



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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جامعة عين شمس التوثيق الإلكتروني والميكروفيلم

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**Impact of Graded Dietary Supplementation of
Nucleotides Upon Zootechnical Performance
and Biometric Indices of Gilthead Seabream
(*Sparus aurata*) Fry**

**Thesis
Submitted by**

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(M. Aqua. Sc., Universitat Politècnica de València, Spain 2014)

**For
Ph.D.
(Nutrition and Clinical Nutrition)**

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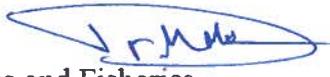
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**“Impact of graded dietary supplementation of nucleotides upon
zootechnical performance and biometric indices of gilthead seabream
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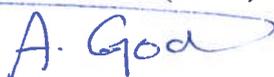
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ABSTRACT

An experimental feeding trial was conducted to visualize the impact of replacement fish meal with a mixture of plant and animal protein supplemented with a commercially available exogenous nucleotide product NucleoforceFish™ on growth performance parameters, biometric indices, some antioxidant biomarkers, liver mitochondrial enzyme activities, selected gene expression of gut microbiome and body composition of gilthead sea bream (*Sparus aurata*) fry. Consequently a total of five hundred and forty gilthead sea bream, *Sparus aurata* fry with an average initial weight of 0.358 ± 0.002 g/fish were randomly assigned into six experimental groups stocked in six separate cement ponds each (18 m³ capacity) each was installed with three equal net-enclosures (each of 0.5 m³) and stocked with 30 fry in triplicate. Fish were fed on six isonitrogenous, (45% CP) experimental diets were formulated to be and equicaloric. The first group was fed on the basal diet (FM0/0) contained 25% of fish meal without any supplementation and served as a control group, fish of the second and third groups were fed on the same basal diet supplemented with 250 (FM25/250) and 500 (FM25/500) mg/kg NucleoforceFish™, respectively. While the fourth, fifth and sixth groups were fed on another basal diet in which fish meal was totally substituted with a mixture of poultry by product meal (PBP), soybean meal (SBM), corn gluten meal (CGM), and squid meal without NucleoforceFish™ (FM25/0) or the same basal diet supplemented with 250 mg/kg NucleoforceFish™ (diet 5, FM0/250), or with 500 mg/kg NucleoforceFish™ (diet 6, FM0/500) the experiment lasted for 150 days. Results revealed that, dietary nucleotides supplementation at a rate of 250mg/kg or 500mg/kg enhanced final body weight, weight gain, and specific growth rate, survival rates, condition factor, protein efficiency ratio, hepatosomatic index with decreased viscerosomatic index of gilthead sea bream fry especially at higher level of supplementation regardless to the to the inclusion of fish meal

in such diets. In addition dietary supplementation of nucleotides resulted in a positive impact on mitochondrial functions as indicated by the noticed improvements in liver complex enzyme activities. Nevertheless, the exogenous nucleotides supplementation resulted in positive effects on antioxidants biomarkers as indicated by higher levels of superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH) and lower levels of malondialdehyde (MDA). Also nucleotides had positive changes in the IGF1, TCR-B, IL-1 β gene expression, and the iron homeostasis hormone, hepcidin. Furthermore; it showed overall beneficial effects on gut microbiome (*Photobacterium; damsela; Vibrio anguillarum; Lactobacillus plantarum; Lactobacillus subtilis* and *Enterococcus faecium*). Regarding the impact of such dietary treatments on proximate body composition; results showed elevated levels of the protein, ether extract, and carcass energy content in fish carcass at both levels of supplementation. Fish fed diets with 25% fish meal exhibited higher content of protein and lower content of both ether extract and energy irrespective of nucleotide levels. Amino acids (AA) of fish flesh fed on nucleotide supplemented diets increased over the control, especially at 250 mg kg⁻¹ irrespective of FM levels, while AA was lower at the 25% fishmeal diets as compared to 0% FM diets irrespective of nucleotide levels of sea bream either dietary 25% FM diet (FM25) or free FM diet (FM0) fish groups. It could be concluded that dietary supplementation of the commercially available nucleotide (NucleoforceFish™) could be used as a successful nutritional management tool to ameliorate the adverse effects of partial and total replacement of fishmeal by cheaper plant and animal protein sources in the diets of gilthead sea bream fry. Such improvements are not only due to its positive impact on growth performance, survival rates, condition factor, protein efficiency ratio, hepatosomatic and viscerosomatic indices, but also due to its positive impact on mitochondrial functions, some antioxidants markers, IGF1, TCR-B, IL-1 β gene expression, hepcidin, gut microbiome and proximate body composition as well as amino acid profile. Finally its positive economic impact is also a value added feature at the commercial level.

Key words: Fishmeal, Exogenous Nucleotide, Mitochondria, Immunity, Gene expression, Gut microbiome.

Dedication

*To the soul of my mother and the solidarity of my father;
the drivers of my success and the reason to whom I am now,
I hope I have fulfilled your dream now.*

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