We gratefully acknowledge the financial support from our partners:
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Acknowledgement of Country

The University of Queensland (UQ) acknowledges the Traditional Owners and their custodianship of the lands on which we meet.

We pay our respects to their Ancestors and their descendants, who continue cultural and spiritual connections to Country.

We recognise their valuable contributions to Australian and global society.

Welcome from the organising committee

On behalf of the organising committee, I warmly welcome all guests to the 16th Australia & New Zealand Sensory and Consumer Science Symposium, hosted virtually from Brisbane, Australia. We gratefully acknowledge Fiona Fleming and Carilee Hicks from the Australian Institute of Food Science and Technology for providing financial and administrative assistance with this event.

We would also like to extend a warm welcome to our guest speakers, Sara R Jaeger, Sujinda Sriwattana and John Ennis. We thank them for their time and enthusiasm in supporting our symposium and for sharing their extensive knowledge and expertise.

We would also like to recognise the troupe of Brisbane-based students and staff who volunteered their time and worked tirelessly to help prepare materials and assist with technical aspects for this symposium. A special thanks to Shaoyang Wang.

We hope this symposium will provide an exceptional platform for us to learn new skills, to exchange ideas, and to build collaborations within both professional and research establishments.

I hope we can all meet again – in-person – in the near future!

Sincerely,

Heather Smyth, PhD
Centre for Nutrition and Food Science, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland
Organising and Scientific Program Committee

Heather Smyth (chair 2022)
Principal Research Fellow
Queensland Alliance for Agriculture and Food Innovation, The University of Queensland

Jodie Hill
Research Director
Sensory Solutions

Gie Liem
Senior Lecturer
Centre for Advanced Sensory Science, Deakin University

Mei Peng
Department of Food Science, University of Otago

Joanne Hort
Research Director
Massey University

Annesley Watson
Sensory & Consumer Product Insights Manager
The Smith's Snackfood Company, PepsiCo

Support from AIFST

Fiona Fleming
Chief Executive Officer, AIFST

Carilee Hicks
Membership and Administration Services Manager, AIFST
Symposium Program (9:30 – 12:30 AEDT)

Tuesday 15th February 2022

Themes: Marketing and sustainability
Health and wellbeing
Emerging sensory methods

9:20 am  Zoom lobby opens and participant admission

9:30 am  Heather Smyth | University of Queensland
Acknowledgement of Country
Welcome
Duncan McDonald, AIFST Chair

9:35 am  Session 1 (guest speaker)
Session chair: Jodie Hill

Sara R Jaeger | Plant and Food Research
The transition to plant-based foods and beverages: consumer insights based on empirical research

10:35  Session 2 (15 min presentations)
Session chair: Anne Watson

Manuela Rigo | Deakin University

Sarah Counsell | Fonterra
Exploring the insights from Response Time Testing and Conjoint Analysis for product concepts

Clare Wijngaarden | University of Queensland
User perspectives of Australian Native Foods

11:40 am  Session 3 (5 min presentations)
Session chair: Gie Liem

Summer Wright | Massey University, Riddet Institute
Opportunities and barriers for Māori businesses to foster the plant-based foods value chain in Aotearoa, New Zealand

Hannah Browne | University of Otago
Does motherhood impact on eating? – comparing energy intake, macronutrient composition, physical activities between pregravid females and mothers

Zinat Mohammadpour | University of Adelaide
Variation in the bitterness of Australian diets
Maheeka Weerawarna N. R. P.  | Massey University
Development of an alternative to nine-point hedonic scale using emoji

Rebekah Orr  | Feast Lab, Massey University
Emotional lexicon development for plant-based burger patties

Susan Elaine Putnam Bastian  | The University of Adelaide

12:30 pm  Close
Wednesday 16th February 2022

Themes:  
- Cross-cultural and consumer food choice  
- Sensory application in product design and development

9:20 am  
Zoom lobby opens and participant admission

9:30 am  
Heather Smyth | University of Queensland
Welcome

9:35 am  
Session 4 (guest speaker)
Session chair: Gie Liem

Sujinda Sriwattana | Chiang Mai University
Using sensory evaluation in the development of reduced sodium foods: Case studies

10:35  
Session 5 (15 min presentations)
Session chair: Mei Peng

Emily Fisher | Feast Lab Massey University
Understanding difficult sensory attributes across cultures

Jenna A. Fryer | Oregon State University
Temporality of smoke attribute perception in wildfire-affected wines and efficacy of rinse protocols on sensory carryover

11:20 am  
Session 6 (5 min presentations)
Session chair: Jodie Hill

Catriona Hay | Massey University
Comparing cross-cultural differences in attitudes and habits concerning drinkable yoghurt by Chinese and New Zealand European consumers

Denise Hunter | The New Zealand Institute of Plant and Food Research Limited
Diversity of flavour in New Zealand mono-floral honeys

Jasmine Ngo | The University of Queensland
Sensory effects of different emulsifiers and vegetable oils in simple emulsions

11:50 am  
Session 7 (Poster Session)

Poster Session – break out rooms

Hannah Patrick*, Emma Beckett, Soumi Paul Mukhopadhyay
What's all the buzz about honey? - An examination of the relationship between sensory and descriptive attributes and its effect on consumer liking, perception and decision making when purchasing honey

Jaqueline Moura Nadolny*, Heather Smyth, Odette Best, Emma Hassall, Sandra Olarte Mantilla, Jason Stokes, Heather Shewan
Sensory characteristics of Australian bunya nuts

Nicolene Fisk*, Yi-Hsuan (Sandy) Lin*, Clara Shaw, Megan Taylor
A sense of our journey to zero waste
Rianita Pramitasari*, Daniella Karmelita, Anastasia Tatik Hartanti
Sodium reduction in chicken nuggets substituted by Indonesian overripe tempeh powder
and their sensory characterization using check-all-that-apply (CATA) questions

Shannon Ruzgys* and G. J. Pickering
What does a sustainable diet mean for Gen Z?

Yingting Zhao*, Heather E. Smyth, Keyu Tao, Robert J. Henry, Robert G. Gilbert
Starch molecular structural features and volatile compounds affecting the sensory
properties of polished Australian wild rice
Thursday 17th February 2021

Themes:  Digital developments in consumer behaviour studies
         Physiology and food oral processing
         Sensomics

9:20 am  Zoom lobby opens and participant admission

9:30 am  Heather Smyth  |  University of Queensland
         Welcome

9:35 am  Session 8 (guest speaker)
         Session chair: Jo Hort

         John Ennis  |  Aigora
         Sensory Science and Emerging Technologies

10:35 Session 9 (15 min presentations)
         Session chair: Heather Smyth

         Gary Pickering  |  Brock University
         Foodies: who are they and who cares?

         Sashie Abeywickrema  |  University of Otago
         Odour and taste cues in food have differential effects on satiety and downstream snack intake

         Laura V. Mezei  |  The University of Adelaide
         Predicting consumer acceptance of unfamiliar wines: Rapid modelling of non-traditional and mainstream Australian red wine sensory data using Absorbance-Transmittance and Fluorescence Excitation Emission Matrix (A-TEEM) spectrofluorometric analysis.

11:35 am Session 10 (5 min presentations)
         Session chair: Anne Watson

         Caroline Giezenaar  |  FEAST - Massey University
         Will digital immersive technology be the future of consumer testing?

         Mohamed Mawas  |  Deakin University
         Visual cues and evoked sensory stimulation impact online food desires

         Dongdong Ni  |  The University of Queensland
         Saliva interprets oral sensory physiology, oral processing behaviour, and human satiety

         Sandra M Olarte Mantilla  |  University of Queensland
         Oral physiology, sensory acuity, product experience and personality traits impact consumers’ ability to detect particles in yoghurt

         Cynthia Garambas  |  Benguet State University
         Organoleptic and Physicochemical Characterization of Ethnic Smoked Pork Delicacy (Kinuday) Produced by the Ibaloy Indigenous People in Cordillera, Philippines
Tanweer Gondal | Deakin University
Volatile profiling of Australian brown and white rice varieties using GC-TOF-MS

12:30 pm  Close
Guest Speaker Profile

Dr Sara R Jaeger

Dr Sara R Jaeger leads the Sensory and Consumer Insights Team at Plant and Food Research in New Zealand. In this role she has over the past decade supported New Zealand agri-food industries in pursuit of a greater consumer-focused orientation. Alongside this work, Sara is focused on development and implementation of novel methods for sensory and consumer research. She regularly publishes the team’s work and presents it at international conferences. She currently serves as editor for Food Quality and Preference.

A/Prof Sujinda Sriwattana

A/Prof Sujinda Sriwattana is a member of the Asian Sensory Network and Dean of the Faculty of Agro-Industry, Chiang Mai University, Thailand, and Chairman of the Curriculum Committee for the Higher Research Degree program in Agro-Industrial Product Development. Her research interests include sensory science and consumer research, value-added food product development and functional ingredients. Currently, A/Prof Sriwattana is working on texture and flavour development of plant-based meats, value-addition to raw agricultural materials and developing technologies to up-scale pilot plant processes for food industry applications to modernise the food industry in Thailand.

Dr John Ennis

Dr John Ennis is co-founder and president of Aigora, a consulting firm dedicated to helping sensory and consumer science teams prepare for artificial intelligence. Dr. Ennis, a Ph.D. mathematician who conducted his postdoctoral training in computational neuroscience, has more than a dozen years of sensory and consumer science consulting experience. Dr. Ennis is the author of over 40 peer-reviewed publications and two books, is the chair-elect of the ASTM E18 “Sensory Evaluation Group,” serves on the editorial boards of the Journal of Sensory Studies and Food Quality and Preference, and is the 2013 winner of the Food Quality and Preference “Researcher of the Future” award.
Oral and Poster Presentation Abstracts
In alphabetical order based on presenting authors FIRST name.

