



Dietary requirement for n-3 long-chain polyunsaturated fatty acids for fast growth of meagre (*Argyrosomus regius*, Asso 1801) fingerlings

Carvalho M.^{a,b,c,*}, Peres H.^{b,c}, Saleh R.^{a,d}, Fontanillas R.^e, Rosenlund G.^e, Oliva-Teles A.^{b,c}, Izquierdo M.^a

^a Grupo de Investigación en Acuicultura (GIA), Instituto Universitario Ecoaqua, Universidad de Las Palmas de Gran Canaria, Crta. Taliarte s/n, 35214 Telde, Spain

^b Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), Terminal de Cruzeiros do Porto de Leixões, Av. General Norton de Matos s/n, 4450-208 Matosinhos, Portugal

^c Departamento de Biologia, Faculdade de Ciências da Universidade do Porto (FCUP), 4169-007 Porto, Portugal

^d Oceanography Department, Faculty of Science, Alexandria University, Moharram Bek, Alexandria, Egypt

^e Skretting Aquaculture Research Centre AS, PO Box 48, N-4001 Stavanger, Norway

ARTICLE INFO

Keywords:

Essential fatty acids requirement
Argyrosomus regius
EPA
DHA
ARA

ABSTRACT

The establishment of well-balanced diets that meet nutrient requirements is important to optimize a large-scale production of new aquaculture species. This is the case of meagre (*Argyrosomus regius*), a promising new aquaculture species, with great potential owing to its high growth rate, feed efficiency and easy adaptation to captivity. Knowledge on the nutritional requirements of this species is still scarce, namely regarding essential fatty acids, which are required to sustain growth, development, immune status and survival. A feeding trial was performed with meagre fingerlings (2.8 g ± 0.23) testing 5 increasing dietary n-3 LC-PUFA levels (0.8, 1.4, 2.0, 2.6 and 3.6% DM) with the purpose of evaluating the n-3 LC-PUFA requirements for fast growth of meagre fingerlings. Meagre reflected very high specific growth rates (4.1 to 4.6%) and low feed conversion ratios (0.7 to 0.8), thus highlighting its great potential for aquaculture production. Fish fed 0.8% n-3 LC-PUFA showed the lowest growth, which was significantly improved by increasing the dietary n-3 LC-PUFA levels up to 2.0–2.6%. DHA and ARA were preferentially retained over EPA in whole fish body. Fish fed 0.8% n-3 LC-PUFA showed an up-regulation of *fads2* and *elovl5* relative gene expressions. Thus, meagre seems to have active $\Delta 6$ desaturases and *Elovl5*, but their activities being insufficient to produce DHA and EPA from PUFA precursors to sustain fast growth, at least under the experimental conditions tested. Young meagre shows a typical marine requirement for n-3 LC-PUFA, estimated to be, at least, 2.0% DM of the diet.

1. Introduction

In recent years, an urgent need for new aquaculture species emerged to increase both the competitiveness and sustainability of the Mediterranean aquaculture sector and the expansion of the aquaculture products market (Abellán and Basurco, 1999). Within this context, a great interest for meagre (*Argyrosomus regius*) production has grown (Monfort, 2010). This species constitutes one of the most promising species for the diversification of Mediterranean aquaculture, being considered as a priority species in research and development programs of the Mediterranean countries (Poli et al., 2003; Mateos, 2007). Meagre is a carnivorous fish belonging to the *Scianidae* family and

inhabiting the eastern coast of the Atlantic and Mediterranean and Black Seas (Quéro and Vayne, 1987; Floeter et al., 2008; FAO, 2013). The species has several characteristics that support it as a suitable candidate for commercial production, such as easy adaptation to captivity (Cárdenas, 2010; Monfort, 2010), fast growth (reaching > 1 kg in cages in < 2 years) (Quémener, 2002; Suquet et al., 2009), and excellent feed conversion ratios (Calderón et al., 1997; Jiménez et al., 2005; El-Shehly et al., 2007). In addition, it has a high nutritional flesh quality, with high protein and n-3 polyunsaturated fatty acids (PUFA) as well with low n-6/n-3 ratio values (Poli et al., 2003; Piccolo et al., 2008; Monfort, 2010). In the wild, meagre feeds on Mysidacea, Decapode and Teleostei (Cabral and Ohmert, 2001). In captivity,

Abbreviations: ARA, arachidonic acid; DHA, docosahexaenoic acid; DM, dry matter; EFA(s), essential fatty acid(s); *Elovl5*, fatty acyl elongase 5; EPA, eicosapentaenoic acid; FA(s), fatty acid(s); *Fads2*, fatty acyl desaturase; FAMES, fatty acid methyl esters; FCR, feed conversion ratio; FI, feed intake; FO, fish oil; LA, linoleic acid; LC-PUFA(s), long-chain polyunsaturated fatty acid(s); LER, lipid efficiency ratio; LNA, linolenic acid; MUFA, monounsaturated fatty acid; OA, oleic acid; PER, protein efficiency ratio; PUFA(s), polyunsaturated fatty acid(s); RT-PCR, Real-Time PCR; SFA, saturated fatty acid; SGR, specific growth rate; VO, vegetable oil; WG, weight gain

* Corresponding author at: Grupo de Investigación en Acuicultura (GIA), Instituto Universitario Ecoaqua, Universidad de Las Palmas de Gran Canaria, Crta. Taliarte s/n, 35214 Telde, Spain.

E-mail address: martaribeirocarvalho27@gmail.com (M. Carvalho).

<https://doi.org/10.1016/j.aquaculture.2018.01.028>

Received 12 September 2017; Received in revised form 16 January 2018; Accepted 17 January 2018

Available online 31 January 2018

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