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Statistical Multiblock Approach on Oral Processing parameters to understand aroma release and perception in different cheese products.

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During food consumption, aroma compounds are released and then transferred to olfactory receptors in order to be perceived. The mouth is the first organ to perceive the different signalling events associated to food breakdown. These events are very complex and as such, their description necessitates combining different data sets. The present paper proposed an integrated approach to understand the relative contribution of main food oral processing events involved in aroma release during cheese consumption and their impact on sensory perception.

For that purpose 48 healthy consumers were recruited for their normality and repeatability regarding their dental status and saliva flows. Oral physiological parameters (salivary composition and flux, oral volume) were measured on these subjects. Four based cheese products varying in firmness and fat content were characterised by their rheological properties and flavoured with nonan-2-one (blue cheese) and ethyl propanoate (fruity). *In vivo* aroma release was followed by nose-space Atmospheric Pressure ionisation- Mass Spectrometry measurements. Masticatory behaviour was recorded by electromyography during cheese consumption. Subjects' boluses were collected at the swallowing time. Bolus rheological properties were measured by compression. Mouth coating was evaluated by fluorimetry.

A multiblock partial least square regression (MB-PLS) was performed to explain aroma release from the different physiological data sets (masticatory behaviour, bolus rheology, saliva composition and flux, oral volume, mouth coating and bolus moistening).

This statistical approach was relevant to point out that aroma release was mostly explained by masticatory behaviour whatever the cheese and the aroma, with a specific influence of mean amplitude on aroma release after swallowing. Aroma release from the firmer cheeses was explained mainly by bolus rheology. The persistence of nonan-2-one, the most hydrophobic compounds, in the breath was mainly explained by bolus spreadability, in close relation with bolus moistening. Resting saliva poorly contributed to the analysis whereas the composition of stimulated saliva was negatively correlated with aroma release and mostly for soft cheeses, when significant.

A group of 14 subjects representative of the 48 was asked to measure the intensity of the two aroma descriptors (fruity, blue cheese), after each swallowing event. A good relationship was found between fruity aroma and the release of ethyl propanoate. However no direct relation could be found between blue cheese aroma and the release of nonan-2-one. In fact a great inter-individual variability was observed for this hydrophobic compound which remains longer in the nasal cavity than ethyl propanoate and which perception was highly influenced by oral physiological parameters, such as mouth coating.

Therefore MB-PLS appears to be a powerful statistical approach in food science in order to prioritize and identify important oral processing parameters to explain aroma release and perception.