Will digital immersive technology be the future of consumer testing?

*Caroline Giezenaar*, Joanne Hort
FEAST - Massey University
*Presenting author

Oral Presentation

The environments and/or contexts typically used to determine consumer affective and sensory responses have been questioned for ecological validity. However, conducting consumer testing in real-life scenarios is costly, logistically complex, and difficult to standardise between participants due to a lack of control over external cues and product preparation. Immersive environments, representative of consumption contexts, may provide more ecologically valid data. Recently, digital immersive technologies have been proposed to contextualise consumer studies whilst maintaining experimental control.

In this presentation, the results of a literature review which aimed to understand the impact of digital immersion on consumer response is presented.

Between 2015 and 2021, 21 published peer-reviewed studies in the field of consumer testing used digital immersive technologies to immerse participants during sample evaluation. These studies used a variety of techniques: HoloLens, VR glasses, digital immersive rooms or large screens. All provided visual cues, and some also included audio, olfactory, and/or tactile cues. Digital contexts varied from traditional (café, pub, domestic kitchen, restaurant) to non-traditional (beach, park, night club, farm barn) consumption settings.

Studies that compared responses in digital immersive contexts compared to traditional consumer testing environments (sensory booth or central location test) found that engagement was consistently higher in the digital immersion compared to traditional settings. Furthermore, emotional response ratings were more comparable to responses in real-life than a traditional setting, and reliability of sample evaluation increased in a digital immersive context. Appropriateness of the study context for the stimuli may affect sample evaluation outcomes (liking, emotional response) and reliability of sample evaluation. Although effects of digital immersion on hedonic liking ratings were inconsistent, most studies did not find liking to be affected by study context.

In conclusion, digital immersive techniques look promising to improve ecological validity of consumer testing, but further development and research is required.
Culture plays a key role in consumer food choices and attitudes. Whilst food choices may change when exposed to a new culture, the time and extent of the acculturation process is not clear.

A projective technique using culturally relevant images and 5W1H (when, where, which, what, why and how) warm-up discussion were incorporated in Focus groups (FGs) to investigate whether the attitudes towards yoghurt of recent Chinese immigrants in New Zealand (NZ) were representative of consumer attitudes in China and whether these were impacted by increased residence time. Four population groups took part: Chinese in Beijing (BJ), Chinese living in NZ for less (CH<3y) or more (CH>3y) than 3 years, and NZ Europeans in NZ (NZE). FGs were conducted in Chinese or English. Transcripts were uploaded into NVivo software to facilitate extraction of key themes according to each population group using an inductive coding approach.

Health reasons, drinkable type and ambient temperature of consumption described by CH<3y closely matched BJ consumers, but some habits mimicked NZE, particularly regarding consuming natural yoghurt with fruits, muesli and/or nuts for breakfast. In contrast, CH>3y mainly consumed chilled yoghurt closely aligning with NZE, indicating that habits were associated with increased residence time and exposure to the new culture.

This exploratory study revealed that attitudes and habits can be impacted by a new culture, but some habits do mimic home country consumers even after longer residence times. This understanding indicates that, with caution, recent immigrants could represent a more affordable opportunity to model overseas markets, particularly in pandemic contexts where travelling is not possible or very expensive.
A sense of our journey to zero waste

Nicolene Fisk, *Yi-Hsuan Lin, Clara Shaw, Megan Taylor

Fonterra

*Presenting author

Poster Presentation

To quote Annie Leonard, a proponent of sustainability, “There is no such thing as ‘away’. When we throw anything away it must go somewhere”.

These days, there is a real focus on waste reduction and sustainability across multiple disciplines; Fonterra is no exception and has announced two key targets: to send zero solid waste to landfill by 2025 and to have 100% recyclable, reusable or compostable packaging by 2025. A drive to push forward in adopting this mindset has been key in the success of eliminating waste within the Fonterra Research and Development Centre’s Consumer Science team’s sensory unit.

At the beginning of our journey, waste within the unit seemed high, both in terms of the samples analysed and the containers and material, etc., used in their preparation and presentation.

Starting with a waste audit, our key focus points were: What was recyclable? What was compostable? What was reusable?

We identified areas for quick wins, e.g., replacing foam cups with reusable glasses, and researched options such as compostable pottles and identifying lifecycles of materials used regularly in the lab. Trials were conducted looking at usability, cost, availability and health and safety. This then led to decisions around ‘Go’ – what could we implement now or in the future and ‘No Go’ – but were there other options?

The small steps we take now will have a positive impact on the quality of our environment and be part of the success of Fonterra’s waste reduction goals.
Customers and end users are critical players in any FMCG value chain. It is important to understand what drives interest in a product and category in terms of how and which products are used, sought out, and ultimately valued by different groups of consumers.

For the native food industry this information (market insight) can help stakeholders at all stages of the value chain: from primary growers (e.g. guiding on which foods to grow and how to grow them), for intermediaries (e.g. identifying opportunities on how to value add, process and pack foods), to product developers (e.g. what sort of products to incorporate them in) and marketers (e.g. what communication and education is required to best promote and appeal to their target audiences). Overall, market insight will help identify any key barriers or pain points associated with product use, as well as highlighting opportunities and direction for market initiatives moving forward.

The aim of the present research is to collect a snapshot of general market interest and usage relating to Australian native foods. Results reported here will help inform future studies relating to both general and food specific research around determination of demand and value for Uniquely Australian Foods.
An ethnic smoked pork delicacy native to the Ibaloy Indigenous People in the Cordillera, Philippines (kinuday) was characterized in terms of organoleptic and physicochemical attributes. Generic Descriptive Analysis was utilized to characterize the organoleptic characteristics of kinuday. Twenty-four English lexicons and their corresponding local terms were generated to describe kinuday’s organoleptic characteristics. Characteristics of samples smoked for 24 hours and 36 hours smoking duration in terms of color, texture, visual dryness, aroma, saltiness, and smoky flavor were compared. When smoking duration (24-hour and 36-hour) is compared, statistical analysis established that the uncooked outer skin and lean color, saltiness, and smoky flavor are significantly different. Other remaining attributes are not significantly different. For the physicochemical analyses, samples’ pH level and sodium content reveal value differences between 24-hour and 36-hour, but value remains constant for the water activity. Color differences between 24-hour smoked and 36-hour smoked pork are perceptible at a glance (skin and fat) and perceptible through close observation for lean.
Mānuka honey currently represents the largest export honey product from New Zealand (NZ), in terms of both volume and value. While the volume of non-Mānuka honey exports has steadily increased in recent years, the export unit price of non-Mānuka honey remains considerably lower than Mānuka honey. There may be potential to increase the value of non-Mānuka honey products by leveraging off their unique or distinct flavours. Acknowledging that honey is a difficult product for consumers to evaluate, because it is inherently sweet and typically consumed with other foods or beverages, the aim of this study was to develop a consumer-relevant lexicon to describe the flavour of NZ mono-floral honeys and determine if this could be used by consumers to discriminate between honeys. The mono-floral honey lexicon was developed using natural language processing of NZ honey producers’ websites, and an appropriate sample set of five mono-floral honeys was selected using the output from this analysis. Consumers (n=101) then generated flavour profiles of selected mono-floral honeys using a “check-all-that-apply” methodology. Results indicated that consumers were able to discriminate between different styles of honey, but were less able to discriminate between honeys with a mild flavour. This suggests the potential to market mono-floral honeys with a stronger flavour to consumers relative to their flavour preference, which may represent an opportunity for NZ honey producers to grow their product category.
Saliva interprets oral sensory physiology, oral processing behaviour, and human satiety

*Dongdong Ni*, Heather E Smyth, Michael J Gidley, Daniel Cozzolino

The University of Queensland

*Presenting author

Oral Presentation

Saliva, an unavoidable ingredient during food consumption, plays an important role in oral processing, perceptions, and human satiety. However, it is still not well known how much bio-information can be interpreted from saliva.

In this study, three plant-based foods were used as mid-morning snack for 52 participants to evaluate satiety response. The study measured human oral sensory physiology, oral processing, food intake, satiation, and satiety. The unstimulated saliva was collected from participants and scanned using mid infrared spectroscopy (MIR). The connections between saliva and oral sensory physiology, oral processing, satiation, and satiety were explored.

Results showed that MIR spectroscopy can distinguish salivary differences between individual participants due to age. The relationships and individual variations between saliva quantity, oral sensing physiology, and oral processing using the MIR spectra of saliva were identified. Different compositional signatures of the saliva related to oral sensing physiology and oral processing differences among different demographic groups. Moreover, a correlation between MIR fingerprints of saliva and satiety was found.

