FOOD FILES

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To beef or not to beef

Have you ever wondered how plant-based burgers compare to the real beef ones? A new study from the US tried to find out by asking consumers to taste and rate four different kinds of burgers: two made from plants, one made from a mix of meat and mushrooms, and one made from 100% beef. The plant-based burgers were either made from peas or a special protein that looked and tasted like meat. Some consumers were told what they were eating, and some were not.

The study found the plant-based burger that looked and tasted like meat was the most popular among the consumers, even more popular than the beef burger. The beef burger came second, followed by the pea burger and the meat-mushroom burger. The study also found the consumers could tell which burger was the beef one when they did not know what they were eating, but they still liked the plant-based 'meat-like' burger more. The study suggested there were other reasons why consumers preferred the plant-based burgers, such as health, environment or animal welfare. However, the study had some limitations in its design, so the results may not apply to everyone. But the study showed that some plant-based burgers can be a good (sensory) alternative to meat burgers in terms of taste and enjoyment...but maybe just not for everyone.

Sogari, G., Caputo, V., Petterson, A. J., Mora, C., & Boukid, F. (2023). A sensory study on consumer valuation for plant-based meat alternatives: What is liked and disliked the most?. *Food Research International*, 169, 112813. https://doi.org/10.1016/j.foodres.2023.112813

Thermal processing: impact on the aroma and taste of plant-based beef versus real

This study aimed to validate improvements in the flavor profile of plant-based beef analogues (PBBAs) by investigating differences in the volatile profiles and taste properties compared to traditional beef. The authors' research examined three distinct PBBA types (PBBA-B, PBBA-C, and PBBA-D) as well as beef prepared in raw, fried, and steamed styles.

By applying solid phase microextraction coupled with gas chromatography-mass spectrometry (SPME-GC-MS), combined with the electronic nose (E-nose), electronic tongue (E-tongue), and a sensory assessment, the authors identified a total of 126 volatile compounds in both PBBAs and beef. Intriguingly, 2,3-butanedione (391.22–517.28 Qg/kg in beef) and octanal (41–96.24 Qg/kg in beef) were absent in all PBBAs. This disparity was attributed to markedly elevated levels of acids, hydrocarbons and heterocyclic compounds in PBBAs (several fold to hundred times) compared to beef, preventing an accurate simulation of beef aroma across various cooking methods.

The E-nose and sensory analysis indicated a noticeable reduction in aroma for thermally processed PBBAs compared to beef. Additionally, the E-tongue analysis highlighted PBBAs being more bitter and sour in taste compared to beef. The presence of a fat-like aroma in PBBA-D potentially contributed to its closer similarity to beef in the sensory evaluation.

The aromatic profiles and taste characteristics of PBBAs exhibited a noticeable distinction from beef, including:

- An abundance of spice and condiment-derived compounds in PBBA-B and PBBA-C
- The absence of a fatty aroma in PBBAs but a pronounced beef-like aroma
- A reduction in several volatile aromas in PBBAs following thermal processing in contrast to beef
- A tendency for PBBAs to display

heightened bitterness and astringency.

To achieve a more accurate replication of beef's flavor profile, it was recommended to reduce the proportion of spices, soy sauce and other condiments in the ingredients, introduce elements that enhance fat aroma, and cautiously incorporate beef essence. Incorporating substances that evoke meaty aromas post-heat treatment could also prove beneficial.

Zhang Z, Zang M, Zhang K, Wang S, Li Dan and Li X (2023) Effect of two types of thermal processing methods on the aroma and taste profiles of three commercial plant-based beef analogues and beef by GC-MS, E-nose, E-tongue, and sensory evaluation, *Food Control* 146, 109551. https://doi.org/10.1016/j.foodcont.2022.109551

Exploring the influence of cultural background on wine preferences

Have you ever wondered why your favourite food or wine might not be as enjoyable to someone from a different cultural background? Food preferences can be influenced by a variety of factors, such as gender, age, body weight and cultural background.

Culture, especially, has a strong influence, shaping the tastes and traditions we're accustomed to. To gain a better understanding of this phenomenon with wine, a study invited wine enthusiasts from Western and Chinese cultural backgrounds to share their wine preferences.

The results revealed that Western panellists preferred wines with stronger 'floral' notes and did not find 'sweet,' 'woody' and 'smooth' characteristics desirable, while the Chinese group favoured 'earthy' and 'umami' wines with low acidity.

During wine tasting, the perception of wine aromas through orthonasal and retronasal olfaction is considered highly influential for rating wine quality. Aroma compounds interact with the retronasal pathway, where saliva plays a facilitating role in these interactions. The analysis of the proteins in the panellists' saliva revealed significant differences in specific protein composition,

including proline-rich proteins (PRPs) and lipocalin-1 (LCN-1). These differences could be a key factor contributing to the diverse preferences between the two cultural groups.

These findings suggest that our saliva and cultural background have more significant impacts on our food preferences than might have previously been thought. This insight may also apply to other foods and beverages. Such knowledge could prove valuable for wine producers seeking to cater to diverse consumer groups.

Luo J, Ruan X, Ang C-S, Nolvachai Y, Marriott PJ, Zhang P and Howell K. (2023) Variation of wine preference amongst consumers is influenced by the composition of salivary proteins. npj *Science of Food* 7:51. https://doi.org/10.1038/s41538-023-00222-1

The sound of taste

The food context is important to understand, as a range of contextual factors can influence taste perception and enjoyment. A recent study looked at how ambient music can influence the taste of a passionfruit mousse dessert in a restaurant setting.

A focus group of professional musicians helped select the most appropriate music and two classical musical pieces were selected to match the taste profile of the dessert: Nocturne Op.9 No.2 in E flat major, by Fryderyk Chopin for sweet taste; and Capriccio No.24 in A minor by Niccolò Paganini played for sour taste. Forty-nine adult participants were recruited into the study to eat the dessert under each of the following conditions in a randomised, balanced order:

- In silence
- While listening to sweet music
- While listening to sour music.

Music had a significant impact on sour taste perception. Participants perceived the dessert as more sour when listening to sour music compared to silence. In addition, the sweet music decreased the perceived sourness of the dessert compared to silence. Surprisingly, neither musical piece changed the sweetness of the dessert. This study validates the influence of music on the tasting experience, particularly that unpleasant music can heighten the unpleasant aspects of a food.

This study offers one way in which music can be used to create an innovative multisensory gastronomic experience. In food service and health-related contexts, for example, playing pleasant music during a meal may increase the likelihood of consuming healthier but disliked foods. It may also improve the eating experience in contexts where the palatability and acceptance of foods can be challenging, such as in aged care facilities or hospitals.

Campinho J, Sousa P, Mata P. The influence of music on the perception of taste. *International Journal of Gastronomy and Food Science.* 2023; 31:100669. https://doi.org/10.1016/j.ijgfs.2023.100669

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