

Technical Considerations in the Development of Feeds for Shrimp Larvae and Broodstock

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Abstract

The culture of shrimp is moving, albeit slowly, from an industry dependent on capture of wild animals (broodstock and postlarvae), to the use of domesticated animals. This represents a major shift towards the intensive animal husbandry techniques common in other animal production industries. Although primarily driven by concerns over the health status of wild stocks, and the consequent impact on farming operations, this shift also heralds profound implications for shrimp nutrition, not least in the fields of larval and broodstock nutrition. The development of shrimp stocks reared entirely in captivity and potential to develop genetic selection programs raises the possibility of selection based on a number of criteria, including nutrition.

Current broodstock maturation systems rely heavily on live feeds as a source of nutrition. Squid, mollusk meats, marine polychaetes and Artemia biomass are among a number of components regarded as important sources of nutrition for shrimp broodstock. However, natural food items such as these suffer from issues such as availability and variations in nutritional profile depending on source, season, storage and environmental factors, making it difficult to provide consistent performance. Attempts have been made to produce commercial maturation diets but impacts on reproductive performance have generally resulted in their use as supplements to, rather than replacements for, live or fresh feeds.

Similarly, larval feeding regimes still depend largely on live feed sources such as phytoplankton, rotifers and Artemia. Although generally under greater control in terms of availability and culture conditions, these still suffer from some of the problems of consistency as live feeds for broodstock, as well as being relatively inconvenient and expensive to produce.

Many types of formulated larval feeds are available and, in some cases, have been used at high rates of replacement for live feeds. However, wide variations in culture conditions and environments, as well as concerns over quality of post-larvae (as opposed to quantity) produced under high live-feed replacement regimes, have limited widespread adoption of feeding regimes using predominantly formulated diets. At the same time, there are severe technical constraints to the development of complete feeds for larvae given the small size of the feed particles and the development of the larval gut and digestive physiology.

This paper will provide a necessarily brief overview of the issues facing feed formulators and some of the key considerations that must be addressed in developing formulated feeds for shrimp broodstock and larvae.