

High Flesh n-3 HUFA Content as a Trait in Salmon Breeding Programmes

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Fish are the only major dietary source for humans of omega-3 highly unsaturated fatty acids (HUFA) including eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids that are essential for protecting humans against cardiovascular diseases. With declining fisheries, farmed fish such as Atlantic salmon (*Salmo salar*) constitute an increasing proportion of the fish in the human diet. Flesh n-3 HUFA content is a trait of considerable importance in farmed fish, particularly now that the fishmeal and fish oil components of traditional aquaculture diets have to be replaced by more sustainable alternatives including plant meals and vegetable oils (VO). However, selection strategies towards high flesh n-3 HUFA contents require a phenotypic and quantitative genetic basis.

We analysed the inter-individual variation of flesh n-3 HUFA contents in a single strain of Atlantic salmon smolts fed a VO-based diet. The results show clear differences between individual fish and give a first indication of how large inter-family differences may have to be in order for families with particular phenotypes in the trait to be identified. A model is described which allows to determine the flesh n-3 HUFA contents of Atlantic salmon smolts based on non-invasive selection criteria. The application of modern molecular techniques (microarrays) gave us the opportunity to analyse differential expression patterns of transcriptomes in fish fed VO. The association of changes in liver gene expression with phenotype (flesh n-3 HUFA levels) will be discussed.