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SENSORY RESEARCH

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POSITIONING OF NOVEL REDUCED-FAT CHEESES IN THE COMMERCIAL SPACE USING PROJECTIVE MAPPING

INTRODUCTION

Reduced-fat cheese can suffer from poor sensory characteristics resulting in decreased consumer acceptability. Low pressure homogenisation (leading to activation of indigenous lipoprotein lipase and release of volatile fatty acids from fat) may improve flavour and texture of reduced-fat cheese resulting in better market positioning.

The aim was to develop and investigate the uses of an homogenisation step in production of full- and reduced-fat cheeses and to apply projective mapping to evaluate how cheeses are positioned relative to commercial samples.

METHODOLOGY

Milk pre-processing and cheese production

Milk was standardised to 2 or 3% fat, homogenised at 10 MPa, incubated at 37°C for 1 h and pasteurised, before Emmental cheesemaking to produce a reduced-fat (RF_H) and full-fat cheese (FF_H). Control cheeses (RF_C and FF_C from 2 and 3% fat in milk, respectively) were made from unhomogenised milk.

Descriptive sensory profiling

Sensory profiling of cheese was performed at 90 d of ripening. A panel of 15 trained assessors evaluated 19 attributes. Terminology and reference standards were developed during training

Projective mapping

Projective mapping of the 4 test cheeses and 6 commercial cheeses (with one replicate) was carried out with 46 subjects (12 male, 34 female, age 19-55) who arranged the samples based on their similarities or differences on a 60 cm² white paper sheet and described the samples according to their own criteria.

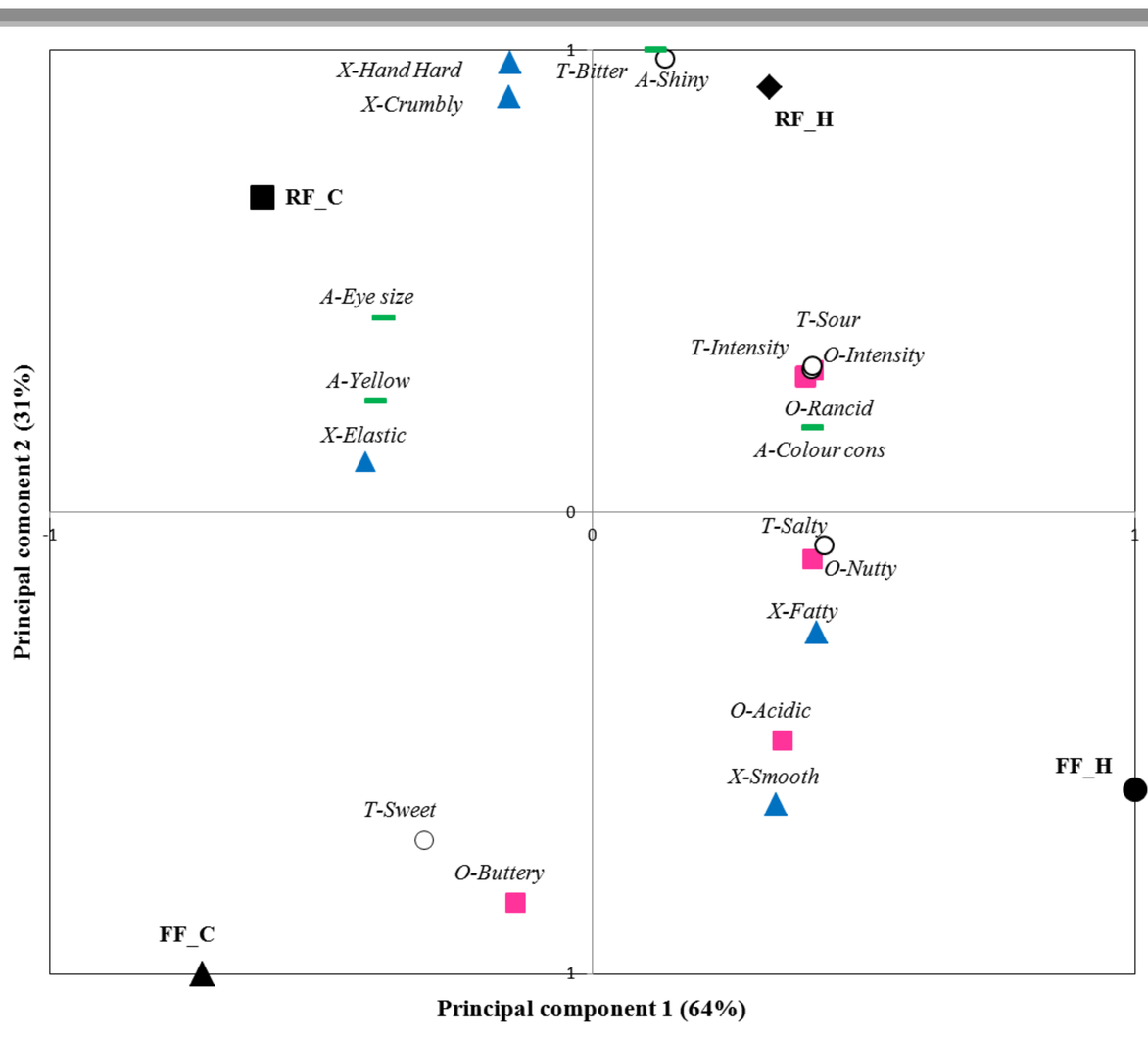

Figure 1. Biplot of scores and loadings obtained from principal component analysis of sensory profiling data of reduced-fat control cheese, RF_C; full-fat control cheese, FF_C; reduced-fat cheese produced with milk homogenised at 10 MPa, RF_H and full-fat cheese produced with milk homogenised at 10 MPa, FF_H.

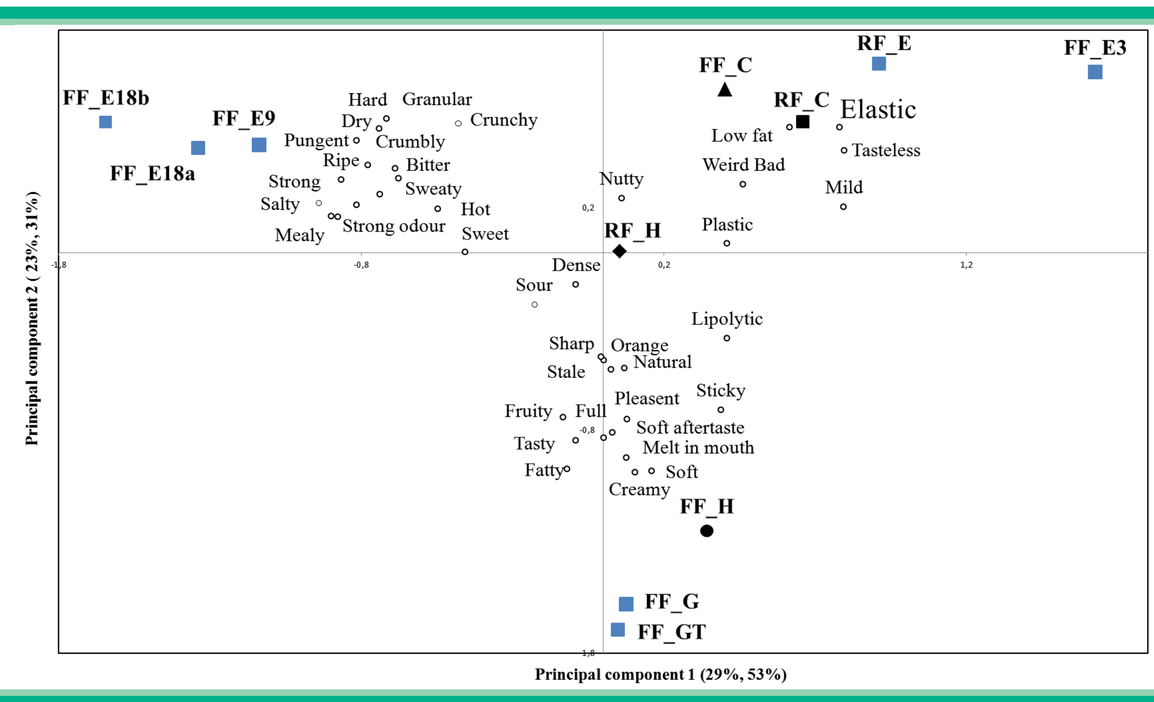

Figure 2. Principal component regression (PCR) plots of scores and loadings obtained from projective mapping coordinates and words used to describe samples. FF_E3, 9 and 18a/18b refer to commercial full-fat Emmental cheeses ripened for 3, 9 and 18 months, respectively. RF_E was a commercial reduced fat Emmental. FF_G and FF_GT refer to full-fat commercial Gouda and Gruyere-type cheeses, respectively.

