miranda.mirosa@otago.ac.nz

p.s. I'm NOT a futurist!


MENU
Aperitif
A dystopian or utopian food future: Food in 2050
Entrée
Back to reality: Food in 2024 and the need to innovate
Main Course
A deep dive into alternative proteins and food waste
Desert
How "WE" grow the food system we want

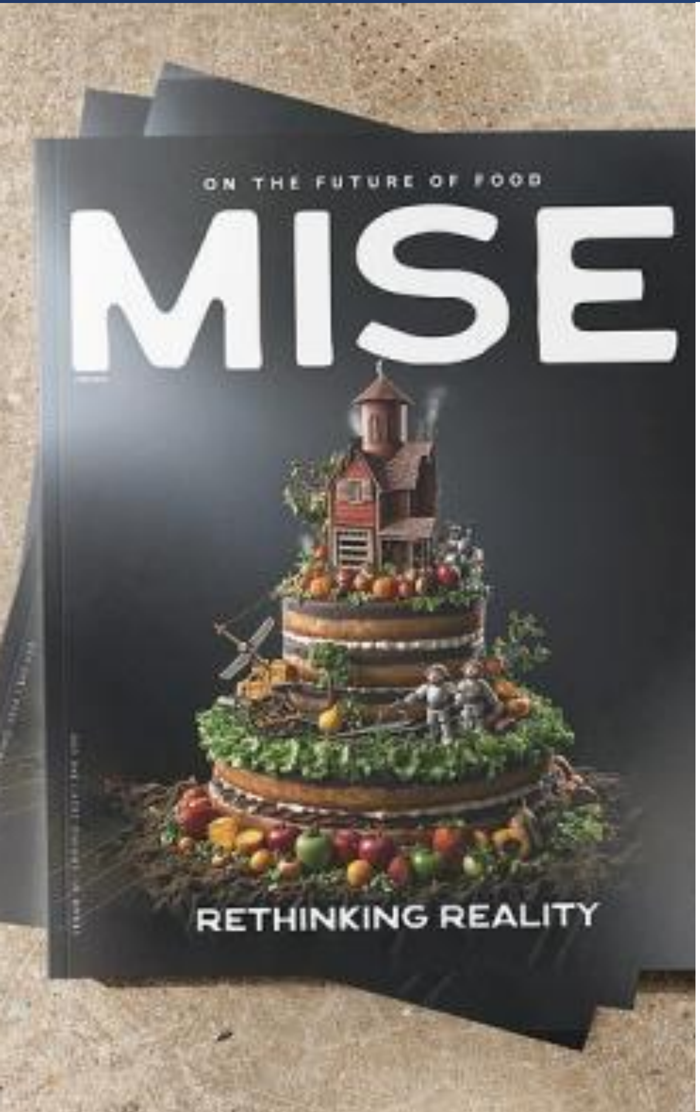
A Dystopian Dinner: Food in 2050 (The Gloomy Version)

The future of food ISN'T predetermined

By learning from these potential pitfalls, we can work towards a brighter future…

A Utopian Dinner: Food in 2050 (The Bright Version)

There ARE food futurists who can help with things like scenario planning



Enhancing Action With Foresight

Envisioning future food system scenarios helps us understand the long-term impact of today's choices and guides actions for a better future.

