Reducing sodium content in cheese and improving fat composition

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INTRODUCTION

- a) Cheese = 9 mt Europe; 40% of European milk; 18 kg/y/h;

- b) Cheese = 5% of the total salt intake in Europe but 7% in France, Greece, Italy ;

- c) Salt in cheese = 1-2g/100g (from 0.4 % to 2% depending on cheese variety) (0.4% in Emmental).

INTRODUCTION

d) Cheese is a fermented product :

Lactic+propionic in Emmental

Lactic+Yeast+Mould Camembert.

The NaCl in cheese controls water availability aw for fermentations.

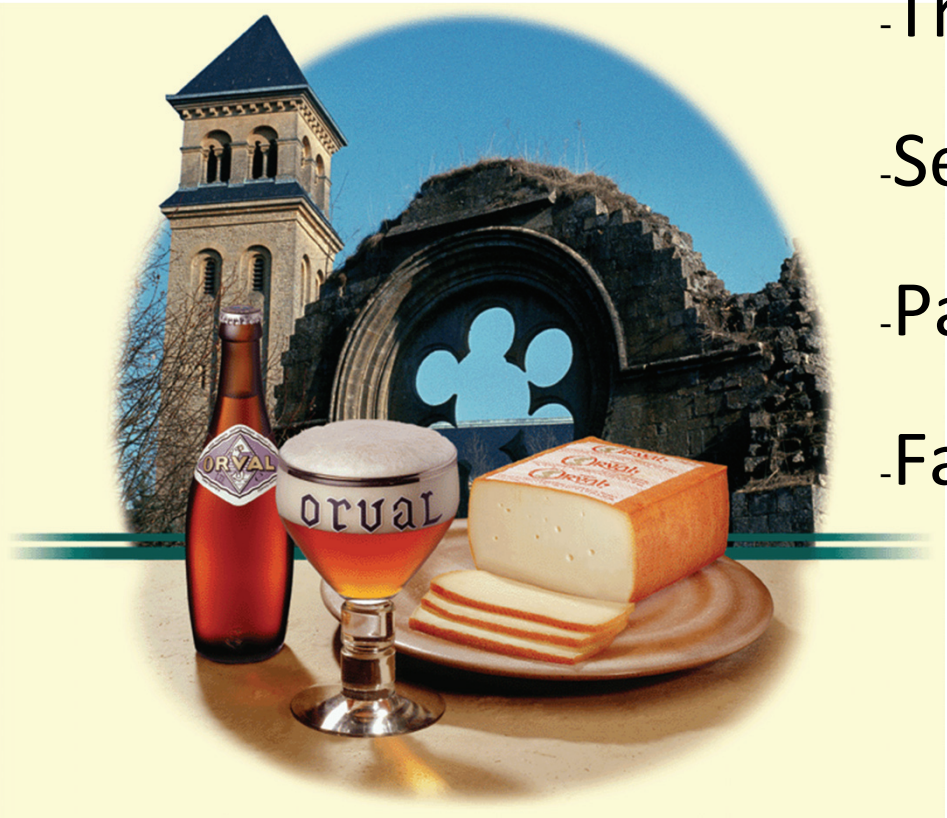
INTRODUCTION

4 partners :

- **INRA:** STLO Rennes F (proteolysis, propionic acid fermentation);
- **ACTALIA** : the cheese technical centre F (experimental Brie, Camembert & Raclette cheeses);
- 2 Belgian cheese companies :

ORVAL (Trappiste: semi-hard cheese);

HERVE (Bou d'Fagne: soft smear cheese).



