

Food Safety of Atlantic Salmon Raised on Different Dietary Oils

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Consumption of fatty fish can be an important route of human exposure to persistent organic pollutants (POP) such as dioxins, dioxin-like PCBs, brominated flame retardants, and persistent organochlorine pesticides. Farmed fatty fish can be tailored in such a way that consumer exposure to contaminants is reduced. Two well documented approaches can be used to produce salmon with lower contaminant background levels, these include a) replacement of fish oils with vegetable oils and/or b) use of decontaminated fish oils.

Most POPs do not reach steady state levels (stable maximum levels) during a normal production time of a farmed salmon (e.g. estimated steady states for dioxins and dioxin like PCB is approximately 22 months; Berntssen et al. 2006). Long term trials (at least a complete sea water phase) are hence needed to assess the actual levels of POPs in market size fish. Two trials on these two approaches are presented. The levels of several notorious contaminants were analysed in feed ingredients, feed, and skin-off fillets of market size salmon. These included polychlorinated biphenyls (PCBs), dioxins (PCDD/Fs), organochlorine pesticides (OCP), polybrominated diphenyl ethers (PBDE), and poly aromatic hydrocarbons (PAHs).

In the first trial, Atlantic salmon smolts (~200 g) were fed either a traditional marine ingredient based diet or a diet with a maximum replacement of fish oil and -meal by alternative feed ingredients. The use of alternative feed ingredients reduced the feed levels of POPs while the levels of PAHs increased. The carry-over of persistent organic pollutants (POPs), assessed as biomagnification factors, was significantly ($P < 0.05$) lower in fish fed the novel feeds compared to the traditional feeds, which contributed to the reduction in contaminants in fish reared on novel feeds. The biomagnification factor of PAH was lower than that of POPs, still the PAH levels in fish reared on the novel feeds were significantly higher than the PAH concentration in traditionally-raised fish.

In the second trial Atlantic salmon smolt (~80 g) was fed on a diet based on normal fish oil or commercially decontaminated fish oil. The trial is ongoing and market size fish will be reached in June 2009. Final levels of contaminants from both trials in market size fish will be presented.