

## Effect of Dietary Sesamin on Fatty Acid Desaturation in Salmonoids

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Sesamin-type lignans are found in the sesame seed and oil, showed significant effects on lipid metabolism in rats, e.g.  $\beta$ -oxidation, elongation and desaturation of fatty acids. Rainbow trout (*Oncorhynchus mykiss*) was fed sesamin (0.58 g / 100 g diet) in two experiments together with a mixed oil of linseed and sunflower oils (6:4, by vol.), which contained 33% 18:2 & 32% 18:3 (Experiment 1) and 36% 18:2 & 23% 18:3 (Experiment 2). The level of docosahexaenoic acid (DHA, 22:6n-3) in white muscle triacylglycerols increased from 5.7 to 7.8% (experiment 1) and from 5.5% to 6.3% (experiment 2). This difference in desaturation has possibly depended on the 18:3/18:2 fatty acid ratios in the two diets. An *in vitro* study on Atlantic salmon (*Salmo salar* L.) hepatocytes confirmed and partly explained the effects of sesamin on fatty acids found *in vivo*. Hepatocytes incubated with a sesamin and episesamin equimixture (0.05 mM, final concentration) showed increased elongation and desaturation of  $^{14}\text{C}$  18:3n-3 to DHA ( $^{14}\text{C}$  22:6n-3,  $P < 0.01$ ) and down regulated gene expression of  $\Delta 6$  and  $\Delta 5$  desaturases compared to controls. Furthermore, an increased  $\beta$ -oxidation of  $^{14}\text{C}$  18:3n-3 ( $P < 0.01$ ) to the  $^{14}\text{C}$  acid soluble products, acetate, malate and oxaloacetate was found, in agreement with increased expression of carnitine palmitoyltransferase I, which is suggested to be a rate limiting step in  $\beta$ -oxidation. Also the gene expression of PPAR $\alpha$  was down regulated in hepatocytes as well as in rainbow trout liver. These studies show that sesamin has favourable effects on lipid metabolism leading to an increased level of DHA, which may be of interest for aquaculture use.