

NZIFST Annual Conference Speaker Abstracts



Day 1 – Tuesday July 6th 2021



Session Title: A - Opening Plenary

Name Professor Dame Juliet Gerrard
Job Title Prime Minister's Chief Science Advisor
Organisation New Zealand Government



Presentation Title:



Session Title: A – Opening Plenary

Name Ian Proudfoot
Job Title Global Head of Agribusiness
Organisation KPMG



Presentation Title: New Zealand, our consumers, and our 2040 future

The world we live has become incredibly complex, partly due to the impacts of the pandemic, but also driven by the emergence of new technologies, greater recognition of inherent inequalities in society and the need to address the era defining issue facing society, climate change. The change we are experiencing is fuelling massive disruption across the global food system creating opportunities for farmers, growers, fishers and producers of food and fibre products around the world. For the first time we have realistic concerns about whether New Zealand's food and fibre sector has the capacity and capability to participate in the great big, beautiful tomorrow that is emerging. Ian will explore what needs to be done to ensure that all New Zealanders benefit from New Zealand retaining a seat at the top table of innovation in the food system.



Session Title: B1 – Consumer Food Safety

Name Ben Sutherland
Job Title Principal Food Technologist
Organisation Food Standards Australia New Zealand



Presentation Title: Novel Food Ingredients for use in retail foods

Novel foods are non-traditional foods that require a premarket safety assessment by FSANZ in order to establish their safety before they are added to the food supply. In Australia and New Zealand, novel foods and novel food ingredients are regulated under Standard 1.5.1 – Novel Foods, in the Food Standards Code and cannot be sold as food or used as a food ingredient unless it is listed in the Standard. Ben will speak on the process of determining whether a food is novel, via the Advisory Committee on Novel Foods and the requirements for demonstrating the safety of novel foods. Two recent case studies of novel food applications will be provided during his talk.



Session Title: B1 – Consumer Food Safety

Name Tracey Phelps
Job Title Scientist
Organisation Plant & Food Research



Presentation Title: Food Safety – what really happens in Kiwi kitchens?

New Zealand has one of the highest rates of foodborne campylobacteriosis in the world. Despite this disturbing statistic in 2008 FSANZ reported that New Zealand consumers are generally confident in the safety of their food supply. Very little research has been conducted in the 12 years since the FSANZ study thus we addressed this deficit by conducting a series of focus groups around New Zealand, followed by interviews with fifteen Auckland households. Our aim was to understand perceptions of food safety in New Zealand in addition to examining personal food safety practices adopted by consumers in their homes. We also talked to consumers about their attitudes and behaviours around food waste.



Session Title: B1 – Consumer Food Safety

Name Tanya Soboleva
Job Title Principal Advisor
Organisation New Zealand Food Safety



Presentation Title: Food Safety during Pregnancy. What's new?

NZFS reviews and offers up-to-date food safety guidance to ensure New Zealanders get the information they need to enjoy a diverse diet, to stay healthy, and keep safe from foodborne illnesses. New Zealand's food safety guidance is based on information available at the time. However, factors that influence food safety advice change with time. Appearance of new foods and changes New Zealanders' diets, changes in variability and virulence of foodborne hazards alternate risk profiles of different food/hazards combinations. Additionally, there is an epistemic factor that reflects changes in our knowledge of foodborne hazards and associated risks to different groups of population. At the end of 2020 NZFS updated its food safety advices for pregnant women. This presentation will explain updated recommendations on how to avoid foodborne illness and provide an insight into some of the strategic science and communications work associated with the updated guidance.



Session Title: B1 – Consumer Food Safety

Name Jenny Young
Job Title Researcher
Organisation Plant & Food Research



Presentation Title: Exploring B2C Retailers' views about X-Ray as a phytosanitary food treatment

Irradiation for the prevention of food-borne diseases has been an available phytosanitary technology for decades. Although the technology is accepted by the scientific community, and regulations are established, commercial acceptance is slower. Consumer studies indicate continued negativity towards food irradiation. However, little research has considered the perspectives of Business to Consumer (B2C) retailers. Using in-depth interviews, we explored the views of 12 New Zealand B2C participants from supermarkets, and food outlet / delivery chains. The aim was to gain understanding of their views regarding benefits/ negative effects of X-ray treatment, in relation to other treatments, such as methyl bromide. This included insights into consumers' possible perceptions. The findings show the different ways participants compared the benefits/challenges of the treatments. Key differences emerged across participant's experience and seniority levels. This allows a more nuanced understanding of factors affecting the acceptance of this technology, and informs future research design.



Session Title: B2 - Innovation in the Food Space

Name Marie-Laure Delabre
Job Title Senior Food Technologist
Organisation SFAT – Massey University



Presentation Title: Evaluation and Optimization of Microwave Induced Thermal Processing Technology

Microwave-induced thermal processing has been touted as a game-changer for pre-packaged food products. Using thin packs and defined-geometry microwave, food can be heated evenly to pasteurisation and sterilisation temperatures in seconds. This minimises local over-processing or cold spots meaning good retention of sensory properties and of heat labile nutrients. However, this lack of defined cold spots complicates validating the technology. One of the FIET projects is looking at this question with a Muegge GmbH Coaxially induced microwave pasteurisation and sterilisation (CIMPAS) pilot plant, one of only two in the world.

The heating patterns in pre-packaged model products were assessed across all voxels within a pack by creating Maillard Browning reactions and using image analysis. Additionally, temperature-time data were recorded at several locations to calculate local F0 values accumulated. Several process variables were found to have significant effects on both the processing time to achieve required F0 values and the homogeneity of heating. Optimising these variables enabled F0 values for sterility to be obtained in a fraction of the time of retort processing with a more homogeneous heating pattern. The results from this study provide confidence that microwave-induced thermal processing, though still in its infancy, has promise for New Zealand companies manufacturing pre-packaged foods.



Session Title: B2 - Innovation in the Food Space

Name Angela Cornelius
Job Title Senior Microbiologist
Organisation ESR



Presentation Title: Generating high quality genomes to assess industry strains for safety

Next-generation sequencing technologies provide a fast and cost-effective way to determine the DNA make-up or 'whole genome sequence' of a microorganism. The widely-used Illumina technology produces short segments of DNA sequence (short-reads) that can be assembled into a draft genome. While this is often adequate for routine analyses (e.g. typing), genomic safety analyses, such as confirming the absence of genes associated with antimicrobial resistance or toxicity, requires both long- and short-read sequencing to generate high-quality, preferably closed, genomes. Pacific Biosciences (PacBio) long-read sequencing had been successfully used with lactic acid bacteria (LAB) but is not available in New Zealand resulting in delays and high costs. We have found that an alternative, Oxford Nanopore Technologies (ONT), is cheaper and faster, and can be combined with Illumina sequencing to generate high-quality genomes for LAB used in the food industry. This capability has now been successfully transferred to an industry laboratory.



Session Title: B2 - Innovation in the Food Space

Name Graham Eyres
Job Title Senior Lecturer
Organisation University of Otago



Presentation Title: Understanding how to manipulate the flavour of kānuka smoke

Kānuka (*Kunzea ericoides*) wood is widely utilized for smoking food products, but the chemical composition of kānuka smoke and the compounds responsible for its flavour character are poorly understood. This presentation will present a summary of findings from research conducted in the Food Industry Enabling Technologies (FIET) program. To understand how smoke generation conditions influence the composition and aroma profile of kānuka smoke, the volatile composition was investigated by varying temperature, oxygen, gas flow rate and moisture content in a laboratory scale smoke generator. Volatiles were analysed by gas chromatography mass spectrometry (GC-MS) and GC-olfactometry with a trained panel of assessors to identify flavour active compounds. Results illustrated that the smoke composition and flavour of kānuka smoke can be manipulated and controlled. This provides industry with valuable information on how to tune smoke flavour and improve quality and consistency of smoked food products.



Session Title: B2 - Innovation in the Food Space

Name Aiman Jamsari
Job Title Post-Doctoral Bioprocess Engineer
Organisation Plant & Food Research



Presentation Title: Drying sticky products – from fruit and vegetable juices

We will highlight the outcomes of the Food Industry Enabling Technology (FIET) project, Drying Sticky Products, for processing and economic modelling for drying fruit and vegetable juices.

The juices contain sugars and acids which determine the glass transition temperature (T_g) at the dried water activity, a critical parameter for dried products (spray drying, vacuum belt drying or freeze drying) in order to achieve stable products. Maltodextrin is often added, up to 50% of the powder, to change the T_g to allow drying. Our processing model addresses which products require maltodextrin.

A side stream of juicing is pomace, which is typically discarded. Adding modified pomace back to the juice increases the fibre and requires two fluid nozzle for spray drying and benefits freeze and vacuum belt drying by hindering collapse during the drying.

We are working with companies targeting the pomace-enriched dried beverages based on the processing principles as well as the economic modelling estimates.



Session Title: B3 – Developments in Automation

Name Ben Conway
Job Title Associate Mechanical Engineer
Organisation Aurecon



Presentation Title: Designing and visualising factories of the future

The design process in the Architecture, Engineering and Construction industry has evolved significantly in the last 30 years, from paper based drafting being carried out by hand, to 2D CAD drawings and 3D CAD models. Now, fully integrated Asset Information Models and ultimately Digital Twins can be produced. The possibilities of connected data combined with a visual representation of assets are seemingly endless, and with the power of automation and artificial intelligence, the prediction of the future performance of an industrial plant can be engaged with. Energy consumption, emissions, productivity, throughput, uptime, and maintenance scheduling can be optimised through the connection of various data sources. In this presentation Ben will step through this evolution, and explain the value that can be realised throughout the asset lifecycle with the use of data-centric design workflows.



Session Title: B3 – Developments in Automation

Name David Tanner
Job Title Managing Director
Organisation Start Afresh Ltd



Presentation Title: Labour woes in Horticulture... What next?

The horticultural industry in New Zealand is facing unprecedented pressure, primarily due to a reduction in available labour, combined with significant growth in both volume and value of exports. Whilst COVID-19 has intensified the situation, there has long been concern that lack of available labour would constrain the industry, particularly in the practical aspects of growing, harvesting and packing/processing these time-sensitive crops. This presentation will explore the options for relieving this pressure using technology: a multi-pronged approach to the situation that includes orchard design, growing structures, biological and chemical strategies and automation.



Session Title: B3 – Developments in Automation

Name Chong Deng
Job Title Research Engineer
Organisation Callaghan Innovation



Presentation Title: Soft Robotics for Food Handling

Soft robotics is a relatively new and growing field. Soft robots generally have a deformable body that can adapt to the external environment. This intrinsic adaptiveness presents a great potential for handling delicate objects such as food products. Examples of how this technology can be implemented for food handling will be presented here, as well as the advantages and challenges involved.

One example of a soft robot that can be used for food handling is the soft robotic table developed to manipulate delicate objects simultaneously. The surface of the table is made from soft material and objects can be transported and re-orientated by deforming the surface with a specific pattern. Another example of adopting soft robotics for food handling is the use of soft robotic grippers. The advantage of soft robotic grippers is the ability to grasp objects with irregular shapes, while not damaging them in the process.



