INNATE IMMUNE SYSTEM MODULATION AND DISEASE RESISTANCE IN EURASIAN PERCH FED CONTRASTED LC-PUFA DIETARY CONTENTS

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This study was designed to investigate the effects of dietary fish oil replacement by linseed oil on the regulation of immune response and disease resistance in Eurasian perch (*Perca fluviatilis*). A control diet containing fish oil (FO diet) and characterized by high levels of n-3 LC-PUFA (6% EPA, 7.5% DHA of total fatty acids (FAs)) was compared to linseed oil diet (LO diet) composed of low LC-PUFA contents (1% EPA, 2.3 % DHA of total FAs) but high C_{18} fatty acid levels. The experiment was conducted with juveniles of 17.5 g initial body weight reared in quadruplicate groups for each experimental diet. After 10 weeks of feeding, the measure of leucocyte populations in blood, lysozyme and alternative complement pathway activities in plasma, reactive oxygen species (ROS) production in spleen and kidney, and expression of genes related to innate immune system in spleen, kidney and liver demonstrated that the dietary oil source did not affect the basal immune system in Eurasian perch despite the significant decrease of LC-PUFAs levels recorded in liver and muscle of fish fed LO.

To compare the immune competence of fish between dietary conditions, a bacterial challenge from two rearing conditions was performed two days after the end of the nutritional trial: fish injected with 4.10^7 cfu of *Aeromonas salmonicida* (bacteria condition) and fish injected with sterile medium but maintained in the same flow system that fish challenged with bacteria (sentinel condition). After three days of trial, the cumulative mortality recorded in fish challenged with bacteria was not significantly different between experimental diets (FO: 35%; VO: 37%). A significant decrease of lymphocyte, thrombocyte and basophil populations was observed in fish from the bacteria condition. On the contrary, plasma lysozyme activity and reactive oxygen species production in kidney significantly increased in fish challenged with *A. salmonicida* while the plasma alternative complement pathway activity was not affected. Increase of plasma lysozyme activity as well as ROS production in spleen and kidney of sentinel fish suggest that these immune defenses can also be activated, but at lower bacteria concentration than in infected fish. However, no differences in leucocyte populations, plasma

lysozyme and alternative complement pathway activities were observed between dietary treatments. Similarly, expression of genes related to eicosanoid synthesis in liver were not affected by the dietary oil source but were strongly stimulated in fish challenged with *A. salmonicida*. These findings suggested that the use of linseed oil does not depress the innate immune system of Eurasian perch juveniles.

Keywords: Eurasian perch, linseed oil, LC-PUFA, *Aeromonas salmonicida*, innate immune system.