**Design of an oleogel, utilising high oleic sunflower oil with sunflower wax, as a shortening replacer for saturated fat reduction in short dough biscuits**

Veronica Giacintucci, Lisa Methven, Julia Rodriguez Garcia

*Department of Food & Nutritional Sciences, University of Reading, Whiteknights, Reading, Berkshire RG6 6AH, UK*

Following World’s Health Organisation (WHO) guidelines, the challenge for the food industry is to reduce total and saturated fat to less than 10% of total energy intake in foods, and hence alternatives to shortening are of interest. Structuring liquid oils in oleogels is a strategy to improve the fatty acid profile of a baked product. Most of the fats used in bakery products are saturated fats which are solid or semi solid at ambient temperature; these fats have a developed crystalline structure and are more effective in coating and stabilizing air bubbles during mixing and baking, than liquid oils. Structuring vegetable oils for the production of oleogels is a strategy to nutritionally improve the fatty acid profile of a baked product while maintaining the technological functionality of the fat system in the matrix and the process. A gelled oil has a liquid fraction, but exhibits solid-like behaviour1. Through oleogelation, edible oils are entrapped within a three-dimensional network. In order to use oleogels in fat reduced biscuits produced in this study, high oleic sunflower oil, sunflower wax and liquid soy lecithin were used as structuring agents. For oleogel design, a Box-Behnken three-factor response surface design was chosen. The oleogels were used to replace 70% (the remaining 30% weight being replaced by maltodextrins) or 100% of the palm oil in doughs and biscuits;. Firstly, oleogels were characterized by rheological and textural properties. The oleogels had signficantly different rheological and textural properties compared to the control palm oil. In particular, oleogels formulated with higher oil concentration had a higher rate of structural breakdown. Oleogel produced with a ratio of 2:1 wax:lecithin had more similar textural characteristics to the control, although with significantly higher firmness values. Fat replaced doughs were significantly firmer than the control; such differences were attributed to both the fat oleogel presence and the different physical properties of the maltodextrins. The bulking agent tended to aggregate upon mixing in samples where the oleogel had a higher percentage of oil and a lower percentage of structuring agents (wax:lecithin). Formulations for fat replacement were selected based on similiarity of dough texture to the full fat control. Once baked into biscuits, 100% oleogel formulation matched positively the texture of the full fat control.

*References:*

1.O’Sullivan C. M., Davidovich-Pinhas M., Wright A. J., Barbut S. and Marangoni A. G. (2017). Enhanced delivery of lipophilic bioactives using emulsions: a review of major factors affecting vitamin, nutraceutical, and lipid bioaccessibility. *Food & Function,* 8, 1438– 1451.