- Trappiste/Vieil Or
- Semi hard cheese
- Pasteurised cow milk
- Fat 34%, Salt 2%

Bou d'Fagne

- Soft cheese with smear
- Pasteurised cow milk
- Fat 30% Salt 2.5%

The questions :

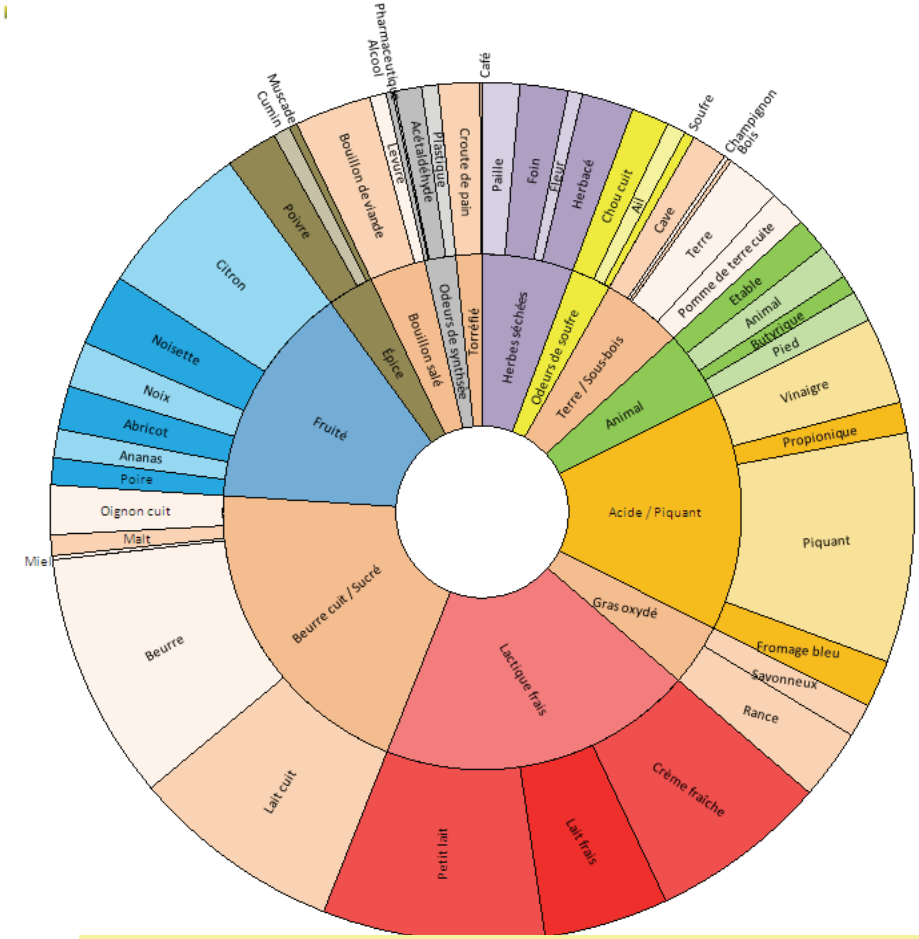
- How the main mechanisms are modified by the salt reduction ?
- What is the nature and the intensity of quality modifications due to salt reduction ? and what is acceptable by consumer ?
- How to correct these modifications ?
- How to combine the salt reduction and the improvement of fat by increase of Unsaturated Fatty Acids (UFA) ?