Back to reality: 2024
Our global food system is hugely impressive…

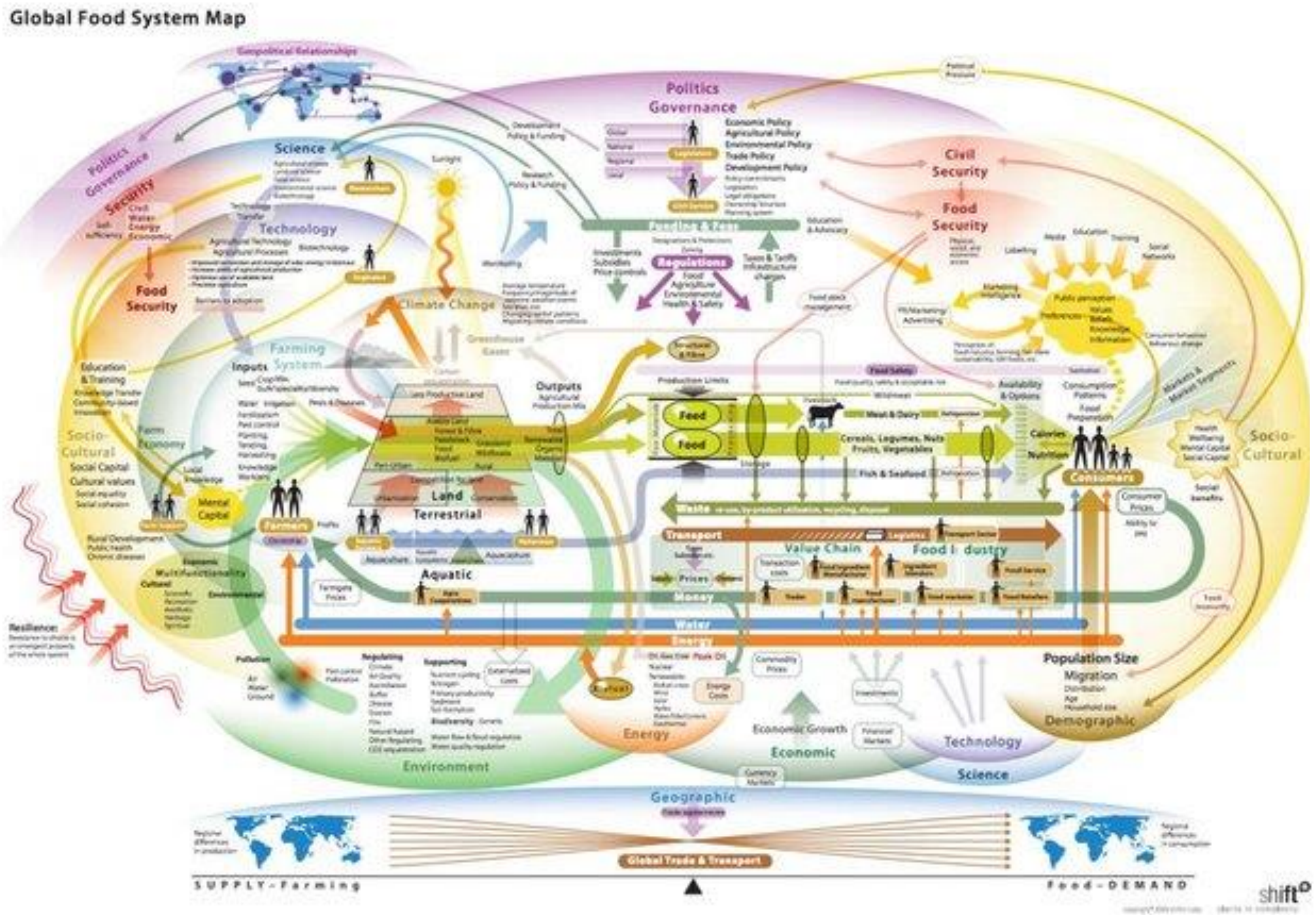
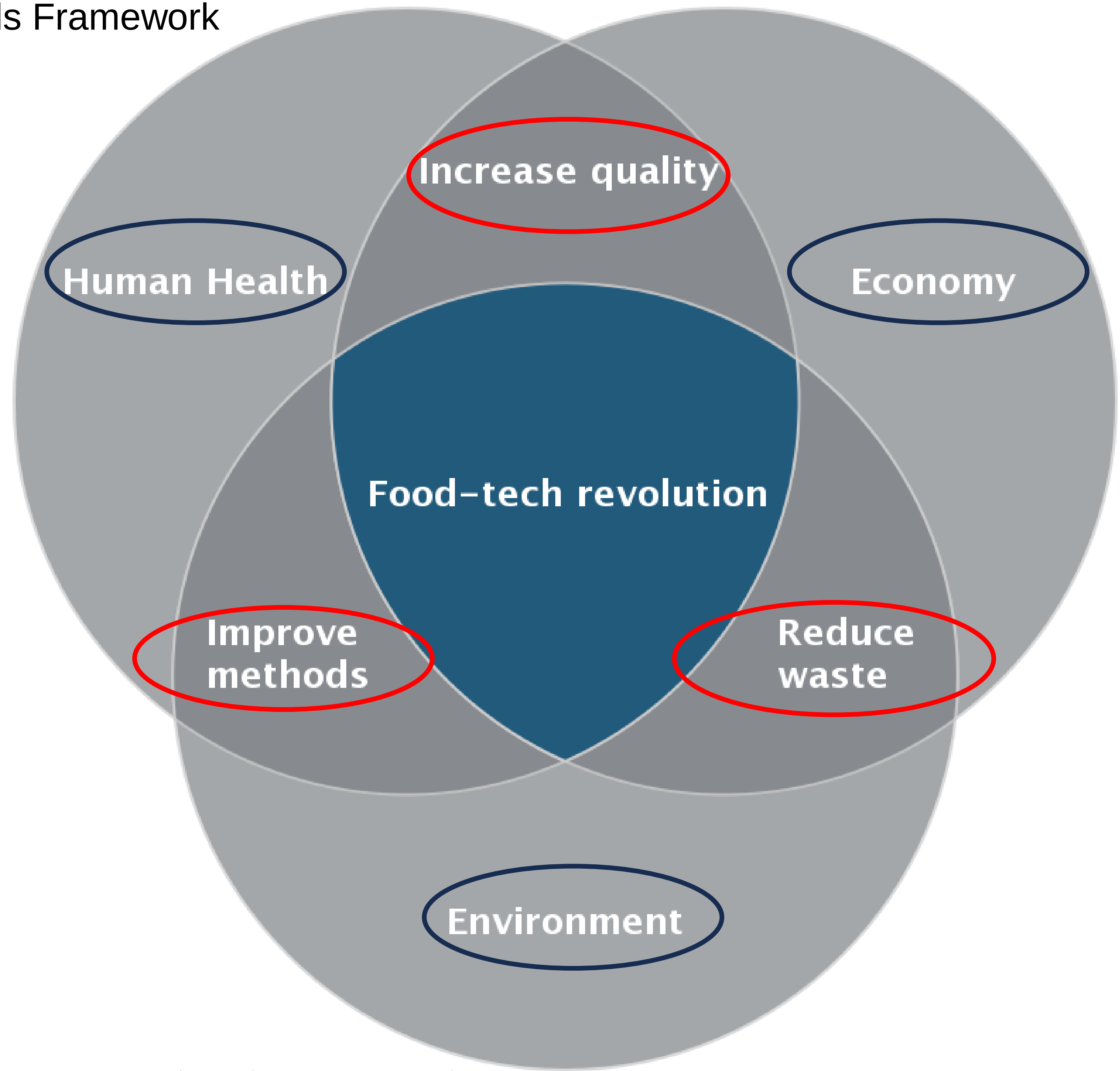


