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MODEL CHEESE MATRICES: CHARACTERIZING THEIR MICRO AND MACROSTRUCTURE TO STUDY THE MIGRATION OF SMALL SOLUTES INSIDE CHEESES

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Ripening process of cheese is mainly determined by the behaviour of microorganisms inside the cheese matrix, and then through the migration of substrates and metabolites. Indeed, mass transfer of substrates must not be limiting for the growth of bacterial colonies, which are immobilized in the matrix, and metabolites must not either accumulates around the colonies to avoid stress phenomena. Our hypothesis is that the micro and macrostructure of the cheeses is then (of capital importance) a key/crucial factor on the migration rates of these solutes.

The aim of the current project was to characterize different lipoproteinic gel networks at the macroscopic and microscopic scales, in order to be able to further understand the impact of matrix structure on mass transfer properties of small solutes in cheese during the ripening process.

Different model cheeses were obtained by renneting a milk concentrate, and either adding gelatine or fat, or removing (the whey protein fraction) whey proteins.

Macrostructure was studied, first by following the renneting kinetics of the concentrate, second by measuring the rheological properties of model cheeses using large uniaxial compression or low amplitude dynamic oscillation of cheese cores and slices, respectively. The microstructure was observed by confocal scanning laser microscopy.

The impact of changing the composition of model cheese on their micro and macrostructure was shown and relationships between macro and microstructure of cheese were pointed out.

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