

REQUIREMENTS FOR N-3 HUFA OF MEAGRE (*Argyrosomus regius*, ASSO, 1801) FINGERLINGS

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Introduction

For new aquaculture species, the establishment of well balance diets that meet their nutrient requirement is important to optimize large-scale production. This is the case of meagre (*Argyrosomus regius*), a promising new aquaculture species, with great potential due to their high growth rate, feed efficiency, flesh quality, market prices and easy adaptation to captivity (Monfort, 2010). Knowledge on the nutritional requirements of this species is still scarce. Fatty acids play key biological roles and, for marine fish, n-3 HUFA are considered essential being required to sustain growth, development, immune status and survival (Watanabe, 1982; Izquierdo, 2005). Thereupon, the present study aimed to evaluate the n-3 HUFA requirements of meagre fingerlings.

Materials and Methods

A feeding trial was performed at FCPCT (Fundación Canaria Parque Científico Tecnológico, Las Palmas de Gran Canaria) testing 5 increasing dietary n-3 HUFA levels: 0.9, 1.5, 2.0, 3.0 and 3.9% on a dry weight basis (Skretting, Stavanger, Norway). Triplicate groups of meagre fingerlings with an initial body weight of ± 2.8 g were fed each experimental diet by hand, three times a day, until apparent visual satiety, 6 days a week, during 30 days. Fish were randomly distributed in 15 cylindroconical fibreglass tanks of 200L capacity, at a density of 45 fish tank⁻¹. Average water temperature along the trial was $23 \pm 0.2^\circ\text{C}$ and water quality was daily maintained. At the end of the experimental period fish were weighed, measured and sampled for biochemical composition and fatty acid analysis. Livers were collected for *fads2* and *elov15* relative gene expression analysis.

Results

The establishment of well balance 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 testing 5 increasing dietary n-3 HUFA levels (0.9, 1.5, 2.0, 3.0 and 3.9% DM) with the purpose of evaluating the n-3 HUFA 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 0.9% n-3 HUFA showed the lowest growth, which was significantly improved by increasing the dietary n-3 HUFA levels up to 3.0% (Fig. 1). DHA was selectively retained over EPA in whole fish body. Additionally, the reduction of the dietary n-3 HUFA level below optimum levels led to an accumulation of n-9 FA, as well as an increase in the OLA/n-3 HUFA ratio. Fish fed 0.9% n-3 HUFA showed an up-regulation of *fads2* and *elov15* relative gene expressions (Fig. 2). Thus, meagre seems to have active $\Delta 6$ desaturases and Elov15, but their activities being insufficient to produce enough DHA and EPA from PUFA precursors to sustain fast growth. Young meagre shows a typical marine requirement for n-3 HUFA, particularly EPA and DHA, estimated to be circa 2.6-3.0% DM n-3 HUFA based on a second-order polynomial model.

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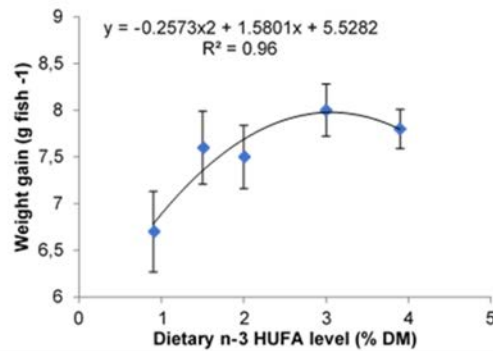


Fig. 1. Second-order polynomial relation of weight gain of meagre fingerlings and dietary n-3 HUFA levels.

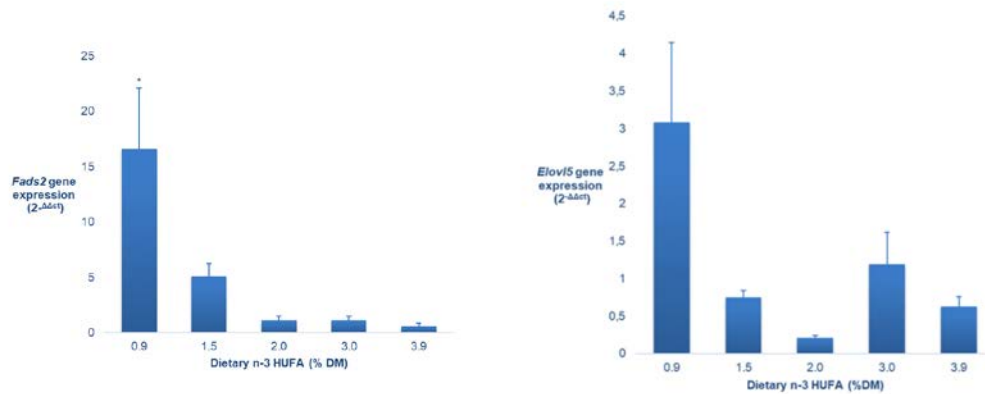


Fig. 2. Fatty acyl desaturase *fads2* and Fatty acyl elongase 5 *elov5* gene expression ($2^{-\Delta\Delta ct}$) of meagre hepatic tissue fed the experimental diets for 30 days; * indicates significance difference ($p=0.043$) related to diet 3.9% n-3 HUFA.

References

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