Session Title: B3 – Developments in Automation

Name Don Cleland
Job Title Professor
Organisation Massey University



Presentation Title: Decarbonising Food Processing in NZ Using Heat Pumps

Heat pumps (HPs) represent a significant opportunity to decarbonise food sector process heating. For most sites, once heat recovery is optimised, waste heat is seldom available above 60oC. HP opportunities are examined via case studies. Below 100oC, existing technologies such as water MVR systems, ammonia high temperature HPs and trans-critical CO2 HPs are suitable and commercially available, and will become more cost-effective as carbon charges rise. Cost and complexity of the enhanced electricity supply and HP technology remain significant barriers plus there is a paucity of experience of such systems in NZ. Above 100oC, suitable technologies are emerging and multi-stage cascaded or hybrid compression/absorption systems look promising. However, the effect of lower COP due to the larger temperature lifts on the economics, and the immaturity of the technology for such temperatures remain significant barriers. To be successful, HPs must be closely integrated with other heat recovery and thermal storage systems.



Session Title: B4 – Consumer Research

Name Joanne Hort
Job Title Fonterra Riddet Chair of Consumer and Sensory Science and
Director of Feast (Food experience and sensory testing) Lab
Organisation Massey University



Presentation Title: Contemporary Consumer and Sensory Science

Consumer Sensory Science has evolved since the early days of Flavor Profiling (™), Hedonic Profiling and the ubiquitous Triangle test. Its growth as a discipline sees it making a vital contribution to many different functions in today's Food Industry including ideation, product design, process development, quality control and marketing to name but five. The field has progressed from an initial focus on highly controlled experimental trials with specialist trained panellists to much wider use of consumer data and has been enabled by new technologies. That is not to say that some of the established methods are not of important, more that there is now a much bigger toolbox available to support an understanding of consumer-product relationships and hence predict product success. In this talk Professor Hort will highlight some of the changes that have occurred and the new approaches that constitute a contemporary and future facing consumer sensory science toolbox.



Session Title: B4 – Consumer Research

Name Lei Cong
Job Title Lecturer
Organisation Lincoln University



Presentation Title: Consumer-led design of functional foods in China

Air pollution is becoming an increasing problem in many developing economies with China being one of the countries most effected. Four Consumer Idealized Design (CID) workshops were conducted in Suzhou to explore the ideal product attributes consumers require in functional foods designed against air pollution. Tablet was the most common format in the supplement designs and the majority of conventional-foods were designed as either snacks, drinks, or dairy options. Effective health claims were considered to be "boosting immunity" for products designed for long-term use and "relieving respiratory symptoms" for products designed for use in acute situations. Supplements and conventional-format functional foods were perceived as having different health benefits and target markets. Consumers' attention to food safety suggested product producers should apply multi-methods to communicate the safety of their products to consumers. This study was the first to utilize CID workshops with Chinese consumers and will help inform industry product development.



Session Title: B4 – Consumer Research

Name Amy Errmann
Job Title Visiting Researcher
Organisation Plant & Food Research



Presentation Title: Premium or value?: consumer perceptions of ready-to-eat meals

Recent developments in 'Ready-to-Eat' (RTE) consumables are driving more premium offerings of RTE. These include sensory benefits, such as taste and texture, while also enhancing nutrient preservation in RTE products. Despite commercial interest in providing these products in market, little is known about the perception of consumers towards RTE meals. Historically, RTE meals have been associated with poor quality and 'TV dinner' consumption occasions. The current study contributes to a more contemporary understanding of consumer responses to RTE products that have better sensory and nutrition attributes. Focus groups were conducted with primary shoppers in younger and mature cohorts, in which consumer perceptions to RTE meals were explored. Results show that consumers categorise RTE as 'premium' or 'value', and that shelf-life, store aisle placement, and packaging are key drivers in how consumers form their perceptions of premium vs. value positioning.



Session Title: B4 – Consumer Research

Name Damien Mather
Job Title Senior Lecturer
Organisation University of Otago



Presentation Title: Fresh food online shopping repurchase intention: The role of Post-Purchase customer Experience and Corporate Image

This study looks into Chinese consumers' post-purchase experience when buying fresh food online. Compared to other products, fresh food online shopping is less predictable and controllable due to its perishable nature, so delivery, customer support, food quality, return and exchange, and packaging may greatly impact customer repurchase intention. We examine these factors at the post-purchase stage impacting customers' satisfaction and repurchase intention. We also explore how corporate image moderates the relationship between customer satisfaction and repurchase intention. 317 Chinese fresh food online shoppers' data was analysed by PLS-SEM. "Product-in-hand" and "customer support" are highlighted as drivers of customer satisfaction and repurchase intention. A good corporate image strengthens both. This offers managerial implications for Chinese fresh food e-commerce platforms on retaining customers and achieve long term success. It also provides global food stakeholders early insights on promoting their products in this new channel type.



Session Title: C - Plenary

Name Cath McLeod

Job Title Director

Organisation New Zealand Food Safety Science and Research Centre



Presentation Title: Food safety challenges in 2021: Partnership underpins the integrity of Aotearoa's food supply.

The New Zealand Food Safety Science and Research Centre provides advice and practical science solutions to around 30 industry, government and Māori organisations to support the production of safe food in Aotearoa. Food safety challenges are increasing, this stems from various drivers, including, the increasing human population, pressures on water quality, climate change, shifts in pathogen prevalence, increasing outbreaks of zoonotic infectious diseases, antimicrobial resistance concerns, and the movement towards sustainability – including the use of recycled packaging, desire to reduce food wastage, efforts to decrease plastic usage, and the development novel foods based on alternate proteins. These drivers have inherent food safety risk, and our work involves gaining in depth understanding of the scale of risk, researching strategies to reduce risk, and finding practical pathways to implement risk mitigation measures. This talk focuses on the challenges the Centre's Partnership is tackling and the national initiatives underway to support New Zealand's food sector.



Session Title: C - Plenary

Name David Sutton

Job Title National Quality Manager & Corporate Counsel

Organisation Goodman Fielder NZ



Presentation Title: Working in the grey - Risk Management, Food Safety & Quality

On the face of it, food safety should be simple - surely something is either safe or it isn't.

In the real world, sometimes you get lucky and it is black and white – it is clear what needs to happen. In those cases, you don't need quality managers or food safety professionals. But more often than not, the circumstances manufacturers and regulators find themselves in are not black and white. We work in the grey, having to make decisions or recommendations without all the facts, working with probabilities and risk assessments.

This presentation will take you through some of the objective methodologies I have employed over the years of 'working in the grey' including:

- distinguishing between safety and quality issues (it's not as easy as you think),
- management processes for the different types of risk, and
- presenting decisions or recommendations in a way which demonstrates due diligence.



Session Title: C - Plenary

Name Richard Archer
Job Title Logan Campbell Professor of Food Technology
Organisation Massey University and Riddet Institute



Presentation Title: FIET The Penultimate Chapter for our biggest Food Engineering Research Programme

FIET stands for Food Industry Enabling Technologies. It is a large research programme that has run for six years and finished its MBIE-funded phase in June. This talk will cover:

1. What each of the 13 projects has achieved
2. What is available to companies to use now
3. The commercialisation track of the various technologies
4. How such programmes might be structured in future.

FIET is also a grouping of six research organisations that partnered to initiate then deliver the programme: Massey University as host, the Universities of Auckland and Otago, AgResearch, Plant & Food Research and the Riddet Institute. FIET is also the community of students, post-docs and other researchers who have worked together to build collaborative partnerships that will outlive FIET.

This is the penultimate chapter - research is largely complete and commercialisation journeys are under way.



Session Title: D1 – Food Safety Onsite

Name Denver McGregor
Job Title General Manager Food Safety & Quality
Organisation King Salmon



Presentation Title: Listeria - The fight from all angles

Food Safety is more prominent within Food manufacturing sites than ever before. Yet, Listeria monocytogenes is still causing deaths and illnesses, and the listeria testing technology is now so sensitive to finding listeria monocytogenes positive results, that border rejections and recalls are being reported worldwide at significant cost to manufacturers. It appears that we don't know everything there is to know about Listeria monocytogenes, so how does a food manufacturing business stay one step ahead of this dangerous pathogen? At New Zealand King Salmon we decided we needed to learn as much as we could about Listeria monocytogenes so that we could hit it from all angles.



Session Title: D1 – Food Safety Onsite

Name Shakeel Ahmed
Job Title Food Scientist
Organisation iMonitor Ltd



Presentation Title: Opening the black box in food manufacturing

New Zealand food manufacturers are still reliant on paper or spreadsheets regarding quality and production management during the manufacturing process. Innovations in the digital lean domain allow manufacturers to make significant improvements to their quality and production management practices.

A qualitative survey was carried out with production and quality managers at fifty-eight New Zealand food manufacturers and four in-depth interviews with quality managers aimed at establishing the current state, challenges of quality and production management faced by the industry due to its dependence on the paper medium. The impact of implementing digital lean solutions was documented with three manufacturers.

Organisations working with paper medium face a data black box. It impedes them from having complete visibility and control of their quality, compliance, and production processes. We conclude that implementing digital lean solutions provides organisations with significant opportunities in increased traceability, quality, productivity, reduction of waste and business risks.



Session Title: D1 – Food Safety Onsite

Name Harry Martin
Job Title Scientist
Organisation Plant & Food Research



Presentation Title: Potential applications of 'Lab on a Smartphone' for assessing crop quality

Fluorescence-polarization (FP) assays are applicable to a wide range of metabolites and biomarkers. FP assays have been developed for the fungal toxins ochratoxin (in wine and dried fruit) and aflatoxin (in food staples and animal feed). FP assays are readily adapted to smartphones, allowing measurements to be taken where portability and minimal sample preparation is at a premium. FP assays for vitamins biotin (B7) and folate (B9), actinidin, and ACC-oxidase are presented, demonstrating different developmental stages, their easy use and versatility. We show how screening allows the selection of cultivars naturally high in folate, providing an alternative to artificial fortification. The enzyme ACC-oxidase, highly expressed in many ripe fruit, is an indicator of fruit maturity for harvest and during storage. Thus, an FP smart-phone accessory could report the quality and shelf-life of foods produced for human and animal consumption taking analytical chemistry out of the lab and into the field.



Session Title: D1 – Food Safety Onsite

Name David Lowry
Job Title Managing Director
Organisation Lowry Food Consulting Ltd.



Presentation Title: Can You afford the Price of Poor Hygienic Design?

Every year many food companies pay the economic and reputational price of food safety and/or food spoilage events which could have been avoided if hygienic design disciplines were embedded in their operational and quality culture. Using real life examples, the costs to business of not consciously addressing hygienic design principles in plant and process design, change management and process efficiencies are highlighted. Focus is given to management systems required to address and sustain hygienic process environments, and process tools and guidelines to deliver and recognise failings in hygienic design. The role that EHEDG New Zealand can play as an essential resource to enable companies to minimise costly incidents and gain efficiencies is highlighted.



