CATÓLICA
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PORTO

EUROFOODCHEM

The Effect of Dissociating Agents on the Dispersion of a Grated Cheese

Conclusions for its Structure-Holding Interactions

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June 17th 2019

Summary

- Introduction
- Material and Methods
- Results and Discussion
- Conclusions
- References

Introduction

Cheese Microstructure[1]

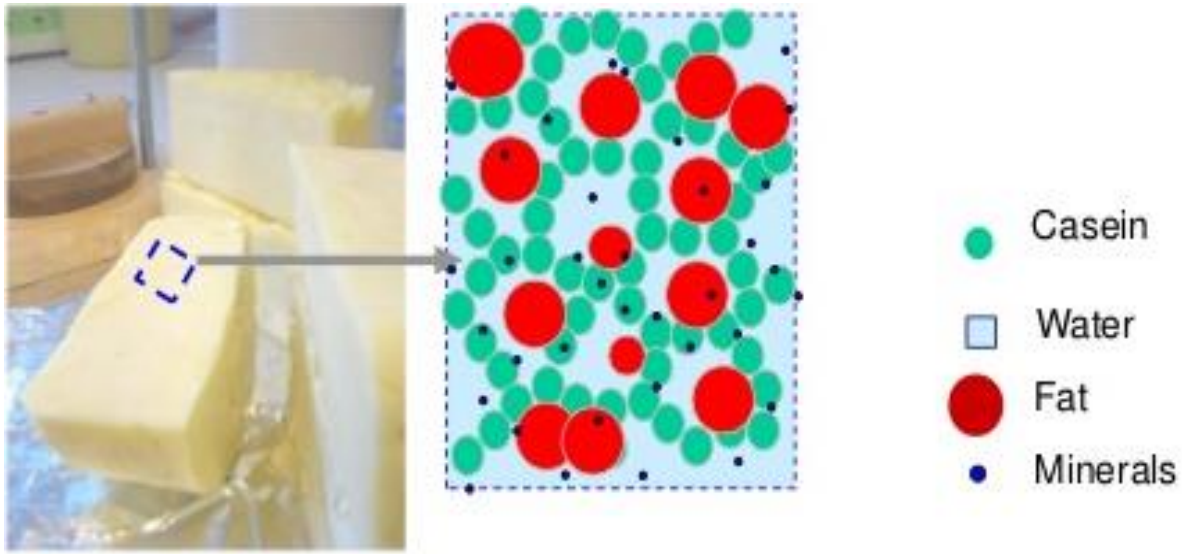


Figure 1 - Cheese Microstructure.
Image from https://pt.slideshare.net/MarkFink/the-microstructure-of-australian-cheddar-cheese-and-other-dairy-products

Cheese microstructure affects:[2]

- Flavour
- Texture
- Melting
- Quality

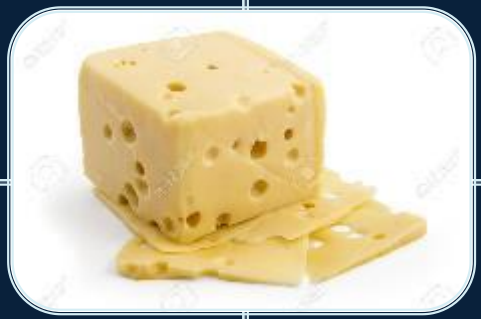
Introduction

Emmental Cheese[3]

