FOOD FILES

Words by Dr Djin Gie Liem, Dr Yada Nolvachai, Dr Andrew Costanzo and Dr Dan Dias

Embracing the future of food: how we're learning to love novel foods and beverages

In a world increasingly focused on sustainability and health, the food industry is constantly innovating to meet consumer demands. A recent comprehensive study shed light on the factors influencing consumer acceptance of innovative products and outlined a roadmap for future research.

Novel foods and beverages (NFBs) are emerging as key players in the quest for healthier and more sustainable diets. These include everything from plant-based meat alternatives and cultured meat to genetically modified foods and innovative beverages. Despite their potential benefits, consumer acceptance remains a significant hurdle.

The review identifies several critical factors that shape consumer attitudes towards NFBs. Psychological factors such as food neophobia, or the fear of new foods, play a major role. Consumers often perceive novel foods with scepticism, influenced by perceived risks and benefits and emotional responses such as disgust.

In addition, socio-cultural factors, including diets, consumption habits and trust in institutions, significantly impact acceptance. For instance, consumers with vegetarian lifestyles or those who trust scientific institutions are more likely to embrace NFBs. Product-related factors such as information labels, brand, packaging and product origin are crucial. Clear and appealing product information can significantly enhance consumer acceptance.

The review highlights that most studies focus on technology-based innovations such as genetically modified foods and cultured meat, predominantly using quantitative research methods. However, there is a notable gap in qualitative and multi-method approaches that could provide deeper insights into consumer behaviour. Geographically, the majority of research is concentrated in Western countries, leaving a significant gap in understanding consumer behaviour in developing regions such as Asia, Africa and Latin America.

To bridge these gaps, the review suggests several future research directions. Incorporating broader theories such as Hofstede's cultural dimensions and dual processing theory can provide a more comprehensive understanding of cultural and cognitive aspects of NFB acceptance. Employing multi-method studies, web-based data, machine learning and psychophysiological measures can capture a more holistic view of consumer behaviour. Research should extend to under-explored regions to gain insights into diverse consumer behaviours and preferences. Investigating factors such as mindfulness, personal norms and situational appropriateness can offer new perspectives on consumer acceptance.

For marketers and policymakers, these findings offer valuable insights to assist in developing effective strategies for promoting NFB. Understanding the diverse factors influencing consumer acceptance can help tailor marketing messages, improve product design and enhance the overall consumer experience.

As the food industry continues to innovate, understanding consumer acceptance of novel foods and beverages is crucial. This study provides a comprehensive overview of the current landscape and offers a roadmap for future research, paving the way for a more sustainable and health-conscious future.

Reference: Mosikyan S, Dolan R, Corsi AM, Bastian S. (2024) A systematic literature review and future research agenda to study consumer acceptance of novel foods and beverages. *Appetite*, https://doi.org/10.1016/j.appet.2024.107655

Legume pasta: the tasty way to stay full and healthy

Legume-based products are gaining popularity as a sustainable, plant-based option for improving dietary habits. Flours made from legumes may also be suitable gluten-free

alternatives to wheat flour. A recent study conducted in Italy investigated how different types of legume-based pasta affect satiety and energy intake in healthy volunteers. The results offer insights for consumers and food manufacturers looking to promote legume-based alternatives.

The study involved two experimental protocols. In the first, participants consumed one of four types of pasta: lentil pasta; chickpea pasta; durum wheat pasta; and gluten-free pasta made from rice and corn flours. Participants were able to eat as much as desired in an ad libitum meal. The second protocol involved a fixed portion of each pasta followed by an ad libitum buffet two hours later. Researchers measured energy intake during and after meals and used a visual analogue scale to assess appetite sensations such as fullness and desire to eat.

The results showed that lentil pasta significantly reduced energy intake compared to durum wheat pasta. This effect was particularly strong in females, who reported lower energy intake both during the meal and at the subsequent buffet. Lentil pasta also led to higher post-meal satiety and reduced the desire to eat compared to the other pasta types. However, the palatability of lentil and chickpea pasta was rated lower than that of durum wheat pasta, suggesting that taste and texture may influence overall meal satisfaction.

These findings suggest that lentil-based pasta can help consumers man age food intake and feel fuller for longer. For the food industry, this indicates potential for developing legume-based products as part of a healthy and sustainable diet. However, improving the palatability of these products could enhance their appeal and encourage wider adoption. Further research is needed to explore long-term effects and potential for broader consumer acceptance.

Source: Cioffi, I., Martini, D., Del Bo, C., et al. (2024). Lentils based pasta affect satiation, satiety and food intake in healthy volunteers. *Current Research in Food Science*, p.100858. https://doi.org/10.1016/j.crfs.2024.100858

Flavour unlocked: aromatic profile, antioxidant and anthocyanin magic in fermenting fine-flavour Ecuadorian cacao

Ecuador is one of the world's leading producers of fine-flavour cacao (Theobroma cacao), with approximately 75% of its cacao bean exports classified as 'fine-flavor'. This is primarily made up of Trinitario and Criollo cacao varieties, which are widely cultivated across tropical Latin America. However, the Nacional variety, predominantly grown in Ecuador, is also considered fine-flavor cacao due to its unique aromatic profile, characterised by floral, green and spicy notes. Today, hybrid cacao beans from crosses between Nacional and Trinitario varieties are commonly grown in Ecuador, offering a rich and complex aroma profile.

The fermentation of fine-flavour cacao beans is a crucial process that enhances both their sensory qualities and the economic value for cacao farmers. A recent study explored the changes using gas chromatography-mass spectrometry (GC-MS) metabolite profiling, along with assessing the antioxidant capacity and anthocyanin content, throughout the fermentation of fine-flavor cacao beans.

The study revealed that the evolution of key aroma compounds in Nacional x Trinitario cacao beans was generated by the formation of key metabolites after 48 hours of fermentation. The desirable compounds identified included 17 fruity and nine floral-like volatiles, along with metabolites contributing towards caramel, chocolate, ethereal, nutty, sweet and woody aromas. Inadvertently, undesirable metabolites with camphoraceous, cheesy, fatty and pungent characteristics were also detected.

The compounds, which either formed or degraded during fermentation, likely originated from the pulp, were inherent to the bean, or were synthesised by microorganisms. Additionally, it was determined that the anthocyanin content decreased over time, while the ferric reducing antioxidant power (FRAP) and total phenolic content (TPC) values fluctuated throughout fermentation, displaying a similar trend which suggested a partial correlation between the assays. These findings enhance our understanding of aroma compound development and antioxidant activity during fermentation, offering insights that could be applied in future research to optimise the fermentation process and improve the quality of fermented cacao beans.

Source: Chóez-Guaranda, I., Maridueña-Zavala, M., Quevedo, A. et al. (2024) Changes in GC-MS metabolite profile, antioxidant capacity and anthocyanins content during fermentation of fine-flavor cacao beans from Ecuador, *PLoS One* 19(3) e0298909 https://doi.org/10.1371/journal.pone.0298909

Dr Djin Gie Liem is Associate Professor, Dr Yada Nolvachai is Post Doctoral Fellow, Dr Andrew Costanzo is Lecturer and Dr Dan Dias is Senior Lecturer. All are at CASS Food Research Centre, School of Exercise and Nutrition Sciences, Deakin University.