

Swiss cheese flavor variability and correlation based on odor activity values and descriptive sensory attributes

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Introduction

Flavor consistency is a challenging task for the Swiss cheese industry. Flavor is a fundamental basis for sensory and an important characteristic that determines consumer choice and acceptance.

Aim

To further understand flavor complexity in Swiss cheese, this study evaluated flavor variability based on odor activity values (OAVs) of volatile compounds and descriptive sensory attributes.

Methods

Selected ion flow tube mass spectrometry (SIFT-MS) was used to analyze the headspace concentration of volatile compounds in Swiss cheese samples from 5 different factories. OAVs were obtained using the concentrations and odor threshold values for each compound. Trained panelists evaluated sensory attributes of cheese samples using Spectrum™ descriptive analysis. Intensities were uniformly scored (0-15-point scale) across all attributes. Multidimensional datasets from OAVs and sensory were evaluated using PCA, ANOVA, and PLSR.

Results

Swiss cheeses from different factories were successfully differentiated and classified according to specific volatiles and sensory attributes that were highly associated with each cheese. Correlations among volatile compounds and sensory attributes were identified as positive (parallel increase or decrease in volatile concentration or attribute), negative (orthogonal effect), or null (insignificant/no effect). Three principal components effectively differentiated cheeses using OAVs for cheese groups with relatively high concentrations of sulfur-containing, ammonia, organic acids, or aldehydes. Five principal components discriminated cheeses based on sensory attributes. Descriptive sensory data were successfully correlated with OAV-based high-impact and key volatile compounds.

Conclusion

Correlations between flavor volatiles and sensory attributes brought about further understanding on the complexity of flavor among different Swiss cheeses. Not all attributes strongly correlated with volatile compounds, which suggests that certain high impact compounds may or may not essentially contribute in sensory flavor characteristics of Swiss cheese. Differences in starter and non-starter cultures, holding temperatures and times, and milk sources with diverse manufacturing processes and practices contribute significantly on the complex flavor formation and variability of Swiss cheese.