
Effects of zinc supplementation in diet containing linseed oil to replace fish oil on the growth, body composition, lipid metabolism of Nile tilapia (*Oreochromis niloticus*)

Yu-Hung Lin^{*1}, Yen-Chun Lee^{†1}, and Jia-Ming Wu¹

¹National Pingtung University of Science and Technology – Taiwan

Abstract

It is an important issue to reduce the use of marine-captured fish oil in sustainable aquaculture. A 2×3 factorial-designed study was used to evaluate effects of different levels of dietary zinc (Zn) on growth performance, body composition and lipid metabolism of Nile tilapia fed diets with fish oil (FO) and linseed oil (LO) as n-3 fatty acid sources. The experimental diets were prepared with plant ingredients that containing 10 g/kg of phytic acid. Two control diets containing 3.25% FO and LO were supplemented with 0, 50 and 100 mg Zn/kg, respectively. Six experimental diets were each fed to triplicates of tilapia (initial weight of 4.92±0.01 g) in a recirculation system for 8 weeks. Regardless of lipid sources, results revealed that fish fed diets with 100 mg Zn/kg had higher weight gain, feed efficiency, and protein efficiency ratio than other two dietary groups; fish fed the diet with 150 mg Zn/kg diet reduced hepatic total lipid content; whole body eicosapentaenoic acid (EPA) concentrations and retention, and hepatic fatty acid desaturase (FAD2) gene expression increased but plasma triglyceride and cholesterol concentrations decreased by increased dietary Zn levels. Fish fed diets with LO had higher n-3 fatty acids concentrations in whole body and muscle than fish fed diets with FO. The study indicates that 100 mg Zn/kg is recommended for tilapia while the diets based on plant ingredients. It also suggests that dietary Zn supplementation can improve EPA synthesis through the increment of FAD2 gene expression in both FO and LO diets.

Keywords: Zinc, Nile tilapia, Fish oil, linseed oil, sustainable aquaculture

*Speaker

†Corresponding author: lalami1218@gmail.com