



THE NEW ZEALAND
INSTITUTE OF FOOD SCIENCE
& TECHNOLOGY INC



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

NZIFST Conference 2019

SPEAKER ABSTRACTS

Good Food 4



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CHRISTCHURCH

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DAY 1 - Tuesday 4 July

A1-1 Innovating traditions with Kaitahi - The Native Superfood Co

Leonie Matoe, Acting General Manager, Kai Tahi Ltd trading as Kaitahi

In this presentation we will move between traditional and contemporary notions to create an intergenerational dialogue for the industry to consider. The central idea that we will explore together is grounded on the belief that in a Māori worldview humans are born as stewards, endowed with obligations and empowered at the same time to care, respect, conserve and create wellbeing (Spiller et al, 2011). Our model reflects the development of an indigenous food enterprise where people and nature matter. The Kaitahi journey is an expression of Ngaa Rauru Kiitahi innovation anchored in a philosophy that places energy on traditional views of vitalism, humanism and reciprocity in order to enjoy and preserve the bounties of Papatūānuku, leading to the success of value creation through an indigenous lens (Huambachano, 2015). Kaitahi will highlight how the benefits of a resource derived by Indigenous peoples applying embedded cultural practice can be realised through innovative product development.

A1-2 The dynamics of Food Safety

Gale Prince, President, SAGE Food Safety, LLC

In the past decade there has more innovation in food safety than in the prior 40 years. This dynamic change has been driven by the advancement of epidemiology with the use of DNA. This technology has moved the ability to identify a contamination incident from a reactive to a preventive mode with a much quicker identification of the causative food vehicle. The Global Food Safety Initiative (GFSI) has brought advances in the discipline of food safety practices applied to food processing and distribution. The Food Safety Modernization Act has shifted the responsibility to the producer to demonstrate the safety of product in the market place. The Partnership for Food Safety focus is on consumer education and good food safety practices in the kitchen. Food safety is a shared responsibility from farm to table for everyone involved in delivery of a safe meal.

B1-1 Nutritional aspects of Raw Milk: A beneficial or hazardous food choice

Catherine Stanton, Senior Principal Research Officer/Research Professor, Teagasc

While there is a very real health risk associated with consumption of raw milk contaminated with human pathogens, which can result in serious illness, the debate over the benefits associated with raw milk consumption continues. The “GABRIELA” study reported an inverse relationship between the consumption of raw milk and incidence of asthma (Loss et al., 2011), while another European wide study by Waser et al. (2007) reported that consumption of farm/raw milk may offer protection against asthma and allergy development. We reported that heat treatment of raw milk significantly alters its immunomodulatory effect, based on in-vitro studies (McCarthy et al., 2015). This presentation will provide an overview of the benefits and hazards of raw milk consumption.

B1-2 PFAS - Dietary implications of an emerging contaminant

Andrew Pearson, Specialist Adviser, MPI

Per- and Poly-fluorinated alkyl substances (PFAS) have been on the global radar as emerging environmental contaminants for over a decade and in late 2017 were identified in New Zealand as investigations of use identified environmental contamination. MPI has led the work programme to manage the food safety risks PFAS may present both through local consumption in impacted areas and to the general public. This presentation brings together the chemistry on why PFAS are an environmental concern, how the investigations and response to the New Zealand findings has evolved over the last 2 years, and how the risks through food have been managed.

B1-3 Using whole genome sequencing to improve food safety

Lucia (Lucy) Rivas, Senior Scientist, ESR Ltd

Next-generation sequencing technology provides a fast and cost-effective way to determine the entire DNA make-up or 'whole genome sequence' (WGS) of a microorganism. The power of WGS is being increasingly applied to food safety management and foodborne disease surveillance in New Zealand. Analysing the WGS can accurately identify the microorganism species and explain the genetic relationships between microorganisms of interest, improving the ability to detect and trace the pathogen through the food chain. Being able to identify microorganisms with the same genetic make-up also helps narrow down options for solving contamination problems. For example, the WGS of a *Listeria monocytogenes* from a food can be compared with isolates from other food processing sources such as ingredients and food contact and non-contact surfaces. WGS analysis of isolates collected over a longer time period can also identify the persistence of a particular microorganism within a primary production or processing environment.

B1-4 Formation of 2- and 3-monochloropropanediol and glycidyl esters in processed vegetable oils

Darren A Saunders, Senior Scientist, ESR Ltd, Christchurch

2- and 3-monochloropropanediol (2- and 3-MCPD), glycidol and their esters are processing contaminants that are formed in vegetable oils when they are being decolourised and deodorised prior to their sale or use as an ingredient in foods. Vegetable oils are commonly used as an ingredient in infant formulas as well as many other foods such as margarines and cooking oils. Research has shown that the esters are metabolised back to the parent compounds 3-MCPD and glycidol after ingestion, and are considered to be potential human carcinogens. This presentation discusses the formation of these compounds during processing and mitigation strategies.

B2-1 High value opportunities from marine materials

Andrew Stanley, General Manager Innovation, Sanford Ltd.

Sanford is a leading New Zealand seafood Company and is New Zealand's oldest publicly listed Company. Our vision is to be the best Seafood Company in the world and we are advancing on that journey. With a strong foundation and a wealth of opportunities Sanford is exploring the significant value that can be found in marine extracts via quality research and sound business strategy. An overview will be presented of key activities and opportunities

B2-2 Production of xanthophylls by New Zealand microalgae and the sea urchin *Evechinus Chloroticus* (Kina).

Donato Romanazzi, Industry Research Liaison, Cawthron Institute

Microalgae produce many valuable molecules that can be used as ingredients in functional foods, as nutraceuticals, in cosmetics/cosmeceuticals and as biochemical reagents. Further Kina, a New Zealand native sea urchin (*Evechinus chloroticus*) is an underutilised resource and a rich source of bioactive materials.

Through an international research collaboration between the Cawthron Institute (New Zealand) and Hokkaido University (Japan) we tested the ability of the golden-yellow algae *Tisochrysis Lutea* (T-Iso) to accumulate fucoxanthin and its potential health applications. Additionally, under the National Science Challenge of Sustainable Seas, a research collaboration has formed between Hikiarangi Bioactives Limited, Massey University, Cawthron and local indigenous groups to evaluate the bioactives in Kina across season and location.

Cawthron has developed methods to improve the yield of target molecules from microalgae and optimised the conditions for growth and xanthophyll accumulation in continuous culture of T-Iso. Chromatographic techniques were used for isolation and purification of fucoxanthin from microalgae biomass. Extracts rich in echinenone were produced and assessed for levels of carotenoids including echinochrome.

A range of xanthophyll rich products, including algal and urchin extracts, have been evaluated in a series of in vitro models of inflammation, joint health and an in vivo model of allergy.

B2-3 Nutrition from the sea

Smitha James, Department Manager, Nutraceutical and Rural Products, United Fisheries Ltd.

The New Zealand Seafood Industry faces major problems with the enormous volumes of under-utilised waste product generated, and this is becoming a global issue because of sustainable marine requirements.

United Fisheries have for a few years now been looking at ways and means of creating value for offal generated by our fish processing plant. We have developed an Enzymatically Hydrolysed Liquid Fish Protein which is turned into liquid fish fertiliser for the agricultural industry and liquid fish silage which can be used as an animal feed or an additive for aqua farming. The remaining raw material from that process is fish bone which can be turned into a Calcium Fish Bone Microcrystalline Hydroxyapatite compound, considered to be the most bio available form of calcium.

B2-4 Restore and regenerate our natural resources: Food waste for food and biomaterials applications

Amin Shavandi, Assistant Professor, Université Libre de Bruxelles

Economical and consumer pressures lead to large quantities of food to be processed resulting in large amounts of by-products and waste to be managed. Research from our lab is exploring opportunities for biotransformation of lignocellulose and marine derived bioresources, in particular seashells, chitin, lignin and cellulose, into value-added products such as biofuels, biomaterials, lactic acid, biomedical active oligosaccharides and biomedical products contributing to the concepts of circular economy as well as bio-based society and industry. Our approach utilises novel

approaches such as light energy coupled with fungal and bacterial enzymes (PETase) for depolymerisation of biomass to produce novel bioactive compounds for food and health from waste streams.

This presentation will discuss various products developed from food by-products, such as biomaterials for tissue engineering and regenerative medicine, and bioactive compounds for food applications. In particular, the presentation will highlight the potential use of chitin and its derivatives, chito-oligosaccharides to synthesise various biomaterials including wound healing materials, and bone pastes with the ability to enhance the healing process at molecular and cellular levels.

B3-1 Huataukina To Iwi E! Kina Research Project

Ruihana Paenga, Project Manager, Hikurangi Bioactives Ltd

Ruihana Paenga is the Project Manager for the Huataukina To Iwi E! Kina Research Project on the East Coast on behalf of Hikurangi Bioactives.

In 2016 Ngati Porou rohe had the highest premature mortality rates in the country and 91% of the population lives in very deprived conditions. However the last three years has seen an ever increasing move towards self sufficiency and self determination.

Ruihana will discuss the role of companies like Hikurangi Bioactives who are pushing the limits in rural Maori communities where culture and tradition is so dominant and where sustainable economic transformation is desperately needed.

