

## The Effect of Dissociating Agents on the Dispersion of a Grated Cheese – Conclusions for its Structure-Holding Interactions

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Cheese can be described as a bi-continuous gel structure consisting of a porous protein matrix (casein) interspaced with localized domains of fat [1]. The way this matrix is formed is key, since it plays a role in the final microstructure of cheese and, consequently, its texture, flavour and overall quality [2] [3]. This work used Emmental cheese, which is a Swiss-type, semi-hard curd cheese. In these cheeses, the matrix acidification occurs after pressing of the curd, i.e., when most of the whey has already been expelled. Hence the concentration of colloidal calcium increases proportionally with the concentration of casein at drainage, leading to the formation of a highly cohesive and mineralised matrix [2]. Urea, SDS, EDTA, NaCl and NaOH solutions are commonly used as protein denaturants. In this work, we aimed to determine the contribution that each type of interaction had in cheese structure. For that, we used the different dissociating agents referred above, at different concentrations and combinations [4].

In this work, in order to determine total protein in cheese, we developed a modification of an UV absorbance method, preceded by the dissolution of the samples in NaOH [5]. The method was also adjusted to quantify protein in solutions where cheese was dispersed.

Sample solutions of dissociating agent and Emmental cheese were heated to 70 °C with constant agitation. This protocol, involving heating the cheese, pretends to approximate the conditions cheese is subjected when preparing cheese-containing food products, such as sauces or processed cheeses, among others. Afterwards, the samples were centrifuged, and the supernatant separated. Aliquots of this were diluted in NaOH 0.1 M, before measurement by UV absorbance at 280 nm.

The solubilized protein by each dissociating solution was then evaluated and compared to the total protein in cheese.

Results showed that a cooperation between hydrophobic interactions, hydrogen bonds and ionic interactions are involved in the protein structure of Emmental cheese, since combinations of urea, SDS and EDTA show a high solubility for the cheese proteins. Urea, alone, at the concentration of 6 M, was able to solubilize up to 85% of cheese proteins, while urea (6 M), SDS (2.5%) and EDTA (4 mM) combined were able to solubilize up to 92% of the cheese proteins.

### References:

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