Session Title: D2 – Overcoming Covid Challenges

Name Chrissy Stokes
Job Title Extension Design Specialist
Organisation Zespri International Limited



Presentation Title: Keeping the kiwifruit train chugging during Covid - and beyond.

The NZ Kiwifruit industry is no stranger to a crisis. A biosecurity incursion in November 2010 introduced a vine disease, *Pseudomonas syringae* pv. *actinidiae* (Psa) into the country, and the resulting disease decimated Gold kiwifruit orchards, destroyed orchard values, and eventually created a more resilient industry.

Central government support, a robust research portfolio, a long-standing new varieties breeding programme and great relationships with scientists and research providers, a single desk, and northern hemisphere experience all fed into a response that was considered, coordinated, and ultimately, highly effective.

These same attributes stood us in great stead in 2020, but it was not without its challenges, any many of these continue into 2021 and beyond.



Session Title: D2 – Overcoming Covid Challenges

Name Rebecca Culver
Job Title Managing Director
Organisation Just Zilch



Presentation Title: Food Rescue in lock down

Rescuing food is a full-time job and the team at Just Zilch have taken on the challenge. When lockdown hit the team was faced with having a limited number of people able to volunteer and food that still needed to be rescued. Restaurants and cafes faced sudden closure and with food that would spoil. Producers were faced with stock that had nowhere to go and Just Zilch didn't have customers as normal to give it all away. Just Zilch stepped up to the plate, working alongside other organisations in Palmerston North to ensure that everyone who need food was able to get it.



Session Title: D2 – Overcoming Covid Challenges

Name Ivy Gan
Job Title Scientist
Organisation Plant & Food Research



Presentation Title: Chinese Perceptions and Demand for New Zealand Food: Daigous' views Post-Covid

Daigou, which means 'buying on behalf' in Chinese, refers to the trading practice of Chinese expats purchasing products from overseas and shipping them back to consumers in China. In New Zealand, Daigou are active in the food and wellness sector. Through in-depth interviews with sixteen and an online survey with 205 Daigous, this study documented the impact of Covid-19 on the operation of Daigou, and captured Daigous' views of Chinese consumers' perceptions and demand for New Zealand food products post-Covid. Disruption in logistics, impaired buying power and desire, and concerns of international parcels contracting Covid-19 virus are major factors for the overall decline of Daigou sales post-Covid. However, orders increased for supplements, milk powder, and honey among 25% Daigous surveyed, alongside the rising attention to physical health among consumers. Daigous were optimistic about Chinese consumers' demand for New Zealand healthy food in the future, with both opportunities and challenges presented.



Session Title: D2 – Overcoming Covid Challenges

Name Katharine Adam
Job Title Microbiologist
Organisation Quantec



Presentation Title: Can cow's milk proteins inhibit viruses?

Quantec produces immune defense proteins (IDP®), an ingredient, that contains a blend of 50 plus proteins isolated from fresh cow's milk. IDP contains at least 40% lactoferrin, a protein with known antiviral properties. The aim of this study was to determine if IDP had antiviral properties, and how they compared with those of lactoferrin. Antiviral effects were determined using in vitro tissue-culture based assays. Included in the testing were herpes simplex virus (HSV-1, MacIntyre), human influenza A (INFLUENZA A/Puerto Rico/8/34), human influenza B (INFLUENZA B/Lee/40), adenovirus (ADV-5), and a model for SARS-CoV-2: vesicular stomatitis virus-pseudotyped (rVSV-SARS-CoV-2 S). IDP was able to inhibit these viruses at a similar or lower concentration to lactoferrin. Further work is needed to determine if IDP based products can reduce the symptoms or incidence of viral infections in humans.



Session Title: D3 – Upcycling Food

Name Miranda Miroso
Job Title Associate Professor Department of Food Science
Organisation University of Otago



Presentation Title: Insights into consumer acceptance of upcycled foods made from waste

According to the International Upcycled Food Association, which has recently produced a certification standard for upcycled foods, these products use ingredients that otherwise would not have gone to human consumption. Both business and public interest in upcycled products is at an all-time high, with 'upcycling' hitting almost all the top food trend lists for 2021.

However, while there are hundreds of brands available in the USA, in NZ there are only several ranges. Advancing the idea that consumer-led new product development is the key to market success, 4 focus groups and a representative survey of 1000 consumers was carried out to assess consumers' perceptions of upcycled foods. While most consumers were positive about the approach's potential to reduce waste, they were reluctant to pay a premium and believed that the food's origin needed to be stated. Findings will guide manufacturers' efforts in development and marketing of foods from waste streams.



Session Title: D3 – Upcycling Food

Name Campbell Ellison
Job Title Food Technologist
Organisation Callaghan Innovation



Presentation Title: Circular Processing of Beer and Bread Waste

Spent grain is becoming a more significant by-product or waste stream in New Zealand as the amount of beer produced continues to rise and more craft breweries open. The goal was to create a closed loop between bread and beer where the spent grains from brewing are converted into bread and waste bread from the store is brewed into beer. Part of the closed loop bread-to-beer project is to convert the spent bread and malted barley grains from the brewing of beer into a shelf-stable "flour". As spent grain was not currently a human food material, we needed to develop frameworks for the collection, storage and processing of the spent grain and returns bread to ensure the finished products would be safe.



Session Title: D3 – Upcycling Food

Name Rahul Permal
Job Title PhD Candidate
Organisation Auckland University of Technology



Presentation Title: Converting Industrial Avocado Waste into Useful Products

The production of cold-pressed avocado oil (CPAO) has significantly increased in recent years due to its health benefits and culinary applications. However, extracting CPAO generates many by-products. To put this into perspective, for every 100 kg of CPAO, approximately 350 kg of avocado skin and seeds, 190 kg avocado pomace, and 570 kg of avocado wastewater (AWW) are generated. Pomace generated from CPAO is used as animal feed, but the seed, skin, and AWW are discarded into the landfill. This disposal practice is of concern as it pollutes New Zealand's environment, whilst incurring a high disposal cost to the avocado oil industry. Very little research has been conducted on valorising the CPAO by-products. Therefore, this research will present alternative use of avocado by-products such as converting AWW into powder for food preservation and avocado seeds into an extruded ready-to-eat snack.



Session Title: D3 – Upcycling Food

Name Anu Gnanavinthan
Job Title Head of Innovation, Quality & Compliance
Organisation The Pure Food Co.



Presentation Title: Novel 3D printing on Texture Modified Foods (TMF) to feed vulnerable population

The Pure Food Co (TPFC) has developed a range of highly nutritious fortified purees using novel process and technologies. These products have been very popular with hospitals/Aged Care across the country. Kitchen staff struggle to make the time to present pureed foods for those residents that require Texture Modified Food in an appetising way. Research has shown that food presentation has a significant impact on the eating experience and on food intake - something that is especially important for older people with eating difficulties who often struggle with low appetites. As a next step to an automated processing technology of shaped foods at PFC, we have explored the possibilities of 3D food printing for preparing personalised nutritious meals. The TPFC along with The University of Auckland present an exciting new way to offer highly nutritious pureed foods in a visually pleasing way using 3D printing. We expect the fine control over personalised portion control to reduce plate waste and allow better management of nutritional intake.



Session Title: D4 – Tackling Nutrition

Name Jonathan Saunders
Job Title Business Development Manager – Nutritionals
Organisation The TATUA Co-operative Dairy Company Ltd



Presentation Title: Dairy and Plant based peptone solutions: Probiotics and beyond

Peptones are an important source of nitrogen and amino acids in microbial nutrition. They can be made from different substrates, and the selection of substrates is under increased focus with fermentation being a key trend in the world of food production. What we feed probiotics and functional metabolite producing micro-organisms has implications for consumers. Market trends such as allergen-free introduce additional considerations for microbial nutrition production processes. Tatua has extensive experience in peptone production both from dairy and plant substrates. Key areas of research where Tatua has had success in peptone applications include: Casein peptones for diagnostic media; Soy peptones for growing probiotic strains; and Pea peptones as allergen-free microbial nutrition for fermentation and probiotic applications. Peptones will continue to become more diverse and varied, as consumer trends evolve with the increased usage of micro-organisms in human nutrition.



Session Title: D4 – Tackling Nutrition

Name Chris Johnson
Job Title Managing Director
Organisation Anagenix Ltd



Presentation Title: Plant to bottle - A journey

Chris will present the opportunities and issues around bringing plant based ingredients to the global markets. Anagenix over a number of years have had to find ways to get large global brands excited about our products and then formulate our ingredients into their on shelf sku's. We started with building a solid science portfolio including clinical trials. Once this was in place we needed to build a sales toolkit which included building a brand that would allow distributors and brands globally to leverage our products into the market through their formulations. The journey was long and frustrating.



Session Title: D4 – Tackling Nutrition

Name Biniam Kebede
Job Title Senior Lecturer
Organisation University of Otago



Presentation Title: Metabolomic fingerprinting to tackle food science and nutritional challenges

It is becoming increasingly recognised that metabolomic fingerprinting combined with data mining have a considerable potential to tackle food science and nutritional challenges. Metabolomics focuses on high-throughput characterization of small molecule metabolites in biological systems. It is ideally positioned to be used in many food research areas, such as (1) component analysis; (2) quality/authenticity/safety assessment; (3) consumption monitoring and nutritional and health biomarker selection. In this talk, a summary of on-going research activities at the university of Otago will be presented. Case studies on the potential of metabolomics to aid NZ hop breeding, study traceability of foods, investigate impact of food processing on quality, etc. will be presented. Challenges and opportunities will also be discussed. Overall, our research has successfully demonstrated that metabolomics combined with modern chemometrics have a huge potential to understand, control and predict food quality changes from farm to fork and beyond.



Session Title: D4 – Tackling Nutrition

Name Tony Mutukumira

Job Title Senior Lecturer in Food Technology

Organisation Massey University



Presentation Title: Reducing FODMAPs in bread

Fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs) comprise of a group of indigestible short-chain carbohydrates that have gained attention as potential triggers of gastrointestinal (GI) symptoms such as abdominal pain, bloating and diarrhoea in patients with GI-related disorders (e.g., Crohn's disease, Coeliac disease, and Irritable Bowel Syndrome). Bread is a major source of FODMAPs and may not be suitable for susceptible consumers. Sourdough culture is a complex microbial ecosystem dominated by lactic acid bacteria and yeast which is capable of degrading FODMAP sugars through enzymatic activities. Therefore, reduction of FODMAPs in bread can be achieved using sourdough fermentation technology.



Day 2 – Wednesday July 7th 2021



Session Title: E - Plenary

Name Jeremy Hill
Job Title Chief Science and Technology Officer & Professor
 Sustainable Nutrition
Organisation Fonterra Cooperative Group & Riddet Institute,
 Massey University
Presentation Title: Sustainable Nutrition Initiative



The purpose of the Sustainable Nutrition Initiative is to help create a better understanding of the food system and opportunities for improvement in order to sustainably feed the global population with the nutrients required.