Swiss-type

Semi-hard curd

Matrix acidification after pressing of curd

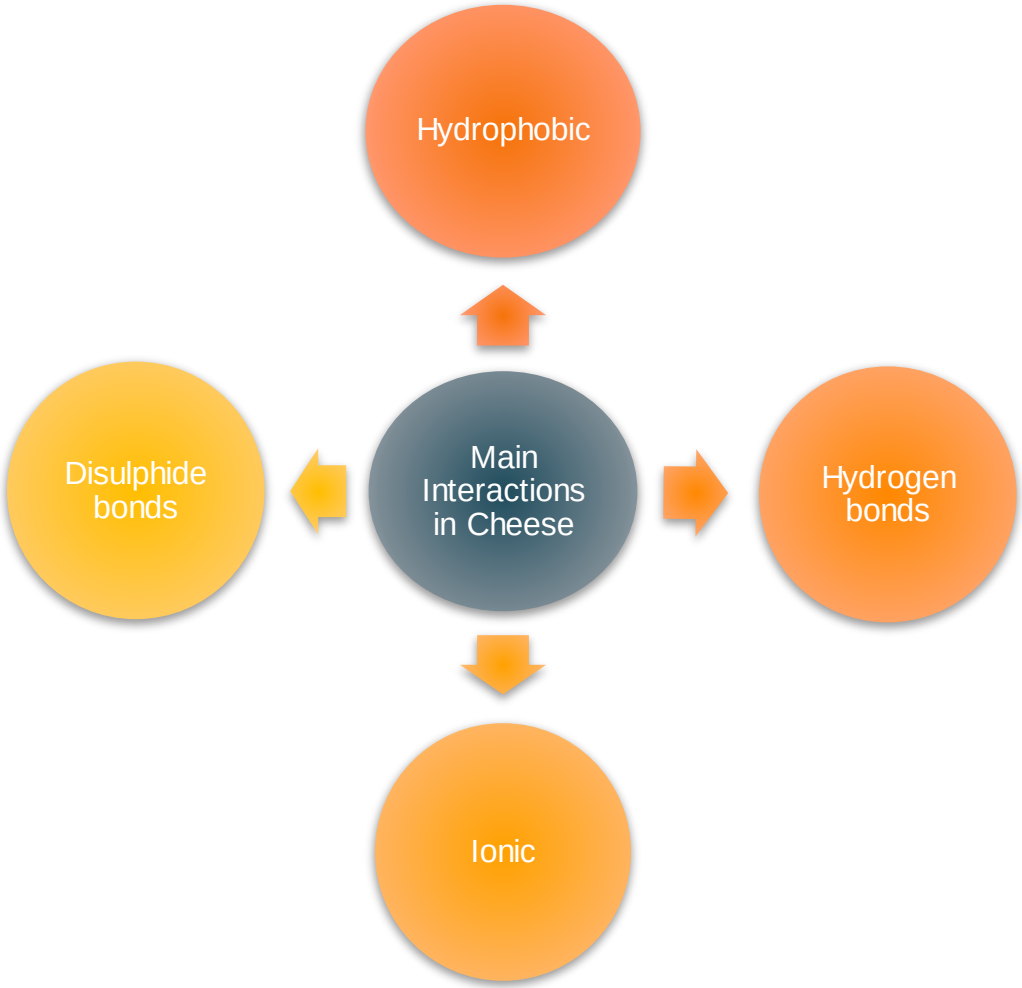


Colloidal calcium concentration increases with casein concentration at drainage

Formation of para-κ-casein matrix with Ca-casein ratio close to that of milk casein micelles

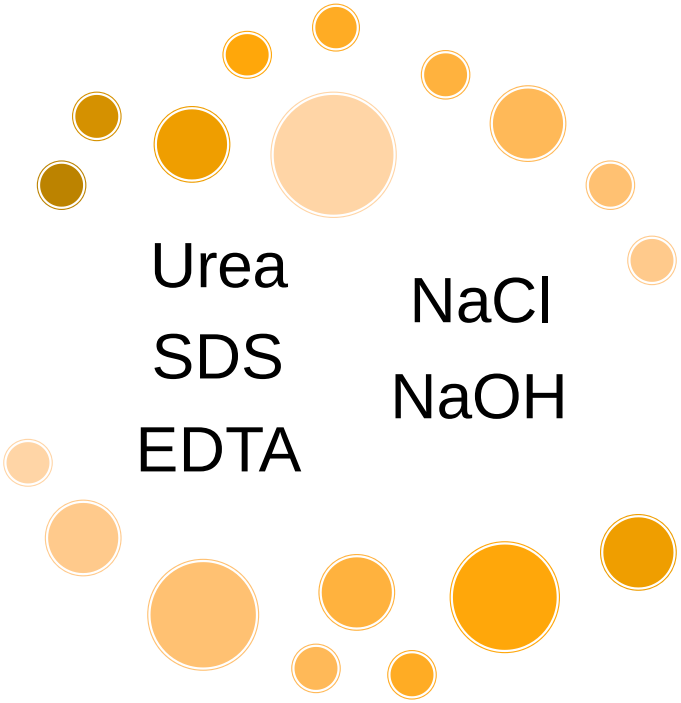
Introduction

Cheese Interactions[4] [5]



