Stabilization of Oleogel based Bakery Products by Antioxidants

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Bakery products significantly contribute to the consumption of saturated or *trans*-fatty acids due to the triacylglyceride structured fat that is necessary for functional and physical properties of the product. Often palm oil or hydrogenated fats are used to achieve the requirements necessary for the fat phase of bakery products. An alternative is the use of oleogels based on a structurant such as ethyl cellulose or waxes and a vegetable oil which is converted into a gel-like structure. By this it is possible to prepare fat phases with similar properties as triacylglyceride structured fats usable to replace palm oil or hydrogenated fats in bakery products. The use of rapeseed oil for the preparation of oleogels is recommended due to the favorable fatty acid composition, but the oxidative stability of rapeseed oil is much lower than for palm oil or hydrogenated fats resulting in lower storage stability of the products.

The aim of the present work was to show the effect of an antioxidant on the storage stability of oleogels and resulting bakery products. In a first step the influence of seven synthetic (BHT, BHA, TBHQ) and natural (sage extract, 2 x rosemary extract, mixture of tocopherols) antioxidants on the oxidative stability of rapeseed oil was tested in a Rancimat at 120°C. From this experiment one rosemary extract was selected with the highest positive impact on the oxidative stability. In the further course of the experiment rapeseed oil based oleogels structured by ethyl cellulose or sunflower wax and stabilized with rosemary extract were used as fat phase for the preparation of cookies. The addition of rosemary extract resulted in a significant improvement of the oxidative stability from 8.1h to 10.4h for cookies prepared with oleogel based on ethyl cellulose and 8.2h to 10.5h for cookies prepared with oleogel based on sunflower wax. Later cookies prepared by different oleogels stabilized with rosemary extract were stored over a period of 112 days at room temperature. As parameters to follow the oxidative state of the cookies the peroxide number and hexanal as marker substance for oxidative degradation products were measured.

The addition of rosemary extract resulted in a significant reduction of the peroxide number in comparison to cookies without antioxidant. Over a period of 112 days only a slight increase of the peroxide number was found while in products not stabilized by rosemary extract the increase was remarkable higher. For hexanal formation during storage no significant difference was found for samples at the beginning of the storage experiment in comparison to samples after 112 days of storage.