Before we embark on changes to our diets or food supply, we need have a better understanding of the food system.

Under what scenarios is it POSSIBLE for the global food system to provide the bioavailable nutrients to feed the global population?

What scenarios are PRACTICAL to achieve, for example in terms of level of change required, cost of that change or affordability of food?

What is the OPTIMAL scenario to deliver a sustainable food system?

To support this we have developed a model – the DELTA Model – that aims to generate informed discussion. It can generate a wide range of possible scenarios to explore and expand thinking.



Session Title: E - Plenary

Name Dale Bowie
Job Title Development Chef/Owner
Organisation Ideas 2 Plate



Presentation Title: Making the connection between science and cooking

Science is integral part of the kitchen today; we can see more and more scientific equipment being used in kitchens. We know the Chefs at the top of the game or desperate to understand the makeup of the products that they are using. During this talk I will make the connection between the modern hospitality kitchen and the science lab

Over the last year working with Agresearch we have come leaps and bounds in understanding how scientists and chefs can work together can achieve the impossible.



Session Title: F1 - Fonterra

Name Mark Piper
Job Title Director Category, Strategy and Innovation
Organisation Fonterra Cooperative Ltd



Presentation Title: Unlocking the Goodness of New Zealand Milk

With around 150 years of experience in NZ and 94 years of innovation, the dairy industry is just getting started. We believe that dairy has a strong future as global demand continues to grow and the opportunities for NZ to have a strong animal agriculture sector alongside a strong non-animal agriculture sector is very exciting for the future of NZ.

At Fonterra we are looking at the next step changes in innovation to continue to be the most sustainable producer on the planet while making nutritious and delicious food.



Session Title: F1 - Fonterra

Name James Dekker
Job Title Platform Manager, Nutrition & Health
Organisation Fonterra Cooperative Ltd



Presentation Title: Going with your gut; making a success out of probiotics

Fonterra has been active in probiotics research for over 25 years, and have developed two commercialised strains that are among the most recognised strains in the world. Although Fonterra has spent a lot of effort defining the health properties of its strains, success in probiotics is dependent on more than "just" providing consumer-centric health benefits. The probiotics research programme was able to utilise expertise from across the co-operative, from manufacturing and product stability research to regulatory support.



Session Title: F1 - Fonterra

Name Amanda Nottage
Job Title Research Technologist
Organisation Fonterra Cooperative Ltd



Presentation Title: "Cream' Cheese of the Crop

Creating value for Fonterra shareholders is at the forefront of our strategy so it is no surprise that value added products are a focus for innovation.

Cream cheese is a successful and high value export product for Fonterra. By utilising our knowledge of product history and continuing to apply innovation, our cream cheese is meeting the demands and application needs of global markets.



Session Title: F1 - Fonterra

Name Kailyn Smith
Job Title Corporate Sustainability Manager
Organisation Fonterra



Presentation Title: Sustainability & The Conscious Consumer: A Fonterra Perspective

Having sustainability practices is no longer optional, consumers demand it and expect companies to have credible claims and ambitious sustainability agendas. As a co-operative, Fonterra has a longstanding commitment to sustainability and is constantly evaluating customer and consumer insights to develop sustainability solutions with the conscious consumer in mind. We know we have the opportunity, and the responsibility, to influence for the good and make a difference when it comes to sustainable dairy nutrition.



Session Title: F2 - Sense, satisfaction and the measurement of taste and aroma

Name Ryan Chanyi
Job Title Postdoctoral Researcher
Organisation AgResearch



Presentation Title: An improved method for extracellular polysaccharide isolation from *Streptococcus thermophilus* in high protein samples

Extracellular polysaccharide (EPS) produced by lactic acid bacteria is an important component contributing to the texture of fermented food products. Typically, bacterial growth medium-based measurements are used to infer a bacterium's ability to produce EPS in a commercial product. Current isolation procedures are not adequate for high protein samples, such as milk. Therefore, an improved methodology was developed. Three methodologies were assessed in three different growth media. Xanthan gum spiked samples showed efficient recovery (>80%) in CDM and M17 but not in RSM. Implementing a protease step for RSM increased xanthan gum recovery from 28-34% up to 64%. When tested using three *S. thermophilus* isolates, the improved methodology significantly increased the recovery yield of EPS in RSM. This study provides an improved method for the isolation of EPS in proteinaceous samples, such as yogurt and kefir.



Session Title: F2 - Sense, satisfaction and the measurement of taste and aroma

Name Hanh Nguyen
Job Title Scientist
Organisation AgResearch



Presentation Title: Milk gelation investigation using microscopy, conventional and high throughput micro-rheology techniques

Gelation process is one of the most significant changes during fermentation and affects the structure, rheology and mouthfeel perception of fermented products. In this study, we investigated the gelation process of milk fermented by different cultures using microscopy, high throughput micro-rheology and conventional rheology techniques.

Significant differences were found in the gelation of milk fermented by different cultures. Gelation points determined by conventional rheology occurred at different pHs for milk fermented by different cultures and were correlated with the transitional points in the high throughput micro-rheology system. Microstructural characterisation showed a new step in gelation process – gelation inception started with the formation of serum pockets seeded within the continuous phase of milk protein, prior to protein aggregation. The results demonstrate the usefulness of high throughput systems to rapidly screen bacterial strains and the power of multiple technique approaches, to develop new fermented products with desirable rheological and structural properties..



Session Title: F2 - Sense, satisfaction and the measurement of taste and aroma

Name Jihan Kim
Job Title Postdoctoral Scientist
Organisation AgResearch



Presentation Title: Rapid assessment of microbial performance using a mini-scale meat fermentation system

Meat fermentation is a traditional and economical way to preserve and enhance the quality of meat. The process is a complex biological chain of events mediated by a shifting balance of dominant microorganisms. The mini-scale system was developed to evaluate the performance and potential applications of microbial starter cultures. Five commercial strains (2 x Lactobacillus, 2 x Staphylococcus, 1 x Pediococcus) were selected and microbiological activities that affect the sensory and quality attributes of fermented meat products were measured. Various chemical and instrumental analyses were employed, including acidity, texture, colour, oxidation, and accumulation of small molecule metabolites by nuclear magnetic resonance. The new system is a useful tool to facilitate tests of fermentation strains, recipes and other industry-relevant factors. The mini-scale meat fermentation system plus the assays are practical and efficient at a simultaneous evaluation of multiple strains.



Session Title: F2 - Sense, satisfaction and the measurement of taste and aroma

Name Fionnuala Murphy
Job Title PhD Student
Organisation AgResearch



Presentation Title: Exploring the changes in sensory attributes and peptide fingerprints throughout the fermentation of milk

The fermentation of milk transforms it into various products with an extended shelf-life and enhanced nutritional and sensory properties. The aim of this study was to track the changes in bitterness and flavour intensity, perceived by consumers, throughout the fermentation of milk. Using fermented milks prepared from two different starter cultures (YF-L811 (mild flavour) and YC-380 (intense flavour)), the differences in two key attributes perceived by consumers at six time points throughout fermentation were evaluated. Combining this with mass spectrometry techniques, we wish to establish whether a correlation exists between changes in bitterness and flavour, and the peptide fingerprints of these fermented milk products. By better understanding the development of desirable and off-flavour characteristics, this information can potentially aid in the selection of new and interesting bacterial cultures to enhance the quality, acceptability and flavour of fermented milk products.



Session Title: F3 – Alternative Proteins

Name Lovedeep Kaur
Job Title Senior Research Officer
Organisation School of Food and Advanced Technology, Massey University



Presentation Title: The Role of Kiwifruit Consumption in Plant Protein Digestion

Plant proteins are gaining popularity as they are seen as an environmentally friendly answer to the growing global demand for protein foods. However, there is insufficient knowledge on how these proteins are digested in the human digestive tract and how their digestion may be influenced by other components of the food matrix such as kiwifruit. Thus, the aim of this study was to determine the effects of actinidin in Green (*Actinidia deliciosa* var. 'Hayward') and SunGold (*Actinidia chinensis* var. *chinensis* 'Zesy002') kiwifruit on plant protein digestion, using a 3-stage in vitro model. Four commonly consumed plant proteins, including pea protein, almonds, tofu, and quinoa, were digested in the presence or absence of Green or SunGold kiwifruit extract. Both kiwifruit extracts altered the digestion patterns of all digested proteins, particularly in the gastric digestion phase. However, their impacts varied among different proteins. The results suggest the potential of kiwifruit for improvement of digestive health.



Session Title: F3 – Alternative Proteins

Name Chih-Chieh Chuang
Job Title Research Scientist
Organisation Fonterra, Recent PhD Grad from Massey University



Presentation Title: Hemp seed protein: prospects and pitfalls

Hemp seed containing <5 mg/g THC can be legally incorporated into foods and processed for food ingredients in Australia/New Zealand. Dehulled hemp seed contains ~32% w/w protein, which is ~60% of the non-fat solids. We developed a hemp protein isolate (HPI) process consisting of aqueous salt extraction (0.25M NaCl, pH 7) followed by ultrafiltration, dialysis and freeze-drying, which produced 89.6% pure hemp globulin (edestin). HPI had low solubility at <0.2M NaCl, but solubility could be dramatically improved by complexing with sodium caseinate (milk protein) via heating (90°C, 4-15 min) or pH-cycling (pH 12, 1h). Colloidal HPI-caseinate nanocomplexes had good heat stability and emulsifying activity.

Scale-up of the HPI process is likely meet challenges around cost and water usage, but especially the limited solubility of HPI. Published in vivo data on the nutritional quality of hemp seed protein indicate that although ileal digestibility is 84-97%, the amino acid profile is poorly matched to human indispensable amino acid requirements, particularly due to low lysine content (DIAAS 0.56).

Aside from solubility and protein quality concerns, hemp seed can be considered to be relatively nutritious food due to polyunsaturated lipid profile, favourable n-6:n-3 ratio and high fibre content. Hemp seed food ingredients range from whole seed to powders containing up to 70% w/w protein, and though the prospects for hemp protein beverages are limited by the low solubility of edestin, hemp seed ingredients are a promising new option for snacks, bakery products, and breakfast cereals.



Session Title: F3 – Alternative Proteins

Name Jaspreet Singh
Job Title Associate Professor
Organisation Massey University



Presentation Title: Hybrid Meats: New Zealand's answer to rapidly growing global meat analogues industry

There is a great interest all around the world to create second generation of meat analogues which are capable of providing similar nutritional value, physical dimensions and taste like real meat cuts. The commercially available vegetarian meat analogues, which are usually prepared through traditional extrusion cooking fail to mimic the meaty taste, mouthfeel and nutritional quality of real meat. Processing combinations of protein sources differing in their compositional, denaturing, and melting characteristics is nearly impossible with extrusion cooking. A new technology (provisional patent filed) has been developed at Massey University in New Zealand to create plant protein-animal protein (low value meat and milk protein sources) hybrid meat analogues possessing superior nutritional, textural characteristics and physical dimensions. This technology is capable of handling a range of protein ingredients (plant-only and their combinations with dairy, meat) to produce flexitarian meat analogues of varying dimensions. A range of techno-functional, molecular characteristics and sensory attributes of hybrid meats have been studied and compared with commercially available meat analogues. There is an opportunity for New Zealand food industry to capture a share of rapidly growing global meat analogues market through this new technology and animal protein ingredients from our primary streams.



