Short communication

Notes on the early larval rearing of the butter catfish *Eutropius depressirostris* (Schilbeidae) using live and artificial feed

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Abstract

Use was made of zooplankton, *Artemia*, and an artificial diet to grow the larvae of the butter catfish *Eutropius depressirostris* during the first 16 d after active feeding commenced. Both live feeds proved to be superior to the artificial diet when provided on an equivalent calculated dry mass basis.

Introduction

The butter catfish, *Eutropius depressirostris* (Fig. 1) is endemic to southern Africa. It occurs in river systems flowing eastwards towards the Indian Ocean, from Kenya in the north to the Pongola River system in the south (Jubb, 1967).

Some information exists on the biology and ecology of this fish species (Groenewald, 1964; Gaigher, 1969 a,b; Potgieter, 1974). Hecht (1980) did some work on the age, growth and reproduction of the fish in the Luphephe-Nwanedzi impoundment, Venda, South Africa. The first successful studies on the artificial spawning and larval rearing of the butter catfish were carried out by Kruger and Polling (1984). However, Kruger and Polling (1984) experienced difficulties with the larval rearing programmes and it was, therefore, decided to conduct further investigations into the early growth of the butter catfish using live and artificial feed.

Materials and methods

In the present investigations, successful spawning of the butter catfish was achieved using alcohol-preserved pituitary gland material of the sharptooth catfish *Clarias gariepinus*. Induced spawning procedures were executed according to Schoonbee and Prinsloo (1986). The eggs are of the adhesive type, and were therefore hatched in Heath Techna trout hatching trays, following procedures described by Prinsloo *et al.* (1987). The larvae used in the present investigation were all from the same female.

Feeding commenced two days after hatching when the larvae were transferred to 50 glass aquaria at a density of 10 larvae per ℓ of water. The tanks were connected to a 6 000 ℓ capacity recirculating system provided with a biological filter. Water replacement was continuous at a rate of 60 $\ell\,h^{-1}$. Water temperatures of the system were maintained at 26 to 28°C throughout the feeding programme. Feed used included the following: zooplankton developed in outside concrete ponds rinsed through a 180μm sieve. The zooplankton consisted predominantly of the Cladoceran *Moina* sp. and the rotifer *Brachionus* sp. One-day-old *Artemia nauplii* and a dry commercial fish feed, Tetramin, used in the aquarium trade, were also employed as food. Powdered Tetramin was screened through a 186μm sieve before each application.

Experiments were done in duplicate except in the case of the tanks receiving *Artemia*, where zooplankton and dry feed were used after nine days of treatment, when no more *Artemia* material was available. Feeding trials lasted for 16 d. At the water outlets of each tank a 63μm nylon mesh screen was placed to prevent loss of larvae and food. Screens were cleaned regularly with a fine brush.

The three types of food were provided on an *ad lib* basis using on average a daily minimum quantity of 25%, expressed as dry mass, of the total daily estimated wet mass of the fish larvae in each tank. Food was initially applied twice daily at 09h00 and 15h00, during the first 6 d, after which the application times were increased to four times per day, to minimise the accumulation of excess food in the tanks at any given time. The tanks were cleaned daily in the mornings, and all uneaten food and dead larvae were removed.

Sampling to determine mass increments of fish larvae, and to adjust feed ratios, was conducted on days 3, 6, 9 and 13. On average ten larvae were collected randomly from each tank for individual mass determinations during each of the specified days (Table 1). The larvae were weighed accurately on an electronic balance to the nearest milligram after being carefully dried on a nylon sieve provided with blotting paper underneath.

On day 16 a sample of 100 larvae per treatment was used to calculate the final mean mass of the larvae for each treatment. In the case of larvae where dry feed was used, only 14 larvae survived, which were all weighed. All the larvae from all treatments were counted to determine the percentage survival.

Limited chemical analyses of the water in the various tanks, which included pH, conductivity, dissolved oxygen, ammonia, nitrate and phosphate, were conducted every third day according to APHA (1980).

Results

Results of the water chemistry of all the treatments showed no serious decline in oxygen or increases in values for ammonia and phosphates. Oxygen concentrations in the tanks were all below 5 $mg\ell^{-1}$. Values for ammonia did not exceed the value of 0,09 $mg\ell^{-1}$ at any time. The conductivity of the water fluctuated between 90,8 $\mu S\ cm^{-1}$ and 110 $\mu S\ cm^{-1}$. The pH values fluctuated between 8,2 and 8,5.

The three feed types used (Table 1) clearly demonstrated the

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superior quality of the live food over that of dry feed. *Artemia* proved to be the best over the first nine-day period, when the larvae increased from the original mean mass of 1,27 mg to 25,35 mg, compared to 20,88 mg where zooplankton was used as food. In the case of the dry feed, the mean mass of the larvae on day nine was only 5,62 mg. On day sixteen, larvae receiving zooplankton reached a mean mass of 145,87 mg with a survival rate of almost 63%. In the case of larvae receiving dry feed, a mean mass of 9,66 mg was achieved after 13 d. On day 16, only 14 larvae out of a 1 000 (1,4%) survived. In the case where *Artemia* was substituted by zooplankton and dry feed respectively (Table 1), the combination of *Artemia* followed by zooplankton provided the best growth results of the two, with an eventual mean mass of 140,51 mg, compared to 71,52 mg where dry feed was used as substitute for *Artemia* (Table 1). Survival in both cases exceeded 63% after 16 d.

