



The importance of dietary HUFA for meagre larvae (*Argyrosomus regius*; Asso, 1801) and its relation with antioxidant vitamins E and C

Najlae El Kertaoui¹, Carmen María Hernández-Cruz¹, Daniel Montero¹, María José Caballero¹, Reda Saleh^{1,2}, Juan Manuel Alfonso¹ & Marisol Izquierdo¹

¹Grupo de Investigación en Acuicultura (GIA), Universidad de Las Palmas de Gran Canaria, Transmontaña s/n, Arucas, Las Palmas, Spain

²Oceanography Department, Faculty of Science, Alexandria University, Alexandria, Egypt

Correspondence: M Izquierdo, Grupo de Investigación en Acuicultura (GIA), Universidad de Las Palmas de Gran Canaria, Transmontaña s/n, Arucas, Las Palmas, Canary Islands 35413, Spain. E-mail: mizquierdo@dbio.ulpgc.es

Abstract

Despite the interest of meagre (*Argyrosomus regius*) as a fast-growing candidate for Mediterranean aquaculture diversification, there is a lack of information on nutrition along larval development. Importance of highly unsaturated fatty acids (HUFA) and the antioxidant vitamins E and vitamin C has not been investigated yet in this species. Six diets with two levels of HUFA (0.4% and 3% dw), two of vitamin E (1500 and 3000 mg kg⁻¹) and two of vitamin C (1800 and 3600 mg kg⁻¹) were fed to 15 dah meagre larvae. Larval growth in total length and dry body weight was significantly lowest in larvae fed diet 0.4/150/180 and showed few lipid droplets in enterocytes and hepatocytes and lower HUFA contents than the initial larvae. Increase in dietary HUFA up to 3%, significantly improved larval growth and lipid absorption and deposition. Besides, among fish fed 3% HUFA, increase in vitamin E and vitamin C significantly improved body weight, as well as total lipid, 22:6n-3 and n-3 fatty acids contents in the larvae. Thus, the results showed that 0.4% dietary HUFA is not enough to cover the essential fatty acid requirements of larval meagre and a high HUFA requirement in weaning diets is foreseen for this species. Besides, the results also pointed out the importance of dietary vitamin E and C to protect these essential fatty acids from oxidation, increase their contents in the larvae and promote growth, suggesting high vitamin E and C requirements in meagre larvae (higher than 1500 and 1800 mg kg⁻¹ for vitamin E and vitamin C respectively).

Keywords: n-3 HUFA, requirements, antioxidant, *Argyrosomus regius*, fish larvae, vitamin E, vitamin C

Introduction

Meagre (*Argyrosomus regius*) is one of the fast-growing species proposed as a candidate for marine finfish diversification on commercial aquaculture in Mediterranean and Eastern Atlantic coasts (Queméner 2002; Mateos 2007; Gil, Grau, Basilone, Ferreri & Palmer 2013). At present, optimized spawning induction protocols produce high quality eggs and larvae from this highly fertile species denoting the excellent aquaculture potential of this species (Fernández-Palacios, Schuchardt, Roo, Hernández-Cruz & Duncan 2009; Mylonas, Mitrizakis, Sigelaki & Papadaki 2011; Duncan, Estévez, Porta, Carazo, Norambuena, Aguilera, Gairin, Bucci, Vallés & Mylonas 2012). Besides, larval development (Fernández-Palacios, Schuchardt, Roo, Borrero, Hernández-Cruz & Socorro 2007; Hernández-Cruz, Schuchardt, Roo, Borrero & Fernández-Palacios 2007; Jiménez, Rodríguez la Rúa, Sánchez & Cárdenas 2007; Pastor & Cárdenas 2007; Abreu, Socorro, Betancor, Caballero, Fernández-Placios, Hernández-Cruz, Roo & Schuchardt 2009; Cardiera, Vallés, Dionisio, Estévez, Gisbert, Pousao-Ferreira, Cancela & Gavaia 2012), as well as larval rearing techniques (Estévez, Treviño & Gisbert 2007; Roo, Hernández-Cruz, Borrero, Schuchardt & Fernández-Palacios 2010; Vallés & Estévez 2013) have been extensively