

New Formulation and Processing Strategies for the Manufacturing of Cheese Fortified with Omega-3

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The fortification of food with essential polyunsaturated fatty acids (PUFA), such as omega-3 and omega-6, is an interesting and timely topic. The health benefits associated with PUFA ingestion are several, such as reduction in cardiovascular diseases, anti-inflammatory and anti-allergic effects, development and function of brain, retina and nervous systems, protection against certain types of cancer. In recent years the number of available PUFA fortified foods around the world has been rapidly increased in the attempt to address the nutritional deficiency of the population. Naturally containing omega-3 fatty acids of animal (fish) or vegetable oils (i.e. flaxseed, canola, soybean) are generally chosen as ingredients for fortification. In the effort to produce fortified cheeses, the most cost-effective and easiest option is the direct addition of the nutrient to the milk before cheese-making. However, the oil separation at the milk surface makes its incorporation in the curd difficult and generally negligible. The effective incorporation of the nutrient in the curd, and thus in the cheese, can be obtained only by achieving a stable coexistence between the aqueous and the added oil phases. The aim of the present research was to develop effective strategies in order to fortify *queso fresco*, chosen as target product, with omega-3. In particular, two approaches were studied: i) processing strategies: high pressure homogenization (HPH) was applied as pre-treatment to enrich milk with fish oil; ii) formulation strategies: selfassembly monoglyceride structures were used to encapsulate fish oil to be further delivered in milk before cheese-making. Results highlighted that both approaches could offer interesting ways to effectively incorporate oils rich in omega-3 into cheese. Perspectives and pitfalls of the two strategies will be discussed taking into account cheese quality characteristics, product oxidative stability as well as industrial needs.