Image: www.ccafs.cgiar.org

Innovation is an Effective Route to Change

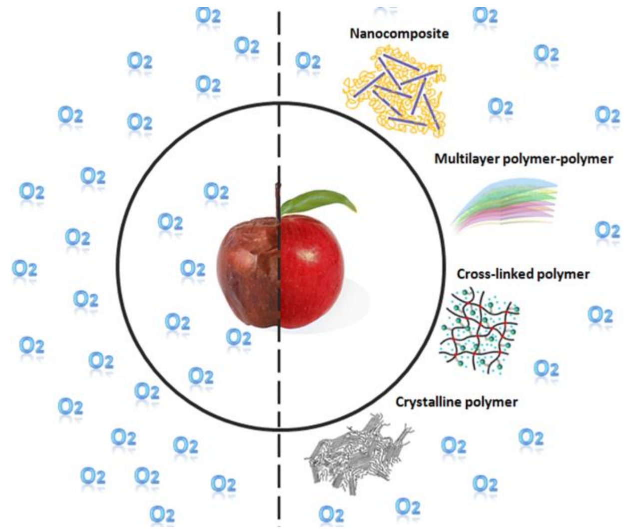
Goals Framework

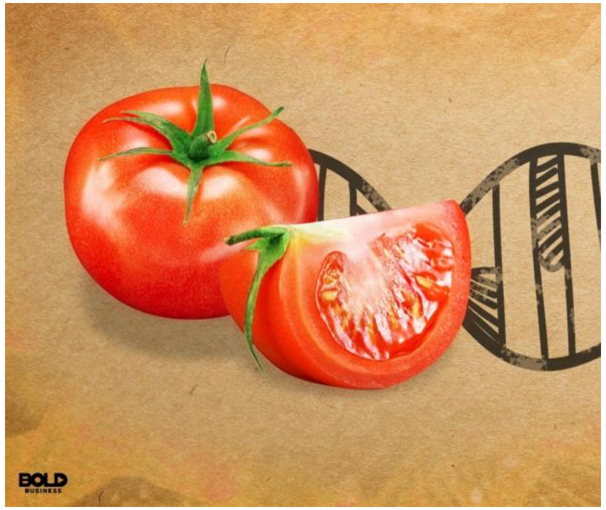


https://www.institute.global/insights/tech-and-digitalisation/technology-feed-world#introduction-the-need-for-another-agricultural-revolution

