Whey protein aggregates and caseins to control the texture of dairy emulsions in a large range of protein concentrations without non-dairy additives

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More natural and healthier food products represent a strong consumers' demand in developed countries. Proteins are essential ingredients to texture foods. However, there are two limits with the use of proteins: obtaining a gelled matrix at low protein concentration and obtaining heat stable solutions at high concentrations of heat-sensitive proteins, such as whey proteins. This is the case of dairy emulsions, which will therefore require the addition of non-dairy gelling or stabilizing agents to obtain desired food texture.

Emulsions at 5 and 30% fat were prepared with whey proteins (native or aggregated) up to 10% content (w/w) and caseins, which concentration ranged from zero to a sufficient amount to cover the total oil/water interface with casein. The texture of the obtained emulsions was discussed in the light of the emulsion structure, which was visualized by CLSM (emulsion scale), TEM (droplet scale) and the characterization of the oil/water interface composition by SDS-PAGE (interfacial scale).

Results showed that the texture of dairy emulsions can be controlled over a wide range of whey protein concentrations and without the addition of additives by combining the heat stability properties of whey protein aggregates with the interfacial properties of caseins. At low protein content, especially caseins, the whey protein aggregates adsorb at the interface and connect the fat globules, which allows the emulsion to form a gel. At higher casein concentrations, the caseins adsorb at the interface to the detriment of the whey protein aggregates, which remain in the dispersed phase, and the emulsions are fluid and stable after heating, even at high protein concentrations.

Hence, the design of the water/oil interface is a mean to better control the texture of dairy emulsions in the absence of non-dairy additives. This work will help to create additive-free dairy products that meet consumers' demand for more natural products.