The study indicates the potential of the salivary fingerprint spectra to understand the consumer eating experience, human satiety, and food selection more deeply, providing a tool for marketing and sensory experiments.
Temporality of smoke attribute perception in wildfire-affected wines and efficacy of rinse protocols on sensory carryover

Jenna A. fryer*, Thomas S. Collins and Elizabeth Tomasino

Oregon State University

*Presenting author

Oral Presentation

With developments in climate change, wildfire occurrence has been increasing in recent years in wine regions arounds the world, posing many challenges. Smoke produced from these fires carry organic compounds, which can be absorbed by the grape berry. The wines produced from these smoke affected grapes have been found to contain elevated levels of smoke-related volatile phenols, leading to off aromas and flavors. Wildfire smoke tainted wines have been described as having a smokey, burnt, and dirty aroma, along with a persistent ashy aftertaste. Due to the lasting nature of these attributes, there is an observed issue related to potential carryover between samples, which can increase the number of false positives occurring in tastings both in research and at wineries. This work, using standard and temporal check-all-that-apply, desired to better understand the attributes associated with the sensorial profile of wines with various level of smoke phenols (high, moderate, and low) and the temporality of their presence. Additionally, the efficacy of different interstimulus protocols was evaluated to determine the best rinse and time separation of samples to reduce carryover. The results of this work showed that a 1g/L pectin solution rinse and 120 s of separation between samples is ideal to fully reduce smoke-related attribute perception. This work also further indicates the need to investigate deeper the impact of in-mouth release of volatile phenols from their bound forms that may have a large impact on smoke flavor and individual differences in perception.
Some multimodal attributes, such as creaminess, cause difficulty for sensory scientists to interpret the specific sensations consumers are referring to. This is compounded when working across different markets and languages which requires deeper investigation to better understand the attributes. The aim of this work was to develop an approach to better define creaminess perception in milk across two cultural groups, Chinese and New Zealand Europeans. Chinese participants were recent immigrants (resided in NZ<3yrs) and spoke Mandarin regularly at home or socially. Consumption habits, as indicated in the recruitment screener, suggested these recent immigrants mimicked habits of mainland Chinese consumers. A translator fluent in both Mandarin and English was utilised allow the two languages to be used dynamically, allowing greater understanding of the terms used. Discussion groups involving various activities was chosen as the methodological approach to encourage deeper discussions and elicit responses. Milks eliciting a wide range of sensations were compared using paired comparison and rank rate tasks. Paired comparisons forced the participants to identify the creamier sample then list descriptive terms determining their selection. A rank rate task utilising the same samples followed to further discriminate sample on magnitude differences in creaminess. The advantages of applying these methodologies allowed targeted understanding of terms important in creaminess perception and a large sample set to be presented across groups. Discussions were enriched and encouraged term elicitation. The addition of a translator allowed for deeper understanding into creaminess terms used by Chinese participants. The lexicon established in this study requires further validation and a subsequent quantitative study is the proposed next step.
Foodies: who are they and who cares?

*Gary J. Pickering* and Hannah M.G. Pickering

Brock University

*Presenting author

Oral Presentation

While ‘foodies’ are generally believed to relate to food in ways that others do not, they are poorly defined in the peer-reviewed literature. Importantly, they represent a consumer segment of significant potential interest to restaurateurs, food producers and behavioural scientists. In this study we sought to develop and validate for the first time a measure of ‘foodiness’ (the Foodie Index). We also applied that measure to assess whether foodiness associates with personality traits using standard personality measures (the Adult Impulsiveness, Venturesomeness and Empathy Scale and the Big Five Inventory), and two taste phenotypes (PROP and thermal tasting).

We developed a 12-item tool (the Foodie Index) comprised of four sub-scales – enjoyment and interest, time investment, monetary investment, and knowledge. The Index displays good internal reliability (Cronbach’s alpha, .87; mean interitem correlation, .38), and each sub-scale demonstrates acceptable reliability. The structure of the Index was further examined using confirmatory factor analysis (principal axis factoring, varimax rotation, Kaiser normalization), and shows as anticipated that the four sub-scales each primarily load onto separate factors.

Scores on the Foodie Index were then used to categorize participants (N=471) into one of two groups: foodies (average score < 4.9/9) and non-foodies (average score > 5.5/9). Foodies and non-foodies did not differ for age, gender, or ethnicity, however as expected foodies were more food adventurous (p(χ2)<0.0001). We also show that foodies are more venturesome than non-foodies (p(t)=0.05) and score higher for openness to experience (p(t)=.02) and extraversion (p(t)=.01). While PROP responsiveness does not vary with foodiness, foodies are more likely to be thermal tasters than are non-foodies (p(χ2)=.005). The Foodie Index provides a standardised tool for researchers to further assess the characteristics and behavior of foodies, which may provide actionable insights for food producers, retailers, and marketers.
Motherhood can be a life-enhancing experience, however, it is associated with physiological and behavioural disturbances. Motherhood as a construct truly begins with childbirth and is a transformative experience, and an inflection point for long term physical and mental health. While there is extensive research about immediate and short-term effects of pregnancy, little is known regarding the long-term behavioural changes through motherhood. In particular, it remains unclear whether diet and food choice shift due to pregnancy and the long-lasting effects of these shifts. This talk will introduce our recent study on long-term effects of pregnancy and motherhood on energy intake and dietary patterns. This study comprised of 140 women, 70 mothers and 70 non-pregnant nulliparous women who completed a weighed 4-day food records. Additionally, the participants completed a range of eating-related questionnaires (e.g. Dutch Eating Behaviour Questionnaire and Food Craving Questionnaire). The data were analysed using both univariate and multivariate techniques to profile macronutrient intake, eating behaviour, food choices and cravings, against demographic factors and exercise intensities. It was found that mothers had a significantly higher percentage of fat intake in their daily total energy intake than non-pregnant nulliparous women (p=0.045). Additional differences were observed in BMI (p<0.001), eating behaviours (p<0.041), and food choice determinants including natural content, health, and ethical concern (p <0.03). Furthermore, differences in food cravings for certain foods were also observed (p=0.031). Multilinear regression models were used to indicate strong predictive factors for energy intake in both mothers and non-mother groups. Overall, this is the first study to assess long-term dietary intake and eating behaviour changes associated with motherhood. It provides novel insights into dietary behaviour differences between mothers and non-mothers.
Bunya nuts are the seeds of Araucaria bidwillii, a conifer native to South-east Queensland, Australia. They are one of the 19 species of Araucaria family found around the world, being the nuts from Brazil and Chile the most commonly consumed. They are traditionally eaten boiled or roasted. This study aims to profile the sensory properties of bunya nuts together with chestnut as a comparator. Since chestnuts do not come from a conifer tree, it is expected they will have differences. Different methods of preparation are also expected to change the sensory attributes. Representative samples were collected from a variety of locations in South-East Queensland, prepared and presented to a panel of 14 experienced tasters applying conventional sensory descriptive profiling. During training, the panel developed a lexicon of twenty-three sensory attributes together with definitions and reference. Profiles of the boiled and roasted bunya nuts revealed higher scores for hardness on the first bite than chestnuts and, when chewed, became more crumbly, dry and grainy. They had a savoury aroma and flavour, and roasted samples exhibited a roasted aroma. Bunya nut samples were less sweet than chestnut samples. Differences in the sensory properties due to method of preparation were also observed. Boiled bunya nuts were softer and moister, with lower scores for crumbly and grainy. This research is foundational in providing technical information on the sensory profile of this important Indigenous Australian nut and provides a strong basis to support novel food sector opportunities and initiatives for the bunya nut as a re-emerging food source not only in Australia, but also Brazil and Chile.
Sensory effects of different emulsifiers and vegetable oils in simple emulsions

*Jasmine Ngo*, *Jason Stokes, Heather Smyth*

The University of Queensland

*Presenting author

Oral Presentation

Emulsions play a pivotal role in food products with palm kernel oil being the main oil source and monoglycerides being the most common emulsifier. With an increasing consumer demand for healthier food products with more natural and sustainable ingredients, food companies are trying to meet consumer demands by constantly reformulating their products without compromising in sensory quality. The usage of palm kernel oil has been heavily criticised due to adverse health and environmental effects. There is also an increased interest in replacing synthetic or animal-derived food additives to plant-based sources due to plant-based diets having a good reputation for being healthier and more sustainable for the planet. This study aimed to compare how conventional and alternative vegetable oils and emulsifiers impact the sensory properties of simple dilute emulsions. Fifteen emulsions were made using a combination of three different vegetable oils: hydrogenated palm kernel oil, coconut oil, and rice bran oil, and five different emulsifiers: monoglyceride, diacetyl tartaric acid ester of mono-and diglycerides (DATEM), sunflower lecithin, pea protein, and rice protein. A trained panel evaluated 20 sensory attributes (six aroma, six flavour, three in mouthfeel and 5 aftertaste/after-feel attributes), using conventional quantitative descriptive analysis. Results from the sensory evaluation indicated that fifteen of the twenty attributes were rated to be significantly different between the samples at p-value of 0.1. Overall, the emulsifiers appeared to be the main drivers towards sensory differences rather than the vegetable oils as samples were separated based on their emulsifier type. This indicates that replacing palm kernel oil with alternative vegetable oils is possible without adverse effects on sensory properties. Ultimately this research will be useful to food companies in finding alternative vegetable oil and emulsifier replacements that are more nutritious, sustainable, and appealing to consumers.

Massey University

*Presenting author

Oral Presentation

The nine-point hedonic scale is a widely used tool in consumer research and to use with children or clinical populations verbal anchors have previously been changed to pictorial/facial anchors. This modification also overcame limitations of translation to other languages and use with illiterate consumer groups. Recently, researchers have investigated the use of emoji as an alternative to verbal affective responses in consumer research. Emoji are widely used by people in everyday communication especially in social media. Notably, familiarity with emoji for reporting feelings and abstract concepts may provide more accurate measures on their product experiences. To date the use of emoji in measuring consumer responses to foods is limited. This research aimed to develop an emoji based nine-point hedonic scale based on emoji meaning across New Zealand (NZ) and Singapore residents. Adults (n=1427) aged 25-55 years, fluent in English, who were daily users of a smart phone and emoji in texts/emails from NZ (n=716) and Singapore (n=711) participated in an online survey. Participants were asked to select one emoji (from a selection of 40) to best represent each level of liking on the nine-point hedonic scale that related to liked and disliked food experiences. Emoji from Apple platform (iOS 14.5) were presented on Compusense cloud® in 4 x 10 matrix in random order using a balanced William Latin Square design. Usage frequency and standard deviations of emoji were calculated and analysed using ANOVA. This presentation will present the emoji scale based on usage frequency across both countries. Some differences in emoji usage for liking levels across the countries existed but these were not substantial suggesting a single emoji scale could be used in at least these two countries.