TABLE 1
MEAN INDIVIDUAL MASS ($\bar{x}$ in mg) AND MASS RANGE (mg) OF LARVAE OF THE BUTTER CATFISH *EUTROPIUS DEPRESSIROSTRIS* FED ON ZOOPLANKTON, *ARTEMIA* AND A COMMERCIAL DRY FOOD FROM DAY TWO AFTER HATCHING, FOR A PERIOD OF 16 D. INITIAL LARVAL DENSITY FOR ALL TREATMENTS AT 10 LARVAE PER ℓ.

Day no.	Feed types used					
	Zooplankton		*Artemia*		Commercial dry feed	
	$\bar{x}$	range	$\bar{x}$	range	$\bar{x}$	range
1	1,27		1,27		1,27	
3	5,29	5,29- 5,30	5,79	4,75- 6,83	2,99	2,98- 2,99
6	10,08	9,66- 10,41	14,72	14,68-14,76	4,11	3,87- 4,36
9	20,88	19,58- 22,18	25,35	25,16-15,55	5,62	5,53- 5,71
			Zooplankton	Dry feed		
			$\bar{x}$	$\bar{x}$		
13	70,93	67,52- 74,34	57,35	39,86	9,66	6,70-12,62
16	145,87	143,80-147,94	140,51	71,52		*21,10-89,71
			% Survival after 16 d			
	62,92		65,00	63,89		1,40

*Only 14 larvae of the original 1 000 survived, but these grew very rapidly due to cannibalism which occurred increasingly during the last phase of the experiment.

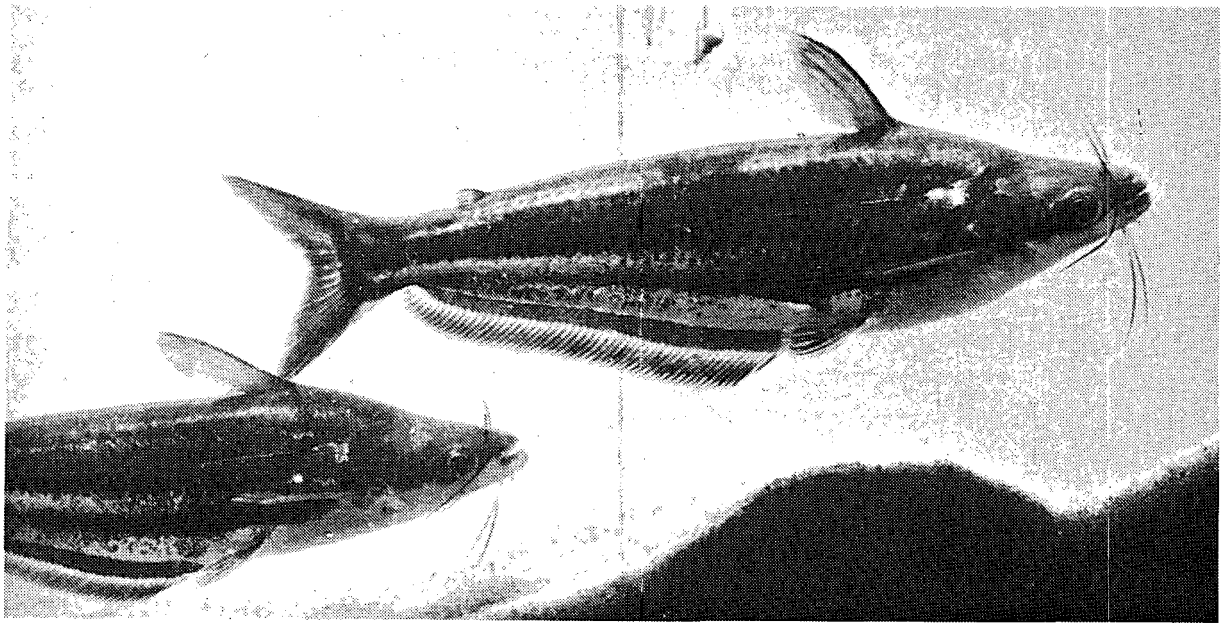

Figure 1
The butter catfish Eutropius depressirostris

Discussion

The present growth results, where both zooplankton and the combinations *Artemia* zooplankton and *Artemia* dry feed were used, compared favourably with the feeding results obtained for *E. depressirostris* larvae by Kruger and Polling (1984) who used *Artemia nauplii* and zooplankton as food. A mass increment of only 8,7 mg was recorded by these authors for larvae fed over a period of 26 d and at a stocking density of 10 larvae per ℓ. When larvae were reared by Kruger and Polling (1984) at a density of 2 larvae per ℓ of water, a mean mass of 80 mg was achieved over the same period. It must, however, be noted that Kruger and Polling (1984) kept water temperatures in which larvae were reared at approximately 23°C, which is 3 to 5°C lower than water temperatures in the present investigation. Another factor which may have affected larval growth of *E. depressirostris* as reported by Kruger and Polling (1984), might be the quantities of food applied as well as the daily feeding intervals, of which no account was given by the authors.

Our present growth trials with larvae of *E. depressirostris* again confirm the value of live food in the larval rearing of fish, particularly during the early larval stages (Prinsloo and Schoonbee, 1986).

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