

## Comparative Survival and Growth Rate of *Clarias gariepinus* and *Heteroclarias* Hatchlings Fed Live and Frozen Daphnia

R.O. Ojutiku

Department of Water Resources, Aquaculture and Fisheries,  
Federal University of Technology, Minna, Niger State, Nigeria

**Abstract:** Feeding trial was conducted to assess survival and growth rate of *Clarias gariepinus* and *Heteroclarias* (hybrid of *Clarias gariepinus* and *Heterobranchus longifilis*) larvae (3-day old) fed on live and frozen Daphnids. Live and Frozen daphnia were used as starter diet at 50 Daphnids per larvae per feeding time for each of the species for fourteen days to assess their performance. The response to the feed and the species were compared. *Heteroclarias* and *Clarias gariepinus* fed live Daphnids performed better in terms of growth rate than those fed Frozen daphnids, though, no significant difference ( $p < 0.05$ ) statistically. *Clarias gariepinus* and *Heteroclarias* fed Frozen had greater survival than those fed live Daphnids. *Heteroclarias* fed live and Frozen Daphnids performed better in growth and survival than *Clarias gariepinus*. Therefore, Live Daphnids is recommended for larvae though Frozen Daphnids can be used as supplement and *Heteroclarias* is recommended for aqua culturists for better growth and survival.

**Key words:** Daphnia, *Heteroclarias*, hybrid

### Introduction

Aquaculture in Nigeria is in the developing stage, because it has not been able to meet the demand and supply of the ever-increasing population. It is acknowledge as the efficient means of providing food which is rich in protein source, income and employment opportunities for the populace. Madu *et al.* (1988) noted that interest in fish culture is growing very rapidly in Nigeria but the scarcity of fingerlings of widely acceptable species of catfish such as *Heterobranchus longifilis* (Val. 1840) and *Clarias* species tend to constitute a major constraint to the rapid development of fish farming in Nigeria. Brain and Army (1980) mentioned that economically productive aquaculture like agriculture, is heavily dependent on adequate supply of seeds or fertile eggs and juvenile fish, with which to stock the pond enclosures and other culture systems. Fish culture today is hardly imaginable without the artificial or semi-artificial mass propagation of fish seeds of culture fish species. *Heterobranchus* and *Clarias* happen to be among the more than 300 species of fin fishes that have been cultivated but not spawn in captivity as reported by Brain and Army (1980) which therefore implies that their seed have to be obtained from the wild. But it was reported by Afinowi and Marioghae (1986) that supply of fingerlings from the wild as most unreliable, unstable and inadequate, since the breeding habit of most culturable species is seasoned and the fish has to be captured at the time which may not correspond to the optimum production conditions. Hybridization is practiced to achieve either of the favourable outcomes; these are heterosis or hybrid vigour, which is defined in a broad sense as increased

performance value of progeny above the average of the parental performance of value. Food plays an important role in fry rearing, without which the fry cannot survive. Due to the exorbitant rate of *Artemia* which is a live food, there is the urgent need to source for live feed locally.

The study was therefore to determine and compare the survival and growth rate of hybrid hatchlings of *Heterobranchus longifilis* and *Clarias gariepinus* fed with live and frozen zooplankton (*Daphnia*) for two weeks with the parental performance (*Clarias gariepinus*).

### Materials and Methods

The brooders used for the experiment were obtained from a private farm at Ilorin and Minna Fish market, Nigeria. They were kept separately in 150cm×150cm outdoor concrete tanks at the farm and were fed maintenance ration containing 35% crude protein feed formulated before use at the farm. Brooders selections for this study were based on both external morphology and eggs characteristics. Females were selected displayed based on a rounded soft abdomen with prominent blood vessels, swollen reddish vent and appearance of viable eggs upon slight pressure on the abdomen. Using a scoop net, the brooders were removed from the concrete tanks which were further separated into species and sexes. Male, *Heterobranchus longifilis*, male *Clarias gariepinus* and female, *Clarias gariepinus* were put into plastic bowls containing clean water and covered until required.