RESULTS

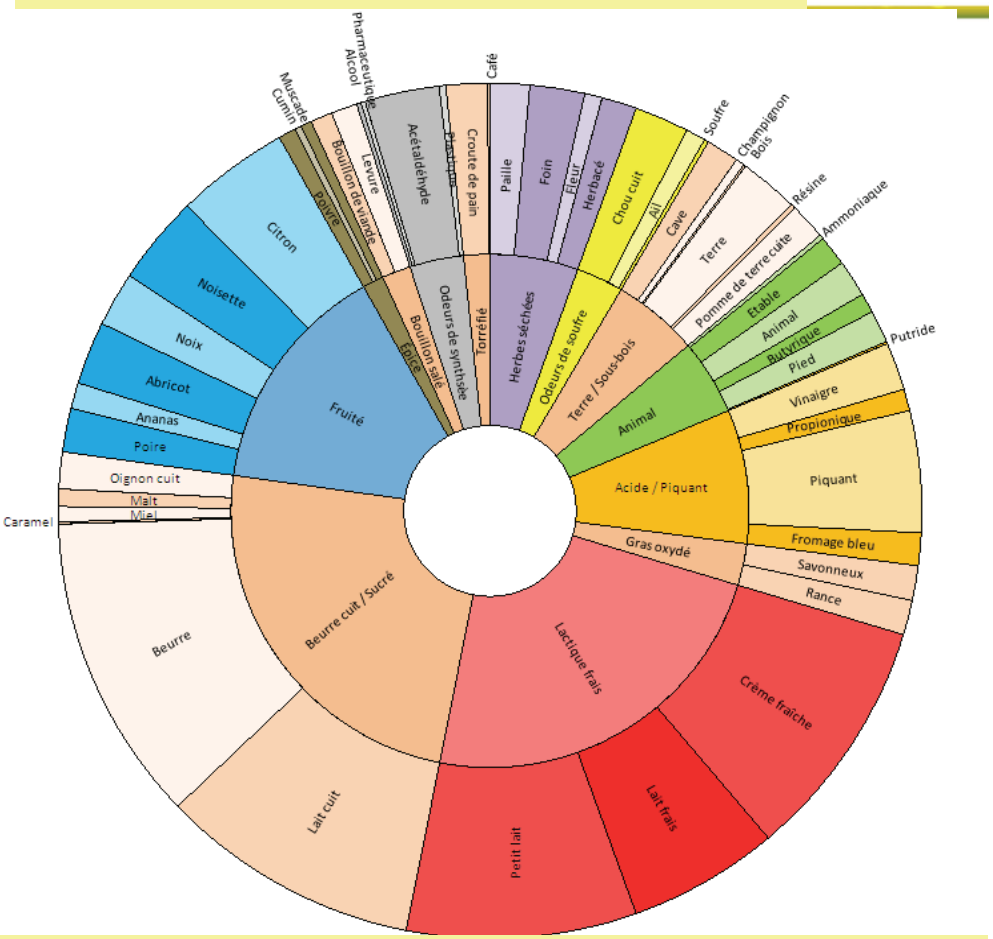
- Cheese ripening is not deeply modified by 30% salt reduction (INRA-Actalia: Emmental in laboratory; Actalia: Raclette, Brie, Orval : Trappiste)

- Generally quality (aroma, texture, functionnalities) seems not affected (Brie : Actalia) or, when affected, improved (Trappiste: Orval) by 30% salt reduction.