Session Title: F3 – Alternative Proteins

Name Nicola Wilson
Job Title Food Technologist
Organisation Leaft Foods Ltd



Presentation Title:

At Leaft Foods, we see the challenges faced globally when it comes to food consumption and we are hitting these head on, striving to create a high quality, sustainable plant protein. We are working to creating ingredients and formulations with protein from leaves, to open up new choices for eaters of food, and unlock opportunities for growers of leafy crops. Our new product and process development journey, propelled by the lab scale research of our predecessors, is now gaining momentum. Jump aboard with us for a voyage of discovery, as we navigate the Leaft Foods start up waka through the uncharted waters of scale up and novel food product development.



Session Title: F4 – Creative Developments

Name Nick Smith
Job Title Research Officer
Organisation Riddet Institute



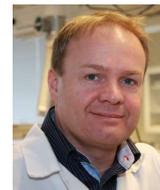
Presentation Title: The DELTA Model for sustainable food systems of the future

Understanding how to attain a sustainable food system requires models that can forecast the nutrition that will be required by the population. We have developed the DELTA Model, which captures global data on food production and supply chains to calculate the nutrition available to the global population. The model can be used to simulate existing or future food system scenarios. The DELTA Model finds that sufficient macronutrients are supplied by the current food system to nourish the global population and population increases of up to 1.5 billion people. Conversely, current micronutrient availability does not meet global requirements. Calcium and Vitamin E are undersupplied by the current food system, while others also become undersupplied when considering future populations. Reducing food waste does not resolve all of these micronutrient undersupplies. The results of the DELTA Model emphasise the need to consider nutrition when planning future global food systems.



Session Title: F4 – Creative Developments

Name Alastair Ross
Job Title Senior Scientist
Organisation Ag Research



Presentation Title: Quick and detailed measurement of food properties using rapid evaporative ionisation mass spectrometry (REIMS)

Methods such as metabolomics can provide highly detailed and useful information about food, yet require too much preparation and analysis time to be of practical use outside of a research laboratory. Rapid evaporative ionisation mass spectrometry (REIMS) is a new development that allows measurements on intact samples within seconds, resulting in a high resolution mass spectral fingerprint that provides insights into molecular composition. We have applied REIMS to many different food research projects, including finding distinct molecular signatures related to lamb country of origin, different pasture types and processing. REIMS represents the potential for rapid mass spectral fingerprinting for food monitoring of provenance, quality, safety and product development.



Session Title: F4 – Creative Developments

Name Sarah Cordiner
Job Title Research Associate
Organisation Plant & Food Research



Presentation Title: Direct from the Orchard: A stable high vitamin C food ingredient

Ascorbic acid, commonly known as Vitamin C, is an essential nutrient, potent antioxidant, and widely used food ingredient. However, high temperatures, pH, and food processing induce its rapid degradation. A chemically stable variation of ascorbic acid, 2-O- β -D-Glucoopyranosyl-L-ascorbic acid (AA-2 β G), has recently been observed in high concentrations in crab apples (*Malus sylvestris*), making it one of only four plant species for which ascorbyl glycosides have been reported. The stability of the natural ascorbic glycoside observed in crab apples was similar to the synthetic AA-2 β G, widely used in cosmetic and pharmaceutical products. In our study we report the concentrations of ascorbyl glycoside during the manufacture of four crab apple food products (jelly, leather, powder, cider) and their palatability to a sensory panel, and discuss the feasibility of making an apple food product that contains natural shelf stable vitamin C.



Session Title: F4 – Creative Developments

Name Jolin Morel
Job Title Research Scientist – Food Process Technology
Organisation Massey University/Callaghan Innovation



Presentation Title: Continuous Rapid Freezing of Liquid Food Products

To grow the New Zealand sheep dairy industry further, a reliable method for aggregating multiple milkings into lots large enough to process economically is needed. Freezing in large pouches or buckets can cause a loss of quality after frozen storage.

Under the FIET research programme we carried out a systematic investigation into changes occurring during frozen storage of ovine milk, phase transitions occurring during freezing, and the effect of freezing conditions on the ice structure in the frozen product.

From this scientific background, we investigated several continuous freezing methods culminating in a novel form of freezer. This was prototyped at various scales. It exploits the effects of ice growth rate on ice structure, and the progressive freezing behaviour of ovine milk to achieve rapid continuous freezing into solid pellets.

This talk will describe our freezer, the physics behind its operation and commercial production of units for on-farm or near-farm use.



Session Title: G - Plenary

Name Volker Kuntzsch
Job Title Chief Executive
Organisation Cawthron Institute



Presentation Title: Volume versus Value – care to differ!

Value creation in primary industries has traditionally been associated with increasing volumes and efficiency improvements across the supply chain. Recently, the focus on branding, storytelling and innovation has prompted a different perspective on value appreciation, especially in the marine sector. Limited land space in Aotearoa and a focus on natural capital mean we ideally apply measures that relate value to ha of land or water space farmed, which might suggest that increasing value can only be achieved through highly innovative product. However, deliberate differentiation on the basis of origin, product traits and care can ensure high value, even at scale that traditionally would have been classed a commodity. A further paradigm shift in value creation from our primary resources will be achieved by fulfilling consumer expectations beyond their basic needs, i.e. shifting from food to nutraceuticals, cosmeceuticals or pharmaceuticals, and in meeting growing societal demands regarding our products' environmental footprint.



Session Title: H1 – We've Got Bugs

Name Anne-Marie Perchec - Merien
Job Title Specialist Adviser Microbiology
Organisation New Zealand Food Safety, Ministry for Primary Industries

Presentation Title: It's here; our *C. botulinum* type A freedom bubble has burst

This presentation reports the first evidence of *Clostridium botulinum* type A in New Zealand.

C. botulinum strains pathogenic to humans (types A, B and E) have never previously been detected in environmental samples or from food harvested or produced in New Zealand.

In June 2020, four botulism cases associated with the consumption of home-preserved sea snails occurred in the Bay of Plenty. *C. botulinum* neurotoxin type A was detected by PCR and *C. botulinum* type A was isolated in the remaining food consumed by the cases.

Following this episode, an environmental survey targeting seafood and anaerobic sediments in the vicinity of the original recreational harvest was undertaken in July 2020.

A total of 100 samples were collected and analysed by PCR for the *C. botulinum* neurotoxin (NT) and non-toxin non-hemagglutinin (NTNH) genes.

One sample from a stormwater sediment was found positive by molecular testing for both the neurotoxin type A (NT A) and the NTNH genes, and several other samples were positive for NT A only.

A wider survey is recommended to better quantify the distribution of *C. botulinum* type A in New Zealand shellfish from recreational and commercial growing and harvesting areas, to provide assurances to customers and consumers, and to inform guidance for home preservation of shellfish harvested in New Zealand.



Session Title: H1 – We've Got Bugs

Name Emmanuel Kyere
Job Title Food Microbiology Technologist
Organisation Massey University



Presentation Title: Reduction of the colonization of lettuce by *L. monocytogenes* using UV-C stress

Mild stress of leafy greens by UV-C has been reported to stimulate plant defences capable of reducing pathogens on produce surfaces. In this study, the attachment, survival and growth of *L. monocytogenes* was investigated on lettuces stressed with mild UV-C radiation (1.3 kJm^{-2}). Attachment of *L. monocytogenes* to UV-C stressed (1.3 kJm^{-2}) lettuce leaves after 1 h was significantly ($p < 0.05$) reduced by $1.4\text{--}1.5 \text{ log cfu/cm}^2$. UV-C stress also reduced the survival of *L. monocytogenes* on lettuce by $1.8\text{--}1.9 \text{ log cfu/g}$ 96 h after inoculation, however a higher dosage of UV-C stress (2.6 kJm^{-2}) did not inhibit the survival of *L. monocytogenes*. The total phenolic compounds in lettuce significantly increased following UV-C stress indicating the accumulation of polyphenols might have contributed to the inhibition of *L. monocytogenes* growth. Appropriate dosage of mild UV-C stress of lettuce can reduce the attachment, survival and growth of *L. monocytogenes* in lettuce and can therefore be explored further for application in fresh produce safety.



Session Title: H1 – We've Got Bugs

Name Saili Chalke
Job Title PhD Student
Organisation Plant & Food Research, Massey University



Presentation Title: *Listeria* biofilm in the cationic world – What's happening ?

Listeria monocytogenes is a Gram-positive foodborne pathogen that causes outbreaks of listeriosis associated with a diverse range of foods. *L. monocytogenes* forms biofilms as a strategy to enhance its chance of survival in the environment. These biofilms then provide a source for contamination in processing plant environments. These biofilms are difficult to eradicate as they are resistant to the antimicrobial agents used in cleaning. Cations such as magnesium, calcium, and sodium are an integral part of the seawater and seafood environment. Bacteria use these cations to maintain their homeostasis; however, high concentrations inhibit growth. Therefore, it is important to understand the relationship between these cations and biofilm formation.



Session Title: H1 – We’ve Got Bugs

Name Graham Fletcher
Job Title Research Team Leader
Organisation Plant & Food Research



Presentation Title: Persistence of *Listeria monocytogenes* on apples during international and domestic supply chain

A listeriosis incident in the USA in 2014/15 involving apples refocused the industry on *Listeria monocytogenes* control throughout the supply chain. Temperature profiles of shipping containers travelling between NZ and the USA, and of the typical domestic supply chain were simulated. Two apple cultivars were tested in each scenario: ‘Royal Gala’ as a closed calyx and ‘Scired’ as an open calyx cultivar. Apples were spot-inoculated with *L. monocytogenes* cocktail on the skin and in the calyx region. Sampling was conducted on day 1, and at 1, 2, 4, 8, and 12 weeks after inoculation for international and day 1, 2, 3 and 5 after inoculation for domestic supply chain simulations.

L. monocytogenes did not grow under either temperature regime. Bacteria inoculated into the calyx persisted longer than the body. *L. monocytogenes* concentrations decrease during typical commercial transport and storage conditions but surviving pathogens may still risk causing foodborne disease.



