Lipid Oxidation in system of Fat blend with Monoacylglycerols

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Lipid oxidation in margarine emulsions is very complicated for description. In our previous research (Pokorna I. et al., 2004; Pokorna I. et al., 2006) the influence of monoacylglycerols as emulsifiers on the rate of lipid oxidation in margarine emulsions was studied. It was found that margarine with monostearoylglycerol (C18:0 acid in acyl chain) oxidized slowly and margarine with commercial emulsifier D (mixture of acids C16:0, C18:0, C18:1 and C18:2 in acyl chain of monoacylglycerols) oxidized to the great extent.

In this research model fat blend was prepared and it was stored 8 weeks at 15 °C with addition of 0.4 % of monoacylglycerol with different acyl chain (C10:0, C12:0, C14:0, C16:0, C18:0, C18:1 and commercial mixture of monoacylglycerols C16:0, C18:0 , C18:1 and C18:2). The lipid oxidation rate was measured by the peroxide value, the conjugated diens content, the p-anisidine value, the acid value and the oxidation stability by Rancimat method (at temperature 120 °C secondary volatile products were wafted by air to demineralized water and the conductivity of water was measured). Fat blends with monoacylglycerols were separated to the liquid phase and solid phase for the determination of monoacylglycerol distribution. Each phase was analyzed by GLC-FID and the monoacylglycerol concentration was determined. The monoacylglycerol concentration in liquid phase was marked (l) and in solid phase (s).

It can be said that the rate of lipid oxidation to a certain extent relates to the ratio of (s)/(l). The system with low ratio of (s)/(l) oxidized to maximum (monoacylglycerol with oleic acid in acyl chain) and the system with high ratio of (s)/(l) oxidized minimally (monoacylglycerol with C14:0 and C16:0 acid) with the exception of monostearoylglycerol. The mixture of different acyl chains of monoacylglycerol contributes to low lipid oxidation rate.

Pokorna I., Filip V., Smidrkal J.: Influence of surface active substances mixture on lipid oxidation in emulsions. 3rd Euro Fed Lipid Congress, 2004.

Pokorna I., Filip V., Smidrkal J.: The influence of mixture of monoacylglycerol and phospholipid emulsifier on lipid oxidation in emulsion. 4th Euro Fed Lipid Congress, 2006