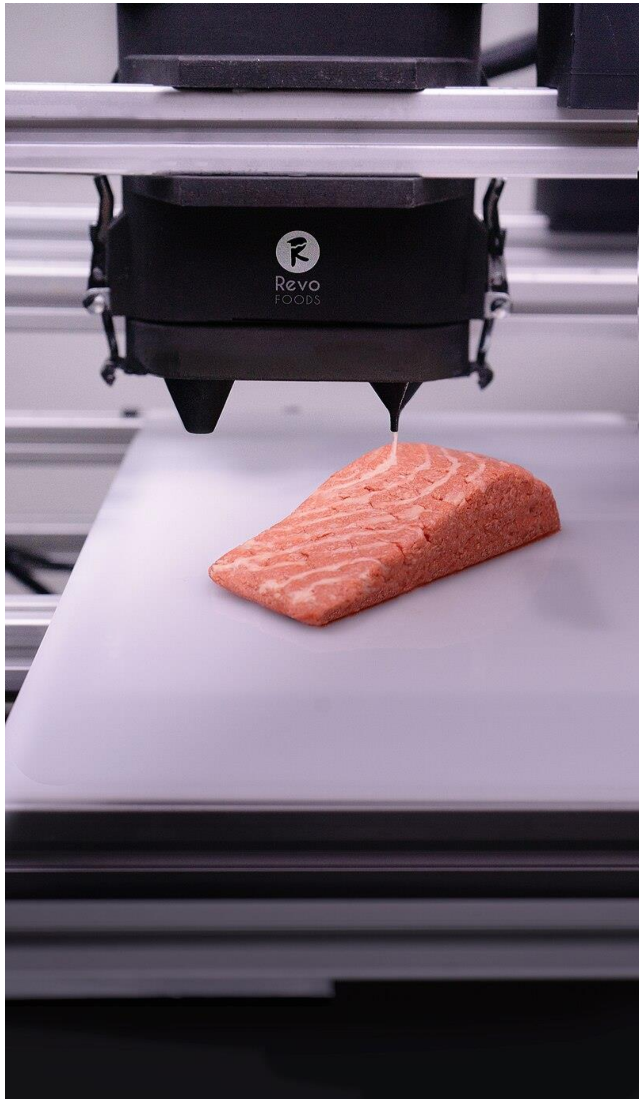
Hig

Digital and biological cross-cutting technologies





Digital and biological cross-cutting technologies



A range of innovations hold potential to revolutionise our system

A. Increase quality	B. Improve methods	C. Reduce waste
Precision	**New Foods**	**Supply Chain**
• Robotics and automation • Farm-management software and sensing	• Plant-based food alternatives • Cultured and lab-grown food	• Food sensing and processing • Food preservation and smart packaging • Renewable cold-storage
Protection	**New Farms**	**Marketplaces / mobile services**
• Gene editing • Microbiome technologies for crops and soil • Biological-based crop protection	• Controlled environment agriculture and vertical farms	• Digital marketplaces

No one technology presents a single perfect solution!
The task is determining how to make the most suitable technologies work to achieve the greatest impact while minimising risks.

Although this list is not exhaustive, it aims to illustrate the transformative potential of innovations in food and agriculture across the supply chain.

Building the best possible future food system is likely to require embracing some, if not all, of these innovations

What are the key strengths of the innovation area?

What are the current limitations?

What opportunities could be created if this technology was scaled up? What opportunities are there to advance this area of innovation further and how could this have a greater impact?

What are the possible negative implications of scaling the technology up further? What are the trade-offs?

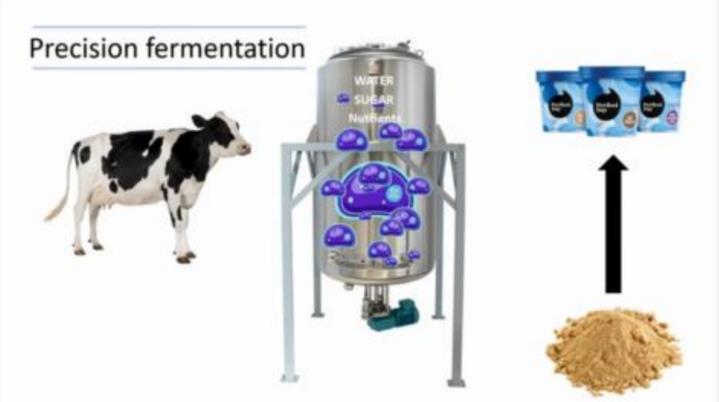
A "DEEP DIVE" INTO TWO INNOVATION CATEGORIES:

- new foods (alternative proteins)

- food waste

INNOVATION CATEGORY: NEW FOODS (ALTERNATIVE PROTEINS)

What are Alternative Proteins?



Fermented Protein

Precision fermentation uses fermentation and yeasts to replicate dairy foods. Fermentation is not used to produce meat alternatives.

Whey and rennet derived from precision fermentation are already in commercial production, and casein and milk fats can also be produced.

Fermented proteins have long historical origins, and have been made from nuts, seeds, tubers, and coconuts. There are traditional fermentation methods in te ao Māori.

Plant-Based Protein

Plant-based meat and milk alternatives are made of protein extracted from plants, legumes or grains.

