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Investigating the Relationship between Colour Code, Odour, and Flavour Analytics in Swiss Tilsit Cheeses

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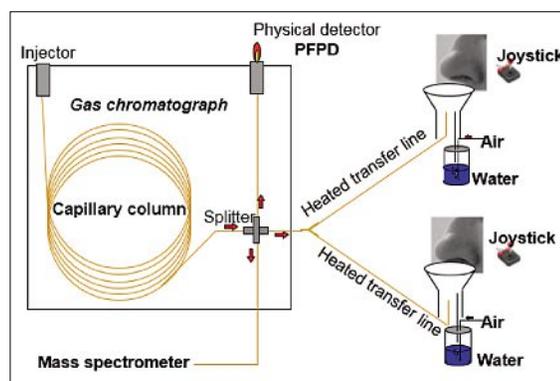
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Swiss Tilsit is a semi-hard cheese manufactured in the eastern part of Switzerland. Three main types, differing in fat content, raw material, and ripening time and sold with coloured labels, are well known: green, red and yellow Swiss Tilsit (Table 1). Each dairy has its own fabrication recipe, but sensory aspects also depend on the raw material: Especially cheeses made from raw/partially thermised milk are known for a more multifaceted flavour, possibly due to microbial diversity. Volatile sulphur compounds (VSCs) are amongst other chemical compounds reported as key flavour constituents in various cheeses. Due to low odour thresholds, they have pronounced sensory properties and can influence cheese flavour even at low concentrations.

In order to evaluate odorant compounds and their impact in a (food) sample, gas chromatography (GC) employs the human nose as an analytical physiological detector (GC-Olfactometry, GC-O), often in combination with physical detectors such as a mass spectrometer (MS) or pulsed-flame photometric detection (PFPD) for specific detection of VSCs.

With the aim to conduct a comparative study between the odour and VSC profiles of the Tilsit varieties, green, red, and yellow Swiss Tilsit cheeses were analysed by GC-MS/PFPD-O on a two-way-GC-O

Aromagrams of Swiss Tilsit cheeses (bottom: yellow Tilsit, middle: green Tilsit, top: red Tilsit) obtained by GC-Olfactometry using the VIDEO-Sniff-method and AcquiSniff® software with eight panellists and a two-way-GC-O setup.



Scheme of the two-way GC-olfactometry set-up with mass spectrometer and pulsed-flame photometric detector PFPD used at the Agroscope Institute for Food Sciences in Bern.

system where two odour assessors ('panellists') work simultaneously on one sample in order to guarantee reliable results and time gains. VSCs were quantitated by GC-MS/PFPD. Volatile (odorant) compounds and VSCs were extracted by headspace solid-phase microextraction (HS-SPME) prior to analysis. Olfactometry data were recorded and processed using an olfactometry method that combines information on the number of panellists ($n = 8$) able to smell a specific odour ('detection frequency'), odour intensity, and the vocabulary used by the panellists to describe the odours they smell during analysis (VIDEO-Sniff: vocabulary-intensity-duration of elementary odours by sniffing). Results are displayed in coloured 'aromagrams', indicating the main odour families.

GC-O and VSC profiles show a clear difference between the Tilsit cheeses. GC-O results revealed that the samples' odour is mainly influenced by buttery-cheesy and sulphury odour notes and confirmed that the overall flavour of Tilsit made from partially thermised milk is more intense and diverse than the one of Tilsit made from pasteurised milk.

Reference

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Table 1. Description of Swiss Tilsit cheeses (www.tilsiter.ch, 2015)

	Green Tilsit	Red Tilsit	Yellow Tilsit
Thermal treatment	Pasteurised milk	Partially thermised milk	Pasteurised milk with higher fat content
Fat in dry matter (FDM)	at least 45% FDM	at least 45% FDM	at least 55% FDM
Approx. fat content in 100 g	28 g	29.5 g	33 g
Ripening time	30–60 days	70–110 days	30–75 days
Taste perception	Mild aroma, slightly sour	Rich, spicy, and pungent	Creamy, slightly sour, mild aroma

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