

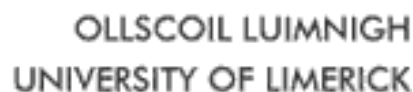


A study of the interactive effects of fat and salt reduction on the biochemical, physical and sensory characteristics of Cheddar cheeses

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12th November 2014



Fat and Salt Reduction

- Problems associated with reducing fat
 - Altered composition and biochemical effects
 - Texture defects
 - Poor cooking properties
- Problems associated with reducing salt
 - High moisture content/low pH
 - Altered proteolysis, texture and flavour
 - Microbial safety
- Interactive effect
 - Unknown?

CheeseBoard Sub-Task 1.1

- Title:
 - Optimising the matrix of half-fat (50% reduction), reduced-salt (30% reduction) cheese to give desired texture and flavour production
- Overall objective:
 - Develop a knowledge platform to facilitate the development of Cheddar cheeses with reduced-fat and reduced-salt
- Reason:
 - Market
 - Health and lifestyle

Interactive effects of reducing fat and salt

Experimental design for pilot-scale cheese manufacture

Target fat
content (%)

Full-fat
32%

Half-fat
16%

Target salt
content (%)

1.8%

1.2%

0.9%

1.8%

1.2%

0.9%

Cheese Code

FFFS

FFRS

FFHS

HFFS

HFRS

HFHS

Interactive effects of reducing fat and salt

Results: Cheese composition

	Effect of fat reduction	Effect of salt reduction	Interactive effects
Protein	↑	NE*	↑
FDM	↓	NE*	↓
Moisture	↑	↑	↑
MNFS	↓	↑	↓
Salt	NE*	↓	↓
S/M	↓	↓	↓