This type of protein includes traditional foods such as tofu, and new technology that mimics meat by modifying protein, perhaps adding soy leghemoglobin to offer a ‘bloody flavour’.

https://ourlandandwater.shorthandstories.com/beyond-meat-and-milk/index.html

Cell-Cultured Protein

Cell-cultured (or lab-grown) protein is created by extracting cells and replicating them in a laboratory environment. The end product is identical to the original product, having been made from the same genetic material.

This method enables the production of real meat from any species. It is not considered genetic modification.

Cell-cultured foods still await regulatory approval. Just one product is for sale in Singapore.

"Countries that are dependent on importing food from countries such as Aotearoa, like China and the UK, will increasingly be able to produce more of their own alternatives to animal protein as technology advances"

(Research lead Jon Manhire, director of The AgriBusiness Group)

Perfect Day fermented milk

Scenario Two

Precision fermentation takes off and demand for plant-based milks increases (+22%), impacting traditional dairy products.

Demand for plant proteins continues (+10%) but technical issues stall the development of cellular products.

Sustainability is one factor driving consumer acceptance, in addition to improved taste and texture, and price parity.

Future Meat plant-based meatballs

Scenario Three

Plant-based products take off, while some of the barriers facing precision fermentation and cellular products are removed.

There is increasing demand for plant protein (+22%), precision-fermented dairy (+10%), and cell-cultured protein (+10%).

Sustainability is a key factor driving consumer acceptance.

Wildtype cultivated salmon

Scenario Four

All alternative proteins take off. There is a significant increase in demand for plant protein (+22%), precision-fermented dairy (+22%), and cell-cultured protein (+22%).

All current barriers to the success of alternative proteins have been removed or are in the process of being overcome. Scale of production increases, and price parity is achieved. Taste and texture improve.

Sustainability is a significant factor. Alternative proteins are viewed as solving several global concerns.

These scenarios were used to inform the below proposed land use changes displayed.

Proposed Land Use Changes

Scenario 1	Scenario 2	Scenario 3	Scenario 4
• Base Case – Business as usual	• 35% reduction in the dairy area • Arable area increases 50% in Canterbury, Southland, Wairarapa and Horizons	• 15% reduction in the dairy area • Arable area doubles across all flat land (25% from dairy, 75% from sheep and beef) - mainly south island • 15% reduction in sheep and beef sector goes to forestry	• 35% reduction in the dairy area • Arable area doubles across all flat land (25% from dairy, 75% from sheep and beef) - mainly south island • 25% reduction in sheep and beef sector goes to forestry
	e.g. Precision fermentation takes off	e.g. Plant based takes off	e.g. All APs take off

Environmental Impact

Greater global demand for alternative proteins will have environmental benefits for New Zealand

Economic Impact

Greater global demand for plant protein will also have economic benefits for New Zealand, but these will be unevenly distributed

Regional Analysis

These include impacts over time on employment, land use, and environment, to inform long-term planning and regional development

Policy Issues

'Natural' is a Core Strength

The New Zealand pastoral sectors' points of difference may increasingly be as an exporter of high-quality 'natural' meat and milk products, which will appeal to a different market than their highly processed alternatives.

We Must Reduce Agricultural GHGs

The negative impacts of increasing global demand for new proteins on New Zealand's meat and milk industry will be significantly higher if we don't mitigate our agricultural greenhouse gas emissions.

This is because a desire to live more sustainably drives some people to want to eat alternative proteins, which can be marketed as having a lower greenhouse gas footprint.

New Industries Will Emerge

New Zealand has the opportunity to become a major producer of alternative proteins. Significant quantities of renewable energy are needed, and New Zealand's supply of hydro and increasingly wind power put us in a good position.

Māori knowledge of traditional fermentation practices is currently untapped.

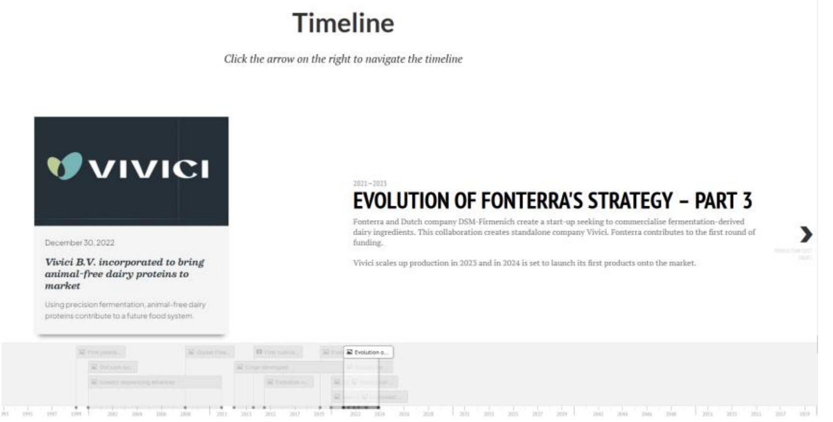
Producing large quantities of protein through precision fermentation and cell-culture processes will require a massive supply of inputs such as serum and yeasts, and this emerging 'feed industry' could also provide opportunities for Aotearoa.