Session Title: H2 - Sense, satisfaction and the measurement of taste and aroma

Name Raise Ahmad
Job Title Postdoctoral Researcher
Organisation AgResearch



Presentation Title: Milk fermentation by *Lactobacillus*: Looking deeper into taste and flavour molecules

Lactic acid bacteria imparts distinct taste and flavour to milk through the fermentation process. Thus, it is vital to understand its metabolic activity to achieve desirable traits in yoghurt. We used two thermophilic [*Lactobacillus helveticus* (LH002), *Streptococcus thermophilus* (ST001)] and three mesophilic strains [*Leuconostoc mesenteroides* (CL3), *Leuconostoc pseudomesenteroides* (CL3ST), *Lactococcus lactis* (BL1)] to ferment reconstituted skimmed milk. As a comparison we also used flavour imparting commercial thermophilic mixed cultures CH1 and YF-L811. Quantitative compositional analysis was carried out to detect: 1) free amino acids contributing to taste and flavour using HPLC, 2) taste metabolites using 1H-NMR metabolomics. Taste and flavour amino acids were highest in LH002 and lowest in ST001. The thermophiles used lactose-glycolytic pathway in homofermentative manner while, mesophiles utilized citrate and pyruvate metabolism in heterofermentative manner to exhibit distinct flavour profile. Moreover, thermophiles produced more sugars, organic acids whereas mesophiles showed higher acetate and butyrate content. Taken together, our data demonstrate disparate flavour profiles among five new bacterial starter cultures that may be used to attain desirable flavour characteristics in fermented milk products.



Session Title: H2 - Sense, satisfaction and the measurement of taste and aroma

Name Evelyne Maes
Job Title Proteomics Platform Leader & senior scientist
Organisation AgResearch



Presentation Title: In-depth characterisation of taste-active peptides in fermented milks

The typical flavour of fermented milks is formed by a combination of molecular compounds, typically derived from the fat, protein, and carbohydrates present in the raw milk. Taste-active peptides are mostly generated through primary proteolysis of the raw material by endogenous enzymes or proteases from microorganisms. As bacterial-inoculated fermentation of milk releases small peptides that can lead to enhanced sensory properties, further insights in their ability to impart taste and flavour is required.

In this study, we applied high-resolution mass spectrometry-based peptidomics approaches to perform an in-depth characterisation of the peptides present in five fermented milks using diverse starter cultures. Over 6000 non-redundant peptide sequences were identified across the dataset. Key insights in the ability to impart taste were obtained from the Q-value of each peptide sequence as well as predictions on their potential taste via an in-house database which contains peptide sequences linked to taste and flavour.



Session Title: H2 - Sense, satisfaction and the measurement of taste and aroma

Name Mariza Gomes Reis
Job Title Scientist
Organisation AgResearch



Presentation Title: Characterization of aromas in drinkable yoghurt fermented by five lactic acid bacteria

The ability to form aroma compounds in fermented milk is one of the basic parameters through which starter cultures are selected for yogurt manufacturing. Yogurt flavour is a result of a delicate equilibrium between aroma compounds present in the milk and secondary metabolites synthesized by lactic acid bacteria. In this study, we characterise the aroma of milk fermented by five lactic acid bacteria obtained from single culture (*Streptococcus thermophilus*, *Lactobacillus helveticus*, *Lactococcus lactis* subsp *lactis*, *Leuconostoc mesenteroides*, *Leuconostoc pseudomesenteroides*), and commercial mixed cultures (YF-L811 and CH-1, both containing *Lactobacillus debrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus*) as well as the control milks (i.e. without bacteria). In total, fifty-five aroma compounds were detected in the fermented milk samples by headspace-SPME-GC-MS. Aroma compounds identified belonged to several chemical classes and were derived from the main skim milk constituents (i.e. protein and carbohydrates). Correlation analysis revealed a clear difference in the aroma profile among groups of samples. It was observed that although *L. mesenteroides* and *L. pseudomesenteroides* belonging to the same genera, they generated very distinct aroma profiles. While *S. thermophilus* has an aroma profile closer to the commercial cultures, it generated 94% and 184% more diacetyl than YF-L811 and CH-1, respectively. The higher concentration of diacetyl might improve the creaminess perception of the yogurt. These results will help to inform the selection of cultures for production of fermented dairy products with particular flavours to reach desirable attributes for different consumer markets.



Session Title: H2 - Sense, satisfaction and the measurement of taste and aroma

Name Amanda Dupas de Matos & Catriona Hay
Job Title Sensory Research Officer
Organisation AgResearch & Massey University



Presentation Title: Are recent immigrants' product preferences representative of consumer markets back in their home country?

In-market consumer trials are expensive particularly during pandemic times. This study explored whether recent immigrants' product preferences mimic consumers overseas. The preferences for drinkable yoghurt were compared across Chinese in Beijing (BJ), Chinese in NZ for less (CH<3y) or more (CH>3y) than 3 years, and NZ Europeans in NZ (NZE). CH<3y described preferences for sweet yoghurt with low sourness and high milky/dairy flavour, aligning with BJ. However, CH>3y closely matched NZE preferences, particularly for sweetness. A preference for thick yoghurt was maintained by Chinese immigrants, in line with BJ, compared to NZE. Many consumption habits of CH<3y matched BJ, but some habits had changed, particularly regarding yoghurt for breakfast. In contrast, consumption habits of CH>3y closely aligned with NZE. Acculturation processes can take at least 3 years to impact immigrant preferences, suggesting that recent immigrants could be used for initial product testing representing a sustainable opportunity to model overseas markets.



Food-With Care
Kai - me te whakaaro nui
NZIFST Conference, 2021
6 - 8 July Palmerston North

Session Title: H4 - Plant & Food Research: Driving NZ's Plant Proteins Future

Name Mandy Armstrong
Job Title Commercialisation Manager
Organisation Cucumber Ltd



Presentation Title: Emerging Proteins – Setting the Scene

Global food supply is being impacted by many pressures, driven mainly by a demand for protein that is not animal based. This presentation will cover:

- Pressures impacting food supply from a global perspective,
- The strategic situation NZ finds itself in – given the history of the pastoral sector
- Potential pathways for NZ to engage in emerging proteins
- Challenges & risks – with an emphasis on the innovation capabilities we need for this future opportunity to be viable

Food-With Care
Kai - me te whakaaro nui
NZIFST Conference, 2021
6 - 8 July Palmerston North

Session Title: H4 - Plant & Food Research: Driving NZ's Plant Proteins Future

Name Thomas Sowersby
Job Title Research Technologist
Organisation Plant & Food Research



Presentation Title: A New Zealand protein industry from plants: Evaluating crop potential

New Zealand's capability for producing animal-derived protein ingredients is globally recognised, however this capability has yet to be leveraged toward the production and manufacture of plant-derived alternatives. The New Zealand Institute for Plant and Food Research Limited has applied Kepner-Tregoe (KT) decision analysis methods to systematically evaluate the potential of more than 70 locally produced crops as feed stocks for a New Zealand plant protein ingredient industry.

Additionally, we have carried out small-scale investigations on several leafy crops to understand the fractionation of leaf processing streams, including their protein yields under differing maceration, conditioning and pressing conditions.

In this presentation we will share our KT analysis process, the outputs generated, and discuss how protein sources, such as peas and leafy crops, fared under our evaluation context. For the leafy crop trial work, we will discuss our methods, the challenges associated with processing leafy crops, and insights from our initial studies.



Session Title: H4 - Plant & Food Research: Driving NZ's Plant Proteins Future

Name Richard Edmonds
Job Title Food Process Engineer
Organisation Plant & Food Research



Presentation Title: Leaf Protein – The critical mass for a viable industry

The use of leafy green plants as sources of "alternative", non-animal dietary protein is an important area of current research. However, the economics of leafy plant protein ingredients for human consumption ("leaf protein ingredients") have previously been shown to be only marginally viable on the basis of current process know-how and fixed ingredient production rates.

We take a membrane-based approach for producing leaf protein ingredients in a New Zealand context and allow the scale of production to vary, to determine the critical scale at which leaf protein ingredient production can be economically favourable here.

We found that 1000 ha of leafy crop production would be the minimal viable area required to produce leaf protein ingredients. The assumptions and methodology will be presented in detail, along with the sensitivity of that critical scale to those assumptions. These results will assist other researchers, giving direction to the most responsive areas of research in leaf protein ingredients in a New Zealand context.



Session Title: H4 - Plant & Food Research: Driving NZ's Plant Proteins Future

Name Lee Huffman
Job Title Food Solutions Team Leader, Principal Scientist
Organisation Plant & Food Research



Presentation Title: Not all commercial plant proteins function equally

New Zealand is a global leader in the development of dairy protein ingredients whose functional properties, such as solubility, dispersibility, viscosity, heat stability, foamability and emulsification, have been tailored to specific food applications. However, with the possible exception of soy proteins, the functional properties of plant protein ingredients have yet to be developed to the same extent and vary widely between different plant protein types and ingredient manufacturing processes

We have tested the aqueous functionality of a range of commercial dairy, soy, pea and potato protein concentrates and isolates and interpreted what these results mean with respect to their likely performance in specific food applications

In this presentation we will share our results, including the performance of selected plant protein ingredients in one or two model foods, e.g. dry mix beverages and cold press nutrition bars. We will also consider the market for plant protein ingredients.



Session Title: H4 - Plant & Food Research: Driving NZ's Plant Proteins Future

Name Mario Alayon
Job Title Development Engineer
Organisation Plant & Food Research



Presentation Title: Optimization of the protein-soluble fibre diffusion and enzymatic starch hydrolysis

For the development/formulation of a plant-based dairy alternative, the diffusion of the soluble nutrients from the plant material (substrate) to the liquid (solvent) is crucial to achieve products with high concentrations of soluble compounds like proteins, fibres and sugars. In the case of plant material that contains starches, they need to be hydrolysed before applying any heat treatment, to avoid their gelatinization during processing. An optimal enzymatic hydrolysis of the starches needs to include an optimal diffusion of the soluble nutrients. Response surface methodology (RSM) is a common technique used in the food process optimisation.

We optimized the enzymatic hydrolysis of starches and the diffusion of protein and soluble fibres by applying RSM. Explanatory variables were temperature, plant material concentration and enzyme/substrate ratio. We evaluated glucose, protein, colour, viscosity and solid content. The product developed had higher protein, total dietary fibre and total solids content than the commercial products evaluated.



Day 2 – Thursday July 8th 2021



Session Title: I1 – Lipids – Drilling Down

Name Andrew MacKenzie
Job Title Principal Research Scientist
Organisation Callaghan Innovation



Presentation Title: Analysis of Phosphorus-containing Compounds in Dairy and Non-Dairy Milks using ³¹P NMR

Phosphorus is present in food in a variety of forms. In dairy products it exists in lipids (e.g. phospholipids), proteins (e.g. phosphate bound to serine in caseins) and also as small molecules (e.g. inorganic phosphate, phosphocholine, glycerophosphocholine). Plant derived milk substitutes can contain other forms of phosphorus, for example phytic acid, which has been described as an “anti-nutrient” due to concerns over it inhibiting the dietary absorption of essential minerals. Processed foods may also contain significant amounts of phosphorus as additives (e.g. E451, sodium triphosphate used as a preservative; E450, pyrophosphate used as an acidity regulator).

The use of ³¹P NMR for the profiling of phosphorus-containing compounds in dairy and a range of non-dairy milks (soy, almond, cashew, oat, hemp, rice) will be presented. Phospholipid profiles, as well as the major forms of inorganic phosphorus, will be compared in these products.