Manuela Rigo*, Mohammadreza Mohebbi, Russell Keast, Paul Harrison, Meghan Kelly, Annemarie Olsen, Wender L.P. Bredie, Catherine G. Russell

Deakin University

*Presenting author

Oral Presentation

Middle childhood is a period in the development of children when they are increasing in cognition, motivation, and social behaviours and this has implications for self-regulation. Self-regulation is an umbrella term that permeates all aspects of life, including actions, cognition, and decision making that are activated purposefully toward goal-directed behaviour. In the food domain, self-regulation involves the regulation of appetite, energy intake and satiety, which is important for the development of health behaviours, food preferences and children becoming more independent in their food choice. Children aged 5 to 12 years completed a discrete choice experiment (n = 1935). They were presented with bread and smoothies and were assessed according to (i) children’s preferred food and beverage choice, and their perceptions of (ii) healthiness and (iii) tastiness. Data were analysed using a conditional logit model for bread and smoothies independently. The results were food-specific. With bread, white bread in a medium or large portion was the most preferred and the tastiest. The small portion of brown sliced bread was perceived as the healthiest. Familiarity and liking of brown bread were significant for choosing brown bread. When selecting a discretionary smoothie, unhealthier attributes, e.g., a chocolate flavour and a large portion defined tastiness, in contrast, a small green smoothie with a thin texture determined healthiness. Children preferred a thin textured berry smoothie in a medium or large portion. BMI z-score of overweight influenced the perception of smoothie healthiness and the tastiness of bread. There was no influence of age, gender or socio-economic position. The findings suggest that different attributes determine the perception of healthiness and tastiness, and this was specific for the food product. This disparity may reflect children’s food choices that were not aligned with health goals, but familiarity may influence more healthful choices. The DCE is a suitable method for determining implicit perceptions in children.
Visual cues and evoked sensory stimulation impact online food desires

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Deakin University

*Presenting author*

*Oral Presentation*

**Background:** Online meal orderings become increasingly popular and is associated with poor eating habits. To influence online meal orderings the present study investigated the role of visual cues and evoked sensory stimulation on desire for cold, warm and neutral foods.

**Method:** In a randomised between subject design, participants expressed their food desire (visual analogue scale) and feeling of presence (e.g., did you feel present on a beach) (Likert scale) whilst looking at a picture and reading a neutral description of a sensory laboratory (control condition), looking at a photo of a beach and reading a neutral description (visual condition), or looking at a photo of a beach and reading a sensory based description (visual+sensory). A Kruskal-Wallis test was utilised to assess whether feeling of presence, visual and evoked sensory stimulation, had a significant effect on desire for food.

**Results:** Participants (n=725 participants, 622 females) who saw the beach photo increased their desire for cold, but not neutral foods (p<0.05), those who were exposed to the sensory description in addition to the beach photo showed a higher desire for cold foods compared to those who just saw the beach photo (p<0.001). These effects were modulated by an increased feeling of presence, in which participants with a higher feeling of presence showed a higher desire for cold foods (p<0.05).

**Conclusion:** Online food desires can be influenced by visual and text based sensory stimulation. The results can inform public health professionals and those working in the food industry to impact healthy food choices in an online environment.
Emotional lexicon development for plant-based burger patties

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*Presenting author

Oral Presentation

Plant-based meat alternatives are becoming more prevalent in mainstream supermarkets, but there is currently little understanding of what is driving consumers to accept or reject these products. Measuring consumer emotional response provides a deeper understanding of how consumers experience a product and can be a better predictor of food choice than liking measures. Emotional response is affected by context, and consumer testing in relevant eating contexts helps to better capture emotion terms consumers would feel in real life. The objective of this study was to develop a consumer-defined emotions lexicon for plant-based burger patties using digital burger eating contexts and to investigate how emotional response differs between dietary groups (Meat eaters, Flexitarians and Vegetarians) and age groups (Millennials and Generation X).

Twelve group discussions were held (n = 4-6 participants per group) where participants discussed their emotional response to four plant-based burger patties that varied in sensory characteristics from meat-like to not so-meat like, and one beef burger patty. Discussion groups were hosted in a digital immersive room with life-sized projections of home and pub restaurant environments, and participants evaluated emotional response to the burger samples in both eating contexts.

Emotion terms from all discussion groups were compiled, and irrelevant and non-emotion terms were removed. The discussion groups generated a lexicon of 177 terms, with similar numbers of positive and negative terms. During a follow-up session using an online sorting task, participants individually grouped the full set of emotion terms into those with similar meanings and chose one emotion term to represent each group of terms. Multidimension scaling (MDS) and hierarchal cluster analysis (HCA) was used to combine the individual groupings into categories to reduce the number of emotion terms. The final lexicon and consideration concerning differences in emotional response between age and diet will be presented and discussed.
Sodium reduction in chicken nuggets substituted by Indonesian overripe tempeh powder and their sensory characterization using check-all-that-apply (CATA) questions

Rianita Pramitasari*, Daniella Karmelita, Anastasia Tatik Hartanti

Atma Jaya Catholic University of Indonesia

*Presenting author

Poster Presentation

Chicken nuggets is one of the processed food that contain a high sodium. In this study, overripe tempeh powder that made by several Rhizopus strains obtained from Indonesia were added into the chicken nuggets to reduce sodium chloride use. Chicken nuggets that contained 1% of salt were formulated by added 1.5% of overripe tempeh powder with the three variations of the Rhizopus strains, namely ATH24, ATH53, and commercial Rhizopus strain. Chicken nugget contained 2% of salt without overripe tempeh powder used as a control. Check-all-that-apply (CATA) questions were applied to describe the sensory attributes of the chicken nuggets using naive consumers within 15-40 years old. CATA result was analyzed by the Cochran’s Q Test, Correspondence Analysis, Principal Coordinate Analysis, and Penalty Analysis. The Cochrans Q Test showed there is no significant differences between sensory attributes. Correspondence analysis showed the control sample had similar attributes with ideal chicken nuggets which is harmony, crispiness, umami, soft texture, no overripe tempeh odor, less bitter and bright color. Sample with ATH24 has attributes like less salty, bitter, less umami and dark color. Sample with ATH53 has attributes such as too umami, less salty, harmony and bright color. Sample with commercial Rhizopus strain had attributes such as less umami, less salty and no overripe tempeh odor. Principal Coordinate Analysis showed attributes crispy, soft texture, umami, less bitter, harmony, no overripe tempeh odor and bright color affecting assessor’s preference. Penalty Analysis showed harmony and umami attributes increasing consumer preference. Sample with overripe tempeh powder from ATH53 potential to be developed due to harmony attribute.
Oral physiology, sensory acuity, product experience and personality traits impact consumers’ ability to detect particles in yoghurt

Sandra M. Olarte Mantilla*, Heather M. Shewan, Rebecca Shingleton, Joanne Hort, Jason R. Stokes, Heather E. Smyth

University of Queensland (QAAFI)

*Presenting author

Oral Presentation

Food texture is a major driver of consumer food acceptance and is influenced by the presence of particles. The objective of this study was to determine if individual differences in human factors (demographic, oral physiology, product experience and psychology) are associated to consumers’ ability to detect particles in semisolid foods (namely yoghurt). A systematic design was employed involving nine yoghurt samples with spherical agar microgels added at levels in the range of human sensory threshold for particle detection in yoghurt. Consumers (n = 117) rated product acceptability, identified specific product sensory properties by Check All That Apply (CATA), and completed a questionnaire including demographics, personality typing, and product related questions. In addition, consumer saliva flow rate, mouth volume, tactile sensitivity, fungiform papillae density, and 6-n-propylthiouracil (PROP) and salt (NaCl) sensitivity were measured. Consumers who identified particles and/or drying in samples (by CATA) had significantly higher fungiform papillae density, were more oral tactile sensitive and were more sensitive to salt taste. The same consumers were more likely to have an open personality type, reported a preference for more cohesive yoghurt textures (fatty, spoonable, not-separated) and were more likely to have a history of consuming yoghurt products in combination with cereal and for preparation of smoothies. These results demonstrate that acceptance and rejection of particles in soft-foods is driven by a combination of intrinsic product factors and human factors. Understanding these drivers will assist the food industry to more accurately target products to specific markets.
Exploring the insights from Response Time Testing and Conjoint Analysis for product concepts

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Fonterra

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Oral Presentation

Response Time Testing (RTT) has been raised recently as a key implicit method to measure subconscious responses, while Conjoint Analysis is an indirect method and known as a more established approach in consumer and sensory science. These two methods raised a lot of interest on their ability to predict consumer choice behaviour.

The aim of this work was to identify the hierarchy of consumer purchase drivers of dairy products gained from RTT and Conjoint Analysis. Specifically, to understand if the implicit and indirect nature of these different approaches would give extra insights or similar outcomes into understanding consumer behaviour.

