

ORIGINAL ARTICLE

# Comparative survival and growth performance of European lobster larvae, *Homarus gammarus*, reared on dry feed and conspecifics

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## Abstract

A bottleneck of crustacean larval culture concerns nutrition and associated cannibalism in communal rearing systems, which impact on larval survival, development and growth. For early-stage European lobster, *Homarus gammarus* larvae, feeding ecology and body composition are largely unknown. We initiated four progressive feeding experiments (novel feed types, feeding regime and feed size and cannibalism effects) on growth and survival, to inform and update husbandry protocols. Performance of larvae offered a dry commercial feed was not significantly different compared with a conventional wet plankton feed of the same ration and size grade (both within 600–1,000 µm). Further experiments found that the same ration of dry feed offered six times daily improved development and growth, over the conventional regime of three times daily. Small-grade dry feed (particles: 250–360 µm) improved larval performance compared with a larger feed (360–650 µm). Larvae were also fed different proportions of dry feed and/or conspecifics in both communal and individual rearing systems (the latter preventing cannibalism via segregation). Individually reared larvae, fed only dead conspecifics, displayed the greatest survival (80%) to postlarvae. This underlines the impact of cannibalism on survival and nutrition in *H. gammarus* larviculture. A final experiment analysed *H. gammarus* zoea 1 composition, identifying deficiencies in ash and carbohydrate in lobster feeds. This suggests a need for a species-specific, formulated dry feed for *H. gammarus* larviculture. Our research represents the first investigation of *H. gammarus* larval composition and dietary requirements and highlights decreased growth potential associated with providing nutrition solely from generic commercial feed.

## KEYWORDS

cannibalism, composition, hatchery, homarid, nutrition

## 1 | INTRODUCTION

Global fisheries management includes the use of wild stock enhancement programmes to supplement natural populations of aquatic animals, including crustaceans (Ellis et al., 2015). *Homarus* spp. hatcheries grow vulnerable pelagic larvae through to the more

robust benthic juvenile stages for release into the wild, in support of ranching, restoration and remediation (Burton, 2003; Ellis et al., 2015). The origins of European lobster *Homarus gammarus* L. larviculture can be traced back to the latter part of the 19th century. Pelagic larvae (zoea; or Z1, Z2, Z3) are reared at high densities and following moult to stage 4, post-larvae (PL) are reared either

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Design, Operation and Training Manual for an Intensive Culture Shrimp Hatchery Granvil Dean Treece, Joe M. Fox, 1999-06 Covers two species *Penaeus monodon* and *Penaeus vannamei* It is organized into three main parts Design Operation and Training The design part focuses on two hatcheries and gives detailed plans of their construction as well as other options The operation portion of the manual details the procedures for most efficient operation of a specific hatchery This manual consists of compiled presently known information important for training new personnel Contains enough detail to provide the newcomer with knowledge to run a hatchery and provides details to assist the experienced hatchery manager Illustrated      Hatchery Manual Mike Sipe, 2002      A Fish Hatchery Manual for Africa Graham Haylor, James F. Muir, 1998

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