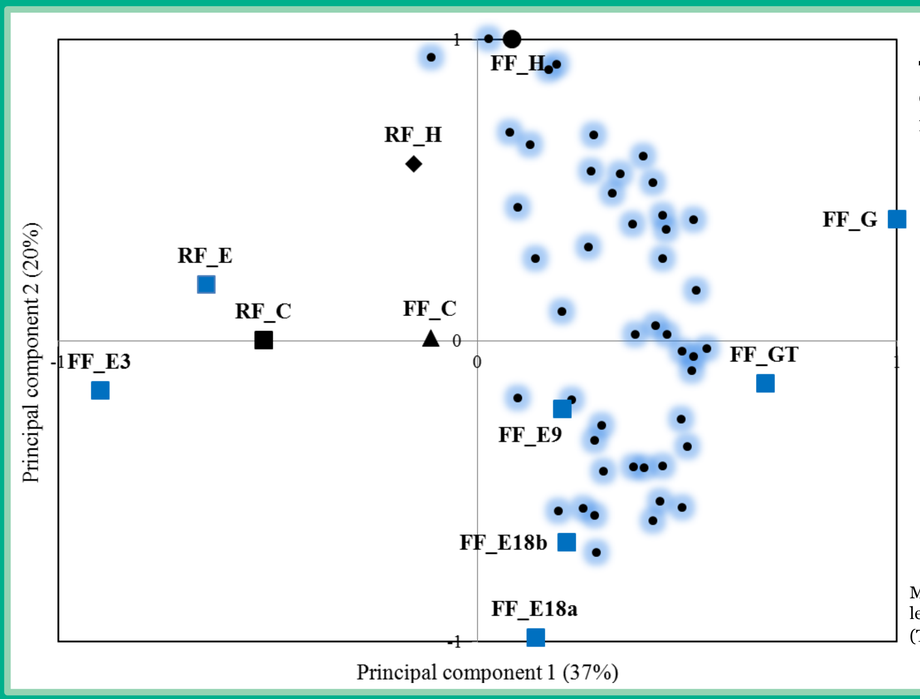

Table 1. Liking scores of cheeses used in projective mapping

Code	Liking	
FF_G	6.1 (1.1)	f
FF_GT	5.4 (1.5)	ef
FF_E9	4.5 (1.6)	de
FF_H	4.4 (1.9)	de
FF_E18b	4.3 (2.0)	de
FF_E18a	4.2 (1.9)	cd
FF_C	4.2 (1.5)	cd
RF_H	4.0 (1.6)	bcd
RF_C	3.2 (1.4)	abc
RF_E	3.0 (1.4)	ab
FF_E3	2.3 (1.2)	a

Means in a column with different letters are significantly different (Tukey's HSD, $P \leq 0.05$)

Figure 3. Internal preference map based on liking scores of the 11 cheeses used in projective mapping. Small black dots represent respondents (n=46).

RESULTS

- RF_H and NF_H were rated as significantly higher in nutty odour, colour consistency and lower in elastic texture and yellowness than RF_C and NF_C (Fig. 1)
- NF_H was positioned with longer-ripened Gouda (8 months) and Gruyere-type cheese (7 months), described as 'pleasant', 'melt in mouth' and 'creamy' (Fig. 2) RF_H was positioned away from NF_C and RF_C and even further from the commercial reduced fat Emmental (6 months)
- FF_H had a higher average liking than a commercial equivalent (FF_E3), RF_H was liked more than a reduced-fat commercial equivalent RF_E (Fig. 3)

CONCLUSIONS

- The projective mapping method revealed promising positioning of test cheeses among commercial alternatives.
- Homogenisation resulted in positioning of the normal fat homogenised cheese with longer-ripened cheeses in a potential new product category.
- Improvements in the sensory quality of reduced fat cheese with the use of homogenisation were achieved.