This presentation will cover the different results from both methods and discuss the pros and cons of each for testing product concepts.
Odour and taste cues in food have differential effects on satiety and downstream snack intake

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*Presenting author

Oral Presentation

Emerging research suggests that food odour and taste may have profound, but differential effects on intake behaviour by altering individual appetite or satiety, pointing to intriguing new avenues for sensory research. To date, it remains unclear whether odour and taste cues can impact on short-term and long-term satiety and appetite. In this presentation, I will introduce our recent empirical study that tested for effects of a sweet-associated odour and taste cue on satiety and downstream snack intake. In this study, a total of 57 male participants (20-39 years; BMI ranges 19.7-38.5 kg·m^{-2}) undertook five sessions in a controlled laboratory setting. The participant was served a breakfast oat pudding of a pre-determined portion. The pudding varied across plain (control), with added low and high vanillin (odour), and with added low and high sucralose (taste). Individual satiety perception at the end of the breakfast was measured using Satiety Labelled Intensity Magnitude scale. Subsequently, the participant was required to record all food and beverage intake for the rest of the testing day, using 24-hour weighed Food Records. Snack consumption, defined as energy intake outside of main meal episode, was classified into sweet and savoury types. Separate repeated-measures ANCOVA were applied to detect differences across the conditions, in terms of SLIM ratings and downstream sweet and savoury snack intake (kJ). The results revealed differential effects from odour and taste cues on immediate satiety, but consistent effects on downstream snack intake. Intriguingly, breakfasts with either added odour or taste were shown to increase subsequent consumption of savoury snack (p<0.001). Differences in downstream sweet snack across the conditions were subject to the participant’s BMI status (p<0.05). This study is the first to test for daylong effects of food odour and taste cues on snack consumption, providing novel insights into sensory-specific-appetite and sensory-specific-satiety beyond the meal of interest.
Agricultural systems have a massive impact on the global environment. Between land and water use, biodiversity loss, and greenhouse gas emissions, agriculture is one of the most dominant threats to the environment. Shifting towards a more sustainable food system is necessary for achieving a sustainable future and feeding a growing population. Consumers can play an important role in this shift towards sustainable agriculture through their dietary choices. With their greater focus on sustainability issues, Gen Z can be a key driver in achieving these goals, and understanding their perceptions and beliefs around sustainable diets offers significant market opportunities for the food industry.

In this exploratory study of 450 young adults, we administered an online survey to gain a holistic understanding of Gen Z and sustainable diets. Using an open response format and content analysis we sought to determine what Gen Z perceives as a sustainable diet, what behaviours they can engage in to promote a sustainable diet, and what barriers prevent them from engaging. We also determined what behaviours they perceive to be the most and least effective in promoting a sustainable diet.

Decreasing food waste, reducing red meat consumption and supporting local farmers were rated as the three most important behaviours for promoting a sustainable diet. Avoiding pre-prepared produce, reducing consumption of sugary drinks, and reducing dairy consumption were rated as the three least important behaviours. The majority of participants indicated that they experienced specific barriers to engaging in a sustainable diet, with cost overwhelmingly cited as the most important.

Our results provide key insights into the perceptions of what sustainable diets mean to Gen Z in their own words. Knowledge gaps are identified and implications for both consumer education and food marketing are considered.
What’s all the buzz about honey? - An examination of the relationship between sensory and descriptive attributes and its effect on consumer liking, perception and decision making when purchasing honey

Hannah Patrick*1, Emma Beckett1, Soumi Paul Mukhopadhyay1,2,3
1University of Newcastle, Ourimbah, Australia; 2NSW Department of Primary Industries, Ourimbah, Australia; 3Charles Sturt University, Wagga Wagga, Australia

NSW Department of Primary Industries

*Presenting author

Poster Presentation

Honey is commonly utilised in most households in Australia, predominantly being consumed for its sensory enjoyment. While the average annual consumption of honey is estimated to be around 0.6-0.8kg per person, little sensory research has been conducted on Australian honey and therefore it remains unknown about what sensory attributes and other descriptors influence consumers likability and decision making when purchasing Australian honey. Using sensory science principles, this research will attempt to bridge the gap by uncovering the relationship between specific sensory and descriptive attributes of honey and their influence on consumer liking, perception and purchasing of Australian Honey. The research will use a mixed method approach with three aims. Firstly, a supermarket audit conducted in both Woolworths and Coles, which will look at what honey type is available in the Australian market, how it is marketed in terms of its’ sensory properties and other descriptive attributes. Through the audit it was found that ‘Sweet’ and ‘Smooth’ were the most used sensory words on honey packaging while ‘Pure’ was the most used descriptive word, found on 60 of the 94 honeys audited. This will be followed by an online survey and virtual choice experiment, recruiting a minimum of 500 participants, assessing how these terms ultimately influence consumer preference and their willingness to pay for the honey. Finally, a consumer taste testing experiment, with approximately 60 participants, will be used to validate these findings with sensory measures incorporated. By implementing these methodologies, an in-depth understanding will be generated to help provide the Australian honey industry with research about what sensory terms to include in the marketing of their honey to increase product profitability and consumer likability. Furthermore, the research will aim to increase profits within the Australian honey industry and help to develop a highly desirable honey profile for consumers.
Plant-based foods have exploded in popularity in response to shifting consumer values for health, sustainability, and animal welfare. For Māori, the indigenous people of Aotearoa, creating plant-based products may be an appealing venture to diversify assets and capitalize on consumer trends. Te Ao Māori (the Māori World) is unique to Aotearoa and may add provenance to food products for businesses who can appropriately harness it. Producing plant-based foods may also contribute to social, environmental, and cultural bottom lines, which are met when businesses operate in a way that is guided by Māori values. While making plant-based foods might be appealing to Māori businesses, there is a paucity of these products. There are even fewer products that are exported despite significant potential in foreign markets. This study aims to understand the opportunities and barriers for Māori businesses to create plant-based foods to assist Māori industry in growing the plant-based foods sector. Semi-structured interviews with a range of actors working in Māori businesses across the plant-based food value chain were conducted. Participants were identified through their work across organisations already partnered with the research program, Te Rangahau Taha Wheako Mō Ngā Kai o Āpōpō: Consumer Dimensions of Future Foods. Participants were asked what the key opportunities and barriers for their organisation to make plant-based food are, how Māori values guide or distinguish their business, and their aspirations for export. The interviews and analysis were underpinned by Kaupapa Māori theory. Inductive thematic analysis revealed themes about the motivating and inhibiting factors in making plant-based foods. Elements of the value chain that are influencing Māori business’ ability to create plant-based products will be presented and discussed.
Predicting consumer acceptance of unfamiliar wines: Rapid modelling of non-traditional and mainstream Australian red wine sensory data using Absorbance-Transmittance and Fluorescence Excitation Emission Matrix (A-TEEM) spectrofluorometric analysis.

Laura V. Mezei*, Jacob A. Long, Lira Souza Gonzaga, Trent E. Johnson, Steven Goodman, Cassandra Collins, Armando Corsi, and Susan E.P. Bastian

The University of Adelaide

*Presenting author

Oral Presentation

Cultivation of emerging grape varieties more suited to Australia’s predicted future viticulture conditions as a result of climate change, could potentially help ensure a sustainable wine industry. Wine consumers are more comfortable purchasing and consuming wines they know or have consumed previously. The authentication of wines that are produced from different grape varieties, vintages and geographical regions, has been successfully conducted using spectrofluorometric analysis combined with machine learning (ML) modelling. In this study, we examined if the molecular fingerprints obtained from A-TEEM spectroscopy are able to predict a wine’s sensory profile and consumer liking. Thirty-five Australian made monovarietal wines from the 2018 through to the 2021 vintages were obtained. These included the non-mainstream, potentially drought resistant varieties, Nero d’Avola (n=10), Montepulciano (n=9) and Touriga Nacional (n=8), and wines made from Australia’s main red wine grape varieties, Shiraz (n=3), Cabernet Sauvignon (n=3) and Grenache (n=2). Preliminary hedonic data and wine sensory profiles generated by a trained Rate-All-That-Apply (RATA) panel (n=36) revealed all wines were liked, except one Montepulciano, and a Touriga Nacional was significantly preferred to 17 of the other wines. Diverse wine sensory attributes such as floral, red fruit, light-bodied; tobacco, dark fruit, full-bodied; oaky, chocolate; and herbal, green; differentiated the wines and highlighted that a number of unique wine styles were captured in this sample. Wines were analysed by the A-TEEM spectrofluorometric analysis and classified based on monovarietal using a ML technique called extreme gradient boosting discriminant analysis (XGBDA). Whether the wine’s spectroscopic fingerprint could also predict wine liking and sensory profile is currently being determined. The potential of utilising the A-TEEM technique as a means for producers to rapidly understand whether wines made from lesser known varieties may make suitable substitutes for wines that consumers are more accustomed with and like, will be discussed.
Wine complexity, is a poorly defined yet important percept because, globally, it is considered a hallmark of high-quality wine for which people pay a premium price. This study aimed to reveal the contribution of extrinsic and intrinsic wine factors to Australian wine consumers’ and experts’ comprehension of wine complexity. An online questionnaire collected knowledge and opinions associated with wine complexity from consumers (n=151) and wine experts (WI; n=49). Consumers were segmented using the Fine Wine Instrument (FWI) into three segments; Wine Enthusiasts (WE; n=55), Aspirants (ASP; n=71) and No- Frills (NF; n=25). Content analysis of open-ended questions, permitted a comparison of the terms commonly used by consumer segments and industry experts to define wine complexity. Complexity ranked 6th in importance for purchase decisions for consumers overall. However, the importance placed on this purchase driver by industry and WEs were significantly higher than the ASPs and NFs. From a list of 19 terms, similar proportions of WI and WE, WI and ASP and WI and NF associated 18, 12 and 2 words in common to describe complexity, respectively. Many differences between industry and consumer perceptions of wine complexity relative to wine style, grape variety, and origin were observed. While NF consumers found the concept of wine complexity “confusing”, “unsure” and associated it with “depth of flavour and enhanced experience”; ASPs mainly thought complex wines were “not just fruity, with rich taste, aftertaste”. WEs found complex wine “having aging potential, multilayered and having an abundance of aromas, flavours and taste” and experts associated them with “wine structure, malolactic fermentation, primary, secondary and tertiary characters and flavour interactions”. This study has unlocked the beliefs about wine complexity from an industry and consumer perspective, contributing to our knowledge regarding human perception of the abstract concept of complexity in complex food and beverage systems.
Rice is a major source of nutrients for more than half of the world's population. Rice aroma is an important and influential driver of consumer acceptability and purchase decisions. But rice aroma perception varies between brown and white rice varieties due to the differences in volatile compounds. Therefore, the present research aimed to identify the volatile compounds in three Australian rice varieties Jasmine (Kyeema), Medium grain (Amaroo) and LoGi (Doongara) with both brown and white. A total of 70 volatile compounds among which 39 compounds are reported as aroma active compounds, were identified using headspace-solid phase micro-extraction-gas chromatography-time-of-flight mass spectrometry (HS-SPME-GC-TOF MS). The relative concentration of aldehydes (nonanal, benzaldehyde), alcohols (1-hexanol, 1-pentanol), ketones (3,5-octadien-2-one, 2-octanone), and acids (nonanoic acid, 2-octanoic acid) were high in brown rice as compared to the white rice. Aroma active compounds 2-nonanone; 2,5-dimethyl-nonane; 2-ethyl-1-hexanol, pentanal were high in white rice. To identify the relationship between brown and white rice varieties, and aroma active compounds, principal component analysis (PCA) was performed. Aroma compounds pentanal, 2-octenal, 2-pentyl-furan, a-terpineol, 3,5-octadien-2-ol, terpinen-4-ol, 2-nonanone and naphthalene were correlated with Jasmine white rice. Most of the off-flavour aroma compounds were associated with brown rice varieties and are likely to influence consumer acceptance of brown rice. Specifically targeting the identified off-flavour compounds in brown rice through innovative food processing approaches may increase the consumer acceptance of brown rice.
Starch molecular structural features and volatile compounds affecting the sensory properties of polished Australian wild rice