Session Title: I1 – Lipids – Drilling Down

Name Sabrina Tian
Job Title Innovation Research Science Manager
Organisation Sanford Ltd



Presentation Title: Developing Marine Omega-3 Oils- With Care

Sanford's innovation strategy is focused on creating new value opportunities with strong links to sustainability. Omega-3 oils that Sanford developed from NZ fish species are used for both human and animal products. Currently a PhD project is co-funded by Sanford and Otago University to support Sanford's efforts to maximize the use of natural resources and investigating new opportunities. The project focuses on lipidomics of fish by-products generated by Sanford. Our findings suggest that fish roe from some of NZ fish species is a great source of marine omega-3 phospholipids.

Another area of interest to Sanford is the quality and stability of marine omega-3 oils. Scientists from Sanford and Callaghan Innovation have designed an effective accelerated shelf-life test using the OXITEST Oxidation Test Reactor. The OXITEST has successfully used for measuring antioxidant performance, assisting marine oil formulation research.



Session Title: I1 – Lipids – Drilling Down

Name Karl Fraser
Job Title Senior Scientist
Organisation AgResearch



Presentation Title: Impact of simulated digestion of ruminant milks on the milk lipidome

Interspecies differences in ruminant milk lipid composition have been previously reported, however the impact of processing and digestion of the lipidome is not well understood. Three goat milk products were prepared for digestion; raw milk; pasteurisation and homogenisation (PH); homogenisation and yoghurt heat (YH) treatment. These 3 milk products were subjected to both simulated semi-dynamic gastric in vitro digestion (20 min and 180 min) followed by static intestinal digestion (20 min and 180 min). Digesta were extracted and the lipidome measured. Lipidomics analysis revealed 369 lipid species in the goat milk digestion samples. The lipidome profile of raw milk after 20 and 180 min of gastric digestion were similar to PH and YH digestion profiles of 20 min, but significantly different to PH and YH 180 min profiles. Intestinal digestion significantly reduced the levels of all lipids after 20 min. This study highlights milk processing can impact the milk lipidome.



Session Title: I2 – Indigenous Foods

Name Donato Romanazzi
Job Title Industry Research Liaison
Organisation Cawthron Institute



Presentation Title: Growth from the sea, health to the people: Revealing karengo as a high-value functional food

Consumers are demanding alternatives to traditional foods mass-produced through intensive agriculture. Novel sources of biomass that have healthy, tasty and nutritious attributes have considerable attraction. Macroalgae are one possible source of biomass for producing novel high-value functional foods that address these consumer drivers.

New Zealand's coastline contains many endemic species of seaweed, including some with unique attributes. Among these, a group of red macroalgae in the genera *Pyropia* and *Porphyra*, collectively known as karengo, are traditionally eaten by Māori.

We are evaluating karengo species for their suitability as the basis for a future high-value foods industry by determining the composition of individual karengo species through the growing season and how the composition influences health-promoting bioactivities of karengo extracts at the level of cell culture.

Compositional profile of New Zealand karengo is compatible with a high-value, health-promoting food. Future investigations will identify the best karengo species for a future karengo-based food industry, determine the bioavailability and bioactivities of their components, and investigate the challenges of establishing commercial-scale aquaculture.



Session Title: I2 – Indigenous Foods

Name Kang Huang
Job Title Lecturer
Organisation University of Auckland



Presentation Title: Nature-inspired microcarriers for enhanced antimicrobial delivery

Antimicrobials are used in agriculture, horticulture, food processing, and medicine to prevent human diseases. The current antimicrobial delivery vehicles have limited dispersibility in complex systems, poor stability in harsh environments, and lack of specificity and affinity for target microbes. In our studies, novel bio-based antimicrobial delivery systems have been developed to effectively target biofilms and deliver antimicrobial molecules to inactivate both bacterial and fungal biofilms. The yeast cell wall particles and eggshell powder were developed to encapsulate a broad spectrum of antimicrobial compounds including hydrophilic, lipophilic and even amphiphilic molecules. These studies demonstrate the high affinity of bio-based compositions to bind target bacterial and fungal cells and inactivate 5 logs of model pathogenic bacteria and fungi in wash water without and with high organic load. In addition, it has been demonstrated that these bio-based compositions can enhance the inactivation efficacy against bacterial and fungal biofilms.



Session Title: I2 – Indigenous Foods

Name Ramandeep Kaur Golan

Job Title PhD Student

Organisation Massey University



Presentation Title: Antioxidant and antimicrobial potential of mānuka and kānuka oils as natural preservatives for food applications

The polyphenolic compounds rich-plant essential oils have great scope to be used as natural preservatives for complete or partial replacements of the synthetic preservatives in food products. In this study, the antioxidant and antimicrobial activities of the essential oils obtained from the native plants of New Zealand, i.e., *Leptospermum scoparium* (mānuka) and *Kunzea ericoides* (kānuka) plants, were characterized. The results of antioxidant assays exhibited that all mānuka oils had greater free radical scavenging activities than kanuka and rosemary oils, at all tested concentrations. About the antimicrobial activity of essential oils, the findings obtained from broth dilution method (concentrations of essential oils from 5 to 0.04 %) exhibited that all tested oils were able to inhibit Gram-negative bacteria (*Salmonella* spp. and *Escherichia coli*) at 5 and 2.5 % concentration. However, lower concentration of mānuka oils were needed for inhibition of Gram-positive bacteria (*Staphylococcus aureus* and *Listeria monocytogenes*) than kanuka and rosemary oils.



Session Title: I3 – CRISPA – Gene Editing

Name Laurence Melton

Job Title Emeritus Professor

Organisation University of Auckland



Presentation Title: CRISPR has the potential to change our world

CRISPR gene editing won the Nobel Prize in 2020, and no wonder. It has tremendous potential to help us deal with the multiple problems of the next 30 years. After explaining how CRISPR technology works the presentation will focus its applications to food production and food safety. Breeding new high yielding wheat, rice and corn will help feed the world's burgeoning population, as will developing plants and animals that are disease resistant. Heat and drought tolerant crops and animals will assist in dealing with the threatening climate change. Nutrition can be improved, by breeding pigs with less fat and producing cooking oils with less saturated fat.

CRISPR can be used to detect bacteria causing food poisoning (e.g. *Staphylococcus aureus*, *Escherichia coli*, *Salmonella*). Superior strains can be chosen for food fermentations and production of probiotics. CRISPR with PCR amplification can detect food poisoning bacteria, meat adulteration and genetically modified crops.



Session Title: I3 – CRISPA – Gene Editing

Name Andrew Allan
Job Title Principal Scientist
Organisation Plant & Food Research



Presentation Title: CRISPR: a tool for generating plants with improved consumer traits

Despite an acceptance that New Zealand would allow, on a “case-by-case” basis, the development of genetically modified (GM) plants or animals, there has been no commercial release of such organisms in this country. This may have been an advantage – NZ’s clean-green-image (CGI) gives us market opportunities. However, GM plants are now 15% of world agricultural value – a market sector in which NZ has no part to play. Gene edited plants are also regulated as GM, in this country. In many other countries gene edited plants are not regulated, and gene edits cannot be detected, unless editing sites are published or disclosed.

Such plants – with gene edits – are not generated “lightly”, i.e. a considerable effort must be made to overcome biological and technical issues to make an edit. Despite this, already new cultivars are available (overseas) which show step changes in yield, improved growth in stressful environments, and increases in consumer-centric phenotypes such as colour, health compounds and flavour.

New Zealand now faces a decision point; how to adapt the regulatory system to cope with “evolved” plants which are better than grower’s current cultivars. What are the benefits and risks of change, versus the risks/benefits of the status quo? What does the future look like for NZs plant-based industries’?



Session Title: I3 – CRISPA – Gene Editing

Name Andrew Pearson
Job Title Manager Food Risk Assessment
Organisation New Zealand Food Safety



Presentation Title: Gene edited food: The global regulatory landscape

The rapid advances in tools for genetic manipulation in food production over the last 10 years, have presented a challenge for regulatory regimes. One of the most prominent gene editing tools CRISPR/Cas9 offers considerable potential in crop and animal breeding due to the precision of the changes it can introduce. In particular, the use of CRISPR to inactivate or delete genes offers an alternative to conventional breeding techniques but with less off-target impacts. Legislation to manage genetically modified food has often been unclear whether it encompasses the use of CRISPR in such roles where no new genes are added. Consequently, governments have been challenged to adapt regulation to the advances in genetic tools. In New Zealand and Australia, a review of new breeding techniques was undertaken in 2019, this paper discusses the recommendations of this review and also considers how other countries have chosen to manage these techniques



Session Title: J1 – Food Authentication

Name Ella Wilkins
Job Title Business Development Manager
Organisation Oritain Global



Presentation Title: How Scientific traceability can be used to prove the authenticity of food and protect reputations.

Food fraud is no longer considered to be a 'victim-less' crime, it costs the industry \$40-50B globally per year and it has many repercussions – both local and global. Worst of all is the detrimental impact it can have on market competition, the environment, animal, and social welfare.

With mounting pressure from consumers and the media, with the associated legislative tightening, supply chain visibility is quickly becoming a necessity.

Oritain's scientific traceability helps shine a light on opaque supply chains, but the work doesn't stop there. Oritain works with partners to help improve their understanding of your supply chain, its risk areas and, more importantly, how to reduce that risk.



Session Title: J1 – Food Authentication

Name Heike Schwendel
Job Title Scientist
Organisation Plant & Food Research



Presentation Title: Food Authentication - futureproofing New Zealand's high-value food industry

Food fraud is a growing risk to food producers and consumers worldwide, where geographical provenance and specific production methods are perceived as value added. Companies and countries are developing protocols which enable the authentication and consequently the protection of their unique products. As a small exporting nation of high-value food products, New Zealand's production systems, geographical origin, unique plants and cultivars deserve and require protection in international markets. The pressures of the COVID-19 pandemic, with its disruption of supply chains, made regulatory surveillance systems worldwide more vulnerable to food fraud. We present an overview of methodologies and legislations which protect the authentication of specific food products, within and outside New Zealand. We also investigate opportunities for the New Zealand food industry to use scientific analyses to implement a food authentication framework into their production systems.



Session Title: J1 – Food Authentication

Name Andrew Lewis
Job Title Principal Scientist & Team Leader
Organisation Callaghan Innovation



Presentation Title: NMR Screening of Foodstuffs to Check for Adulteration and Authenticity

Nuclear magnetic resonance (NMR) spectroscopy is increasing being used for checking the authenticity of foods, beverages, and food ingredients, and to screen them for the presence of adulteration. This talk will review the application of NMR for screening foodstuffs including honey, wine, fruit juices, and food ingredients like edible oils and spices. NMR offers many advantages over other techniques including the ease of sample preparation, the ability to run multiple types of samples without changes to the equipment, the intrinsic ability to quantify chemical compounds present without prior calibration using the specific compounds, and the capacity to detect and identify the compounds that were not specifically expected. The very low instrumental variability (day to day, instrument to instrument, and most importantly, lab-to-lab) makes it possible to compile databases of authentic spectra that can be used to verify the geographical origin, variety, and even the age of the product in favourable cases. The non-targeted nature of the technique provides a means of chemical fingerprinting that is ideally suited to detecting adulterations like added water, sugar syrups or presence of other compounds. The ability to use more than a single isotope (e.g. 1H, 13C, 31P, 23Na etc.), in addition to multiple experiments on the same sample means that a wide variety of compounds can be quantified to verify regulatory compliance.



