ABSTRACT

Despite progress in the aquaculture industry, there remain several bottlenecks in the culture of marine species including: (1) variable larval quality; (2) inability to provide larval prey of appropriate size and nutritional profile; (3) lack of knowledge concerning optimal larval and juvenile culture conditions; (4) a paucity of appropriate commercial culture protocols. This study aims to contribute to the development and improvement of aquaculture protocols using fatty acid analysis and modeling to: (1) determine larval fatty acid requirements; (2) evaluate the need for prey enrichment; (3) optimize *Artemia* nauplii enrichment procedures; (4) optimize productivity of culture protocols via modeling; (5) develop profitability models as management tools for aquaculture facilities.

The egg fatty acid profile provides information on species preferred habitat and diet. We hypothesize that the broodstock and larval diets could be based upon the fatty acids consumed through embryogenesis; available data suggests that the greater the consumption of DHA during embryogenesis, the greater the need for a larval prey rich in DHA.

Artemia nauplii are a commonly used prey that requires enrichment with essential fatty acids to successfully culture marine larvae; however, enrichment promotes naupliar growth and mortality. An *Artemia* enrichment model was developed from experimental data to determine the optimum enrichment protocol to produce a prey with specific characteristics.

To optimize the productivity of culture protocols, response curves that reflect the effect of abiotic and biotic factors on survival and growth should be designed. Productivity models were developed for *Lysmata seticaudata* and *Mithraculus forceps*. Profitability models should integrate information regarding: (1) effect of abiotic and biotic conditions on culture success; (2) facility characteristics; (3) operation costs and sales profit, to allow simulations of different culture scenarios. A profitability model for the culture of *Mithraculus forceps* was developed to be used as a management tool of an aquaculture facility.

Keywords: aquaculture; fatty acid; modeling; egg; profitability