Accepted Manuscript

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PII: S0260-8774(17)30482-X

DOI: 10.1016/j.jfoodeng.2017.11.009

Reference: JFOE 9069

To appear in: *Journal of Food Engineering*

Received Date: 23 May 2017

Revised Date: 7 November 2017

Accepted Date: 12 November 2017

Please cite this article as: Matos, M., Laca, A., Rea, F., Iglesias, O., Rayner, M., Gutiérrez, G., O/W emulsions stabilized by OSA-modified starch granules versus non-ionic surfactant: Stability, rheological behaviour and resveratrol encapsulation, *Journal of Food Engineering* (2017), doi: 10.1016/j.jfoodeng.2017.11.009.

O/W emulsions stabilized by OSA-modified starch granules versus non-ionic surfactant: stability, rheological behaviour and Resveratrol encapsulation

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Abstract

Resveratrol is a natural phenol with many positive effects for human health. However it is a photosensitive molecule with geometric isomerism, easily oxidised with short biological half-life and rapid metabolism and elimination. Thus, encapsulation of resveratrol is necessary. It has low solubility in water and in most of common oils. The goal of this work was to prepare oil-in-water emulsion stabilized by quinoa starch particles containing resveratrol. Quinoa starch particles were modified with Octenyl Succinic Anhydride (OSA) (degree of substitution 1.8%) to make them less hydrophilic. In order to compare starch effectivity as stabilizer, a common non-ionic surfactant Tween 20 was used to formulate surfactant stabilized emulsions. As dispersed phase a mixture of miglyol and orange oil in a volume ratio 1:9 was used in order to increase resveratrol solubility in the oily phase. Both types of emulsions were formulated in full coverage conditions with similar mean droplet size. Thus, differences in the emulsions properties observed only depend on the type of emulsifier.

Pickering emulsions stabilized by OSA-modified quinoa starch granules resulted more stable against creaming phenomena. The rheological behaviour was influenced by the type and the amount of dispersed phase used. Resveratrol encapsulation results revealed that formulations based on starch Pickering emulsions are an appropriate resveratrol carrier system for further use in functional food formulations, better than surfactant stabilized emulsions, leading to encapsulation efficiency (EE) values up to 98%, being more than twice that of the surfactant stabilized systems.