

# EFFECTS OF DIFFERENT FEEDING FREQUENCIES ON GROWTH, FEED UTILIZATION, PLASMA BIOCHEMISTRY AND DIGESTIVE CONDITIONS OF GILTHEAD SEA BREAM (*SPARUS AURATA*) FED WITH DIFFERENT FISH MEAL AND FISH OIL DIETARY LEVELS

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## Introduction

The optimization of feeding management is essential to improve the key performance indicators such as growth rates, feed efficiency, mortality and quality traits of the Mediterranean aquaculture. Optimal feeding frequencies under farming condition may contribute to maximise feed utilization reducing wastes and production costs. Several effects of the feeding frequency on performances have been observed in different fish species mainly depending on the fish size and on the interactions between feeding frequencies and type of administered diets (Yúfera et al., 2014; Enes et al., 2015; Guo et al., 2015; Zeytin et al., 2016). This study was undertaken in order to assess the effects of different feeding frequencies on growth, feed digestibility, somatometric indexes, fish plasma biochemistry, and digestive condition of gilthead sea bream fed different fishmeal and fish oil dietary levels with the final aim to provide guidelines designed for the daily management of feeding practices under farming condition.

## Materials and methods

Two isoproteic and isoenergetic experimental extruded diets with different FM and FO dietary level (FM/FO 30/15 and 10/3, A and B, respectively) were formulated using practical aquafeed ingredients. Each diet was randomly assigned to fish groups of 60 individuals (initial weight:  $88.3 \pm 2.4$ g) each submitted to a different feeding frequency (1, 2, 3 meals day<sup>-1</sup>) in triplicate: (1) a daily meal at 8.30am, (2) two meals a day at 08.30 and 16.00 and (3) three daily meals at 08.30, 12.30 and 16.00 respectively, over 109 days. All the fish received the same total daily feeding ration that was determined based on the feed ingested by the group 1 which was fed close to satiation (90-95% of the satiation level). At the end of trial growth, feed utilization, feed digestibility, digestive enzyme activity, gut histology and plasma biochemistry were measured. Data were analysed by a two-way ANOVA followed by a Tukey's multiple comparison test.

## Results

At the end of the trial, no significant differences ( $p > 0.05$ ) due to the different feeding patterns were observed in terms of final body weight, specific growth rate (SGR), voluntary feed intake (VFI), feed conversion rate (FCR) and no significant differences were found in the viscerosomatic index (VSI), hepatosomatic index (HSI), condition factor (CF) and fat index (FaI) values between different feeding frequencies. SGR and FaI values were slightly higher in diet A compared to diet B while FCR showed lower values (Figure1).

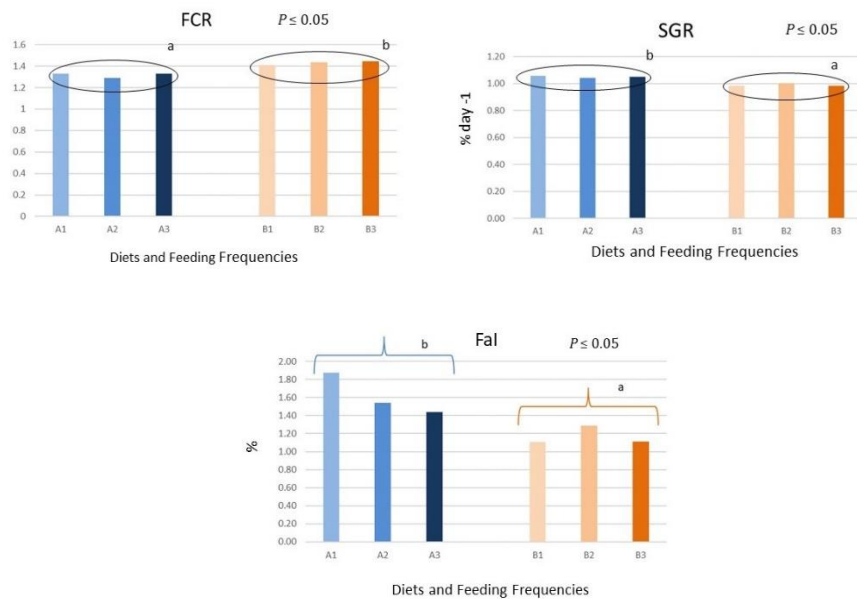


Fig.1. Specific growth rate (SGR), feed conversion rate (FCR) and fat index (FaI) obtained at the end of the trial under different feeding frequencies (1, 2, 3 meals) and fed high (A) and low (B) fishmeal and fish oil dietary level. Different superscript letters a, b denote significant differences among diets.

## Discussion and Conclusion

The results showed that it is possible to obtain an equivalent growth performance and feed utilization regardless of the number of the meals daily administered under both high and low FM and FO dietary level. No effect on fat deposition was determined by feeding frequencies even if a tendency toward lower values were observed in the 3 meals group fed high FMFO level. Based on the present results frequent feeding do not support an increase in feed utilization during the on-growing of sea bream and this could be a useful indication to plan feeding activity at farm level which maximize growth and costs of feeding procedures.

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