Prepare for Market Shifts

New Zealand needs to prepare for significant changes to our key food export markets.

Countries previously dependent on importing food from Aotearoa, including China and the UK, will be able to produce more of their own proteins as technology for producing alternatives to animal protein is adopted.

The dairy sector in New Zealand is more threatened by the development of new proteins than our meat producers. Fonterra's response of engaging with the sector is sensible.



INNOVATION CATEGORY: REDUCE WASTE

UPCYCLED FOOD LAB

UPCYCLED FOOD LAB

Upcycled ginger beer soda recipe

Homebrewers' guide to upcycling bread into beer

RESCUE RE-WORK CITIZEN

GIVE SPENT GRAIN NEW LIFE

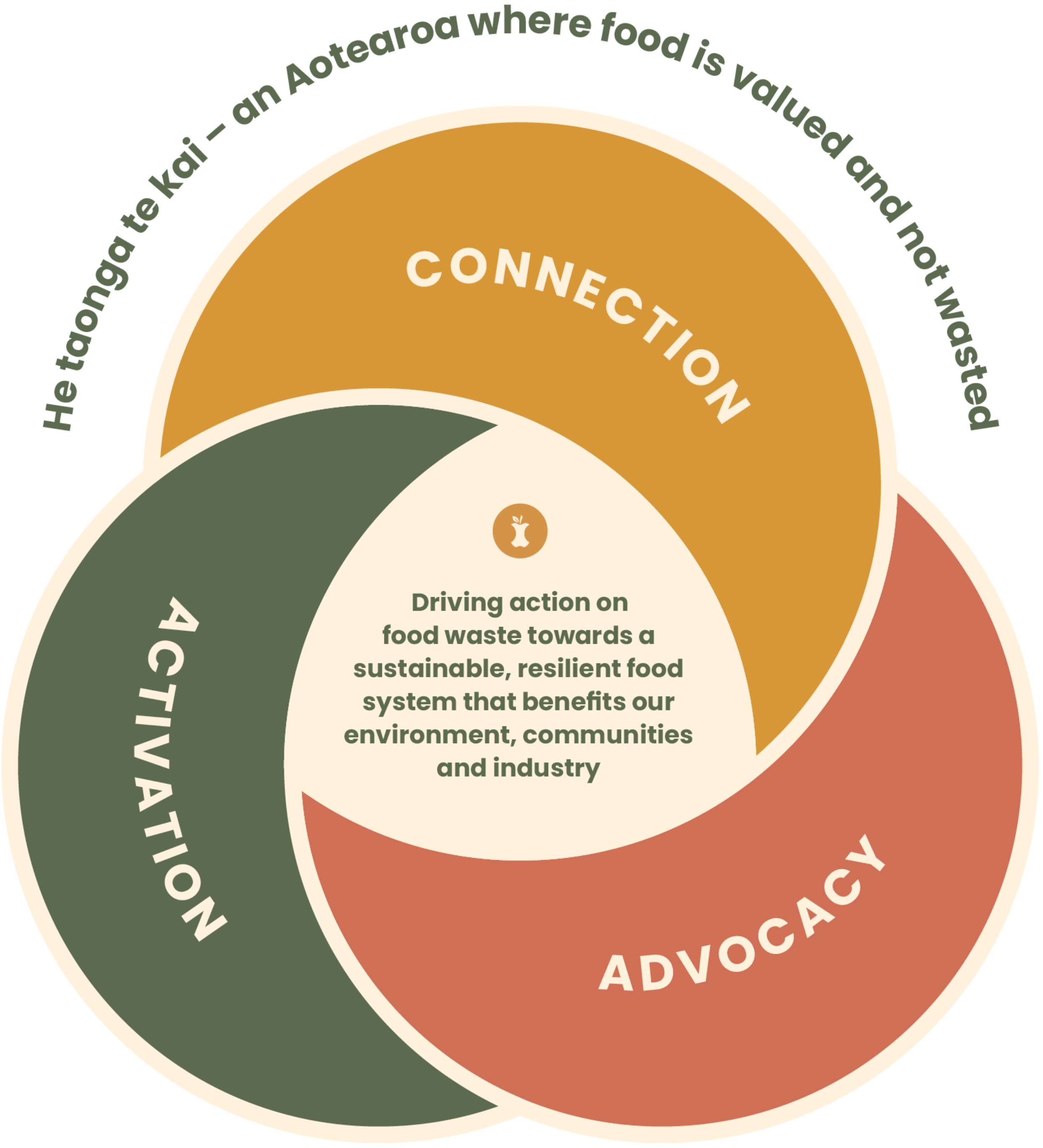
In the US 27 billion kilograms of spent grain is generated every year! Spent grain is the leftovers from brewing. There are ample opportunities to upcycle this valuable 'waste' stream. A number of entrepreneurs have built their business on the growing interest of spent grain, for example Regrained *(4) take spent grain and upcycle it into flour and Rutherford and Meyer, The Upcycled Grain