Introduction

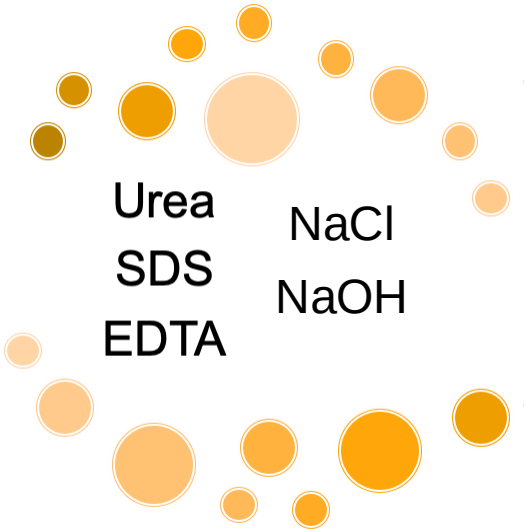
Dissociating Agents[6]



Contribution that each type of interaction had in cheese structure

Introduction

Dissociating Agents



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Concentrations

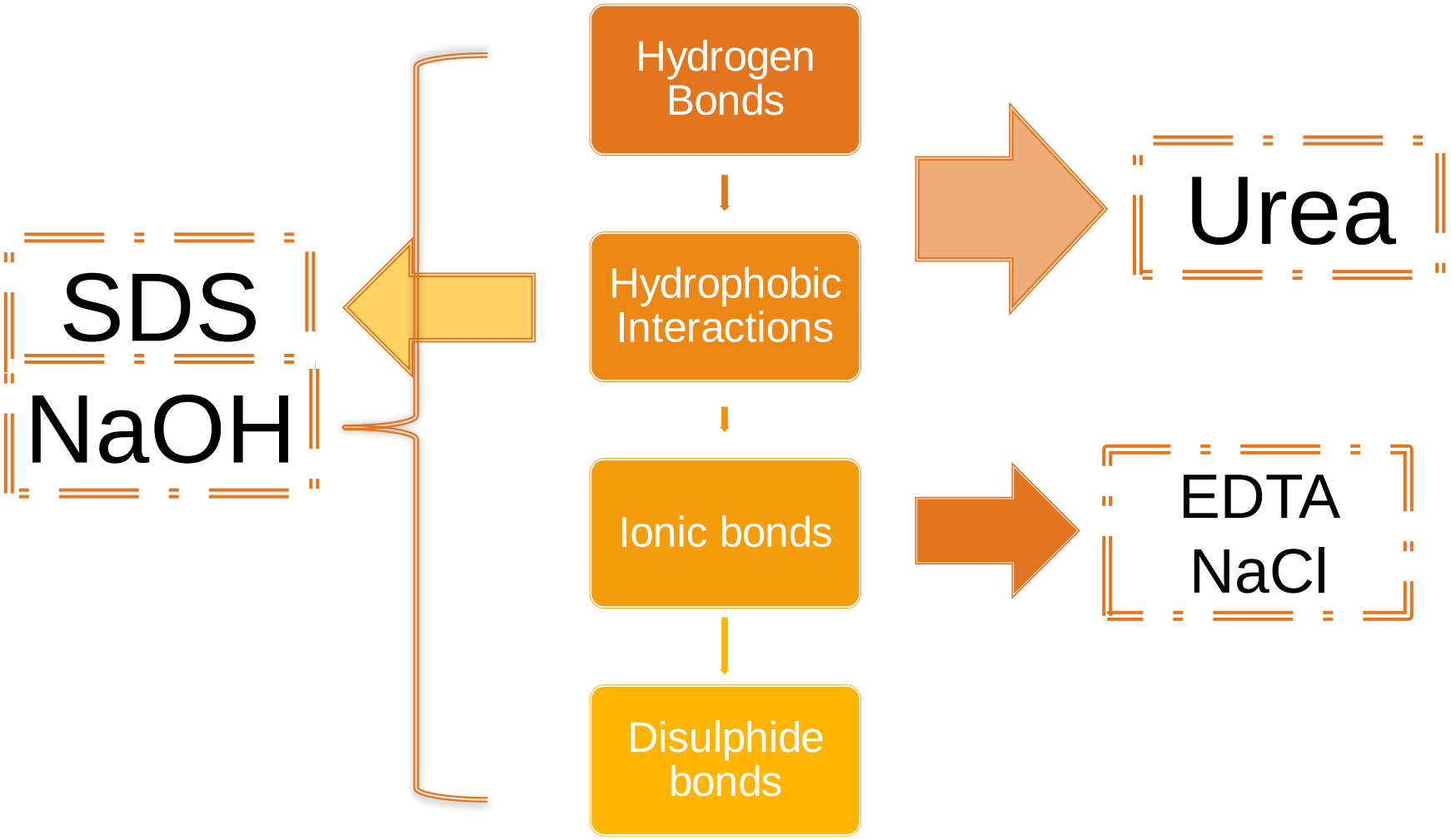
Combinations

Modify protein

solubility and **stability**

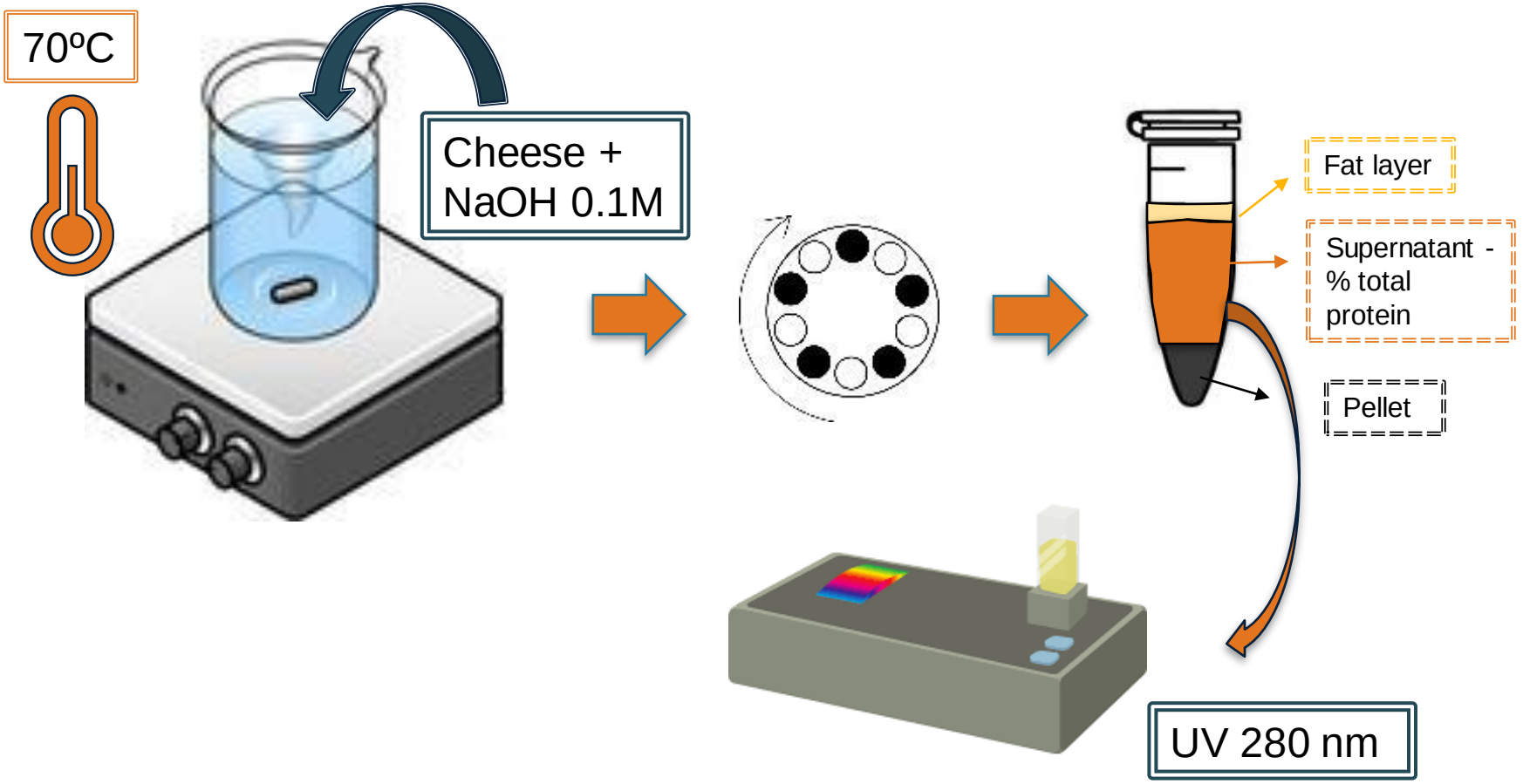
Introduction

Dissociating Agents[7] [8] [9]