*NE = no effect

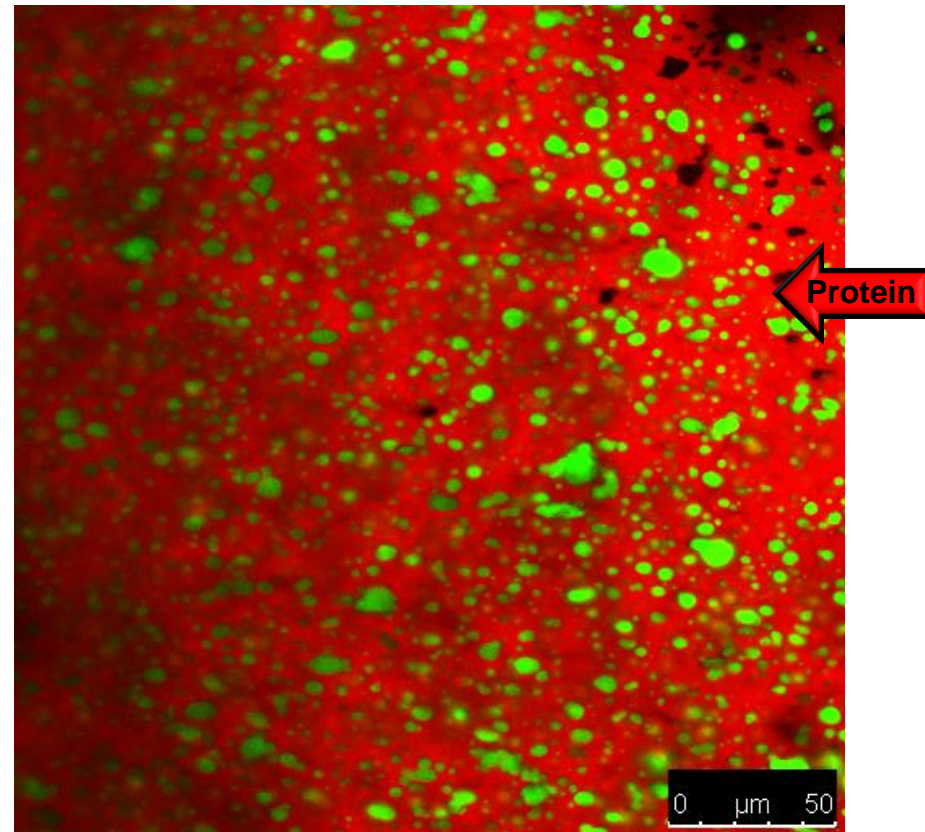
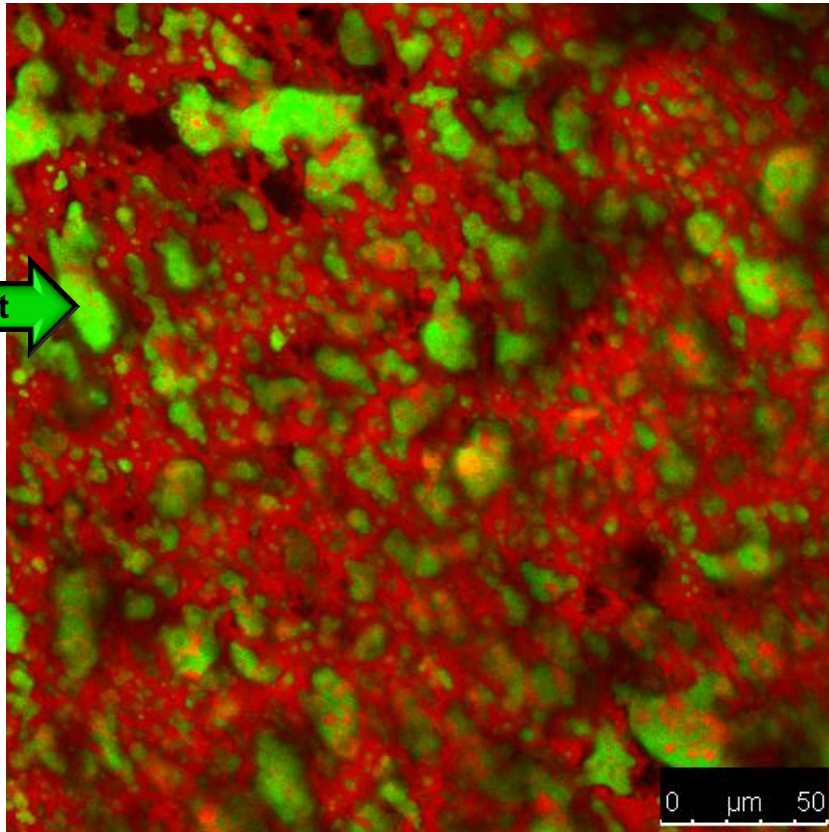
Values presented are means from 3 replicate trials.