**Hormone administration:** Synthetic hormone, ova-prim was used in injecting the female, *Clarias gariepinus*. When administering the ova-prim, a 21-gauge needle

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Table 1a: Mean length (cm) and weight (g) gain of *Clarias gariepinus* and *Heteroclarias* fed live and Frozen daphnids

	Length (cm)		Weight (g)	
	Live	Frozen	Live	Frozen
<i>Clarias gariepinus</i>	0.95	0.79	0.014	0.013
<i>Heteroclarias</i>	1.14	1.13	0.028	0.016

Table 1b: The water quality parameters monitored during the course of the experiment

	Live	Frozen
pH	7.35	7.39
Temperature (°C)	26.5	26.6
Conductivity (Us/cm)	18.15	18.15

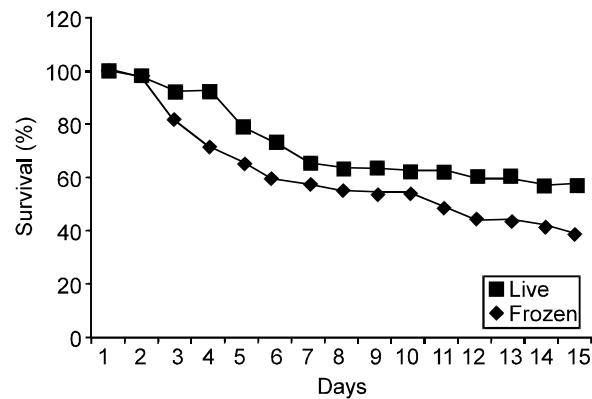


Fig. 1: Survival of *Heteroclaria* fed live and Frozen zooplankton (Daphnia)

(2.5cm) was fitted on a 5 mL syringe and the required dosage was drawn (0.5 mL of ova prim/kg of fish). The female, *Clarias gariepinus* was removed from the basin with the head covered with a hand towel to restrain it. The syringe was aspirated to eliminate air bubbles in the hormone before the needle was inserted into the fish's body at an angle 45° in the dorsal muscle in the direction of the tail above the lateral line and retracting the syringe gently. The injected area was massaged with the thumb finger to distribute the hormone evenly. After the injection the brooders were returned into tanks containing clean water of 27°C for ovulation and maturation of gonad.

**Milt collection and stripping of female fish:** Before the female spawner of *Clarias gariepinus* was stripped, milt was collected from the male *Heterobranchus longifilis* and male *Clarias gariepinus* by sacrificing them. A small incision was made at the posterior end of the abdominal region of the male and the testes were removed. Testes were cleaned with tissues paper to remove blood and then kept inside a Petri dish and covered with another Petri dish until required. The female, *Clarias gariepinus* were removed from the tank check for free flowing eggs.

This was done by holding firmly on the fish with a hand towel covering the head and gentle strokes were applied on the abdomen of the fish from the anterior towards the genital papilla. The eggs were stripped in to two different clean and dry plastic bowls.

**Fertilization of eggs:** The milt collected from the two different species were diluted with physiological saline (0.9%NaCl) solution in a ratio of 1:5 and that of *Heterobranchus longifilis* was used in fertilizing the eggs in the first bowl and that of *Clarias gariepinus* was used in fertilizing the eggs in the second bowl using a clean dry feather to avoid contamination of eggs. Fertilized eggs were incubated at a temperature range 27°C-30°C with a PH of 7.1. Three days after yolk absorption, near uniform sizes of the post larvae of *Heteroclarias* hybrid and pure *Clarias gariepinus* had their initial mean lengths and weights taken.

The experiment was set up in the indoor hatchery. Two dietary treatments (live and frozen daphnia) was used with each treatment triplicated and each of the twelve aquaria tanks containing well aerated clean water received hundred fry. Fry were fed thrice daily (0.8hrs, 13.00hrs and 18.00hrs) at an approximate rate of 50 live and 50 frozen daphnids per fry per feeding time. Water renewal was done regularly to remove uneaten foods and other metabolite to prevent fouling while about 25% of the culture medium was always replaced every morning. Such practice has been found to eliminate shock and enhance survival of cultural organisms (Peter, 1987). The survival values of the fry were determined everyday by counting and recording the mortality. The final mean weight and mean length were taken after the experiment (two weeks) to determine the growth rate.

The results were compared by using analysis of T-tests.

## Results and Discussion

Result showed that the survival of *Clarias gariepinus* fed live and frozen daphnia was 15% and 26.33% respectively and the survival of the hybrid between *Heterobranchus longifilis* and *Clarias gariepinus* (*Heteroclarias*) fed live and frozen daphnia were 37.7% and 57% respectively (Fig. 1).

Results of Fig. 1 (treatment 1) and (treatment 2) showed that the mean survival percentage of *Heteroclarias* fed frozen Daphnia for fourteen days is higher than *Heteroclarias* fed live Daphid but the analysis did not show any significant different ( $p>0.05$ ) in the survival.

