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Emulsification technique affects oxidative stability of fish oil-in-water emulsions

Anna Frisenfeldt Horn¹, Nina Skall Nielsen¹, Louise Søgaaard Jensen^{2,3}, Andy Horsewell^{2,3} & Charlotte Jacobsen¹

¹National Food Institute, Technical University of Denmark

²Center for Electron Nanoscopy, Technical University of Denmark

³Department of Mechanical Engineering, Technical University of Denmark

In oil-in-water emulsions, lipid oxidation is expected to be initiated at the oil-water interface. The properties of the emulsifier used, and the structure at the interface is therefore expected to be of great importance for lipid oxidation in emulsions. Previous studies have shown that e.g. homogenization pressure can affect how proteins locate themselves at the interface of an emulsion. The hypothesis is therefore that emulsions produced with different emulsification equipments differ in their oxidative stability due to differences in the behaviour of the proteins at the interface.

The aim of this study was therefore to compare lipid oxidation in 10% fish oil-in-water emulsions prepared by two different kinds of high pressure homogenizers i.e. a microfluidizer and a two valve high pressure homogenizer. Emulsions were made with equal droplet sizes, and with either 1% sodium caseinate or 1% whey protein isolate. Emulsions were characterised and investigated by microscopy. Lipid oxidation was assessed by PV and the formation of secondary volatile oxidation products. Results showed that the different emulsification techniques had an influence on lipid oxidation and that the effect of the emulsification technique depended on the type of protein used as an emulsifier.