Interactive effects of reducing fat and salt

Results: Microscopic imaging of unheated Cheddar

FFFS: full-fat, full-salt

HFHS: half-fat, half-salt



Interactive effects of reducing fat and salt

Results: Cheese pH

FF: 32% FS: 1.8%
HF: 16% RS: 1.2%
 HS: 0.9%

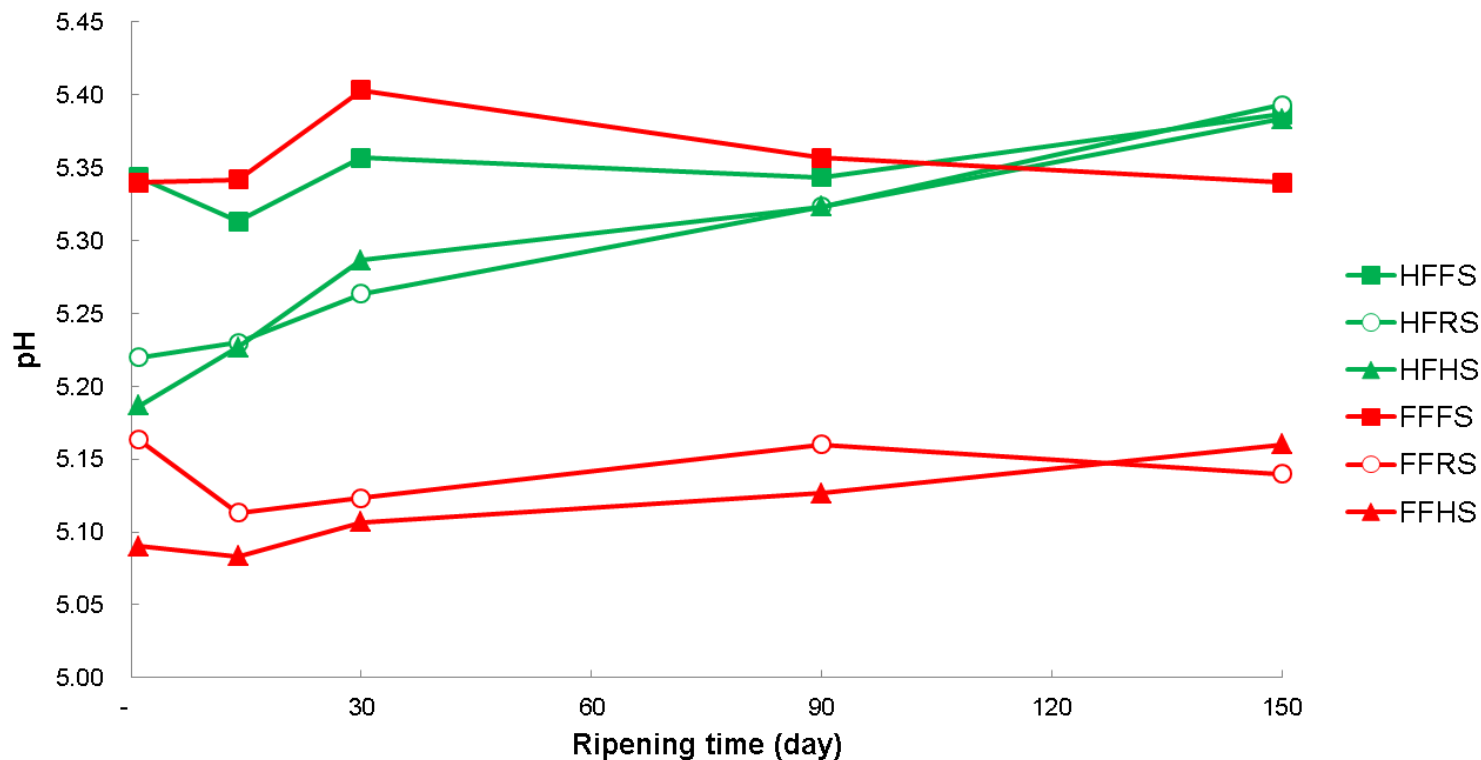


Fig. 1. Values presented are means from 3 replicate trials.