Session Title: J1 – Food Authentication

Name Pradip Gyawali
Job Title Research Scientist
Organisation Institute of Environmental Science and Research (ESR)



Presentation Title: Microbial source tracking approach for shellfish safety

Faecally contaminated water is a major source of infectious pathogens in shellfish. Traditional quality assurance approach lacks specificity and unable to predict the presence of viruses. Application of post-harvest intervention can have negative impact on authentication. Since microbial source tracking markers are specific to their host and accurately identify the source of faecal contamination. The human specific viral markers, crAssphage, F-RNA phage GII and pepper mild mottle virus (PMMoV) were evaluated for their specificity and sensitivity. Their prevalence, concentration in sewage and shellfish were determined. Sensitivity of the markers was 1.0 and specificity ranged between 0.91-0.99. CrAssphage and PMMoV concentrations were one log₁₀ higher than F-RNA phage GII in untreated sewage and 2-3 log₁₀ in treated sewage. As an indicator of norovirus in shellfish, crAssphage and F-RNA phage GII had similar prediction accuracy whereas PMMoV significantly overestimated its presence. Therefore, combined analysis of crAssphage and F-RNA phage GII was recommended.



Session Title: J2 – Mussels and Muscles

Name Matt Miller
Job Title Lipid Chemist
Organisation Cawthron Institute



Presentation Title: Musseling Up - Lipids from Greenshell Mussels

Lipid extracts from New Zealand's iconic Greenshell mussel (GSM) are the world's most expensive nutritional oil (~\$2000 USD/kg). Traditional use of GSM by coastal Māori has been associated with improved joint health and a number of studies have examined the anti-inflammatory effects of GSM extracts.

This presentation highlights findings from a three year High Value Nutrition NSC programme "Musseling Up". Goals include a) identifying, discriminating and verifying GSM active ingredients; b) producing novel GSM food/extract products; c) determining the mechanism and efficacy in pre-clinical and clinical trials.

We have developed rapid analytical techniques using near infrared (NIR) spectroscopy to enable high through put analytics. Clinical trials have determined the extent of the bioavailability of the lipid fractions in four different formats.

GSM food products, food ingredients and extracts provide exciting opportunities for improving joint health and inflammation management.



Session Title: J2 – Mussels and Muscles

Name Fran Wolber
Job Title Senior Lecturer
Organisation Massey University



Presentation Title: NZ greenshell mussel protects joint and bone health

Greenshell mussel (GSM) is an important NZ seafood whose oil contains anti-inflammatory properties. We assessed whether whole GSM, including both oils and proteins, could protect against osteoporosis in bone, osteoarthritis in cartilage, and inflammation in macrophages, using novel cell and animal models. Both in vitro and in vivo, GSM showed protective effects in cartilage and bone but had no significant effect on inflammation. We conclude that whole GSM acts directly on cartilage and bone, and that whole GSM may provide unique health benefits different to its oil extract. As a follow-up to these findings, we have begun human intervention trials including metabolomics.



Session Title: J2 – Mussels and Muscles

Name Emma Bermingham
Job Title Senior Research Scientist
Organisation AgResearch



Presentation Title: The nutritional implications of consuming NZ, pasture-fed beef; preliminary findings

Meat is a complex food matrix of proteins, lipids, vitamins and minerals. The role of red meat in the human diet is of interest to meat producers, consumers and health agencies. Due to the potential role of meat-derived lipids on eating experience and consumer health, the lipid composition of meat is of increasing interest. To date the research has focused largely on the major lipid species, including saturated-, mono-unsaturated and poly-unsaturated. However, pasture-raised beef can also contain an appreciable quantity of the long-chain omega-3 fatty acids (LCn3), eicosapentaenoic acid, docosapentaenoic acid, and to a lesser extent docosahexaenoic acid.

As part of a larger research programme, to understand the nutritional implications of consuming NZ, pasture-fed red meat as part of a balanced diet, the fatty acid composition cooked tenderloin from pasture-raised (n=15 carcasses) and grain-finished Angus beef (n=15 carcasses) were determined. Concurrently, in vitro digestion of cooked tenderloin from pasture-raised (n=5 carcasses) and grain-finished Angus beef (n=5 carcasses) were determined. Finally, an acute human clinical study (ClinicalTrials.gov / NCT04545398) was undertaken to determine the post-absorptive kinetics of chylomicron fatty acids from young (20-34 years of age) men (n=30 per treatment).

We found that, compared to grain-finished beef, the concentration of LCn3 was higher in pasture-raised beef. Furthermore, the digests obtained from pasture-raised NZ beef (striploin) had higher amounts of docosapentaenoic acid in pasture-raised NZ beef. These results will be discussed in context of chylomicron fatty acid concentrations from the human clinical study.



Session Title: J2 – Mussels and Muscles

Name Mike Boland
Job Title Principal Scientist
Organisation Riddet Institute



Presentation Title: Processing muscle foods to improve texture and nutritional value

The 6-year FIET programme will finish this year. Project 3, meat tenderization, has operated for all that time, as a collaboration between the Riddet Institute, Massey University, the University of Otago and AgResearch. It has targeted adding value through texture improvements to meat and shellfish muscle through combinations of novel processes. Riddet CoRE work has investigated the effect of these processes on digestibility and nutritional value of meat and shellfish. The project has investigated meat from beef and dairy cattle, sheep, goats and paua. We have investigated a wide range of novel processes, including high hydrostatic pressure, pulsed electric field, shockwave processing, high intensity ultrasound and enzyme (actinidin) treatment, mostly in combination with sous vide cooking; and two-stage sous vide cooking by itself. This presentation will cover the highlights of the programme from the past 6 years, discuss the present state of the art and provide thoughts for the future.



Session Title: J3 – Getting It Right

Name Glen Neal
Job Title General Manager - Risk Management & Intelligence
Organisation Food Standards Australia New Zealand



Presentation Title: Kai - Me Te Whakaaro Nui ki Te Mana Kounga Kai Ahitereiria me Aotearoa

Perhaps the most careful standards FSANZ must set are those around allergen labelling. Glen will outline the recently completed journey that is Plain English Allergen Labelling. He will also speak about what's next on the allergen labelling front and finish with a plug about the Allergen Collaboration.



Session Title: J3 – Getting It Right

Name Debbie Hawkes
Job Title Allergen Bureau Board Director [Volunteer role]
[But my day job is: IT Process & Systems Manager]
Organisation Allergen Bureau
[Day job for: Hawkins Watts]



Presentation Title: "Food - With care, Kai - me te whakaaro nui" :
How does best practise food allergen management contribute to this theme?

Researchers have published that there is no such thing as zero risk when it comes to food safety, so how does the Food Industry provide "Food - with care". Allergens may be present in a food by direct, intentional addition, but also can be present under conditions of Good Manufacturing Practice (GMP), due to cross contact. We know this can occur at any point from primary production, raw materials, and ingredients and through the manufacturing process.

In February 2021, FSANZ gazetted the new Plain English Allergen Labelling (PEAL) amendment to the Food Standards Code. PEAL has been developed to help ensure mandatory food allergen declarations are clear and consistent so that consumers can understand, and have the information they need to make safe food choices.

This presentation will provide insights into our PEAL updated best practice allergen management guidance resources – including, the Food Industry Guide to Allergen Management and Labelling, and the VITAL® Program.



Session Title: J3 – Getting It Right

Name Janet Goodman
Job Title Senior Adviser Labelling
Organisation New Zealand Food Safety



Presentation Title: Implementation of PEAL (Plain English Allergen Labelling)

Put yourself in your consumers' shoes and consider what you need to do to be better informed about the allergens present in food. Customers who have a food allergy need to know whether a particular ingredient is in your food. Even if you don't have to register as a food business, you still have to meet labelling rules and know what's in your food, or what it may have come into contact with. New rules for allergen labelling have been introduced to provide clear and consistent allergen information – so consumers can make safe food choices.

Find out why the Australia New Zealand Food Standards Code rules have changed, what the changes are, when do they need to be made in order to get it right, and how New Zealand Food Safety can help you on this journey.



Session Title: J3 – Getting It Right

Name Chris Hewins
Job Title Principal Advisor, Recognition Systems and Performance
Organisation New Zealand Food Safety, MPI



Presentation Title: Remote Verification

Traditional verification involves the verifier (auditor) travelling to a food business to seek assurance about practices and processes designed to keep consumers safe. Businesses that don't have a near-by verifier can be disadvantaged by the cost of (literally) having to fly-in their verifier. Prior to the COVID pandemic, New Zealand Food Safety (NZFS) investigated whether technology would allow a verifier sitting in their office to gain an equivalent level of assurance as being on-site; and the skills and capabilities needed to do this. NZFS developed an effective, and cost-effective, process for carrying out remote verification of food businesses, and training and assessment process for recognising remote verifiers. Results from this work enabled verification services to be maintained across MPI throughout the COVID response.



Session Title: K – Closing Plenary

Name John Lawson
Job Title Managing Director
Organisation Lawson Williams Specialist Recruitment



Presentation Title: 2021 NZ Food Industry Salary Survey

The New Zealand Food Industry Salary Survey.
In 2019 Lawson Williams partnered with NZIFST to establish the biannual New Zealand Food Industry Salary Survey.
Food Industry Salary Information particularly for the technical positions held by NZIFST members is virtually non-existent in New Zealand.
Our aim is to provide the Food industry with market relevant salary information in the following disciplines
Technical - Product Development, Packaging, Process development
Quality - QA, QC, Laboratory, Compliance, Food Safety
Science and Research
Health and Safety
Environmental
Operations and Production
Engineering and Maintenance

In 2021 the survey has received increased support and participation from the New Zealand food industry through partnership with NZIFST and the NZ Food and Grocery Council (NZFGC). The survey is free to participating companies and the 2021 report has recently been released.



Session Title: K – Closing Plenary

Name Braden Loveridge
Job Title Business Innovation Advisor
Organisation Callaghan Innovation



Presentation Title: Callaghan Funded Student Grants

Braden, will talk to the 3 main Callaghan Student Grant schemes on offer, namely the Summer Experience Grant, Fellowship Grant and the Career Grant. In the high-level over view of the successful Callaghan Innovation scheme, Braden will set out the key criteria in applying for the different grants and what is required in applying for them - as well as giving some practical applications of where students have been successful in NZ businesses - this will be followed by a short Q&A session, which will also point to where all the information can be found online.



Session Title: K – Closing Plenary

Name Kevin Marshall, CNZM

Job Title Company director and consultant in technology,
research and development



Presentation Title: