

Enrichment of anhydrous milk fat in polyunsaturated fatty acid residues from linseed and rapeseed oil through enzymatic interesterification

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Abstract : Lipozyme TL IM was used in a solvent-free batch and micro-aqueous system for enzymatic interesterification of anhydrous milkfat (AMF) with linseed oil (LO) in binary blends and eventually with rapeseed oil (RO) in one ternary blend. The aim was to obtain and characterize physico-chemically fats enriched with unsaturated C18 fatty acids (oleic, linoleic and especially linolenic acids) from natural vegetable oils. Binary blends of AMF/LO 100/0, 90/10, 80/20, 70/30 and 60/40 (w/w) were interesterified. The evolution of triacylglycerides (TAG) profiles showed that quasi-equilibrium conditions were reached after 4-6 h of reaction. Free fatty acids contents were inferior to 1%. The general decreases in solid fat content and in dropping point temperature obtained with increasing content of LO and interesterification, resulted in good plastic properties for the products originally from the blends 70/30 and 60/40. This assumption was confirmed by textural measurements. Melting profiles determined by differential scanning calorimetry showed a total disappearing of low melting TAG from LO and the formation of intermediary species with a global lower melting temperature. Oxidative stability of the interesterified products was diminished with increasing LO content, resulting in low oxidation induction times. A ternary blend composed of AMF/RO/LO 70/20/10 gave satisfactory rheological and oxidative properties, fulfilling the requirements for a marketable spread and moreover offering increased potential health benefits, due to its enriched content in polyunsaturated fatty acid residues.