Live food for the early larval growth of catfish Heteropneustes fossilis (Bloch)

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ABSTRACT
Zooplankton, Artemia, snail meat, fish meat and rice bran used as feed were tested as diets in the early larval growth of H. fossilis over a twelve-day period. Among all the food types, zooplankton was found to produce the best growth results followed by Artemia, while other food types yielded poor results.

Introduction
The large-scale commercial spawning and culture of catfish seeks a great demand on available live food at hatcheries. Various dry-feed formulae have been investigated as possible substitutes of live food for larval development (Appelbaum and Dor, 1978; Dabrowski, 1983, 1984). In recent years, suitability of various dry-feed formulae has been investigated for the rearing of cyprinid and catfish larvae (Bryant and Marty, 1981; Msiska, 1981; Hecht and Viljoen, 1982; Uys and Hecht, 1985). However, it has been shown that formulated compound diets do not provide optimal larval growth when used exclusively as larval food, especially during the early larval stages of cyprinids and catfish (Hogendoorn, 1980; Dabrowski, 1984; Prinsloo and Schoonbee, 1986), therefore, live food organisms still remain as the major food source. Natural live food provides a substantial availability of protein and other essential nutrients (Jhingran, 1975; Ahmed, 1994).

Heteropneustes fossilis is of great demand for its high nutritional as well as medicinal value. Until recently, the supply of its fry was dependent on natural sources, which was one of the limiting factors towards catfish farming. To overcome this problem attempts have been made to induce singhi to breed using hormones (Haider and Rao, 1994; Nayak and Singh, 1992; Nayak et al., 2000; Nayak et al., 2002). However, unavailability of suitable feed for larval rearing is a main impediment. Varghese et al. (1973), Thakur (1978), Munnet (1979) and Rahman et al. (1987) provided some basic information on the feeding of C. batrachus fry. However, development of suitable feed for rearing H. fossilis fry is lacking. It is therefore, important to study the efficacy of a few selective feeds.

In the present study, a comparison is made on the growth of H. fossilis larvae using zooplankton and Artemia nauplii as two alternative live-foods dur-
ing the early larval growth phase of this species. In addition, snail meat, fish meat and rice bran were used as dry feed substitutes.

**Materials and methods**

Experiments were done in triplicate. Larvae from induced spawning of the equal age and size, are maintained in 15 litre capacity troughs having approximately 300 larvae at a density of 20 larvae l⁻¹ of water. To minimize the possibility of experimental bias towards any specific batch of larvae, the feeding program was determined by randomly selecting the larvae from two troughs for each of the five feeding trials.

Five food types are tested (i.e. zooplankton, Artemia, snail meat, fish meat and rice bran) for evaluation of larval growth. The quantities of live and artificial feed supplied daily to the tanks comprised a minimum of 20% (expressed as dry mass) of the total daily estimated wet mass of the fish larvae. Zooplankton, Artemia and other feeds were supplied three times per day during the first six days of rearing, and five times daily for the rest of the period of experimentation.

Fifteen larvae were collected at random from each trough once per day after 2 to 3 h of feeding. These larvae were immediately killed in 5% formalin. Excess moisture was removed from each specimen before weighing, using blotting paper, then weighed. Water samples were analysed (APHA, 1980) daily during early morning hours (Table 1).

**Results**

All foods were readily accepted from the start of feeding. Dry food was taken by larvae from either the surface or bottom of the trough, whereas Zooplankton and Artemia were in mid water of the trough. After four days, larval competition for acquiring feed was observed in zooplankton fed trough. This behaviour is easily marked with “barbell biting” and “butting” in H. fossilis larvae. The Artemia fed larvae groups showed a decrease in activity from day 10. The snail meat fed larvae showed a decrease in activity from day 4 and continued till day 6, whereas, the fish meat fed larvae showed a decrease in activity from day 4 to 11. Satiation with low levels of activity was not observed.

Growth of the larvae reared on five different kinds of feed is shown in the Fig. - 1. Difference in growth performance between the feed treatments already became apparent from day one, out of which larvae fed with zooplankton performing the best, followed by those fed on Artemia. The growth of larvae fed with snail meat, fish meat and rice bran was clearly indicated by inferior growth performance in comparison to live food.

**Discussion**

The results showed that live food, in particular zooplankton, is a most desirable diet for the rearing of the H. fossilis.
The importance of Artemia as live food (Hogendoorn, 1980; Msiska, 1981) is again confirmed by this investigation. However, Prinsloo and Schoonbee (1986), observed zooplankton as best live food in comparison to commercial dry feed for the rearing of silver carp and grass carp species over a period of 10 to 14 days. Silver carp and grass carps larvae accrued relatively better growth with zooplankton as compared to commercial dry food.

Live food is an important diet in the rearing of larvae of a number of fish species (Bryant and Matty, 1980; Hogendoorn, 1980; Msiska, 1981; Stenson, 1982). Watanbe et al. (1983), Lubzens et al. (1984) indicated the importance of rotifer Brachionus plicatilis for mass larval rearing of fishes and stressed the value of the inclusion of rotifers in combination with artificial dry feeds for the optimum growth of Cyprinus carpio larvae. Matlak and Maltak (1976) indicated that rotifers are important food items of carp larvae during the first three weeks in nursery ponds. Zooplankton is the best larval food for a variety of fish larvae (Watanabe, 1979; Green and Merrick, 1980; Kilambi and Zdinak, 1982; Geigher, 1983a, b and Dabrowski, 1984). The nutritional value of Artemia, for Cyprinus carpio larvae indicated good growth (Bryant and Matty, 1981; Vanhaecke and Sorgeloos, 1983). A variety of dry foods were used for the rearing of C. carpio larvae (Appelbaum and Dor, 1978; Hecht and Viljaen, 1982; Viola and Arieli, 1982).

In the present investigation, best growth of H. fossilis larvae was observed in zooplankton fed group indicating its importance. Larvae fed with zooplankton showed a mean individual growth increment of 37 mg and a high level of activity in 12 days. Our findings for both Artemia and zooplankton are in line with those of Hogendoorn (1980) and Msiska (1981) who also reported inferior growth for Clarias larvae using dry food (trout starter meal) alone in comparison to live feed. Growth of C. lazera (Hogendoorn, 1980) and C. gariepinus (Polling et al., 1988) using live food, corresponded well with our findings over first 12 day larval growing period.

The troughs receiving zooplankton...
were the most affected with lowest oxygen concentration (Table 2). The ammonia, nitrite and nitrate concentration in water was higher in zooplankton troughs in comparison to other dry feed troughs. This indicated that unless proper cleaning and water exchange were done daily the concentration of ammonia, nitrite and nitrate would have been much more, which would be detrimental to larval growth and may cause mass mortality of larvae.

Our present results strongly support the use of live food in the early larval growth phase of *H. fossilis*. Growth performance and activity of the fry fed on snail meat, fish meat and rice bran was not good in comparison to the live food. The poor quality of growth as well as less activity observed in the larvae fed with snail meat, fish meat and rice bran may be due to their inadequate acceptability at larval phases. Low digestibility of feed might also caused such type of inferior growth. Although our present results strongly support the use of live food in early larval growth phase of *H. fossilis*, it should not affect further development and improvement of balanced dry feed.

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### References


Dabrowski, K. 1984. Influence of initial weight during the change from live to compound feed on the survival and

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