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Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

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Citation (APA):

Sørensen, A-D. M., Nielsen, N. S., & Jacobsen, C. (2011). Phenolics and Lipophilized Phenolics as Antioxidants in Fish Oil Enriched Emulsions,. Abstract from 102nd AOCs Annual Meeting & Expo, Cincinnati, Ohio, USA, .

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Phenolics and Lipophilized Phenolics as Antioxidants in Fish Oil Enriched Emulsions

Ann-Dorit Moltke Sørensen, Nina Skall Nielsen & Charlotte Jacobsen

Emulsions containing omega-3 LC PUFA are highly susceptible to oxidation. This causes formation of undesirable flavors and loss of health beneficial fatty acids. Many omega-3 enriched food products on the market are oil-in-water emulsions. According to the so called “polar paradox”, polar compounds work better as antioxidants in bulk oil, whereas lipophilic compounds are better antioxidants in emulsions.

This presentation is an overview of our previous work in the area of fish oil enriched emulsions with antioxidants. Our studies have shown that the lipophilicity of the compounds is not the only factor determining their efficacy as antioxidants in simple model systems. Interactions between the antioxidants, emulsifier and pH also influence the antioxidant behavior. Moreover, studies with lipophilized phenolics in a food emulsion showed that there is no linear increase of antioxidant activity with increased lipophilicity. Instead a cut-off effect was observed in relation to the alkyl chain length lipophilized to the phenolic compound. Furthermore, the efficacy of lipophilic antioxidants is influenced by the type of food system.

Thus, our results show that the antioxidant behavior may not be as simple as stated by the “polar paradox” hypothesis. According to our research results in this area, this hypothesis deserves reconsideration.

Keywords: Lipid oxidation, Polar paradox, pH, Emulsifier, Emulsion system