The roast smell from veggie stock

Predicting how food is going to smell is extremely difficult. But a start has been made.

This is the holy grail in the food industry: being able to develop tasty food at the computer. Product development is still mainly a question of trying things out. How great it would be if you could develop an aroma based on your knowledge of the ingredients and the production process.

'There are so many substances contributing to the roast smell'

Carmen Díez Simón got her PhD for a cautious attempt at this. That attempt forms the culmination of her thesis, in which she analyses the aromas of savoury fermented products such as soya sauces and instant soups. She got a tasting panel to assess a series of vegetarian soup stocks for 34 characteristics related to taste, smell and mouthfeel. The chemistry of the same stocks was then analysed.
That chemical analysis was done with GCMS, a combination of gas chromatography and mass spectrometry that detects and identifies volatile substances. As many as 290 volatile substances were detected, some of which were hitherto unknown. A model then tried to link the chemistry to the experience of the tasting panel.
This produced a clear match for one groups of substances: pyrazines. Pyrazines are responsible for the typical roast and chicken-like smells in fermented stocks. That's the first step, says Díez Simón. But she is wary of over-optimism. 'There are so many other substances that contribute to that roast smell as well. Aroma is a complicated subject.'
'Many different ingredients give the same aroma,' she adds, 'and some substances can cause several different aromas. There is no simple linear relationship between the composition of a sample and the aroma it gives off.'
Then there is the fact that the analytical machines don't detect everything. The human nose is more sensitive than a mass spectrometer, says Díez Simón. 'I could smell some substances that came from the gas chromatograph where the mass spectrometer didn't detect anything.' RK