Antioxidants and prooxidants in milk-like emulsions: Effect of ascorbate, urate, alpha-tocopherol and beta-carotene on early events in lipid oxidation

The effect on early events in lipid oxidation (tendency of radical formation and subsequent development of lipid hydroperoxides) of ascorbate, urate, beta-carotene and alpha-tocopherol individually or combined in concentrations relevant for milk was evaluated by electron spin resonance (ESR) spectroscopy using the spin trapping technique and spectrophotometric determination of peroxide value. alpha-Tocopherol had a clear antioxidative effect both on radical formation and peroxide development, while ascorbate, urate and beta-carotene enhanced radical formation. Ascorbate and to a lesser degree beta-carotene promoted the formation of peroxides. For combinations, alpha-tocopherol more than counteracted the prooxidative effects of the individual prooxidants, while a combination of beta-carotene and ascorbate was very prooxidative. Feeding strategies should accordingly ensure a high alpha-tocopherol level in milk.