Enzymatic oil extraction and positional analysis of w-3 fatty acids in Nile perch and salmon heads.

Abstract:

PUFA from oil extracted from Nile perch viscera were enriched by selective enzymatic esterification ofthe free fatty acids (FFA) or by hydrolysis of ethyl esters of the fatty acids from the oil (FA-EE).Quantitative analysis was performed using RP-HPLC coupled to an evaporative light scattering detector(RP-HPLC-ELSD). The lipase from Thermomyces lanuginosus discriminated against docosahexaenoicacid (DHA) most, resulting in the highest DHA/DHA-EE enrichment while lipase from Pseudomonascepacia discriminated against eicosapentaenoic acid (EPA) most, resulting in the highest EPA/EPA-EEenrichment. The lipases discriminated between DHA and EPA with a higher selectivity when present asethyl esters (EE) than when in FFA form. Thus when DHA/EPA were enriched to the same levelduring esterification and hydrolysis reactions, the DHA-EE/EPA-EE recoveries were higher than thoseof DHA/EPA-FFA. In reactions catalysed by lipase from T. lanuginosus, at 26 mol% DHA/DHA-EE,DHA recovery was 76% while that of DHA-EE was 84%. In reactions catalysed by lipase fromP. cepacia, at 11 mol% EPA/EPA-EE, EPA recovery was 79% while that of EPA-EE was 92%. Bothesterification of FFA and hydrolysis of FA-EE were more effective for enriching PUFA compared tohydrolysis of the natural oil and are thus attractive process alternatives for the production of productshighly enriched in DHA and/or EPA. When there is only one fatty acid residue in each substratemolecule, the full fatty acid selectivity of the lipase can be expressed, which is not the case withtriglycerides as substrates.