OPTIMIZED FEEDING STRATEGIES IN THE LARVICULTURE OF THE ASIAN SEABASS LATES CALCARIFER

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Abstract

This paper reports on the progress made at the Tigbauan hatchery of SEAFDEC in the Philippines, with the larviculture of the Asian seabass Lates calcarifer when using w3-HUFA enriched Brachionus and Artemia.

In order to optimize the transitions of the different prey types, larval mouth size was analyzed as a function of larval development: San Francisco Bay (SFB) type Artemia nauplii can be ingested from days 8 to 10 onwards, and Great Salt Lake(GSL) nauplii from days 10 to 15 (with some variations depending on growth differences between culture trials). In view of the high correlation between mouth size and total larval length, the feeding of different size classes of Artemia can be better programmed, i.e., SFB nauplii can be fed when fish larvae measure 4 mm in length, and 24 hr enriched GSL can be given to 7 mm larvae. The incorporation of the HUFA's 20:5w3 and 22:6w3 in the live prey Artemia, and possibly Brachionus, greatly improved larval ability to metamorphose, although it did not affect growth nor survival until day 21. However, when 21 day old fry were subjected to a stress test, much higher survival rates were obtained in HUFA-enriched seabass larvae, illustrating their superior physiological condition over fry cultured with non-enriched Brachionus and Artemia .

These findings were used to propose an improved feeding strategy for the larviculture of Lates calcarifer .

Introduction

Seabass hatchery and growout culture production based on Thai mass production methods were demonstrated to be economically profitable (Sungkasem 1982). One major constraint however has been the high nutritional requirement of seabass during the hatchery phase, which until now could only be achieved with the live food organisms Brachionus plicatilis and Artemia sp., as no suitable artificial feed has been developed yet (Pechmanee et al. 1984a,1984b; Anon. 1986).

Since producers have to rely on the natural food diet until reliable artificial feeds become available, refinement of the larval feeding technique and new feeding strategies are necessary to reduce the cost of Artemia cysts (Copland and Grey 1987). In this regard, good knowledge of the prey size, prey quality and predator size will be very helpful. Although the size of the mouth is crucial for the ingestion of the prey, very little about it can be found in the literature, and the determination of the first food distribution depends more on experience than real science. However, very simple daily measurements during larval rearing could be considered to provide useful information regarding the suitable prey size for ingestion. Further, the nutritional requirements of the fish can be fulfilled by choosing different Artemia strains, or by enriching Brachionus and Artemia nauplii.

Materials and Methods

In the first experiment, 10 fish were anaesthesized with 3-amino benzoic acid ethyl ester (MS 222) for measurement of total length (TL), standard length (SL) and mouth opening. The latter was obtained after decapitation of the fish. The mouth was completely opened by applying soft pressure on the posterior head region. With this technique the mouth was at its maximum opening, was practically circular, and could easily be redrawn using a stereomicroscope equipped with a drawing mirror. Once the circumference of the mouth was drawn, the microscopic slide with the head of the fish was replaced by a slide with Artemia nauplii: if the body of the nauplii could fit within the circle, the nauplii were presumed to be a possible prey for ingestion. Aside from this visual control, the mouth circumference was also measured using a curvimeter and the diameter calculated by dividing the circumference by π . This technique was preferred to direct measurement since the width of the mouth is highly dependent on the mouth configuration. A closed mouth is larger than a wide-open mouth, but in both cases the circumference remains unaltered.

The results obtained for the first uptake of Artemia nauplii were used in a comparative feeding experiment in 16 tanks of 200 l capacity each. Seabass larvae were obtained from broodstock at the Igang Research Station and stocked at a density of 30 animals per liter. During the early rearing period, half of the tanks were given w3-enriched Brachionus (A) and the other tanks, Chlorella-reared Brachionus (B). In both treatments the daily feeding scheme was maintained at 15 individuals per ml. As soon as the fish could ingest Artemia, the two Brachionus treatments were subdivided in four treatments consisting of the following feeding regimes:

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