Yingting Zhao*, Heather E. Smyth, Keyu Tao, Robert J. Henry, Robert G. Gilbert

The University of Queensland

*Presenting author

Poster Presentation

Cooked high-amylose rices such as Australian wild rices (AWRs) have slower digestion rates, which is nutritionally advantageous, but tend to have inferior eating qualities. Differences in starch molecular structure and composition of volatile compounds between AWRs and commercial rices (CRs) may be significant, which may cause different sensory properties. Here a comparison is made between the sensory and starch molecular fine structure properties, and volatile compounds, of polished AWRs and CRs. Starch structural parameters for amylopectin (Ap) and amylose (Am) were obtained using fluorophore-assisted capillary electrophoresis and size-exclusion chromatography. Volatile compounds were identified using headspace solid-phase microextraction (HS-SPME) coupled to gas chromatography-mass spectrometry (GC-MS). Sensory properties of an AWR and a range of CRs were evaluated and compared using descriptive analysis with eleven experienced panellists. The results showed that AWR had a disintegration texture similar to that of Doongara rice while AWR had a brown bread flavour similar to that of Australian medium grain. Disintegration texture was affected by the amounts of Ap short chains and brown bread flavour by both (E)-2-nonenal and 7-octylthioheptan-1-ol (IUPAC name 7-octylsulfanylheptan-1-ol). These findings suggest that it might be possible to commercialize some AWRs.
Variation in the bitterness of Australian diets

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*Presenting author

Oral Presentation

Individual food choices are largely driven by taste, but also by factors such as health, cost and convenience. Consumption of bitter foods and beverages may have beneficial health properties, such as glucoregulatory effects on diabetes, but little is known about how bitter items are consumed and, in turn, the bitterness of total diet. This study aimed to explore (1) the bitterness of Australian diets, and the relative contribution of bitterness from foods and beverages; and (2) whether the bitterness of the diets varied by socio-demographic, health and dietary related factors, using data from the National Nutrition and Physical Activity Survey.

Dietary data from 9,115 Australian adults were obtained from 24-h dietary records, and combined with the bitter score of food/beverage items evaluated by a trained sensory panel. Total bitterness of diet was calculated and differences between population subgroups evaluated using the Kruskal Wallis test.

Females, those who are older (+50y), and living out of major cities, as well as those with higher vegetable intake (+2 serving/day) and individuals with obesity or diabetes were likely to have a more bitter diet than males, younger individuals, those living in metropolitan areas, having lower vegetable intake and without obesity or diabetes (p<0.001 for all). People with obesity and diabetes reported a higher proportion of bitterness from foods, as opposed to beverage, compared with healthy adults (p<0.001 for both). Overall, the contribution of beverages to total bitterness of the diet was greater than foods (87% vs 13%), but this contribution varied within subgroups of the population. The main sources of bitterness in the diet were tea, coffee and vegetables.

Greater understanding of the health benefits of bitter food and beverage consumption within the diet is warranted, and which bitter foods and beverages are preferred would be of interest to inform possible strategies for intervention.
Poster presentations

*Presenting author

What’s all the buzz about honey? - An examination of the relationship between sensory and descriptive attributes and its effect on consumer liking, perception and decision making when purchasing honey

Hannah Patrick*, Emma Beckett, Soumi Paul Mukhopadhyay

Sensory characteristics of Australian bunya nuts

Jaqueline Moura Nadolny*, Heather Smyth, Odette Best, Emma Hassall, Sandra Olarte Mantilla, Jason Stokes, Heather Shewan

A sense of our journey to zero waste

Nicolene Fisk, Yi-Hsuan Lin*, Clara Shaw, Megan Taylor

Sodium reduction in chicken nuggets substituted by Indonesian overripe tempeh powder and their sensory characterization using check-all-that-apply (CATA) questions

Rianita Pramitasari*, Daniella Karmelita, Anastasia Tatik Hartanti

What does a sustainable diet mean for Gen Z?

Shannon Ruzgys* and Gary J. Pickering

Starch molecular structural features and volatile compounds affecting the sensory properties of polished Australian wild rice

Yingting Zhao*, Heather E. Smyth, Keyu Tao, Robert J. Henry, Robert G. Gilbert
Introduction

- Honey is very popular in Australia, as ~0.6-0.8kg per person is consumed per year.
- Sensory properties are important for honey. However, little sensory research has been conducted on Australian honey.
- This has ultimately left a gap in knowledge for honey manufacturing and marketing about what consumers are looking for in Australian honey in terms of its sensory properties and the best way to market and brand that honey.
- Therefore, research is needed to identify the ideal honey profile and be used to increase profits within the Australian honey industry.
- Using sensory science principles, this research attempts to understand the relationship between sensory and descriptive attributes of honey and how they influence consumer liking, perception and purchasing decision making.

Aims:
1. To determine what honey is available, how it is marketed in terms of its sensory and other descriptive attributes and how these vary by brand, price and origin.
2. To assess the relationship between sensory terminology used in product descriptions and labelling on honey for consumers
   a. Consumption patterns
   b. Preference and Perception
   c. Willingness to pay
3. To assess if consumer preferences and willingness to pay will change after completing a sensory evaluation of various Australian honey.

Methods:

- Background Research/ Literature Review
- Online Survey & Choice Experiment: Using QuestionPro Snowball Recruitment
- Audit Location: Charlestown Woolworths & Coles online
  Date Collected: 6/8/21 - 9/8/21
- Information Collected:
  1. what honey is available, 2. the brand, 3. packaging type, 4. price, 5. weight, 6. Sensory & other descriptive terms.
- Inclusion criteria: Living in Australia, Internet Access, 18+, Proficient English literacy, Do at least half of the grocery shopping.
- Data analysed using Excel & JMP
- Choice Experiment: demographics, consumption patterns, preferences & willingness to pay.
- Data analysed using Excel & JMP

Results:

Most used terms (Audit - 93 products)

<table>
<thead>
<tr>
<th>Sensory</th>
<th>Descriptive</th>
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</table>

Packaging

<table>
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Most common honey attributes

<table>
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Discussion:

- A diverse array of sensory and descriptive terms were used to describe honeys on packaging and website descriptions.
- The results from the online survey suggest that price may not be as important as the sensory attributes such as texture, colour and flavour.
- The most common sensory words found in the audit did not align with the terms most preferred by consumers in the choice experiment.
- ‘Smooth’ as a sensory attribute was found to be important by consumers and is also a common sensory descriptor in marketing for honey. Delicate was the next most positive utility descriptor; however, this was not a common term found in the audit. Sweet, although commonly used, was of negative predictive utility. Floral had significant positive utility; but was rarely featured in the audit results. Mild was the most common website descriptor but was of negative predictive utility, compared to rich, which was used less frequently.
- These data may assist manufacturers in revise and refocus their products and marketing to align with consumer expectations, however in person sensory testing to confirm these results is still required.
Sensory properties of Australian bunya nuts

Jaqueline Moura Nadolny1, Odette Best2, Emma Hassall2, Heather M. Shewan1, Sandra M. Olarte Mantilla3, Jason R. Stokes1, Heather E. Smyth3*

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2 School of Nursing and Midwifery, University of Southern Queensland, QLD, Australia
3 Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, St Lucia, QLD, Australia

Background and Aims

**Background**
- Native to South East Queensland
- Each cone can hold up to 100 nuts each
- Traditional preparation methods: boiling, roasting or grinding into flour
- Similar to chestnuts in terms of composition (fat → starch)
- Highly valued by First Nations Australians in Queensland because they were the main source of energy during the gatherings that happened during bunya nut season (December-March)

**Aims**
- To establish a lexicon for describing the sensory properties (textural, aroma, flavour and aftertaste) of bunya nuts in comparison to chestnuts.
- To explore the sensory impact of two different preparation methods: boiling and roasting.
- To provide a strong basis to support novel food sector opportunities for the bunya nut as a re-emerging food source.

Methods

Conventional quantitative descriptive analysis

**Sample preparation**
- Boiled: 45 minutes, 200 g in 1.8 L of water
- Roasted: 15 minutes, 180°C and 40% humidity

**Sample presentation**

**Trained sensory panel**

Results and Discussion

- Roasted samples were scored higher for: hardness, dry, crumbly and grainy. Sweet lingers, roasted (aroma) and drying were also slightly higher.
- Boiled samples scored higher for: chemical flavour, herbal aroma and aroma intensity.
- Bunya nuts scored higher for: hardness, grainy, drying, and hard to clear.
- Bunya nuts are less intense in terms of aroma and flavour than chestnuts, and were significantly less sweet in aroma, flavour and aftertaste.
- The attributes numbimg and earthy (aftertaste) differentiated bunya nuts from chestnuts.

