



## Larval Feed Development: A Necessity of Fish Nutritional Research

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Fishes, like other organisms, require an energy source to fuel their body systems and processes. There are five periods in the lifespan of fish identified as embryonic, larval, juvenile, adult and senescent. In all these events larval stage is the most critical phase of life of fish where a huge mortality concerns are observed. A major bottleneck in the commercial production is high mortality rate during larval rearing. There might be several reasons for this high mortality rate such as lack of brood care, improper management, lack of knowledge on optical stocking density, lack of standardized rearing environment etc. In addition to these nutritional requirements of most of the species is unknown especially during early stages. specific leading to the formulation of improper feeds. Furthermore, developmental changes from hatched yolk sac larva to fingerling crosses several ontogenetic stages which requests specific and changing farming and feeding practices. Above all the first feeding stage is found in all the areas of the rearing tanks and do not concentrate where the food is distributed, hence, for efficient consumption there should be permanent availability of food in water column.

Feeds have a great influence on the successful rearing of larvae of any fish. Hence, there for the development of suitable feeds for the larvae of fish, different strategies can be adopted. First of all, direct nutritional requirement studies should be conducted for the determination of optimal level of the nutrients to be incorporated in feed. The most direct method to evaluate nutrient requirements for larvae is to feed them diets or live preys varying only in their content of a particular nutrient. Nutrient composition of egg and the yolk sac can also be used another strategy by which the requirement can be determined. Live feeds are the rich sources of quality nutrients and although nutrient levels of live foods are not equivalent to larval requirements but can be used as an estimate of the composition of the larval diet in nature. In addition to the composition of live feeds, nutrient profiles of the whole fish larvae has also been proposed to be a good index of the requirements of

essential nutrients, however, while using the larval nutrient profile as an indicator of the dietary requirements in fish larvae, a correction for the bioavailability of the nutrients cannot be ignored.

A comprehensive understanding of the ontogenetic changes during the early life stages of fish may also help in identifying the limiting factors during larval rearing, determining the appropriate time for weaning and optimizing the feeding practices with the developmental stage of fishes. Besides, exogenous enzyme supplementation at the times of their low activity or expression could also be practiced for the efficient utilization of nutrients. On the other hand, nutritional programming can be helpful in tailoring specific metabolic pathways or functions in fish for improvisation in the nutrient utilization that could also be important strategy for the larval feed development of fish. To date, larval nutritional requirements are only partially identified and much is still unknown for most of the commercially important species. The strategy of digestive ontogeny could act as a useful strategy to understand the physiological state of the fish and for the larval feed development.

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