Find the recipe on our website
https://foodwaste-otago.org/news/the-star-cake-and-beer-together-at-last

food waste innovation
Food Waste Technical & Social Innovations Research Group

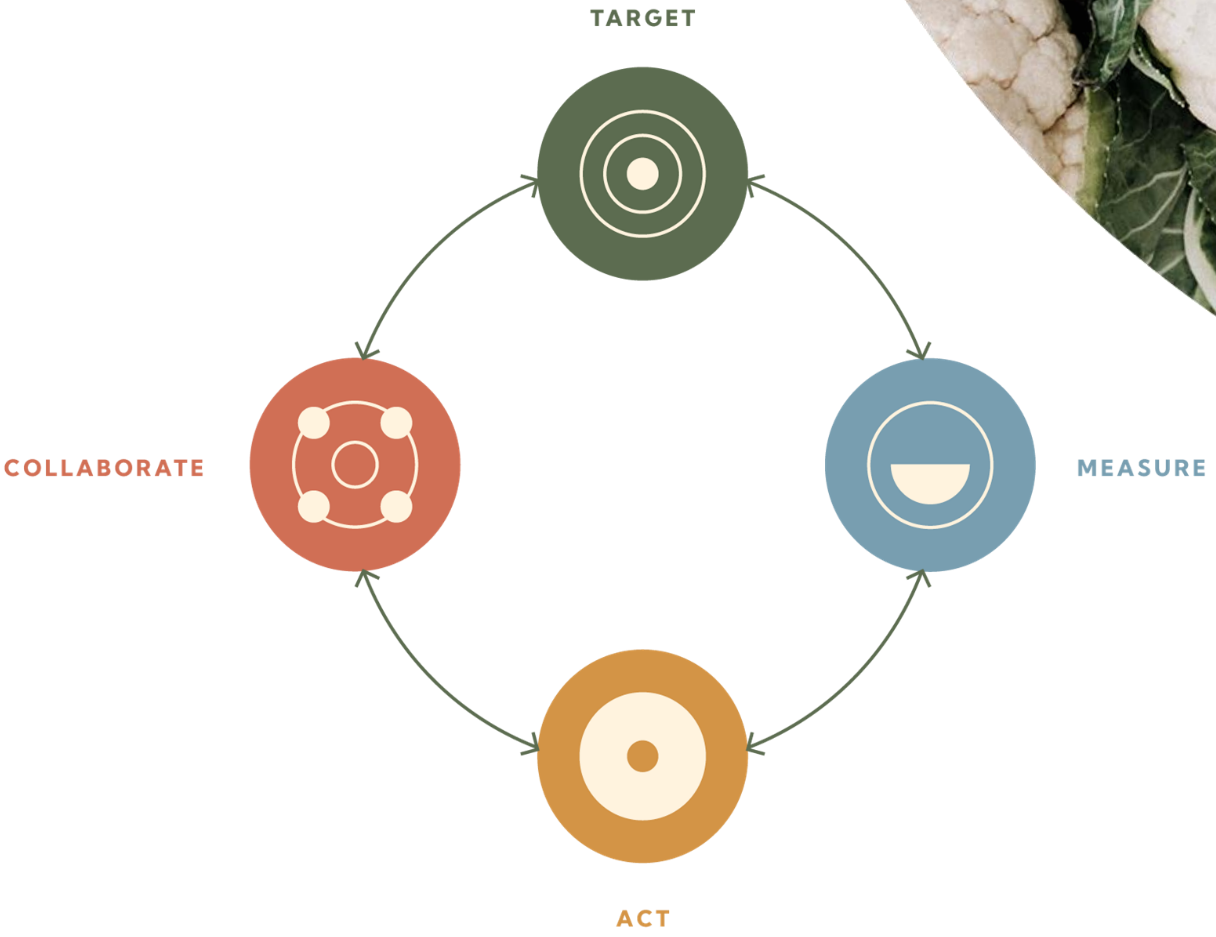
UPCYCLED FOOD LAB

New Zealand Food Waste Champions 12.3



https://www.nzchampions123.org/

Kai Commitment



countdown
goodman fielder
Fonterra Dairy for life
SILVER FERN FARMS
Foodstuffs NZ
Nestlé Good food, Good life
GWF George Weston Foods Limited

https://kaicommitment.org.nz/

FOOD WASTE SOLUTIONS KEY:

Prevention
Systems, tools, food design and approaches that enable the reduction or avoidance of wasted materials, ingredients and products.

