

Marine Fish Larviculture in Mexico: Advances and Challenges in Nutrition and Feeding

Armando García-Ortega¹ and Juan Pablo Lazo²

¹Centro de Investigación en Alimentación y Desarrollo (CIAD), Unidad Mazatlán, Apdo. Postal 711, C.P. 82010, Mazatlán, Sinaloa, México, Tel: +52 (669) 9898700; Fax: +52 (669) 9898701
E-mail: agarcia@victoria.ciad.mx

²Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), K. 107 Carr. Tijuana-Ensenada, C.P. 22860, Ensenada, B.C., México, Tel: +52 (646) 1750500, Fax: +52 (646) 1750572

Abstract

In Mexico, several marine fish species are subject of study as potential candidates for commercial aquaculture. The controlled production of high quality larvae is essential for completion of the culture cycle in these fish. Therefore, current efforts are aimed to develop efficient larviculture techniques. To date, successful larval production has been achieved for spotted sand bass (*Paralabrax maculatofasciatus*), totoaba (*Totoaba macdonaldi*), bullseye puffer (*Sphoeroides annulatus*), California flounder (*Paralichthys californicus*), red drum (*Sciaenops ocellatus*), white sea bass (*Atractoscion nobilis*) and red snapper (*Lutjanus campechanus*). In other fish species some advances in larval rearing have been reported: Pacific red snapper (*L. peru*) and spotted rose snapper (*L. guttatus*). However, high mortalities are still an obstacle for a successful larviculture in a large number of species, as in the case of common snook (*Centropomus undecimalis*), yellow snapper (*L. argentiventris*), leopard grouper (*Mycteroperca rosacea*), pompano (*Trachinotus* spp.) and hogfish (*Lachnolaimus maximus*). Because growth and survival in marine fish larvae are mainly influenced by nutritional aspects, the information on nutritional requirements of fish larvae and nutritional quality of live food and formulated microdiets food is essential for the establishment of adequate larviculture techniques. Feeding protocols, digestive capacity of the larvae and the importance of nutritional quality in live food and microdiets are reviewed for their application in the larviculture of difficult-to-rear species. Feeding protocols with the use of microalgae, rotifers and *Artemia* nauplii are currently used for most species. At first feeding, adequate live food density and particle size are essential for fish larvae. The use of small strain rotifers and copepods has allowed improvements in fish survival during this critical stage. Once successful first feeding is achieved, significant higher fish growth and survival have been obtained with the use of live food enriched with essential fatty acids (i.e. HUFA) when compared to non-enriched rotifers or *Artemia*. Application of specific methods for production and storage of live food, such as *Artemia* cysts decapsulation and live *Artemia* cold-storage have improved experimental hatchery outputs. As for weaning microdiets, several formulated microdiets have been prepared using various manufacturing techniques (i.e. microbound and microencapsulation) and have been tested with good results in some species. However, the lower ingestion rate of microdiets compared to live food is a major problem to be tackled. The use of highly digestible protein sources, intact or predigested, has improved microdiet assimilation.