B3-2 Awaiting Confirmation of Speaker

B3-3 Nuku ki te Puku™ Māori Business Cluster - a values-based model of science, innovation and enterprise

Meika Foster, Director, Edible Research Ltd

NUKU ki te Puku™ comprises a cluster of diverse Māori-owned food and beverage entities that decided to leverage their collective expertise to create a new approach to improving health through scientifically-validated food and nutrition solutions. Its members are committed to using the NUKUTM structure as a platform for connecting communities and mentoring Māori to develop new and sustainable opportunities for wealth. As one of its first initiatives, NUKUTM partnered with the High-Value Nutrition National Science Challenge to develop the Tū Ora Project, which serves as a programme of ‘action research’, guiding NUKUTM businesses and Boards on a journey of science, innovation, and export in a manner that is meaningful and practical, and respects Māori values, aspirations, and preferred ways of learning. The current focus for NUKUTM is on co-design, co-development and co-investment with aligned partners in the commercialisation of nutrition and wellness solutions that are sought by consumers in Asia.

B3-4 As a Fish to Water – don’t we all do this?!

Murray Hemi, Kaitiaki o te Ara Miraka, Miraka Limited

Miraka is a new Maori-owned milk company seeking to tell a story about its good nature.

What’s Good – taste, quality, provenance, how it is produced, who it is produced by? Product sales seem to be motivated by responding to some or all of these questions. But one question that seems strike to me is the question of why? Not why is our food good or why we produce good food but why do we produce/sell stuff – good,

bad, or indifferent? I'd like to find out if your answer to why is the same as a Maori answer to why.

Using a local Mokai story I'd like to illustrate a classic Maori example of being in business (and explore why).

B4-1 Make starter cultures interesting again

Ryan Chanyl, Postdoctoral Fellow, AgResearch Limited

Safety, stability and standardisation are great attributes required for starter cultures used for industrial fermentations, but this tends to sacrifice the individuality of products. In the context of texture and flavour, using the same starter cultures across multiple products fails to give each product its own identity. Our goal is to accelerate the evolution of starter cultures to modify their metabolic processes, enabling creation of new and interesting flavours and textures unique to New Zealand. This will allow new products to stand above the rest and have a distinctive New Zealand flavour while maintaining the safety and stability these cultures are known for. We have acquired the necessary tools to perform high-throughput screening and have established an accelerated evolution pipeline. We have modified the metabolic activity of target organisms and maintained these modifications without selection. We believe this will usher in new, tailored products to meet consumer taste demands.

B4-2 Engineering a high-throughput micro-rheology apparatus

Rob Ward, Postdoc, Massey University

Rapid rheological measurements of many simultaneously gelling samples necessitate sophisticated instrumentation. In this talk we present a few fast-throughput micro-rheology methods currently being developed for measuring viscoelasticity of yoghurt samples as they gel over many hours.

B4-3 Detecting taste sensation by human receptors in vitro

Raise Ahmad, Postdoctoral Researcher, AgResearch, Palmerston North

The sense of taste is important for consumers to make food preference choices because it

allows the rapid evaluation of the chemical compositions in food. Humans can identify five basic tastes: sweet, salty, sour, bitter, umami (meat/mushroom) and a newly discovered taste-enhancing flavour substance, kokumi. Except for salty and sour, all three taste modalities and kokumi detection are transduced by the G protein-coupled receptor (GPCR) class of cell membrane receptors and their downstream secondary messenger molecule, calcium. The aim of the present study was to develop an in-vitro cell-based functional assay to characterize peptide profiles of the major tastant molecules (sweet, bitter, umami), and taste enrichers (kokumi) in fermented milk products. We used Chinese hamster ovary cells (CHO-K1) stably expressing the calcium sensing receptor and detected kokumi flavour by measuring intracellular calcium through a fluorometric imaging plate reader assay. Moreover, we have optimised biocompatibility of yoghurt in our assay against standard kokumi taste agonists (glutathione and calcium chloride). We have analysed an ultra-filtered (<10kDa) water soluble whey protein extract from a yoghurt sample and observed significant activation of the kokumi taste receptor. Since, kokumi can affect the three basic taste modalities our results suggest that enrichment of kokumi flavour might impact on the overall taste experience.

Although kokumi is traditionally related to fermented meat/fish foods, the knowledge of its taste enhancing effect in fermented milk could lead to new products with flavours to target specific export markets.

B4-4 Objective and chemical measures responsible for meat eating quality preferences

Jihan Kim, Postdoctoral Scientist, AgResearch

The objective of this work was to understand Chinese consumer perspective on fermented meat through a scientific approach. Chinese consumer evaluations were conducted with six different types of commercial fermented meat products in China. These products were appraised by a focus group of untrained consumers in Beijing for gustatory impression. Chinese consumers preferred strong meat and spice flavour attributes in the fermented meat, whereas a low preference for sourness and grease was reported. We investigated physicochemical, colour and textural characteristics of the products to identify the extent to which profiles of sensory evaluation match. Volatile compounds were extracted by headspace solid-phase micro-extraction and analysed using gas chromatography -mass spectrometry (GC-MS). Fatty acid composition was also measured by GC. The instrumental measurement results were used to interpret the consumer evaluations. Therefore, the results of this work can be useful to develop fermented meat products targeting the Chinese market.

C1-1 Threat Analysis Critical Control Point (TACCP) and its application within the F&B industry

Ray Haddad, Food Safety Trainer and Auditor, AsureQuality

The interest surrounding food defence is growing. More and more customers and regulators are demanding appropriate food defence threat assessment and mitigation plans. In a way, this is good news to all of us as businesses, customers and particularly as consumers. However, the look and the feel, the scope, depth, breadth and even the definition of food defence and relevant mitigations are still confusing to many in the food and beverage industry.

The purpose of this presentation is to support your efforts in producing and supplying "Good Food 4 – Me, You, Community, Planet" by clarifying the food defence confusion. This succinct presentation is aiming at defining food defence, explaining methodologies used in assessing food defence threats and developing appropriate food defence plans. In addition, the related audit expectations will be summarised.

C1-2 Fundamental Advances: A role for augmented reality in auditing

Harry van Enckevort, AsureQuality

Advances and convergence in science, technology and digital capabilities are transforming what can be done by whom or what, where, when, how fast, how well and how safely. This is reshaping the environment we operate in, offering advantages, new directions and new options for business and operating models. Spatial computing capabilities like Augmented Reality (AR) using connected, wearable, hands-free and voice enabled computers are no longer a trope and gee-whiz of science fiction but reality and a commercial business tool. They provide more operationally efficient and profitable ways of delivering services and products through at-line, in-line and on-line applications.

This talk will briefly describe the current status of AR systems, the why, user and customer experiences arising from using AR to deliver an audit programme, and what's coming up in the development of the technology.

C1-3 Are you on top of your food safety risks? - New Hygienic Design tools for the New Zealand food industry

David Lowry, Managing Director, Lowry Food Consulting Ltd.

Of all pre-requisite programs that underpin HACCP and other FSMS's, hygienic design is the most critical for achieving consistent and sustainable food safety outcomes. WHY? - Because it embraces all elements of factory design, process equipment specifications and operation, and if the 1st principle of hygienic design, i.e. cleanable to a microbiological level, cannot be achieved the FSMS also fails. Despite its importance, there is relatively limited understanding of hygienic design as a discipline, and/or engagement of key stakeholders in its implementation in the broader New Zealand food industry. A European-based, but increasingly global NFP organisation dedicated to the advancement of hygienic design and common global standards is EHEDG - the European Hygienic Engineering Design Group. A New Zealand Regional Sub-division of EHEDG has just been established and the opportunities and tools that membership to EHEDG can bring to the New Zealand food industry, highlighted by global examples, forms the basis for this presentation.

C2-1 Packaging material sustainability in New Zealand - RPET, a case study

Sarah Baylis, Production Manager - Materials, Flight Plastics Ltd

In today's world, consumers and food manufacturers are demanding sustainable packaging solutions for their products. What can this look like in New Zealand where there are challenges of population size, geographic isolation and significant levels of imported food products/packaging? This presentation is a case study of Flight Plastics, the only company in New Zealand recycling post-consumer recycle PET material into RPET. The state-of-the-art wash plant facility in Lower Hutt was commissioned two years ago and has the ability to recycle all the PET recycle material produced or imported into New Zealand. This is a turnkey operation where RPET is produced from plastic bales delivered from MRFs (Municipal Recycling Facilities) from around the country. These are processed through the PET wash plant and then extruded into food grade plastic sheet and then into thermoformed plastic packaging used throughout in the food and grocery industry in New Zealand.

C2-2 New Zealand's food waste issue. Where from and where to ...?

Miranda Miroso, Department of Food Science, University of Otago

This presentation takes a look at how the food industry can work both with their consumers and in their own operations to solve the challenge of reducing food waste. Companies are encouraged to adopt a three step approach: set a reduction TARGET, MEASURE waste quantities and the associated costs, and ACT now to reduce food waste!

C2-3 Taking care in business: how we manage food waste as a supermarket

Kate Porter, Head of Communications and Community, Countdown (Woolworths New Zealand)

Countdown began donating food that would otherwise go to landfill in 2011. What began as a small-scale partnership with The Salvation Army to help people in need

has now developed into 100% of Countdown's 180 stores having a food diversion programme in place; partnerships with charities, food rescue organisations, foodbanks and farmers throughout the country; millions of dollars of food donated each year, and a publicly stated goal towards zero food waste to landfill. Tackling food waste in a food business is no easy task, and there is still a long way to go. Countdown will talk about their approach and the importance they place on reducing waste across the board.