The hybrid (*Heteroclarias*) fed frozen daphnia (57%) performed better than the *Clarias gariepinus* fed frozen daphnia (26%) and T-test showed significant difference ( $p<0.05$ ). Also *Heteroclarias* fed live daphnia had 37% survival and performed better than *Clarias gariepinus* fed live daphnia which had 15% survival.

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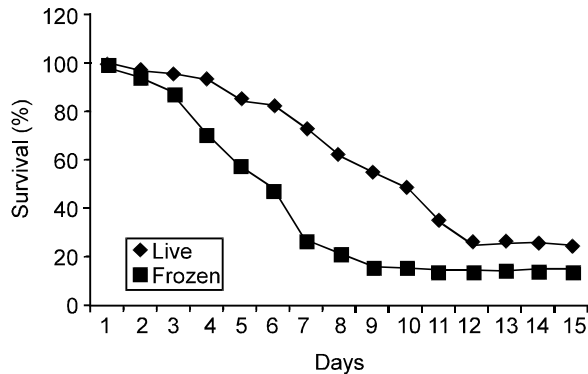


Fig. 2: Survival of *Clarias gariepinus* fed live and frozen zooplankton (daphnid)

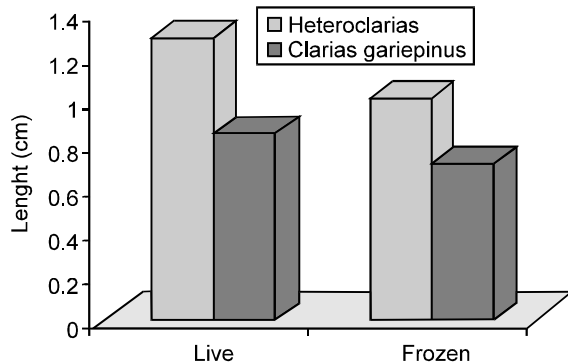


Fig. 3: Mean final length (cm) of *Clarias gariepinus* and *Heteroclarias* fed live and frozen zooplankton (daphnid)

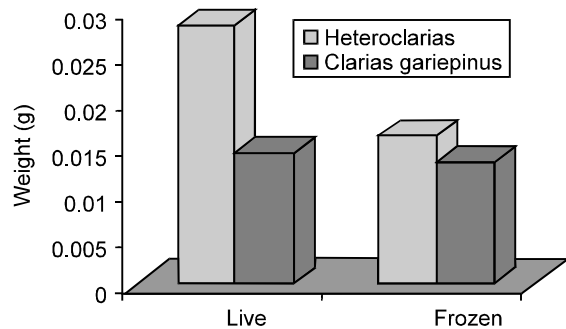


Fig. 4: Mean weight gain (g) *Heteroclarias* and *Clarias gariepinus* fed live and frozen zooplankton (Daphnia)

From Fig. 2, Table 1, the mean final length of the *Heteroclarias* fry fed live Daphnia was 1.44cm, while the mean final length of *Heteroclarias* fry fed frozen daphnia was 1.13cm though T. test analysis did not show significant difference ( $p>0.05$ ). The mean final length of *Clarias gariepinus* fry fed live Daphnia was 0.95cm and mean final length of *Clarias gariepinus* fed frozen

daphnia was 0.79cm. The mean final weight gain of *Heteroclarias* fed live and frozen daphnia are 0.028gm and 0.016gm respectively while the mean weight gain of *Clarias gariepinus* fry fed live and frozen daphnia are 0.0135gm and 0.0126gm respectively (Table 1, Fig. 2) which agrees with the findings of Ovie and Adepoju (1995) and Lamai (1999) who reported that larva fed live daphnia gave the best performance in terms of growth. *Heteroclarias* fed live daphnia performed better in terms of weight gain than the *Clarias gariepinus* fed live which is the pure breed. This implies that Hybrid performs much better than either of the parents because of the improved hybrid vigour. This agrees with the Olarewaju and Dada (1997) who observed that hybrid in most cases were superior to the parent strains in growth; food conversion and resistance to diseases. The development of simple methods and techniques for indigenous zooplankton production would, not only improve the hatchery management of cat fish but would also reduce the cost of production and improve profit margin of hatchery operation because Artemia is expensive because of import tariff.

In conclusion, *Heteroclarias* should be encouraged because it performed better and indigenous zooplankton should be promoted because it will drastically reduce the cost of production.

From the table above, it is clear that the water parameters were within tolerable limits for fish culture.

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