

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

A Hatchery Manual for the Common, Chinese, and Indian Major Carps V. G. Jhingran, Roger S. V. Pullin, 1985 Manual of Hatchery Management Based on Bio-physico-chemical Control Shigehisa Yamasaki, 1991 **Fish Hatchery**

Management Robert G. Piper, 2017-08-07 The most recent Fish Cultural Manual published by the United States Fish and Wildlife Service was authored by Lynn H Hutchens and Robert C Nord in 1953 It was a mimeographed publication and was so popular that copies were jealously sought by fish culturists across the country it soon was unavailable In 1967 the Service s Division of Fish Hatcheries began to develop a Manual of Fish Culture with J T Bowen as Editor Several sections were published in ensuing years Efforts to complete the manual waned until 1977 when due to the efforts of the American

Fisheries Society and of the Associate Director for Fishery Resources Galen L Buterbaugh a task force was established to develop and complete this publication **Earth-Friendly Food for the Future in Your Backyard** Mike Sipe,Eric Doss,2010-10 A practical how to system for creating your own sustainable protein source to feed your family or to launch a commercial enterprise Whether you re concerned about survival struggling to make ends meet in tough economic times or just wanting to have the fun of adding a fresh and inexpensive source of food to your family s diet the Mike Sipe Eric Doss approach to Earth Friendly Food for the Future in Your Backyard is the best place to start Includes diagrams and illustrations along with materials lists and exact instructions for raising Tilapia safely and cost effectively **Tilapia Broodstock and Hatchery Management** Ruel V. Eguia,2007 This manual will surely assist tilapia operators and technicians in producing good quality fry and fingerlings which the industry currently needs Fisheries researchers teachers and students will also find this manual as a good source of basic informarion regarding tilapia broodstock and hatchery management **Hatchery Manual for the White Sturgeon (Acipenser Transmontanus Richardson)** Fred Sequin Conte,University of California (System). Cooperative Extension,1988 A Guide to Prawn Hatchery Design and Operation ,1985 Manual on Hatchery Production of Seabass and Gilthead Seabream ,1999

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