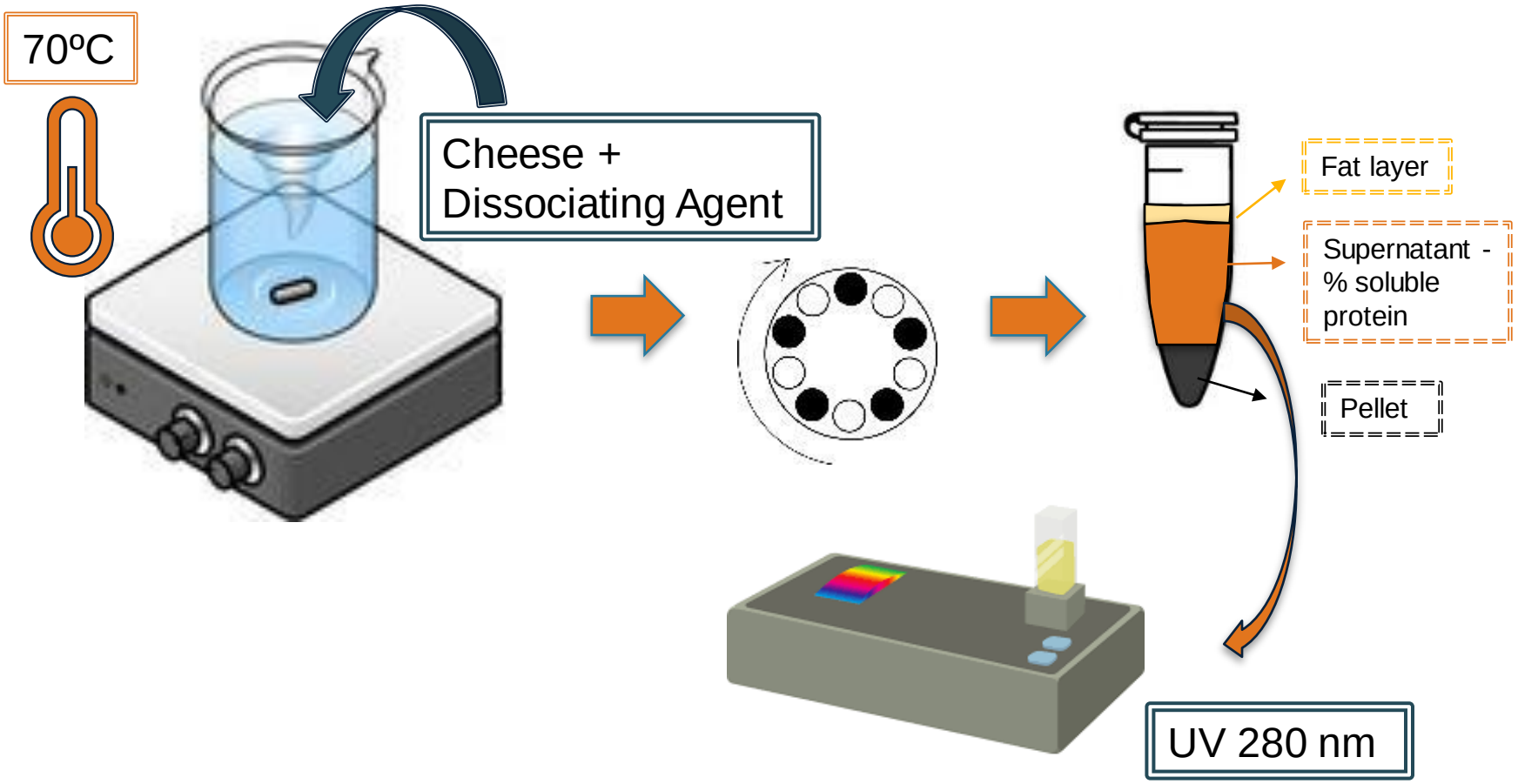
Material and Methods

Determination of Total Protein in Cheese[10]



Material and Methods

Determination of Soluble Protein in Cheese Dispersions[10]



Material and Methods

Experimental Design

Table 1 – Dissociating agents and combinations used in the study, and respective concentrations.

Dissociating Agent	Concentration
NaCl	0.05 and 0.6 M
Urea	1.5 and 6 M
SDS	2.5 %
EDTA	4 and 50 mM
Urea + SDS	6 M + 2.5 %
Urea + EDTA	6 M + 4 mM
Urea + SDS + EDTA	6 M + 2.5 % + 4 mM
NaOH	0.1 M

Results and Discussion

Determination of Total Protein in Cheese

New Method	Kjeldahl Method
0.315 ± 0.010 g	**0.297 ± 0.030 g**

Difference of 5.7%

Results and Discussion

Determination of Soluble Protein in Cheese Dispersions

Table 2 – *Dissociating agents and combinations used in the study, and respective quantity of soluble cheese protein, as well as percentage of soluble cheese protein obtained.*

Dispersing medium	Soluble Protein (g solubilized protein / g added cheese)	Soluble Protein (%)
Deionized Water	0.0319 ± 0.006	9.97 ± 1.90