Conclusions and future work

- Overall, bunya nuts were profiled as intensely savoury, roasted, grainy, crumbly, hard, dry, numbing, hard to clear and drying, with subtle earthy, herbal and chemical flavour and aroma notes.
- Bunya nuts are less sweet, harder to bite into and, when chewed, are more grainy and dry than chestnuts.
- The different methods of preparation led to differences related especially to texture. Roasted nuts were much harder, drier, more crumbly and grainy.
- Future work includes the sensory profiling of bunya nuts after being subjected to different processing techniques, e.g. fermentation or flour preparation.
A sense of our journey to zero waste

Nicki Fisk, Yi-Hsuan Lin, Clara Shaw, Megan Taylor.

Sensory Analysis Unit, Consumer Science, Fonterra Research and Development Centre, Dairy Farm Road, Palmerston North, New Zealand.

Introduction

The Fonterra Sustainability Report\(^1\) has two key targets: to send zero solid waste to landfill by 2025 and to have 100% recyclable, reusable or compostable packaging by 2025. A drive to push forward in adopting this mindset has been key in the success of eliminating waste within the Fonterra Research and Development Centre’s Consumer Science team’s sensory unit.

Waste within the unit in terms of the samples analysed, containers/material used in their preparation and sample presentation was thought to be high. Starting with a waste audit, key focus points were: What was recyclable? What was compostable? What was reusable?

Identification for quick wins, e.g., replacing foam cups with reusable glasses, options for compostable pottles and identifying lifecycles of materials used regularly in the lab. Trials were conducted to look at usability, cost, availability and health and safety. This then led to decisions around ‘Go’ – what could we implement now or in the future and ‘No Go’ – but were there other options?

Objective

To improve sustainability within the Sensory department by reducing waste and replacing materials with reusable or compostable options on a daily basis. To align with Fonterra’s two key sustainability targets.

Challenges

There were issues with the sourcing and usability of alternatives with panel work. Trails conducted on reusable or compostable alternatives in panels identified usability issues, including sharp edges on drinking cups, ill fitting lids, flimsy cups, leakage and labels falling off cardboard pottles.

PLAN

<table>
<thead>
<tr>
<th>Area</th>
<th>Items</th>
<th>Amount</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product and packaging</td>
<td>Bones and packaging</td>
<td>460L</td>
<td>Landfill</td>
</tr>
<tr>
<td>Sample preparation</td>
<td>Packaging</td>
<td>24L</td>
<td>Recycle</td>
</tr>
<tr>
<td>Sample tasting</td>
<td>Hair nets/beard masks/heat towels</td>
<td>900 units</td>
<td>Landfill</td>
</tr>
<tr>
<td></td>
<td>Soda water bottles</td>
<td>24 units</td>
<td>Recycle</td>
</tr>
<tr>
<td></td>
<td>Soda water bottles</td>
<td>24 units</td>
<td>Recycle</td>
</tr>
<tr>
<td></td>
<td>Tissue sheets/wet wipes</td>
<td>180 units</td>
<td>Recycle</td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td>50 sheets</td>
<td>Recycle</td>
</tr>
</tbody>
</table>

Table 1: Results of initial waste audit products per area per week

Tiakina te whenua i tēnei rā, hei oranga tangata mō ngā rā e heke mai nei.

Caring for the land today, so that the land cares for us tomorrow.

DO

- Researched options for easy swaps that would be quick wins.
- Implemented a priority chain of reduce, reuse, recycle and rot (compost).
- Referred to the city’s Waste Management and Minimisation Bylaw\(^2\) for recycling and composting.
- Looked at viable options available in New Zealand and their costing.

ADJUST

- Future focus on non-recyclable plastic pottles.
- Resolving issues with compostable alternatives and with manufacturer supply and availability.
- Further reducing waste by calculating the exact number of samples and references through focused planning.
- Share learnings to the wider Fonterra team.

CHECK

How are our actions impacting our waste output?

Fig 1: Initial and current waste (units of waste per week)

In 2020 department supplies were ordered, made of plastics #3, #4 and #6, that are no longer able to be recycled in New Zealand. Amendments to the Landfyll Bylaws in June 2021 meant these supplies had to be sent to landfill after use, galvanising the team to look towards compostable options.

Future focus is on continuous improvement, by reducing waste through limiting sample amount for evaluation, use of appropriate methods, therefore reducing end point sample disposal and minimising shopping requirements for palate cleaners and references.

Our journey is one of making a positive impact on the quality of our environment, to create the demand for suppliers to provide better options for a more sustainable future and be part of the success of Fonterra’s waste reduction goals.

References


Acknowledgements

Rachel Gainey, Deanne Kasaba, Tim Coolbear, Craig Dodds, Sensory Science Technical Team, FRDC Sensory Panellists, FRDC Sustainability Group, Dooda Design.

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You can’t recycle everything!

In 2020 department supplies were ordered, made of plastics #3, #4 and #6, that are no longer able to be recycled in New Zealand. Amendments to the Landfyll Bylaws in June 2021 meant these supplies had to be sent to landfill after use, galvanising the team to look towards compostable options.

Conclusion

Fonterra’s two sustainability targets have been the key drivers for reducing waste.

Starting with waste audits, the information gained identified quick wins while focusing on the four principles: Reduce, Recycle, Reuse and Rot (Compost). Together with the implementation of a Plan, Do, Check, Adjust system, this gave the department the necessary tools and direction.

This approach showed an immediate reduction in waste to landfill. By replacing the polystyrene cups with reusable glass cups, bottled sparkling water with a multi-use SodaStream® appliance and plastic non-compostable spoons, and stirrers with metal spoons we reduced our waste from 75 rubbish bags to 5 rubbish bags per week.

Future focus is on continuous improvement, by reducing waste through limiting sample amount for evaluation, use of appropriate methods, therefore reducing end point sample disposal and minimising shopping requirements for palate cleaners and references.

Our journey is one of making a positive impact on the quality of our environment, to create the demand for suppliers to provide better options for a more sustainable future and be part of the success of Fonterra’s waste reduction goals.
Nasional Institut of Health and Nutrition

INTRODUCTION

Many people widely consume chicken nuggets due to their easy cooking and good taste. However, almost chicken nuggets contain high sodium. Reducing sodium and substituting the chicken nuggets with a flavor enhancer can be a solution to reduce sodium consumption. Utami et al. (2016) reported that overripe tempeh contained glutatione and aspartate, producing a umami flavor. Tempeh produced by different Rhizopus strains has different glutatione, aspartate, and other amino acids content (Hutapea 2020). It may be expected to affect the sensory characteristics of the chicken nuggets. Hence, this research aimed to analyze sensory attributes of chicken nuggets substituted by overripe tempeh from several Rhizopus strains.

METHODS

1. Production overripe tempeh powder from three different Rhizopus strain (R. microsporus ATH24, R. delemar ATH53, R. microsporus var. oligosporus)

2. Production of chicken nuggets substituted by overripe tempeh [A = 1% NaCl + 1.5% ATH24; B = 1% NaCl + 1.5% ATH53; C = 1% NaCl + 1.5% R. microsporus var. oligosporus; D = control (2% NaCl)]

3. Sensory profiling of chicken nuggets using CATA questions (50 naive consumers, 15-40 years old)

RESULTS AND DISCUSSION

The amino acids dominant in overripe tempeh were glutatione and aspartate. The highest glutatione and aspartate, respectively, were in overripe tempeh powder made by R. delemar ATH53 (76.44 ± 0.56 mg/g and 45.24 ± 0.29 mg/g). Then, followed by overripe tempeh powder made by R. microsporus ATH24 (72.76 ± 0.02 mg/g and 45.87 ± 0.12 mg/g) and R. microsporus var. oligosporus (59.72 ± 0.20 mg/g and 20.67 ± 0.01 mg/g) (Table 1).

Table 1. Comparison of Amino Acid Profiles in Overripe Tempeh from Three Type of Rhizopus

<table>
<thead>
<tr>
<th>Amino Acid</th>
<th>Overripe tempeh from A</th>
<th>Overripe tempeh from B</th>
<th>Overripe tempeh from C</th>
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</thead>
<tbody>
<tr>
<td>Glutatione</td>
<td>76.44 ± 0.56 mg/g</td>
<td>72.76 ± 0.02 mg/g</td>
<td>59.72 ± 0.20 mg/g</td>
</tr>
<tr>
<td>Aspartate</td>
<td>45.24 ± 0.29 mg/g</td>
<td>45.87 ± 0.12 mg/g</td>
<td>20.67 ± 0.01 mg/g</td>
</tr>
<tr>
<td>Other aminos</td>
<td></td>
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</table>

The result of Cochran’s Q test showed there were no significant differences in the sensory attributes between four variations of chicken nuggets (Table 2).

Table 2. Sensory Attributes Differences Between Chicken Nuggets

<table>
<thead>
<tr>
<th>Sensory Attribute</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salty</td>
<td>0.10 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.18 ± 0.29</td>
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<td>Sour</td>
<td>1.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
</tr>
<tr>
<td>Sweet</td>
<td>0.00 ± 0.29</td>
<td>1.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
</tr>
<tr>
<td>Bitter</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>1.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
</tr>
<tr>
<td>Sour</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>1.00 ± 0.29</td>
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<tr>
<td>Sweet</td>
<td>0.00 ± 0.29</td>
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<td>0.00 ± 0.29</td>
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<tr>
<td>Bitter</td>
<td>0.00 ± 0.29</td>
<td>1.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
<td>0.00 ± 0.29</td>
</tr>
</tbody>
</table>

Based on Correspondence Analysis, the ideal chicken nugget has the dominant attributes: harmony, crispiness, umami, soft texture, no overripe tempeh flavor, less bitter, and bright color. The control sample was the closest to the ideal chicken nugget. Chicken nugget with R. microsporus ATH24 has dominant attributes such as less salty, bitter, less umami and dark color. Meanwhile, the nugget with R. delemar ATH53 has dominant attributes such as too umami, less salty, harmonic, and bright color. Nugget with R. microsporus var. oligosporus (commercial Rhizopus strain) has dominant attributes: less umami, less salty, and no overripe tempeh flavor (Fig 1).