C3-1 R&D incentives: making your R&D dollar go further

Nicola Black, Senior Manager, Ernst & Young

You now have the opportunity to access a 15% credit on eligible R&D expenditure with the introduction of an R&D tax incentive - if you spend \$100,000 on R&D you can now reclaim \$15,000 of that expenditure.

Which of your activities and expenditure will be eligible? The incentive has broad application across the food industry offering opportunities to make your R&D dollar go further in new product development, engineering and technological innovations. Defining the boundaries of eligible R&D activities is fundamental to maximising your claim.

This applies from the current income year; 1 April 2019 for most. But the credit will only be available if you collect the right information in real time, starting from now. Nicola Black of EY spent 8 months assisting the Government developing the new policy and legislation. She will discuss the key features of the incentive and how to access it.

C3-2 The Product Development Journey

Tracey Sheehy, Business Development Lead, FoodSouth

Whether you're just starting out, or an established company looking to innovate, this session will guide you through the considerations and pitfalls of F&B New Product Development. From accessing funding, to undertaking research and development, then finally scaling up and commercialising your new product – this session will guide you through who can help, how to plan, and managing the risks associated with bringing a new product to market.

C3-3 Taking your goodies to the world? An overview of trade mark considerations

Corinne Cole, Principal, A J Park

Branding is central to your business strategy. It differentiates you from your competitors and is your strongest asset. Getting the basics right is important when taking your goodies to the world.

Corinne Cole of AJ Park will share how you can make the most out of investing in a great trade mark, and how to avoid common pitfalls.

In this presentation, Corinne will cover the following topics.

- What is a trade mark?
- How to choose a great trade mark
- Avoiding infringing another's rights
- Planning ahead for product and market expansion
- Protection strategies
- Other considerations

C4-1 Cultural differences in perception

Julia Low, Postdoctoral Research Fellow (Riddet and FEAST Lab), Riddet Institute and Massey University

Culture is one of the main factors underlying our food choices, influencing our preferences, attitudes and perceptions about food. Cross-cultural research is becoming increasingly relevant in sensory and consumer science, in particular on understanding Chinese consumer preferences. However, the design of cross-cultural studies involves several methodological challenges that are not commonly faced in studies involving a single culture. This talk reviews some relevant methodological issues that should be considered when designing cross-cultural studies.

C4-2 Chinese consumers' preferences for fermented foods

Anne Marie Manzano, Research Impact Analyst, AgResearch

Innovating in fermented foods may give New Zealand industry the ability to develop distinctive New Zealand and Māori branded products, and gain a competitive advantage against the large number of western countries positioning themselves to supply pure, safe and traceable food to China. The research programme 'Accelerated evolution: A step-change in food fermentation', funded by MBIE in 2016, aims to develop new leading science and technologies, to help transform New Zealand's agri-food resources into high-value fermented food products. With support from industry partners of the programme, online consumer surveys were conducted in Beijing and Shanghai, China, to evaluate Chinese consumers' preferences for fermented food products and their familiarity with the New Zealand and Māori culture and brand. This information could contribute to defining future product concepts, which utilise the science platforms of the programme, to develop differentiated flavour profiles and texture properties that appeal to Chinese consumers.

C4-3 Understanding Chinese consumer attitudes to fermented milk products

Julia Low, Postdoctoral Research Fellow (Riddet and FEAST Lab), Riddet Institute and Massey University

Consumer demand for low temperature and ambient (room temperature) yogurt or fermented milk drinks have increased in China, but the sensory factors that influence their choice and consumptions are unknown. The aim of this study was to understand consumer sensory preference of drinkable fermented milk products among Chinese consumers in China. Three consumer focus group interviews involving 30 articulate and regular consumers of drinkable fermented milk products (17 males/13 females, aged 21-40 years; n=10 in each session) were conducted in Beijing, China. The study revealed interesting results concerning the link between sensory attribute preferences and provenance perception among urban Chinese consumers of fermented milk drinks. This approach and findings will help New Zealand dairy companies to formulate drinkable fermented milk products for export markets with different sensory drivers and cultural expectations to its own.

D1-1 What can anti-consumption teach us about 'Good Food'?

Michael S W Lee, Associate Professor of Marketing, The University of Auckland

The New Zealand Government aims to promote a productive, sustainable and inclusive society. Anti-consumption research can provide strategic insight into those three areas by providing a unique lens from which policy makers, consumers, and

food producers may evaluate their current circumstances. In doing so, anti-consumption research not only leads businesses to a deeper understanding of consumers but may also be seen as a legitimate reason driving social change and behaviours. In attempts to transition New Zealand to a clean green, carbon neutral and ethical economy, anti-consumption research has studied the reasons driving ethical and sustainable businesses. Many of their motivations are based on a rejection of commercial tactics that prioritise profit over everything else. The systematic use/abuse of natural resources and excessive greenhouse emissions drive some businesses to go against the grain and in doing so, many find a unique competitive advantage on the world stage.

E1-1 Food safety in the Boardroom - why Directors should be engaged!

Dean Stockwell, Director, Dean Stockwell Consulting

Keeping our food safe requires leadership! This is true from 'paddock to plate', from 'farm to fork' - i.e. the total supply chain, not to mention all the service industries that are part of the broader food industry. But leadership from whom? Company directors have a clear 'duty of care' and if it all goes wrong' they have liability too! MPI has prepared a 'good governance guide for company directors, executives and business owners'. In just 15 minutes Dean Stockwell will tell you all you need to know and how, as a director, you can play your role in food safety leadership. And by the way, it may help reduce your personal liability and exposure if a food safety event occurs.

E1-2 Taking Food Safety Culture from research to action

Sally Johnston, Manager Food & Beverage, New Zealand Food Safety/MPI

In 2017, the Food Safety Assurance and Advisory Council (FSSAC) and the Ministry for Primary Industries (MPI) commissioned research into food safety culture in New Zealand food businesses. The report was released in July 2018.

These findings of this research indicate there is a good platform on which to develop a strong food safety culture, but that there is still work to do to improve our preventative food safety approaches, enhance food business and food worker compliance, and, most importantly, save lives.

MPI is using this research to make or expand changes to how we approach implementing food safety regulation with the aim of encouraging food businesses to move beyond a tick box compliance approach and develop a strong food safety culture. Hear some examples of the ways MPI is responding to the need for a different approach to contribute to improving food safety culture in New Zealand food businesses.

E1-3 Good Food, Safe Food and the council

Stephen Stout, Team Leader, Food Safety and Health Licensing

The New Food Act places much more responsibility for safe food on the operator of the business and changed the role of councils. The greatest numbers of food businesses are registered with their council. They are often small to very small businesses with limited resources and may have varying knowledge of what food safety requirements apply to their business. This presents many challenges to provide confidence that food is safe to the consumer and to allow businesses to get underway and trade with as little compliance cost as possible.

The ongoing checking of safe food practices is also challenging when dealing with the high turnover of operators and their staff as well as the rapid change of food fashions.

This can cause conflicts of interest between the roles of verifier and educator and the use of enforcement to maintain confidence.

E2-1 From Belgium to Christchurch, building Trade Aid's chocolate programme

Ewan Cameron, Quality Control and Product Development, Trade Aid Importers

The global chocolate industry is very unbalanced: a few very large and wealthy corporations control the market for a product which is grown by millions of very small and un-wealthy farmers. Trade Aid has imported chocolate for well over 20 years, but it always came through those big corporations and although the wrapper said 'Fair Trade' we had no real way of knowing the truth. In 2014 we set out to change this situation and built our own chocolate factory right here in Christchurch. We would buy the raw materials directly from the producers and process them into chocolate in New Zealand, and finally we would be in control of the supply chain and the product...

E2-2 Food and Packaging Waste Diversion

Spring Humphreys, Product Recovery Manager, Envirowaste

Food and Packaging Waste Diversion has become a high priority for all companies that want to do demonstrate their sustainability credentials. This presentation will cover all aspects of the do's and don'ts, the why's and why not's of doing the right things to avoid, minimise or recover with food waste and its packaging. It will include solutions to enable redirection and reuse of suitable edible foods to organisations such as KiwiHarvest, diversion of product suitable to be used for stock food, composting, vermiculture and or gas recovery along with recycling opportunities for the majority of the packaging.

E2-3 Food Rescue - a simple solution to ending local hunger and reducing food waste

Deborah Manning, KiwiHarvest

With food insecurity at an all-time high and millions of dollars of food being thrown away each year, food rescues are providing an efficient and effective solution. Deborah Manning, the Founder and CEO of KiwiHarvest, a New Zealand national food rescue organisation, discusses what KiwiHarvest does, why it matters and what is next.

E3-1 Commercialising New Zealand's first Brain Drink

Angus Brown, CEO, Arepa Nootropics

Considering factors such as raising money, convincing experts, backing up health claims and creating a suitable formulations for scale is just some of the challenges developing a new product in a globally new category called Nootropics.

E3-2 Sustainable biotechnology alternatives for high value food ingredient production

*Nic Lindley, Director Biotransformation Innovation Platform, A*STAR, Singapore*

Natural flavour and fragrance ingredients are extracted directly from plant materials. However, only relatively small amounts of the desired compound can be extracted, e.g. it is estimated that you need to produce about 100 tons of raspberries to extract 1g of alpha-ionone with a land-use of about 20 hectares on an annual basis. When optimised apocarotenoid synthetic pathways are transferred into microbial hosts for fermentation, similar amounts of alpha-ionone can be produced each day in a 2 litre reactor. Sugar consumption represents only a fraction of the land-use otherwise necessary (42 Kg alpha-ionone/hectare sugar cane). Furthermore, this same logic can be extended rapidly to a whole catalogue of compounds making such natural-identical flavouring ingredients an economically viable and sustainable alternative to extraction directly from plant material. The scientific challenges and technological strategies employed to achieve such production levels and consequences for agricultural land-use will be presented.

