

FLAVOUR COMPOUNDS AND SENSORY CHARACTERISTICS OF CHEESE POWDERS MADE FROM MATURED CHEESES

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INTRODUCTION

Cheese powders are used as natural flavour ingredients in industrial applications such as biscuits, savoury snacks, bakery, sauces, dressings, ready meals and processed cheese, where it can be more convenient than regular cheese. Cheese powder contains to some extent the same flavour components as the cheeses it is made from, modified by changes taking place during the cheese powder processing; however both chemical and sensory characteristics of the flavour of cheese powder is sparingly described in the literature. The aim of the present study was to perform sensory analysis of selected cheese powders made from matured cheeses, and correlate the sensory characteristics to flavour substances analysed by chemical analyses.

RESULTS AND DISCUSSION

SENSORY PROFILING OF CHEESE POWDERS

Blue type cheese powders were characterised by the sensory attributes 'blue' odour and flavour, 'free fatty acids', 'sharp', and 'fruity' flavour as well as 'bitter' taste (Fig.1). In addition, this product type was described both by a quick 'flavour release' and 'melt away', and a long 'after taste'.

Smear type cheese powders were described by the sensory attributes 'smear' odour and flavour as well as some degree of 'kokumi', 'umami' taste and 'sharp' flavour. In addition, this product type was described by a medium level of 'flavour release', 'melt away' and 'after taste'.

Hard type cheese powders were described by the sensory attributes 'Parmesan-like' odour and flavour together with 'harmony', 'kokumi' and to some degree 'umami'. Besides, this product type was characterised by having somewhat less intense flavour.

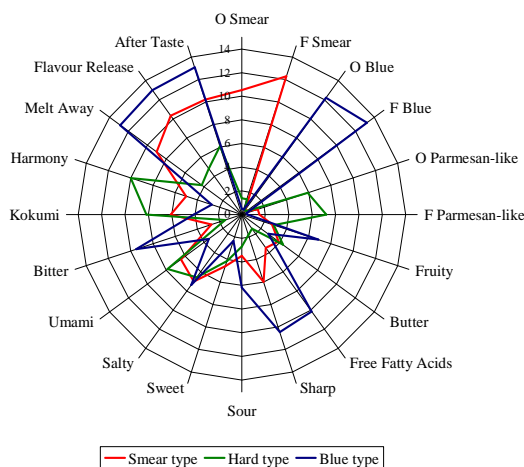


Fig. 1. Sensory evaluation of cheese powders made from matured blue, smear and hard type cheeses, respectively.

MATERIALS & METHODS

CHEESE POWDER PRODUCTION

Three types of cheese powders were industrially produced (Lactosan A/S, Denmark) from a combination of well matured cheeses, each based on minimum 50% of one specific cheese type:

- Blue type cheese powder (Blue cheese) ($n=3$)
- Smear type cheese powder (Bacterial surface ripened cheese) ($n=3$)
- Hard type cheese powder (Hard to extra hard cheese) ($n=3$)

ANALYSES

- Water, fat, protein, protein degradation (pH 4.6 soluble), salt and pH: analysed according to standards of the International Dairy Federation
- Aroma compounds: analysed by dynamic headspace GC-MS
- Total amino acids: analysed by GC-MS after derivatisation with methyl chloroformate
- Descriptive sensory analysis: performed by a trained panel of 8 assessors ($n=3$)

CORRELATIONS: FLAVOUR COMPOUNDS AND SENSORY DESCRIPTORS

Blue type cheese powders were characterised by higher levels of many aroma compounds, primarily esters, methyl ketones and methyl alcohols that are typical compounds produced by *penicillium* species in blue cheese (Fig 2). These compounds were correlated to the sensory attributes 'fruity' and 'blue' odour and flavour.

Smear type cheese powders were characterised by the sulfur compounds dimethyl disulfide and dimethyl trisulfide together with indole and phenol (Fig. 2). These aroma compounds are typical product of smear micro-flora and correlated to the sensory attributes 'smear' odour and flavour.

Hard type cheese powders were characterised only by 3-hydroxy-2-butanone and protein (Fig. 2). The low levels of aroma compounds and chemical substances describing this cheese powder type, might explain the association with the sensory attribute 'harmony', as well as 'kokumi' and 'umami' as these sensory sensations might be more easily perceived in products with a lower levels of aroma compounds.

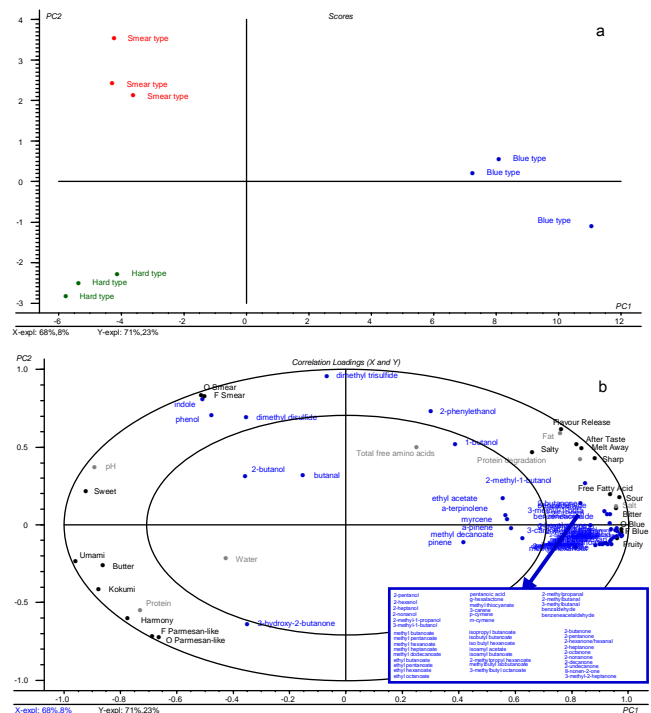


Fig. 2. PLS scores (a) and correlation loadings (b) plots of PC1 vs. PC2. Cheese powders made from matured smear, hard and blue type cheeses. Aroma compounds and chemical composition are X-matrix and sensory data Y-matrix. Ellipses represents $r^2 = 50$ and 100% explained by the model. Sensory descriptors; Chemical composition; Aroma compounds.

'Melt away', 'after taste' and 'flavour release' were correlated to a high level of fat, protein degradation and total free amino acids, which are chemical properties that could be linked to such characteristics.

'Kokumi', 'umami', 'free fatty acids' and 'sour' were only to a limited extent explained by relevant flavour substances analysed. Other compounds e.g. peptides and organic acids could contribute to such sensations and these relations will be studied further.

CONCLUSION

- Sensory profiling: blue cheese powders had the most intense flavour, followed by smear and then hard type
- Blue type cheese powders: characterised by esters, methyl ketones and methyl alcohols, correlating to 'fruity' and 'blue' odour and flavour
- Smear type cheese powders: characterised by the sulfur compounds, indole and phenol, correlating to 'smear' odour and flavour
- Hard type cheese powders: characterised by lower levels of aroma compounds, correlating to 'harmony' and 'kokumi'