Penalty Analysis shows that “must-have” attributes were umami and harmony. Based on the analysis, there was no “nice to have” and “must not have” attribute (Fig 3). The “must-have” attribute is the attribute that exists in the ideal sample but does not exist in the sample. In developing food products, we have to pay attention to the “must-have” attribute. The presence of the “must-have” attribute makes the product ideal (Adawiyah et al., 2017). If we look at the Correspondence Analysis, chicken nugget from overripe tempeh R. delemar ATH53 had the same attribute with the “must-have” attribute, namely harmony, making it even more potential to be developed. The absence attribute in the “must not have” means that the addition of overripe tempeh will not reduce the consumer liking of the chicken nuggets.

CONCLUSIONS

In conclusion, overripe tempeh, especially from R. delemar ATH53, could be used to reduce the sodium content in chicken nuggets without reducing consumer liking.

REFERENCES


Gen Z: What Does a Sustainable Diet Mean to Me?

Shannon Ruzgys¹ and Dr. Gary Pickering¹ ²
¹Environmental Sustainability Research Centre, Brock University, St. Catharines ON
²Sustainable Research Centre, University of the Sunshine Coast, Queensland AU

Introduction

A shift towards more sustainable food systems is a necessity in the 21st century. Consumer demand for sustainability has been shown to influence agricultural systems in the past. Generation Z (Born 1995-2012) represents a different type of consumer, an environmentally conscious one.

Understanding Gen Z’s behaviours, attitudes, and beliefs around sustainable dietary habits is important in ensuring they have the knowledge and resources to make sustainable choices.

In this exploratory study, we aim to gain a holistic understanding of what a sustainable diet means to Gen Z.

Methods

Population
A representative sample of Canadian youth between the ages of 18-25.

Survey Distribution & Approach
Online survey using a mixed methods approach.

In the Words of Youth
We asked participants to describe what a sustainable diet means to them and what things they can do to make their diet more sustainable, as well as any barriers that prevent them from engaging in sustainable dietary habits.

What Matters to Youth
Participants were provided a list of 19 sustainable dietary habits (e.g., support local farmers) and were asked to rank the top five most and least effective behaviours for promoting a sustainable diet. They also rated how important a variety of factors such as taste and price are on their food choices.

Results

Top Five Most Effective Behaviours
(% of respondents who mentioned the behaviour in their top five)
1. Decreasing food waste (59%)
2. Consuming local and seasonal produce (54%)
3. Supporting local farmers (52%)
4. Reducing red meat consumption (42%)
5. Choosing foods with limited packaging (42%)

Top Five Least Effective Behaviours
(% of respondents who mentioned the behaviour in their top five)
1. Reducing consumption of soft drinks and fruit juice (56%)
2. Reducing dairy consumption (56%)
3. Avoiding pre-prepared/chopped produce (54%)
4. Avoiding highly perishable foods (40%)
5. Choosing organic over conventional produce (37%)

What things can you do to make your diet more sustainable?

<table>
<thead>
<tr>
<th>Category</th>
<th>Example</th>
<th>Count (n=426)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat local</td>
<td>“Purchase food from local farmers”</td>
<td>72</td>
</tr>
<tr>
<td>Reduce meat or dairy consumption</td>
<td>&quot;Eat less meat&quot;</td>
<td>52</td>
</tr>
<tr>
<td>Eat more fruits/vegetables</td>
<td>&quot;Eat more plants&quot;</td>
<td>35</td>
</tr>
<tr>
<td>Avoid single use plastics</td>
<td>&quot;Avoid single-use plastic packaging&quot;</td>
<td>33</td>
</tr>
</tbody>
</table>

Conclusion

- Participants are able to accurately identify many unique and important aspects of sustainability without prompting, including behaviours related to social and environmental sustainability.
- They underestimate the environmental impact of reducing sugary drinks and dairy.
- There were few differences between men and women in rankings of the least and most effective behaviours.
- Of the top ten most important food choice motivators, five represent some aspect of sustainability.
- 67% of participants state that there are barriers that prevent them from engaging in sustainable dietary habits, with cost cited as the overwhelmingly most common barrier (51% of responders).
- Overall, this research provides us with insights into Gen Z’s perceptions around sustainable diets, including what a sustainable diet is to them, the behaviours that they deem to be the most and least important for promoting a sustainable diet, and the barriers that prevent them from engaging in these behaviours.
Methods

sensory finding affecting the sensory properties of polished Australian wild rice (AWR) starch molecular structural features and volatile compounds. Yingting Zhao1,2, Heather E. Smyth3, Keyu Tao1,2, Robert J. Henry3 and Robert G Gilbert1,2

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2Joint International Research Laboratory of Agriculture and Agri-Product Safety, College of Agriculture, Yangzhou University, Yangzhou, Jiangsu 225009, China
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Yingting Zhao
Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, St Lucia, QLD 4072, Australia

were found between AWRs and CRs. No distinct differences in composition or structural features of polished AWR varieties and some CRs. The aim is to find out if the sensory properties of polished AWR varieties are acceptable to consumers.

Table 1. Details of the source, chemical compositions and minimum cooking times of varieties.

<table>
<thead>
<tr>
<th>Rice varieties</th>
<th>Country of origin</th>
<th>Cooked rice structure (%)</th>
<th>Amylose content (%)</th>
<th>Wheat starch</th>
<th>Lumen size</th>
<th>Cooking time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWR</td>
<td>Australia</td>
<td>78.0 ± 0.22</td>
<td>11.6 ± 0.20</td>
<td>24.6 ± 0.41</td>
<td>17</td>
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<tr>
<td>ELM</td>
<td>Spain</td>
<td>78.1 ± 0.06</td>
<td>10.0 ± 0.20</td>
<td>16.4 ± 0.02</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Chine</td>
<td>Australia</td>
<td>79.4 ± 1.14</td>
<td>11.5 ± 0.23</td>
<td>22.0 ± 0.20</td>
<td>20</td>
<td></td>
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<td>Eco-Max</td>
<td>India</td>
<td>78.4 ± 0.02</td>
<td>10.5 ± 0.15</td>
<td>24.6 ± 0.51</td>
<td>12</td>
<td></td>
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<tr>
<td>Paint-Rice</td>
<td>India</td>
<td>75.0 ± 0.25</td>
<td>13.2 ± 0.60</td>
<td>25.5 ± 0.11</td>
<td>12</td>
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<td>Park</td>
<td>Spain</td>
<td>77.0 ± 0.04</td>
<td>11.5 ± 0.23</td>
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<td>Long-grain</td>
<td>Thailand</td>
<td>79.0 ± 0.00</td>
<td>11.5 ± 0.15</td>
<td>25.4 ± 0.03</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Australian Wild rice</td>
<td>Australia</td>
<td>79.0 ± 1.00</td>
<td>10.6 ± 0.23</td>
<td>17.4 ± 0.50</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

• No distinct differences in composition or major components and in properties were found between AWRs and CRs.

Table 2. Details of physical properties of rice grains

<table>
<thead>
<tr>
<th>Variety</th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
<th>C*</th>
<th>ΔE ab*</th>
<th>ΔE cb*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWR</td>
<td>94.0</td>
<td>9.2</td>
<td>6.3</td>
<td>15.8</td>
<td>10.7 ± 0.5</td>
<td>80.1 ± 0.4</td>
</tr>
<tr>
<td>CR</td>
<td>97.0</td>
<td>13.3</td>
<td>3.6</td>
<td>12.0</td>
<td>15.8 ± 0.2</td>
<td>80.1 ± 0.4</td>
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<tr>
<td>AWR</td>
<td>94.0</td>
<td>9.2</td>
<td>6.3</td>
<td>15.8</td>
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<tr>
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<td>97.0</td>
<td>13.3</td>
<td>3.6</td>
<td>12.0</td>
<td>15.8 ± 0.2</td>
<td>80.1 ± 0.4</td>
</tr>
</tbody>
</table>

• AWR had lower L* and h°, but higher a*, b*, and C* colour values both in raw and cooked polished rices compared to those of CRs.

Results

Figure 1. PCA bi-plot of the sensory properties of 8 cooked polished rice samples (n = 3 replicates × 11 panellists). (A-B) aroma attributes; (C) texture attributes; (D) flavour attributes.

• The aroma of the AWR was complex, like that of raw cookie dough, cereal with brown bread notes, some sulfurous, eggy, earthy, and root vegetable notes.

• AWR was cohesive and sticky, neither fluffy nor very chewy, and soft and acceptable disintegration in the mouth.

Conclusions

1. AWR had a disintegrating texture similar to Doongara rice, due to the amounts of AP short chains.
2. AWR had a resinous, plastic aroma different from those of commercial rice varieties, resinous aroma by 2-heptenyl, nonadecane, 2h-pyran, tetrahydro-2-(12-pentadecynyl)-, estra-1,3,5(10)-trien-17β-ol and plastic aroma by 2-myristoyl pantethine, cis-7-hexadecenoic acid, and estra-1,3,5(10)-trien-17β-ol.
3. Overall, AWRs have acceptable palatability.

Acknowledgements

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## Contact Details of Symposium Presenters

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<th>University/Company</th>
<th>Email</th>
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Delegates in attendance
The following delegates gave permission for their name and affiliation to be shared with this year’s Symposium attendee’s.

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