

Gas chromatography/pulsed flame photometric detection (GC/PFPD) monitoring of volatile sulfur compounds produced by metabolism of sulfur-containing amino acids in model cheddar cheeses during ripening

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Volatile sulfur compounds (VSCs) such as methanethiol, hydrogen sulfide, methional and methylsulfides (dimethyl sulfide, -disulfide and -trisulfide) are mainly derived from the decomposition of the sulfur-containing amino acids cysteine and methionine, and are regarded to be key flavor compounds in cheese (1, 2). In cheddar for example, methanethiol, dimethyl disulfide and dimethyl trisulfide are reported to have a strong flavor impact, depending on the method of extraction used (1–5).

Headspace-solid-phase microextraction (HS-SPME) sampling using a carboxen/polydimethylsiloxane 85µm fiber coating for extraction of the most volatile compounds, followed by gas-chromatography with pulsed-flame photometric detection (GC/PFPD) to specifically identify sulfur compounds, has shown high sensitivity for VSCs (3–5). However, depending on the type of cheese and the ripening stage, their quantities are often low and may vary strongly due to high volatility and reactivity. Monitoring VSCs during cheese ripening hence remains a challenge (5). It is believed that supplementing the cheese manufacturing process with bacterial strains such as *Lactobacillus casei*, commonly found as a predominant species in cheese at the end of ripening, that possess *cysK2-ctl1-cysE2* operon encoding enzymes leading to an increased formation of hydrogen sulfide and methanethiol, can enhance VSC production (6).

Using a highly sensitive HS-SPME-GC/PFPD method, we here report on the analysis of VSCs in model cheddar cheeses manufactured using adjunct cultures that possess the *cysK2-ctl1-cysE2* operon. Ripening was monitored over three months (sampling at 24 h and 30, 60, 90 days post fabrication). Measurements showed good reproducibility with acceptable mean deviations, and the use of internal standards allowed for reliable tracing over the observed ripening period. Noticeable differences in the formation of VSCs occurred among the cheeses.

Keywords: volatile sulfur compounds, GC/PFPD, HS-SPME, cheddar

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