Example: Qualitative aromas profile Trappiste



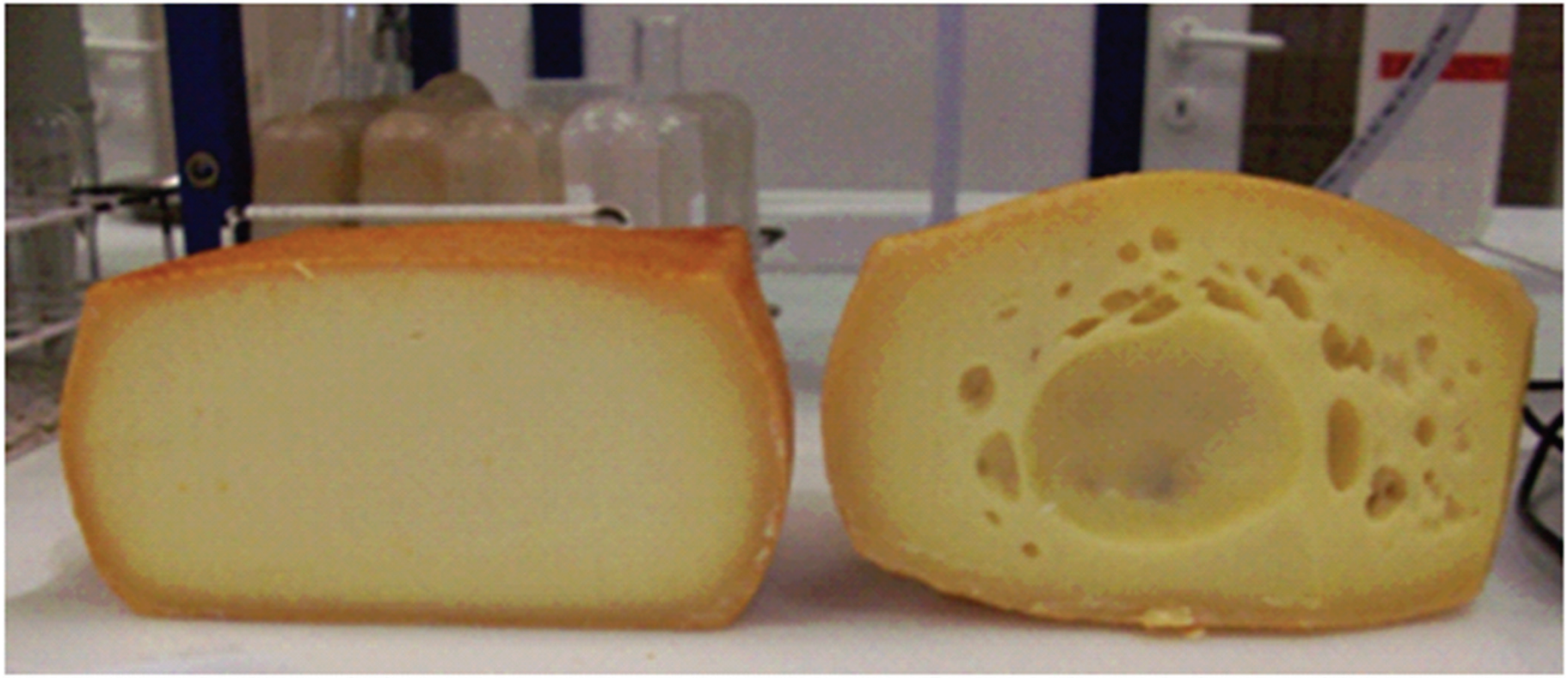
Standard



Salt - 36%

The cheeses aromas are not far ► SaltReduction: more « creamy »

Ripened 3 months Orval Trappiste (Vieil Or)
Salt 2% versus 1.3% = severe defect in Low Salt Cheese



Normal cheese

3 month ripened cheese with reduced salt

Normal salt 2%
20- 40ppm butyric acid

-33% salt 1.3%
617 ppm butyric acid

Trappiste Commercial cheeses

Defect: Presence of *white Penicillium* on Bou d'Fagne -10% Salt
=> severe defect

Effect of lowering salt has to be studied by cheese types and not generally.

Salt eduction

Water is more available → enhancement of fermentations

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Improvement of starters and enzymes activities (→ + texture, aroma, functionalities, taste): Emmental, Raclette, Brie.

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Increase of hazards linked to unwanted microorganisms : Trappiste, Bou d'Fagne, etc.

Study of the increase of unsaturated fatty acids UFA in low fat Brie cheese(ACTALIA)

- Increase by 8% of the percentage of Unsaturated Fatty Acid UFA in milk (*BleuBlancCoeur* : cows fed with linseed);
- UFA+ fat cheeses were characterized by a slightly yellower colour of the rind and of the body, a less intense mushroom odour, a softer texture in mouth;
- Generally: good quality for UFA+ cheeses;
- The effect of salt reduction is more important than the UFA effect.

Marketing study by Orval

- 103 consumers from Bruxelles region;
- normal 2% vs 1.3% Low Salt Trappiste cheeses;
- 70% of consumers are not concerned by low salt cheeses;
- Intention of buying: 60% normal cheese vs Low Salt ;
- Taste difference is Perceived.

- Dissemination *via* scientific and Technical journals (6 articles) ;
- Conferences : Cork 2014, IUFOST Montréal 2014, La Rochelle 2014, NutriEvent 2014, Dairy Boards Meeting.
- Answers to questions from Food Safety Authorities.

CONCLUSIONS

- It is possible to make good quality low salt (30%) soft, semi-hard & hard cheeses and fat-improved cheeses.
- But hazards of unwanted fermentations (moulds, clostridia **etc**.) are higher in low salt cheeses.
- Are consumers ready to buy more expansive low salt cheeses proposed by companies? More marketing studies have to be done to answer to this question.