E3-3 Awaiting Confirmation of Title

Andrew MacDonald (Absolute Wilderness)

E4-1 Catering to the vegan market and the labelling of milk and meat alternatives

Stephanie Hadley, Associate, James & Wells Intellectual Property

As consumers are increasingly prepared to pay a premium price for the ethical, environmental, nutritional or quality of food, veganism has been one area on the rise and a popular target market for food manufacturers. However, the labelling of vegan products can be complicated, particularly with cross-contamination issues. Combine this with the way non-meat and non-dairy alternatives are being marketed to appeal to vegans, concerns have been raised internationally about the potential for misleading consumers. We explore how to navigate your way through such issues via the eyes of the reasonable consumer.

E4-2 Regulating marijuana and its by-products in food

John Barker, Principal, John Barker Law

Jurisdictions around the world are loosening restrictions on the use of marijuana and its by-products, including in the production of foods. FSANZ has approved the use of low-THC hemp seed foods, and the government's commitment to national referendum on marijuana raises the prospect of further change. This paper briefly surveys the current state of the law in New Zealand with regard to the use of marijuana and its by-products in the production of foods, and looks at the ways that regulation has evolved in jurisdictions where the regime for marijuana use has been liberalised.

E4-3 From Good laws to Great laws. - Setting the standard at FSANZ.

Glen Neal, General Manager, General Manager Risk Management and Intelligence, Food Standards Australia and New Zealand

General Manager Risk Management and Intelligence

Everyone expects foods to be safe, fairly described and to consistently deliver on taste and quality expectations. Increasingly people want to change improve the world by applying their values that link to a wide range of factors such as sustainability and ethical production. They can only do this if they trust the information associated with the product they may buy.

The rules around food are likely to face increasing scrutiny from a demanding public. They are struck with the intention of underpinning the relationship between buyers and sellers of food. They must be set in way that is underpinned by science and reflective of the expectations of society – usually expressed as policy and via submissions. To enhance their ability to be complied with, good engagement must occur throughout standard setting processes. This improves the suitability and acceptability of the end product. This is critical to ensuring good laws become great ones.

DAY 2 - Wednesday 4 July

F1-1 Adapting for success in food and fibres

Julia Jones, Head of Analytics, NZX

How we eat, why we eat and what we eat are all changing. However all change comes with its load of opportunity. As the world focus more on wellness (preventing illness rather than curing it) New Zealand is in a great position to produce food that is good for the health of people and ensure that we do so in a way that is ensure social, economic and environmental health for all New Zealanders.

F1-2 The implications of a dietary shift to plant-based foods: sustainability, health, technology and regulatory perspectives

Harraway Visiting Professor - Rickey Yada

The October 2018 IPCC Special Report made clear that limiting global warming to 1.5°C will be needed to avoid the most serious climate-change-related impacts to earth's ecosystems and to retain more of their services to humans. Limiting global temperatures to 1.5°C will require reductions in global net anthropogenic CO2 emissions of 45% from 2010 levels by 2030. Annual total non-CO2 GHG emissions from agriculture in 2010 comprised ~10–12 % of global anthropogenic emissions, with animal GHG emissions comprising ~60% of the total agricultural emissions. Current levels of meat consumption in the developed world, and the increasing place of meat in the diets of advancing developing countries, are a prime mitigative target due to the large environmental footprint of meat production. This presentation will examine the implications of a global shift towards plant-based protein sources including potential impacts to agricultural production, plant-based food technologies, human health, and regulatory environments.

G1-1 Committing to Health: Assessment of New Zealand food company policies for healthier food environments

Dr Sally Mackay, Research Fellow, The University of Auckland

Unhealthy food environments are the major drivers of obesity and related chronic diseases. Along with government and society, the food industry has an important role to play in creating healthier food environments. The Business Impact Assessment on obesity and population nutrition tool (BIA-Obesity) benchmarks food company policies and commitments at a global level. In 2017, company policies and commitments were assessed for the 25 most prominent food and beverage manufacturers, food retailers and quick service restaurants in New Zealand. Publicly available information was analysed and half of companies provided additional comments. Companies were assessed across six domains. The best performing domain was 'corporate population nutrition strategy' followed by 'product labelling'. The worst performing domain was 'product accessibility' with some commitment to 'product formulation', 'product and brand promotion'. New Zealand food companies demonstrated some commitment to addressing obesity and population nutrition issues, but much stronger action is required.

G1-2 Making it easier for consumers to make healthier choices at Countdown

Deb Sue, Nutritionist, Countdown

The Nutritionist's role is extensive and varying, but a major component of the role is to ensure the health and nutrition targets that Countdown set and have committed to are met. The targets are ambitious but we believe by meeting them we will make it easier for our consumers to make healthier choices without compromising the taste, quality, or consumer acceptance of our Own Brand products. As well as the Health and Nutrition targets, we also have a number of other initiatives to help consumers make their food choices.

I will share Countdown's commitment to Health and Nutrition, and some of the reformulation results we've achieved so far over the last 2-3 years.

G1-3 When nutrition and sustainability collide - learnings from the New Zealand red meat sector

Fiona Windle, Head of Nutrition, Beef + Lamb, New Zealand Inc

Red meat - to have or have not? A question more consumers are asking themselves for a myriad of reasons including more alternative protein options, the health of the planet and the health of people. This presentation will delve into the current situation in regards to consumer research insights and how the New Zealand beef and lamb sector are responding.

G1-4 Dietary guidelines: historical efficacy and future relevance

Rickey Yada (Harraway Visiting Professor, UoO)

According to the Food and Agriculture Organization of the United Nations, 88% of countries face significant population health challenges resulting acute and/or chronic undernutrition, micronutrient deficiencies, obesity and diet-related diseases. Dietary guidelines have the potential to influence diets and the food system through a wide range of food and nutrition, health, agriculture and nutrition education policies and programmes. Recent shifts in dietary guidelines reflect growing evidence that achieving shifts in eating patterns (more whole fruit/ vegetables, less processed foods) is most important in improving health outcomes. Although many global jurisdictions have adopted food guides with the intent of improving population health and well-being, definite challenges exist regarding such issues as compliance due to such factors as socioeconomic accessibility, and evidence that adherence leads to improved health. This talk will discuss food guides from the eyes of a food scientist with presently many more questions than answers.

G2-1 The New Zealand Food & Beverage Story

Sarah Morgan, Head of Engagement, New Zealand Story

How do global consumers view New Zealand? What do they look for when buying products and services from New Zealand. Hear the insights from New Zealand Story's country perception research that highlights the messages we need to dial up when promoting food and beverage products around the world.

G2-2 Rise of ethical consumers: – Impact and opportunities for product development and packaging

Maria Adabilla, Chairperson, Orangutan Alliance

Ingredient innovation is a critical part of developing food for the future. With the rise in conscious consumption, the industry plays an important role in sourcing ethical and sustainable ingredients. Maria shares insight into the rise of ethical brands and certifications, its drivers and why good for the planet is good for business.

G2-3 Evergreen Consumption

Shelley McMillan, Head of Consulting – South APAC, Mintel and David Ha, Insights Analyst, ANZ, Mintel

The definition of sustainability is extending to encompass the entire product lifecycle. From farm to retailer to fork to bin and, ideally, to rebirth as a new plant, ingredient, product or package, this 360-degree approach will ensure resources are kept in use for as long as possible. The movement towards circularity as the new sustainability will require collaboration between suppliers, manufacturers, governments, non-profits, retailers and consumers.

A seismic shift in how consumers think about plastic is underway, with bio-based packaging materials set to be a key component to the next generation of responsible packaging. In 2019 and beyond, sustainability efforts will include not only improving access to recycling, but incentivising consumers to recycle packaging and offering upcycled goods. At the same time, efforts to improve air pollution, support plant welfare, restore soil health and embrace regenerative agriculture will emerge as crucial elements of holistic sustainability programmes that are important to companies and consumers alike.

G2-4 50 Shades of Good & NPD Strategy - get close to the consumers but particularly during times of change.

Kristen Soper, The Shopping List

Why: When there are so many messages about what good means, making decisions about the NPD programme and ranging strategy can feel hard. What is driving consumer's buying behaviour? Are you ticking the consumer's boxes or responding to media?

How:

- Anecdotal experiences while working at McDonald's, Coca-Cola and Co-operative Food during times of significant change.

Explains what being consumer obsessed looks like and how to build your ranging strategy on a consumer foundation.

G3-1 Use of innovative processing technologies to induce structural and textural changes in mollusc muscle

Lovedeep Kaur, Senior Research Officer, Massey University

Pāua, the Māori name for large edible sea snails (marine gastropod molluscs), is considered a delicacy in many Asian countries. New Zealand black foot pāua, *Haliotis iris*, is among the largest abalone species in the world. However, due to its large size, its thermally processed meat is tougher compared to other species available in the international market. We hypothesised that technologies such as ultrasound and enzyme treatments can cause structural changes in pāua muscle that

will not only lead to an improvement in meat texture but will also improve its protein digestion kinetics. Experiments were conducted by subjecting pāua flesh to enzyme (actinidin from kiwifruit) and ultrasound treatments, alone and in combination with sous vide processing, followed by analysing them for any textural changes. Results from these experiments will be presented and discussed. The knowledge gained through this work will be applied to other New Zealand mollusc muscles in the future.