NaCl 50 mM	0.0439 ± 0.003	13.70 ± 0.95
NaCl 0.6 M	0.0746 ± 0.011	23.33 ± 3.52
Urea 1.5 M	0.167 ± 0.018	52.10 ± 5.47
Urea 6 M	0.269 ± 0.025	85.30 ± 6.13
EDTA 4 mM	0.0905 ± 0.0079	28.67 ± 2.02
EDTA 50 mM	0.0730 ± 0.0063	22.83 ± 1.96
SDS 2.5 %	0.213 ± 0.007	67.37 ± 1.40
Urea 1.5 M + SDS 2.5%	0.282 ± 0.012	88.20 ± 3.60
Urea 6 M + SDS 2.5 %	0.270 ± 0.016	85.40 ± 2.40
Urea 6 M + EDTA 4 mM	0.275 ± 0.008	87.27 ± 3.56
Urea 6 M + SDS 2.5 % + EDTA 4 mM	0.279 ± 0.022	92.13 ± 10.61

Conclusions

- The new protein quantification method introduced is valid for cheese and probably other lactic matrices (ongoing work).
- Cooperation between hydrophobic interactions, hydrogen bonds and ionic interactions are involved in the protein structure of Emmental cheese.
- The main interactions responsible for protein structure in this cheese matrix are electrostatic, in particular hydrogen bonds, and hydrophobic interactions, since urea (6M) alone can solubilize up to 85% of cheese proteins.

References

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Thanks for the attention!