Interactive effects of reducing fat and salt

Results: Firmness

FF: 32% FS: 1.8%
HF: 16% RS: 1.2%
HS: 0.9%

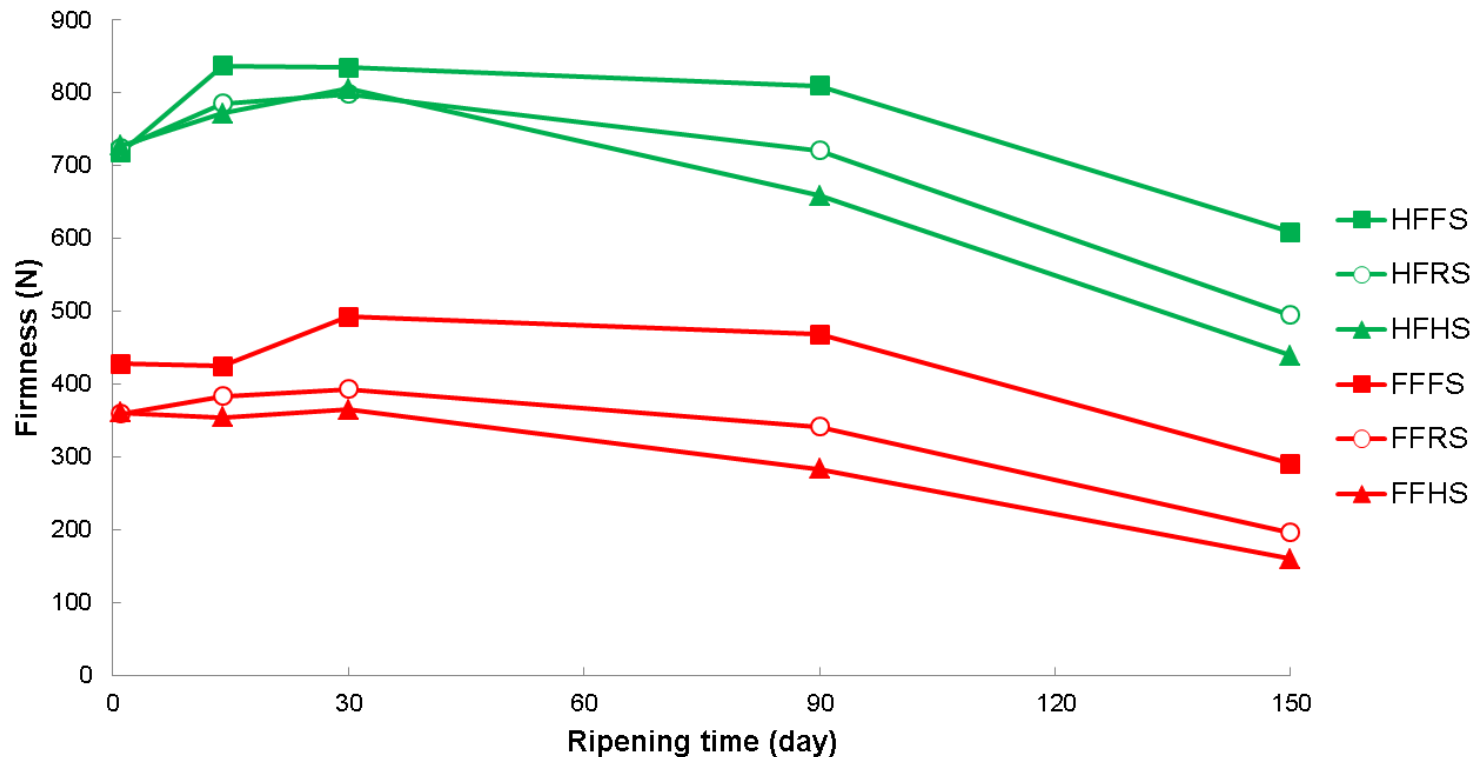


Fig. 3. Values presented are means from 3 replicate trials.

