

TeRiFiQ EU Project: Multiple Gel in Oil in Water Emulsions as Fat Replacers in Sauces and Ready Prepared Foods

Monica TRIF^{1*}, Eva CSUTAK², Natalia PEREZ-MORAL³, Tibor GAGYI², Didier PINTORI⁴, Malte BETHKE¹ and Peter J. WILDE^{3*}

¹ Centiv GmbH, Food Research Department, Villinger Weg 10, Stuhr, 28816, Germany.

² Sativa Product SRL, Strada Cechesti 46, Cristuru Secuiesc, 535400, Romania.

³ Institute of Food Research, Norwich Research Park, Norwich NR4 7UA, UK.

⁴ ITERG, 11 rue Monge - Parc Industriel Bersol 2 - 33600 Pessac, France.

*Corresponding author, e-mail: monica_trif@hotmail.com or peter.wilde@ifr.ac.uk

Bulletin UASVM Food Science and Technology 73(1) / 2016

ISSN-L 2344-2344; Print ISSN 2344-2344; Electronic ISSN 2344-5300

DOI: 10.15835/buasvmcn-fst:11905

ABSTRACT

Stable G/O/W multiple emulsions were obtained over a period of storage of 4 days, compared to W/O/W multiple emulsions. G/O/W emulsions were incorporated into pizza sauces in order to reach a 30% decrease of fat content (the TeRiFiQ project target).

Keywords: *Fat replacer, Food, Gel, Multiple Emulsion, Stability*

INTRODUCTION

TeRiFiQ EU Project (www.terifiq.eu), aimed to achieve significant binary reductions in sodium-fat and fat-sugar content of the most frequently consumed food products around Europe whilst at the same time ensuring the products' nutritional and sensorial qualities, safety and affordability for both industry and consumers.

In the TeRiFiQ EU Project, we investigated the use of gel-in-oil-in-water (G/O/W) multiple emulsions as a method for the reduction of fat in sauces and ready prepared foods. Ready meals are defined as a home meal replacement supplied by manufacturers. Today's consumers are increasingly concerned about health risks caused by food consumption.

Water in Oil in Water (W/O/W) multiple emulsions are susceptible to a broader range of instabilities. Gelling the inner dispersed water droplets (W->G) was shown to improve the stability and yield of multiple emulsions (Perez-Moral et al., 2014; Oppermann et al., 2015).

AIMS AND OBJECTIVES

A stable formula using G/O/W multiple emulsions developed and described by Perez-Moral et al. (2014) and Oppermann et al. (2015) was incorporated firstly into food sauce models, e.g. pizza sauce, and afterwards into prepared foods, aiming to replace fats and oils.

MATERIALS AND METHODS

G/O/W emulsions were prepared by a double-step procedure in which a G/O emulsion was prepared in the first step using Polyglycerolpolyricinoleate (PGPR) as the emulsifier, and then the G/O emulsion was "re-emulsified" in an aqueous phase.

Stability analysis of final products (pizza sauces) was evaluated using the Lumifuge technique and monitoring viscosity (Viscometer DV II-PRO). Using the lumifuge apparatus, fast stability ranking and shelf-life determinations of undiluted dispersions at the original concentration

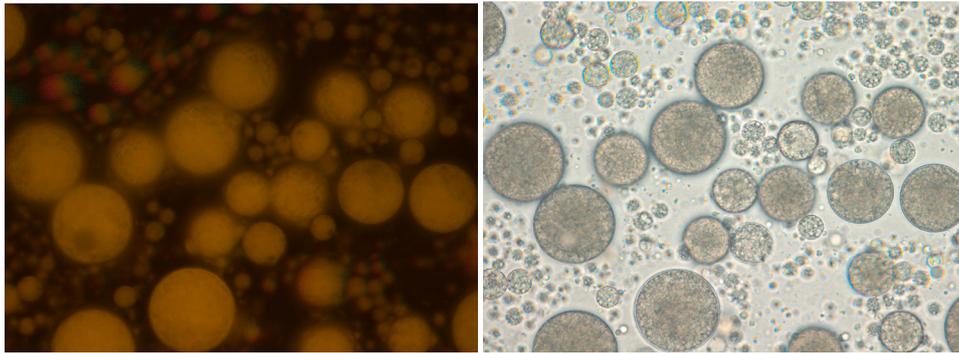


Figure 1. Optical micrographs of stable G/O/W emulsions (Olympus BX40 microscope)

are completed in minutes/hours instead of months/years.

The structure and morphology of the emulsions were studied by optical light microscopy (Olympus BX60 microscope, Olympus (UK)).

RESULTS AND DISCUSSION

G/O/W multiple emulsions (Figure 1) were stable to withstand shear and heat treatments, and have been incorporated into sauces and ready prepared foods, e.g. pizza sauce, in order to reduce the fat content. Because the shelf life of pizza sauces is about 1 week at 4 to 8°C, pizza sauces must remain stable over this period of time. To verify the stability of the sauces, phase separation was monitored and rheology measurements were performed. Viscosity measurements performed on reduced fat pizza sauces compared to the standard ones, have showed that the viscosity was constant, over a storage period of 1 week at about 6°C.

CONCLUSION

The stability of the products was assessed and showed that they were stable under normal storage conditions (5 days at 6°C). We concluded from our studies that stable G/O/W as food-grade multiple emulsions can be successfully incorporated into sauces and ready prepared foods as fat replacers.

Acknowledgement: The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 289397 (TeRiFiQ project).

REFERENCES

1. Oppermann A.K.L., Renssen M., Schuch A., Stieger M.A., Scholten E. (2015). Effect of gelation of inner dispersed phase on stability of (w1/o/w2) multiple emulsions. *Food Hydrocolloids* 48: 17-26
2. Perez-Moral N., Trif M., Csutak E., Pintori D., Bethke M. and Wilde P. (2014). TeRiFiQ Project: Design of multiple emulsions to reduce fat in sauces and ready prepared foods. 1st International PLEASURE Conference "Novel Processing approaches for the development of food products Low in fAt, Salt and sUgar", ABSTRACT BOOK, 18-19 June 2014, La Rochelle, France
3. Perez-Moral N., Watt S., Wilde P. J. (2014). Comparative study of the stability of multiple emulsions containing a gelled or aqueous internal phase. *Food Hydrocolloids* 42: 215-222
4. Trif M., Calinoiu L.F., and Vodnar D.C. (2014). Overview on fat reduction and replacement solutions in ready meals. 1st International PLEASURE Conference "Novel Processing approaches for the development of food products Low in fAt, Salt and sUgar", ABSTRACT BOOK, 18-19 June 2014, La Rochelle, France
5. Scholliers P. (2015). Convenience foods. What, why, and when. *Appetite*. 94: 2-6
6. Schuch A., Deiters P., Henne J., Köhler K., Schuchmann H.P. (2013). Production of W/O/W (water-in-oil-in-water) multiple emulsions: droplet breakup and release of water. *J Colloid Interface Sci.* 402:157-64