G3-2 Validation methods for microwave retorting

Aswathi Soni, Post Doctoral Scientist, AgResearch

The aim of this FIET-funded project is to develop a rapid validation system to support regulatory approval for foods heat-treated with microwave assistance. A pilot-scale Meyer Burger unit has just been installed at Massey University and will act as the test bed to develop rapid validation techniques for this novel thermal process. The process involves suitable packaging, preheating, microwave-heating it in a bath of microwave-transparent RO water under pressure to sterilisation temperature, holding it, followed by cooling under counter-pressure. The process will act differently on different mixtures of foods in a pack.

For the product to be sold and consumed the process must be approved – the regulator must be satisfied that each element of the food received an adequate time-temperature experience, during each cycle of the equipment. This talk will describe the process in detail, sources of variability, the requisites for regulatory approval along with ways to ensure sterilization while reducing the heat exposure time.

G3-3 Effect of shockwave processing and sous vide cooking on beef brisket structure and protein digestibility in vitro

Feng Ming Chian, PhD Student, School of Food and Advanced Technology, Massey University and Riddet Institute

Recently, technologies such as shockwave processing and sous vide cooking have been explored for meat tenderisation. These processing methods may lead to structural modification of muscle which potentially influences the bioaccessibility of digestive enzymes and in turn affects the digestive properties of meat. Hence, the objective of this experiment was to study the effect of shockwave processing and sous vide cooking on bovine muscle structure and protein digestibility in vitro. Beef briskets were exposed to shockwave (11 kJ/pulse) and were sous vide cooked at 60°C for 12 hours, followed by in vitro oral-gastro-small intestinal digestion. Both the molecular and ultrastructure of meat were modified after the processing and subsequent in vitro digestion. The in vitro protein digestibility of the treated meat was also improved in term of ninhydrin-reactive amino nitrogen released. This study was funded by Riddet CoRE and was carried in collaboration with INRA (France) and DIL (Germany).

G3-4 Introduction to Whole Genome Sequencing

Craig Billington, Science Leader Institute of Environmental Science and Research and Phil Bremer, Professor, University of Otago

Whole genome sequencing (WGS) is a powerful tool for gaining insights into the types of microorganisms present in foods and food processing environments. Dramatic reductions in the costs of WGS means that it can now be undertaken

routinely and this is transforming our understanding of microorganisms in agriculture, food and public health.

We will introduce the basic principles of how WGS is undertaken, from sample preparation to generation of DNA sequences and analyses. Some examples of how the data from WGS analyses are being used will also be presented. Interviews with industry and regulatory stakeholders demonstrated a clear understanding of the potential benefits and potential pitfalls associated with WGS research. We will discuss how, prior to undertaking WGS source attribution based research, it is important that companies, regulators and researchers have a clear understanding of the response that a positive association result would trigger.

G4-1 Fat is back! Time to fix past mistakes

David Everett, Science Impact Leader Dairy Products & Supply, AgResearch

Fat in food products has a long history mired in misconceptions, incomplete science, and poor communication to consumers, and has historically been the valuable component of milk, contributing to desirable texture and flavour in food products. The last half-century has seen a swing towards plant-based oils seen as healthier than saturated milk fat, but the story has completely missed the big picture – namely that a dairy food structural matrix has a profound impact upon digestibility, release and absorption of nutrients, and long-term human health. Food consumed as a whole product has different nutritional outcomes than the sum of the individual components. Complex lipids found within milkfat have long been ignored as having nutritional benefits, but research over the last 15 years has demonstrated biofunctionality that protects against some adverse health effects. Dietary guidelines have languished behind scientific developments. We now have a fat revolution driven by scientists and consumers alike.

G4-2 Future on-farm milk chilling and handling in New Zealand

Richard Archer, Logan Campbell Professor of Food Technology, School of Food and Advanced Technology, Massey University

New Zealand does not yet follow best practice milk handling. This MBIE-funded FIET project seeks the form of best practice most suited to New Zealand. It has three components: In the first, Mohammed Farid and Refat Al Shannaq at the University of Auckland developed an ice-bank which can store $\sim 50 \text{ kW/m}^3$ on a $\sim 100 \text{ kW/m}^2$ footprint for a lower installed cost than current units. In the second, Massey University Albany students Harris and Silver, supervised by Potgieter and Arif are devising how to use 3D printing to apply insulation to a large farm vat, so that the plastic matrix provides both structural support and thermal insulation to the stainless steel tank. In the third, a group including Massey and Fonterra are planning the future shape of milk deaeration, cooling, vat storage and tanker transfers to minimise air and shear and maximise quality and flexibility.

G4-3 Continuous rapid freezing of sheep Milk

Jolin Morel, Doctoral Student, School of Food and Advanced Technology, Massey University

New Zealand has a small but growing sheep dairy industry. Daily production is typically small at around 400-600L. This, coupled with distance between processors, makes frequent shipping of raw milk costly. We have developed methods of rapid freezing and frozen storage that minimise milk damage, while keeping a form factor

that allows easy handling and processing. Some of these freezing methods we have presented already. Whichever method is most successful depends on many things, including the physics of freezing, storage and subsequent thawing. Milk quality can be compromised at any stage. This talk will cover the physics involved, key material properties, how this drives process and plant design and the impact of milk composition on freezing, storage and thawing.

G4-4 Deer milk: A decade of research

Aladin Bekhit, Associate Professor, University of Otago

Over the last decade, the physicochemical, nutritional and biological activities of deer milk were investigated in our lab with the aim of supporting deer milk as a commercial product unique to New Zealand. Deer milk has very similar macro-composition to sheep milk but has higher minerals content. The minerals profile of deer milk appear to have an advantage for its high calcium, zinc and phosphorus compared to sheep, goat and cow milk. However, the minerals composition vary greatly during the milking season. Deer milk has greater buffering capacity than cow, sheep and goat milk and its proteins are well digested under in vitro simulated digestion. Deer milk hydrolysates exhibited greater in vitro immunostimulating properties compared to sheep, cow and goat milk. Several bioactive peptides were purified and identified from deer milk. Comparison of the whey of the four species (deer, sheep, cow and goat) using bioinformatics approaches identified similarities and differences in the proteomic composition and the biological significance of the whey proteins of these species. The significance of these differences will be discussed.

H1-1 IUFoST 2020 Progress Report

Richard Archer

H1-2 J C Andrews Award – Winner’s Address

H1-3 Synlait's Pivot

Hamish Reid, Director Sustainability + Brand, Synlait Milk

The global forces at play are leading entrepreneurial milk processor, Synlait, to reshape the role it wishes to play in the world. Hamish Reid will share details of Synlait’s transformation toward to an emissions-free future that places people and environment at the centre of its long-term reason for being.

I1-1 Our love/hate relationship with packaging

Sharon Humphreys, Executive Director, Packaging New Zealand

Love it or loathe it – modern society relies on packaging to deliver goods – safely, undamaged, uncontaminated – from anywhere and everywhere. It communicates essential messages about the product inside, including ingredients and quantities, together with recommendations/instructions for usage, appropriate storage and expiry dates. From the technology in a simple box, to the creativity of a stunningly designed package, to the innovative functionality of smart packaging the modern marvel that is packaging is under fire - not for doing the job it does, but simply because it exists!!

11-2 Rise of ethical consumers – impact and opportunities for packaging

Maria Abadilla, Chairperson, Orangutan Alliance

Packaging plays an important role in the consumer journey. It communicates information beyond a product's functional benefits. With the rise of ethical consumption, consumers are relying on labels to understand how products they purchase are sourced. Maria discusses the role of ethical marks on labels and opportunities for the industry.

11-3 How smart packaging design reduces food waste

Trevor Ingham, National Sales Manager, Sealed Air New Zealand

Behind smart packaging lives a great sustainability story. But why doesn't the world believe it? We live in a world of polar opposites. We have an abundance of food and simultaneously, an abundance of wasted food. Contrasting this, we have communities who are dying and malnourished due to food access and food hygiene challenges; both stories bearing an economic impact. We know packaging is an enabler to reducing food waste, yet today it is so heavily scrutinised. The War on Waste is an exciting time for our industry to evolve, not to defend nor surrender. As a user or producer of packaging you will be informed of how smart packaging design decisions play a pivotal role in reducing food waste and how it drives a great total sustainability story, positively impacting businesses and communities.

11-4 An insight into Chinese consumer purchasing attitudes towards imported food products enhanced with smart packaging technologies

Erin Young, PhD Student, University of Otago

China is New Zealand's biggest export partner with exports valued at New Zealand \$13.9 billion pa in the year up to December 2018. Food products are significant part of that figure and are growing. Smart packaging development is driven by an increased demand for improved health, safety and authenticity, and can be a way to positively differentiate New Zealand food exports in the Chinese market. The objective of this study was to obtain insights into the knowledge and interest Chinese consumers have in smart packaging technologies as applied to imported food products. The results showed that there was low initial familiarity, but once explained, there was a preference for most imported food products enhanced with active or intelligent packaging technologies over the unenhanced alternatives. The acceptance and willingness to pay was higher for intelligent packaging when compared with active packaging, and the top three preferred technologies were all intelligent packaging solutions.

