larviculture (Cahu and Zambonino-Infante, 2001) and thus reduce the dependence on *Artemia*. Though formulated diet may be consumed efficiently by catfish fry at the start of exogenous feeding, it might be suitable and even more adequate than live diet in a later hatchery stage (Petkam, and Moodie, 2001).

CONCLUSION

Starter feed are important in the growth and survival of *Clarias gariepinus* (African catfish) fry. Cyprico feed has been used at different levels of fry rearing and has attained different success levels. However its cost has been known to be a limiting factor in the usage of artificial feed which is of ought most importance in fry production. During the period of experimentation there was a quick adaptation to the cyprico diet due to its fine texture and its attractiveness to the fish with the highest survival rate being recorded there and a low adaptation to the inert diet was observed. Though the combination of both gave a better result in terms weight gain of the fish but there was a very low survival rate due to the pollution of water by undecomposed feed.

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