Dietary Fish Oil

Replacement of dietary fish oil for Atlantic salmon parr (Salmo salar L.) with a stearidonic acid containing oil has no effect on omega-3 long-chain polyunsaturated fatty acid concentrations

Worldwide increase in aquaculture production and the concurrent decrease of wild fish stocks has made the replacement of fish oil in aquafeeds an industry priority. Oil from a plant source *Echium plantagineum* L., Boraginaceae, has high levels of stearidonic acid (SDA, 18:4ω3, 14%) a biosynthetic precursor of omega-3 long-chain polyunsaturated fatty acids (ω3 LC-PUFA).

Atlantic salmon (*Salmo salar* L.) parr were fed a control fish oil diet (FO) or one of 3 experimental diets with 100% canola oil (CO) 100% SDA oil (SO), and a 1:1 mix of CO and SDA oil (MX) for 42 days. There were no differences in the growth or feed efficiency between the four diets. However, there were significant differences in the fatty acid (FA) profiles of the red and white muscle tissues. Significantly higher amounts of SDA, eicosapentaenoic acid (20:5ω3, EPA), docosahexaenoic acid (22:6ω3, DHA) and total ω3 FA occurred in both red and white muscle tissues of fish fed SO and FO compared with those fed CO. Feeding SO diet resulted in ω3 LC-PUFA amounts in the white and red muscle being comparable to the FO diet. This study shows that absolute concentration (μg/g) of EPA, DHA and total ω3 have been maintained over 6 weeks for Atlantic salmon fed 14% SDA oil. The balance between increased biosynthesis and retention of ω3 LC-PUFA to maintain the concentrations observed in the SO fed fish remains to be conclusively determined, and further studies are needed to ascertain this.

Survival of the fattest: fat babies were the key to evolution of the large human brain

In the past 2 million years, the hominid lineage leading to modern humans evolved significantly larger and more sophisticated brains than other primates. We propose that the modern human brain was a product of having first evolved fat babies. Hence, the fattest (infants) became, mentally, the fittest adults. Human babies have brains and body fat each contributing to 11–14% of body weight, a situation which appears to be unique amongst terrestrial animals. Body fat in human babies provides three forms of insurance for brain development that are not available to other land-based species: (1) a large fuel store in the form of fatty acids in triglycerides; (2) the fatty acid precursors to ketone bodies which are key substrates for brain lipid synthesis; and (3) a store of long chain polyunsaturated fatty acids, particularly docosahexaenoic acid, needed for normal brain development. The triple combination of high fuel demands, inability to import cholesterol or saturated fatty acids, and dependence on docosahexaenoic acid puts the mammalian brain in a uniquely difficult situation compared with other organs and makes its expansion in early humans all the more remarkable. We believe that fresh- and salt-water shorelines provided a uniquely rich, abundant and accessible food supply, and the only viable environment for evolving both body fat and larger brains in human infants.