12-1 High hopes for hemp protein foods

Kevin Sutton, Science Group Leader, Plant & Food Research

Hemp is now part of the legal food market in New Zealand, and needs innovation to develop the value proposition for the seed and its components, so that farmers are encouraged to produce it as a high-value crop. Hemp seeds, which are technically nuts, have traditionally been eaten raw (following dehulling) or as sprouted grains, ground into a meal for use in baked goods, or made into hemp "milk". Hemp seed is a rich source of healthy oils, protein and dietary fibre, and also a potent source of many micronutrients, such as phosphorus. Current food products typically use minimally processed hemp seed components, but there is an opportunity for New Zealand in developing more highly functional ingredients that can be incorporated

into higher-value hemp food products. This is especially the case for hemp protein, where there is the opportunity for hemp to take a leading role in the current global “plant proteins” trend. This presentation will discuss some of the recent findings from the hemp protein area and will present a scenario of how the New Zealand food industry might engage with research providers to develop high-value hemp protein, ingredients and foods industries. The environmental/agricultural benefits of such an approach will also be discussed.

I2-2 Taste Pure Nature – Telling our story

Nick Beeby, General Manager, Market Development, B+LNZ

On March 20 the New Zealand red meat sector launched Taste Pure Nature, which is our origin brand. The reason why B+LNZ has decided to invest in this programme is because Country of Origin is a primary navigation tool for consumers and retailers – and a shortcut to understanding and trust. However, when questioned consumers know only a little about New Zealand and even less about our natural farming system. The purpose of Taste Pure Nature is to raise the awareness and create a preference for our meat products.

I2-3 Hybrid Meats: An opportunity to develop superior plant-based meat analogues in combination with New Zealand animal proteins

Jaspreet Singh, Senior Research Officer, Massey University

Alternate proteins, especially from plant sources are seen as an environmentally-friendly, cruelty-free, cost-effective answer to the growing global demand for meat-like foods, considering the unsustainability of meat production by 2050. However, plant proteins underperform animal proteins in terms of their amino acid balance and digestibility. Plant protein-based meat analogues also lack meat-like mouthfeel as processing of plant proteins with high-fat ingredients is not easy. Our pilot scale trials using a new technology based on combination of controlled temperature-pressure-shear has produced meat-like fibrous structure using plant proteins alone and also in combinations with dairy proteins or low value meat sources.

The real opportunity for New Zealand here is creating ‘hybrid foods’ – including but not limited to meat analogues, containing plant and animal/new proteins including plant and dairy or low value meat sources through the use of innovative processing technologies for the flexitarian foods market.

I2-4 Using fermentation to develop structure and flavour in plant protein foods

Gert-Jan Moggre, Scientist, Plant and Food Research

Worldwide there is an increased demand for plant protein products with consumers looking wider afield for their protein intake. This consumer driven evolution provides an exciting opportunity for New Zealand industry to provide into this area. Development of new foods comes with their own challenges as each step in developing a structured food, from the very ingredient you start with through to the techniques used to develop the food structure will greatly influence the sensory attributes and quality of a plant protein-based food. This presentation will discuss how we combine controlled structure development with fermentation as one of the techniques to further develop food structure and flavour. To do this successfully requires the selection of appropriate organisms and have an understanding of how these organisms alter the food structure and flavour as a key aspect of the work. An overview of the progress in this area will be presented.

I3-1 Comparative study on the role of immersive context on affective drivers of tea break snack choices using the Microsoft HoloLens Technology

Julia Low, Postdoctoral Research Fellow (Riddet and FEAST Lab), Riddet Institute and Massey University

Traditionally, sensory scientists are taught to investigate the consumer affective (hedonic and emotional) responses to foods in a controlled laboratory setting – including the control of the stimulus, the participants, and the environment. Whilst existing traditional sensory evaluation instruments in a controlled laboratory environment provide information on consumers’ affective perception of foods, the environment bears little resemblance to the actual food perception in the “uncontrolled” real world. The aim of this study was to investigate the effect of consumption setting (traditional sensory booth, real café environment, and a mixed reality projection of the café) on the liking and emotional responses of consumers towards tea break snacks. Subsequently, we investigated the effectiveness of using the Microsoft HoloLens technology, an Augmented Mixed Reality device, as an alternative tool for sensory evaluation in this study. The results from the present study could potentially open up new frontiers for sensory scientists and will be presented during this talk.

I3-2 “Lean 2.0” / “Industry 4.0” – Using Data to Drive Real Gains in Manufacturing Processes: A Case Study from Tait Communications

Dean Mishewski, Manufacturing Engineering Manager, Tait Communications

In early 2018 Tait began an improvement project focused on the most high-tech, automated part of its factory, the surface mount technology (SMT) assembly lines. The project driver: forecasted demand by mid-year was expected to exceed assembly capacity. The challenge:

“Increase SMT productivity by 20%, while maintaining flexibility / short lead times, without increasing inventory, while catering for an expanded range of products, without capital investment – and by the way, try to do it with fewer machines.”

The project revealed the value of using process data which turned out to be almost within reach the whole time. The story was largely about finding ways to extract and visualise this data, then gain insight into potential for reducing setup times and increasing efficiency. Results exceeded the target, and provided learnings applicable to almost any manufacturer about possibilities for gaining “Industry 4.0” / “Lean 2.0” benefits without necessarily investing in expensive technology.

I3-3 Honesty is really the best policy when telling your brand story...

Paul Ryan, CEO, Trust Codes Limited

With food frauds being regularly reported in the media, it’s little wonder that consumers want to know more about the provenance, quality and sustainability of their food. The Centre of Food Integrity (CFI) reports that the “trust gap” between consumers and food/beverage companies has grown wider in recent years. Paul will discuss how producers can close the trust gap and provide truthful information to consumers, using a range of technologies and mediums to do so.

As consumers start to actively challenge the information they’re given, brand owners are being motivated to verify their supply chains, one data point at a time

I3-4 The smart enough factory

Dean Boston, General Manager, Baker Boys Ltd

In the past companies have fallen into the small “do it yourself” operations or the big “Corporates” categories and New Zealand has generally existed at the small end of town. Traditional New Zealand companies have done great things with people, ingenuity, and Number 8 wire but have struggled to make the jump to technology-driven because of high costs involved. Anecdotes such as “SAP, there’s a couple of million gone”, and “Robots look great but cost hundreds of thousands,” are common. We have survived on making do, hiring more people and continuing with a clipboard and paper. We have to get smarter but we need to do it our way. Welcome to the “the Smart Enough Factory”.

I4-1 Production of an apple pomace ingredient

Florencia Yedro, Plant & Food Research

New Zealand generates about 10,000-15,000 tonnes annually of apple pomace from juicing operations. This represents an opportunity if pomace can be processed to a product having useful functional properties alongside its dietary fibre content. We developed a process to convert apple pomace into a fibre-rich food ingredient, as a liquid concentrate or as a dried powder, which can impart creamy textural properties to food products in response to consumer demand as conveyed to us. The process includes at least three main stages: a hydrothermal treatment, a shearing treatment and a concentration step. For the dried powder version of the product, the concentration step was done using a double drum roller dryer. The effects of initial temperature of apple pomace mixture (10°C - 35°C), steam temperature (114°C - 125°C) and drying time (1 - 1.5 min) were studied. Water activity, wettability, dispersibility, rehydration and viscosity were analysed in order to determine the best operating conditions to obtain a reconstituted apple pomace powder with smooth properties.

The next step of this research is to refine the process design to obtain a drying aid with specific characteristics, to replace all or some maltodextrin during drying of juice or honey.

I4-2 Manipulating mouthfeel in an Apple Pomace-derived Fibre Ingredient

Marizieh Eblaghi, PhD Student, Massey University

Pomace is the semi-solid residue from pressing fruit and vegetables for juice. Pomace is known as a source of dietary fibre (cellulose, hemicellulose and pectin). We seek to devise a process to convert pomace to a fibre-rich food ingredient with desirable sensory properties.

Both particle size of suspended solids and properties of the serum phase can influence functionalities such as texturizing ability and mouthfeel properties. In this study, heat-treated pomace was separated into solid and serum phases. The insoluble solid portion underwent mechanical shearing. SEM images showed that increasing shearing time produced more highly ruptured cell wall material however, this had little effect on particle size distribution. Pectin polymer length in the serum phase was reduced with industrial pectinase and three serums were derived. Reconstituted pomaces were produced by addition of one form of treated serum and one set of solid particles. The influence of these manipulations will be discussed.

I4-3 The effect of polysaccharides on the glass transition temperatures of sugar mixtures and juice powders

Sebastian Linnenkugel, PhD Student, Massey University

Drying of sugar rich products can be a difficult procedure due to stability issues such as stickiness in spray drying or collapsing during freeze drying. These stability issues are related to the glass transition temperature (T_g) of the product. In order to improve the drying capability sugar rich products are commonly mixed with biopolymers to increase the glass transition temperature.

In this work the monosaccharide glucose was mixed with different biopolymers; maltodextrin DE 9-13, soluble inulin and resistant maltodextrin at various ratios (7/3, 1/1, 3/7, 2/8, 1/9). Furthermore the biopolymers were mixed to give various combinations of biopolymers with glucose. These mixture were freeze dried and analysed for their T_g values at zero water activity via DSC. Additionally, the T_g values were estimated using a modified prediction model and compared to the measured T_g values. The comparison of the predicted and measured DSC were in a very good agreement

I4-4 Pulsed Electric Field Technology

Indrawati Oey, Professor, University of Otago

The delivery of repetitive, short (microsecond) and high voltage electric pulses during Pulsed Electric Fields (PEF) processing through the uncut (whole) potatoes is effective in altering their structural integrity. This results in a more controlled leakage of intracellular compounds (e.g. reducing sugars) involved in the Maillard reaction, which reduces the tendency of potatoes to brown during deep frying. This technology also offers improvement in cutting and slicing efficiency as the softer texture induced by PEF makes the potatoes more flexible and easier to cut at a lower energy consumption.

