ISSN: 1391-8796
Abstracts of Presentations
1st Ruhuna International Science & Technology Conference
University of Ruhuna, Matara, Sri Lanka
January 22-23, 2014

Effect of dietary C18 PUFA on fillet Long Chain PUFA concentrations: A comparison between Murray cod and rainbow trout

Shyamalie D. Senadheera[1,4]*, Thanongsak Thanuthong[1,3], David S. Francis[2], and Giovanni M. Turchini[1]

[1] *School of Life and Environmental Sciences, Deakin University, P.O. Box 423, Warrnambool, Victoria 3280, Australia*
[2] *Australian Institute of Marine Science, P.M.B. 3, Townsville, Queensland 4810, Australia*
[3] *Faculty of Agricultural Technology, Songkhla Rajabhat University, Songkhla 90000, Thailand*
[4] *Ocean University (National Institute of Fisheries and Nautical Engineering), Crow Island, Colombo 15, Sri Lanka*

Substitution of fish oil with economical and environmental friendly terrestrial alternatives in aquafeed has drawn significant attention on a global scale. Nevertheless, alternative oils rich in C18 PUFA are known to modulate fatty acid metabolism in fish. The present study evaluated the effects of C18 polyunsaturated fatty acids (ALA+LA) on fatty acid metabolism and final fillet long chain PUFA concentrations in cold water rainbow trout and warm water Murray cod. Two separate sets of six isoproteic and isolipidic experimental diets using three different dietary lipid sources (sunflower oil, linseed oil, and beef tallow) were formulated with varying concentrations of total C18 PUFA (Murray cod: 7.3, 18.8, 29.8, 41.7, 51.7, 63.8 w/w%; rainbow trout: 9.1, 15.4, 29.0, 41.3, 54.0, 66.2 w/w%) maintaining a constant ratio (1:1) of ALA/LA, whereas fish oil was used for the control diet for each feeding trial for Murray cod and rainbow trout separately. Fish were fed twice daily at 8.00 a.m. and 4.00 p.m. to apparent satiation for a period of 133 days (M cod) and 91 days (trout). In Murray cod, fatty acid metabolism estimations demonstrated an increase in delta-6 desaturase activity acting on ALA over LA as the substrate availability increased, while the efficiency of delta-6 activity in rainbow trout was negatively affected by an increasing C18 PUFA content. However, total desaturase activity was directly proportional to total C18 PUFA content in rainbow trout. With the reduction of C18 PUFA, a shift in substrate preference of delta-6 activity was noted in Murray cod. Delta-6 activity on ALA was higher across all concentrations of C18 PUFA in rainbow trout. An increasing trend of delta-5 desaturase activity was noted in rainbow trout fed elevated C18 PUFA while no delta-5 activity was observed in Murray cod. Murray cod exhibited maximal delta-6 enzyme activity at an average C18 PUFA level, denoting that excessive C18 PUFA concentrations are counterproductive. This information provides a valuable insight into the formulation of eco-friendly, sustainable fish oil free aquafeed for different species.

Key words: α-linolenic acid (ALA), LC-PUFA, Linoleic acid (LA), Murray cod, Rainbow trout

*Shyamalie_senadheera2000@yahoo.com