

Early weaning in meagre *Argyrosomus regius*: Effects on growth, survival, digestion and skeletal deformities

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Funding information

Seventh Framework Programme, Grant/Award Number: KBBE-2013-07 single stage, GA 603121

Abstract

Meagre *Argyrosomus regius* is considered a new species for the diversification of fin-fish aquaculture in the Mediterranean. Several bottlenecks have been identified by producers, and among them, the necessity to establish early weaning protocols to reduce production costs. In this study, two experiments were carried out with meagre larvae from 2 to 35 days post hatch (dph) using different weaning strategies, including the early introduction of artificial diets and the reduction of *Artemia* metanauplii to half of the normal amounts. A high frequency of cannibalism and high variability in growth rate and survival were obtained in one of the trials and several changes were introduced (reduction of light intensity, higher frequency of food distribution) in the second trial to increase the survival rate. In both trials, weaning started before the complete morphological and functional development of the stomach; thus, pancreatic enzymes, mainly trypsin and lipase tended to be more active in early weaned larvae compared to the control groups. Early weaning delayed the development of the stomach formation and secretion of acid proteases, which may explain the lower growth rates observed in our study. The effect of weaning on skeletal development was also studied and in this sense the results obtained showed no major influence of the early weaning on the incidence of skeletal deformities. Weaning of meagre larvae can be performed as early as 12 dph, but important aspects such as avoiding cannibalism and co-feeding live prey and artificial diets for at least 5 days were recommended.

KEYWORDS

cannibalism, digestive enzymes, growth, meagre, skeletal deformities, weaning

1 | INTRODUCTION

Larval rearing of meagre *Argyrosomus regius* is usually carried out following a protocol based in European sea bass (*Dicentrarchus labrax*) and gilthead sea bream (*Sparus aurata*) larval rearing (Estévez, Treviño & Gisbert, 2007; Roo, Hernández-Cruz, Borrero, Fernández-Palacios & Schuchardt, 2007; Roo, Hernández-Cruz, Borrero, Schuchardt & Fernandez-Palacios, 2010), including the use of enriched live feeds (rotifers, *Brachionus* sp. and *Artemia* sp. metanauplii). However, larviculture practices based on live preys represent a high cost

compared to inert diets, both in terms of production and labour costs. Different studies have revealed that these protocols need to be adapted to the biological demands of this species, as meagre larvae are quite sensitive to stress produced by high light intensity (>500 lux at water surface), long photoperiods or high densities of live prey (Roo et al., 2010; Suzer, Kamaci, Coban, Firat & Saka, 2013; Vallés & Estevez, 2013). Although the precise nutritional requirements for meagre have not been completely established, larvae show very good growth performance and survival rates using commercially available products for live prey enrichment and feeds