Interactive effects of reducing fat and salt

Results: Heat-induced flow

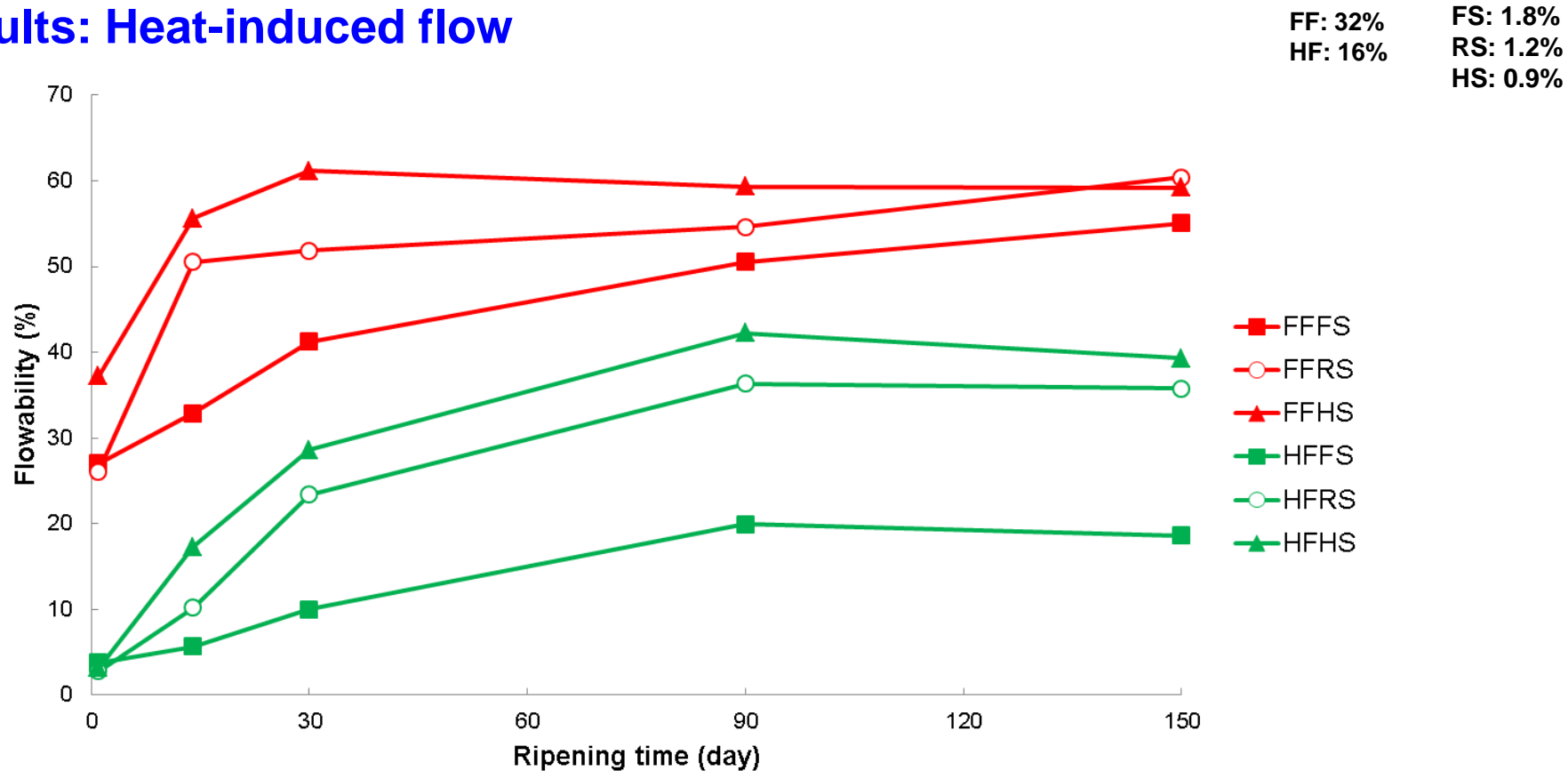


Fig. 4. Values presented are means from 3 replicate trials.

Interactive effects of reducing fat and salt

Results: Sensory acceptability scores for uncooked Cheddar

	FFFS	FFRS	FFHS	HFFS	HFRS	HFHS
Appearance	-	-	-	×	-	-
Aroma	-	-	-	×	-	-
Flavour	-	-	✓	×	-	-
Texture	✓	-	-	×	×	-
Overall acceptability	✓	-	✓	×	-	-

Positively correlated - ✓

Negatively correlated - ×

Indifferent - -

Conclusions

Effects of reducing fat and salt in Cheddar cheese

Composition:

- Fat reduction increases moisture and protein
- Salt reduction increases moisture
- Interactive effects

Cooking:

- Fat reduction reduces flowability
- Salt reduction increases flowability
- Interactive effects

Rheology:

- Fat reduction increases firmness
- Salt reduction decreases firmness
- Interactive effects

Sensory:

- HFFS cheese was unacceptable to the panel
- However, room for improvement



Acknowledgements



Maurice O'Sullivan in University College
Cork for sensory evaluation



Mark Auty in Teagasc Food Research Centre
Moorepark for confocal imaging



Thank You