To assess the potential advantages of PEF in New Zealand, a joint collaboration was established with the Potatoes New Zealand, Elea Germany (PEF unit provider) and a local deep-fried potato producer to carry out an industrial scale trial using a high-throughput PEF equipment. This trial was supported by MBIE under the FIET programme (Project 9).

Specifically, this project investigated the effect of different PEF conditions on a wide range of potato cultivars used locally for the production of French fries and potato crisps. Trials were also carried out to assess the potential of PEF to mitigate the product quality issues (i.e. zebra chip defects) caused by the Tomato Potato Psyllid/*Candidatus Liberibacter solanacearum* pest/disease. The compositional (starch, sugar, amino acid, oil) and sensory properties (texture, colour) of the deep-fried products, produced at commercial scale using untreated and PEF-treated potatoes will be assessed. Our research team will continue to work closely with the potato processing company to interpret the results of the trials.

I4-5 Non-destructive detection of Zebra Chip Disease in potatoes Using Hyperspectral Imaging

Abhimanyu Singh Garhwal, Postdoctoral Research Fellow, Massey University

Hyperspectral imaging is being investigated for its potential to segregate potato tubers, based on chemical changes induced by psyllid-borne *Liberibacter* infection. Infection results in differential levels of browning during potato chip processing. The incidence of this disease in New Zealand potatoes has become the main

constraint to exporting intact tubers to markets such as Japan, resulting in significant economic loss (est. \$40M). Currently, the chip-processing industry relies on destructive visual assessment to identify diseased tubers. In an early proof of concept, we found that hyperspectral data allowed ca. 97% of diseased tubers to be segregated successfully. We extended this work by employing hyperspectral imaging. The spectral signatures of normal and diseased potatoes were collected using a pushbroom hyperspectral camera with a spectral range from 500nm to 1700nm. Pre-processed spectral data was used to develop a spectral discrimination model using Partial Least Squares - Discriminant Analysis (PLS- DA) that segregates normal from diseased potatoes.

I4-6 Shelf-life extension of blueberries treatment with novel ultra-violet system *Gonzalo Martinez, Research Officer, Massey University*

This study evaluated the performance of a prototype system that increases shelf-life of fresh blueberries based on ultra violet technology. This work was divided into two parts; determination of the treatment conductions to minimise mechanical damage and evaluation of the shelf life extension of fresh blueberries. At 120s treatment, minimum bloom was removed and no bruises were observed. Bloom removal was mainly driven by fruit-to-fruit interaction; therefore, blueberries should be spread out in order to reduce contact. In terms of shelf life, fruit treated with 90s of UV exposure had 18.2% lower weight loss than control. Decay of fruit was reduced for all the treatments; however, 90s treatment showed the maximum effect with only 1.7% of the fruit deteriorated after 14 days of storage compared with 16.7% of decay for control. No significant differences in firmness between treatments were found over the period of study.

I4-7 Development of atmospheric freeze drying *Jim Chen, Research Officer, Massey University*

The aim of this project is to develop a drying process for the New Zealand food industry close to vacuum freeze drying (VFD) in quality at a cost closer to hot air drying. To this end, we devised an atmospheric freeze drying (AFD) process under the FIET programme funded by MBIE. At its core the dryer is driven by a cascading desiccant wheel dehumidification system. A prototype atmospheric freeze dryer of 12 kg daily water removal capacity has been constructed for proof-of-concept and to test a range of products. The prototype consists of a drying tunnel for semi-continuous drying of frozen food, counter-current to the drying air, plus an air handling unit housing the desiccant wheel cascade. Frozen cabbage was dried on the prototype as a model for leafy materials, and its drying characteristics determined. The energy efficiency of the whole process was evaluated.

DAY 3 Thursday 5 July

J1-1 Allergen Bureau – Navigate the science, manage the risk

Debbie Hawkes, Allergen Bureau Board Member and General Manager, Quality and Operations, Hawkins Watts

Incidents involving Food allergens are ever increasing, and the number one cause of Food Recalls. e.g., nineteen New Zealand companies required to recall chocolate-containing products this year due to undeclared milk.

The Allergen Bureau is the peak industry body representing food industry allergen management in Australia and New Zealand. The 3rd Food Allergen Management Symposium (FAMS2019) was held in Melbourne from 13-19 May 2019. This conference is an assembly of the best minds from across the globe for Food Allergen Management including researchers, consumer groups, manufacturers, suppliers, laboratories, clinicians, policy makers and enforcement agencies. This presentation will summarise the key outcomes from this symposium, with subsequent updates proposed for the VITAL (Voluntary Incidental Trace Allergen Labelling) program.

Additional key Allergen Bureau activities:

- Risk Review - Interactive website guiding users through best practise steps
- VITAL Certification Standard - Auditable scheme under ISO 17065
- Review and update of Food Industry Guide to Food Allergen Management & Labelling
- Agricultural Co-mingling Working group.

J1-2 Food for Future Consumers: a new Lincoln University Centre of Excellence

Dr Roland Harrison, Dean, Faculty of Agriculture and Life Sciences, Lincoln University

The world of food is changing. The planet is under pressure and consumers want better. To successfully meet these challenges, Aotearoa New Zealand must embrace a paradigm shift from a production-driven to a market-driven agri-food sector. Lincoln University researchers are responding to this new world of food by bringing together expertise from science, commerce and economics to create a more consumer-focused approach to food production. A new Lincoln Centre of Excellence, 'Food for Future Consumers', has been established to understand the links between provenance (land, agro-ecosystems, etc.) and food qualities (production values, composition and preferences). Research themes include characterising how production practices affect food composition, researching cognitive and sensory aspects of food consumption, and expanding consumer choices through business and product innovation. Researchers will also explore new technologies that can protect provenance and provide traceability. This presentation will describe work already undertaken and the work plan for the future.

J2-1 Doing good tastes great

Geoff White, Chief Executive, Trade Aid

Geoff will speak about the establishment of the Sweet Justice chocolate factory in Christchurch. He will touch on the issues farmers face within cocoa and sugar supply chains, how the structural configuration of these supply chains is the fundamental element underlying the relative bargaining positions of different stakeholders, and what Trade Aid is doing to address these issues. Geoff will provide a brief history of the factory and the journey to date. He will give an insight into where they are at the moment and what the future could look like and how they intend to get there.

J2-2 Food and health focus in Pacific Island nations

Ann Hayman, Food Safety and Nutrition Consultant, Food and Agriculture Organisation of the United Nations

Consumers living in small Pacific Island nations may have limited food choices and much of the food is imported. Non-communicable diseases are a major health problem and prevalence of obesity and diabetes is among the highest in the world. Food can be a contributing factor. FAO works with governments in the Pacific region (Kiribati, Federated States of Micronesia, Marshall Islands, Palau, Solomon Islands, Nauru, Vanuatu, Tonga, Cook Islands, Samoa, Tuvalu, Niue, Tokelau, Fiji) to improve food systems by increasing the availability and affordability of healthy food and providing dietary guidelines for food choices. Projects and initiatives outlined include Pacific Islands Food composition data, food safety control systems, school nutrition education, school food programmes, Pacific regional and national food-based dietary guidelines highlighting local food and food taxes.

J3-1 Manuka honey as a fermentation substrate for probiotic *Lactobacillus reuteri* DPC16

Anand Mohan, PhD Candidate (Food Science) University of Auckland

In the present study, potentially prebiotic Manuka honey was utilised as a substrate for probiotic *Lactobacillus reuteri* DPC16 in an anaerobic fed-batch fermenter. The bacterial growth in MRS broth was significantly higher for DrKiwi AMF Manuka honey (Active Manuka Factor: 05+, 10+, 15+ and 20+) than Invert Syrup and control samples without any additional sweetener source. Furthermore, there existed a strong negative correlation ($p < 0.05$) between the pH/glucose levels and the biomass ascertained by the Direct Cell Weight (DCW). To further investigate the mechanisms of the probiotic growth promoting effect, the sugar and oligosaccharide profile of honey and invert syrup was quantified by Total Correlation NMR Spectroscopy (TOCSY). 2-D NMR spectroscopy (HSQC) revealed the formation of short-chain fatty acids (SCFA) metabolites, which are known to positively influence the gut health. Probiotic Lactobacilli growth was thus enhanced by Manuka honey having rated antibacterial activity, together with the production of beneficial fermentation metabolites.

J3-2 Valorisations of antioxidant and antibacterial activities of selected plant-based fermented foods

Anis Shobirin Meor Hussin, Associate Professor, University Putra Malaysia

Lactic acid bacteria (LAB) metabolites have been reported to improve of human health by modulating the immune system. This study is carried out to develop

fermentation process for plant-based fermented foods using appropriate starter culture and raw materials including *Allium sativum*, *Parkia speciose* and *Cleome gynandra*. The raw materials were fermented with several LAB strains and the biological activities including antioxidant and antibacterial activities were evaluated using standard methods. Metabolomics profiling was carried out to determine the changes for the phytochemicals in the fermented samples using ¹H NMR technique. The results demonstrated improves antibacterial and antioxidant activities for the fermented samples in comparison to the raw materials. Several bioactive phytochemicals were observed in the fermented samples and they showed correlation to the antioxidant and antibacterial activities. Plant-based raw materials fermented with the proper LAB strains have high potential to improve the consumer health due to their biological activities.

J3-3 Preparation of a novel emulsifier system based on glycerol monooleate by spray drying

Chia Chun (Marcus) Loi, PhD Candidate, Department of Food Science, University of Otago

Glycerol monooleate (GMO) is an effective emulsifier but is unsuitable for many applications due to its low solubility in water. Encapsulation is a potential alternative to transform GMO into a water-dispersible, free-flowing powder with an extended shelf-life. This study assessed spray drying to prepare instantised GMO powders, and investigated emulsion formulation (maltodextrin type, GMO concentration) on emulsion properties, powder properties and oxidative stability. All homogenised emulsions were suitable for spray drying due to their high emulsion stability, monomodal droplet size distribution (150 to 180 nm) and low viscosity (20 to 65 mPa s). All instantised powders had low moisture content (<2.5%) and demonstrated high solubility (>95%) and good dispersibility (>65%) in water. The instantised powders with 35% GMO showed the highest encapsulation efficiency (>90%). Thermogravimetric analysis showed that instantised powders had a lower oxidation rate than bulk GMO, indicating that spray drying can extend the storage life of GMO.

J3-4 Lactoferrin from Red Deer milk

Ye Wang, PhD Candidate, Lincoln University

Lactoferrin, an iron-binding glycoprotein of the transferrin family, exhibits strong antimicrobial activities. Little is known about the characteristics of milk lactoferrin from species other than cow. Deer milk has potential commercial value to the deer industry since New Zealand has a large population of farmed deer and mated hinds. Understanding the benefits of deer milk and its components to human health can support our long term goal of establishing a deer milk industry in New Zealand. Lactoferrin (Lf) was successfully fractionated from deer milk for the first time. It had similar isoelectric point to cow Lf, pI 7.9 and a similar molecular weight around 78 kDa to cow Lf. Deer lactoferrin contains 707 amino acids which is one less than cow lactoferrin. It is highly homologous with cow lactoferrin with only 8% difference. This difference indicates it might have different bioactivities compared with cow Lf.

K1-1 Search your company soul - growing through employer branding

Charlotte Sullivan, Founder, Auburn Marketing Limited

Finding purpose in life is one thing, but finding our purpose as a business is quite another. It challenges us to stop, step back, take a breath and think about why

we're doing what we do. It's not a goal, or a strategy, and it certainly isn't about profit: it's your reason for being. But why bother? Where's the value? And who cares anyway? When you're able to clearly articulate the purpose of your business it can become your icebreaker, your compass, your motivator and your recruiter. Everything you do should be in the pursuit of that purpose. Join us at the Good Heart session to find out more about how you can unify your team around your purpose for growth.

K1-2 Future-proofing your career

Gareth Robertson, Managing Director, Scientific & Technical Recruitment Ltd

Industry professionals today are surrounded by vast technological change, seeing the influence of the Internet, Artificial Intelligence and emerging technologies such as Blockchain growing consistently. These progressions point towards significant disruption and automation in the future. In fact, studies show that up to 70% of today's jobs will be gone by 2050, replaced by jobs not in existence today. With this in mind, Gareth will review key transferable skills every career needs to navigate the future.

K1-3 Developing our people. A true story

Nicola Hockley, Quality Manager, Goodman Fielder Ltd

The company states on the website that "Our aim is to be a destination employer in the food industry where we don't just offer jobs - we offer careers."

How does this happen in the day to day operations of technical team in an FMCG manufacturing site?

This is a story about some of the things that we are doing to make this aspirational statement a reality for our people.

The Quality and Laboratory team at Meadow Fresh are a multigenerational, multicultural multi-talented bunch of wonderful individuals. The story is set in an old factory, in a dynamic and growing industry. The cast come from all over the planet. It is a story about people. People at different stages of their food industry careers. It is a story about a journey into the unknown. About challenges, collaboration, personal growth and development opportunities that can be found along the way.

Session K2: The 3-minute Pitch. Sponsor Riddet Institute

K3-1 Integrated fingerprinting and chemometrics as a tool for distinguishing the impact of Pulsed Electric Fields (PEF) pre-treatment, winemaking, and storage on Merlot grape juice and wines

Biniyam Kebede, Lecturer, University of Otago

This study investigated the evolution of volatiles, phenolics and oenological properties during red winemaking of Merlot grapes pre-treated with different pulsed electric field (PEF) intensities. A multiplatform approach combining fingerprinting (volatiles) and profiling (non-volatile) coupled with chemometrics was demonstrated for the first time in determining the most important attributes evolving uniquely under the influence of PEF during winemaking. While a PEF pre-treatment applied to grapes did not affect the overall winemaking process, the amount of skin- and seed-bound phenolics such as anthocyanins, stilbenoids, hydroxycinnamic acids, and flavanols was greatly enhanced by PEF while some volatile esters and higher alcohols

were more developed when transforming the PEF-treated grapes into wine. These findings implied that PEF is an industrial-feasible technology that can be considered at the existing commercial winemaking practice as the treatment intensity can be systematically optimised to add different complexities to the resulting wine that might intrigue the consumers.

K3-2 Measuring beef bolus texture

Esther Onguta, PhD Student, Massey University

Understanding the oral processing in beef could lead to methods to influence the sensory experience and digestion outcomes. In order to follow changes in structure during mastication, methods to characterise the beef bolus at different stages of chewing are required. The texture of beef boluses were observed using two instrumental techniques; the compression and slip extrusion test (SET). SET is a test developed to mimic the changes in bolus deformation and lubrication during swallowing. Normalization procedures were required to account for the variation in the shape and volume of bolus samples. The work presented will outline the methodology used in normalizing samples and compare instrumental texture results from both methods. The results demonstrate that SET is most suited to following beef bolus texture during chewing.

This research is part of a project that aims to link the structure of protein rich foods to digestibility and sensory experience through oral processing.

K3-3 Effects of air blast freezing and frozen storage on *Escherichia coli* survival in Greenshell™ mussels and its effect on the n-3 PUFA and microstructure of Greenshell™ mussels

Manasweeta Mohan Angane, Masters Student, Plant & Food Research and University of Auckland

The effect of air blast freezing and frozen storage on eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in Greenshell™ mussels was studied. The total n-3 PUFA concentrations reduced significantly ($p < 0.05$) after storing mussels at -10°C for a period of 90 days but not in mussels stored at -20°C ($p > 0.05$). The frozen storage effect on the microstructure of mussels was also investigated. The microstructure analysis revealed that frozen storage caused serious deformity in tissue structure of mussels. Furthermore, the survival of *E. coli* after air blast freezing and subsequent frozen storage in mussels was evaluated. Mussels were inoculated with *E. coli* culture and their survival was monitored over a period of 84 days. Air blast freezing did not significantly reduce *E. coli* counts in mussels. However, subsequent frozen storage at -10°C and -20°C for 84 days resulted in $> 1 \log^{10}$ reduction in *E. coli* counts.

K3-4 Bridging the gap between the art and science of food smoking

Nadeem Caco, PhD Candidate, Massey University

The process of smoking food has existed for as long as humans have been preserving food. In all that time, it has remained an artisanal skill that has been passed down the generations. The knowledge of these artisanal smokers differs from region to region. There are no universal best practices when it comes to the smoking process. This is thought to be a result of the lack of real scientific evidence to defend the various proposed practices. Research has been conducted in order to understand the fundamental process of smoke formation in order to bridge this

gap. The effects of various parameters on smoke formation have been studied including treatment temperature, mass size, particle size, heating rate and type of wood. It was revealed that treatment temperature and wood type had the most significant effect on smoke composition. The results of this study will help in establishing a universal guideline for the process of food smoking.

K3-5 Drying characteristics of fermented Fijian *Theobroma cacao* beans in a solar-assisted drying system

Rupantri Nandika Raju, PhD Student, Massey University

Fermentation and drying are fundamental postharvest processing treatments for *Theobroma cacao* beans. Drying conditions are critical for quality and storage of dried beans. While temperature is important, relative humidity has a more significant influence on drying characteristics. In Fiji, sunshine is abundant but high relative humidity deters drying. As a result, quality losses mainly from mould infestation and acidity during sun drying can lower commercial value. A solar-assisted dryer with desiccant wheel was designed for drying fermented *T. cacao* beans under Fijian weather conditions. From this model, a prototype dryer was tested in Fiji. This prototype had a desiccant tube and fans. Interactive effects of air temperature, relative humidity and air velocity were considered. The product was dried for 24-36 hours with a pre-drying step of 12 hours at 46 °C and 56 °C followed by another 12-24 hours of drying with silica-conditioned air at 46 °C and 56 °C. This simulated the full scale design proposed. Another set of fermented beans was dried for 24-36 hours using silica-conditioned air at 46 °C and 56 °C. Fick's diffusion model described moisture transfer during drying. Experimental drying data were tested against drying models.

L1-1 Delicious Hemp Drinkable Rivers

Michael Mayell (Social Entrepreneur - Founder of Cookie Time)

Michael will share his food journey from Cookie Time to Nutrient Rescue and Drinkable Rivers. He will share how low THC Cannabis, Hemp, is the solution to two of New Zealand's biggest problems -

1. Our sickening physical and mental health condition
2. Our environmental horror story summed by the fact that 62% of the length of our rivers are unswimmable and it's getting worse - faster.