Upcycle
Solutions that convert food into new, additional value opportunity such as revalorisation and secondary markets.

Redistribution
Tech, networks, transport and infrastructure that prioritise the redistribution of food to humans first.

Recovery
Solutions that recover energy/nutrients from food for use beyond human consumption. Eg: fertiliser, compost, animal feed, anaerobic digestion NOT landfills.


Seeding a Brighter Future

Shifting Mindsets and Skillsets:
The crucial role Agribusiness teachers play in this transformation!

- Cultivating Future-Ready Skills
- Encouraging Collaboration and Entrepreneurship
- Fostering a Sustainable Mindset
- Building a Global Perspective
- Inspiring a Passion for Food


University of Otago
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NEW ZEALAND’S FIRST UNIVERSITY

University of Otago | Ōtākou Whakaihu Waka | A place of many firsts

0:01 / 1:00

Scroll for details

BSc Food Science

Developing healthy and flavoursome foods in a sustainable manner that will meet customers’ expectations.

Flexibility is the key

Our flexible degree structure enables students to tailor their programme based on their career aspirations.

Get them to talk to us for course advice!

Broad range of career pathways:

Product Development,

Safety and Quality,

Production and Processing,

Ingredient Technology and Consultancy,

Agri Marketing, Consumer Insights and Sensory Science,

Policy and Regulatory,

Sustainability,

Entrepreneurship.

Bsc Agricultural Innovation

University of Otago

ŌTĀKOU WHAKAIHU WAKA

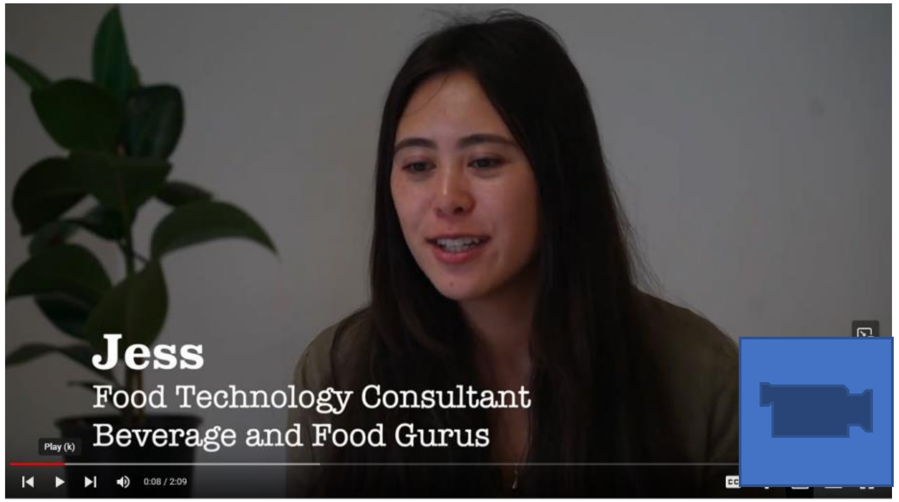
Master of Applied Science in Food & Agriculture (12 months)

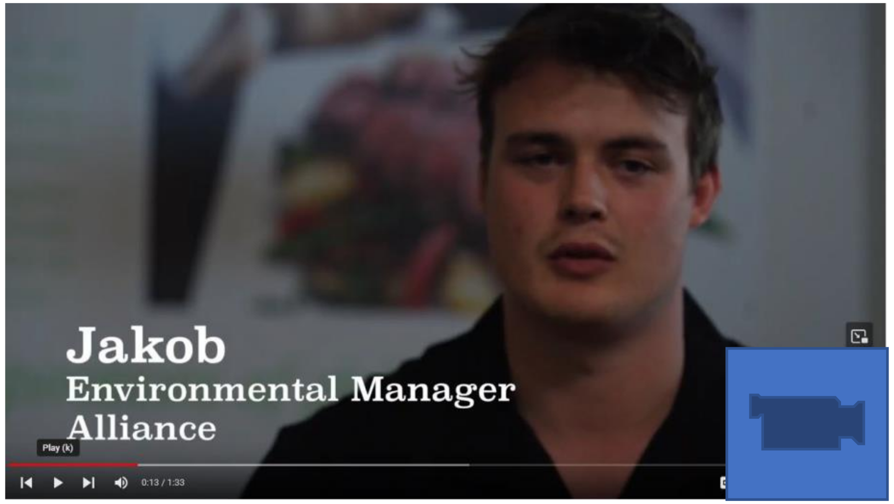
A conversion degree for students without a background in food/ agricultural science to prepare them for a global career in these growing sectors.

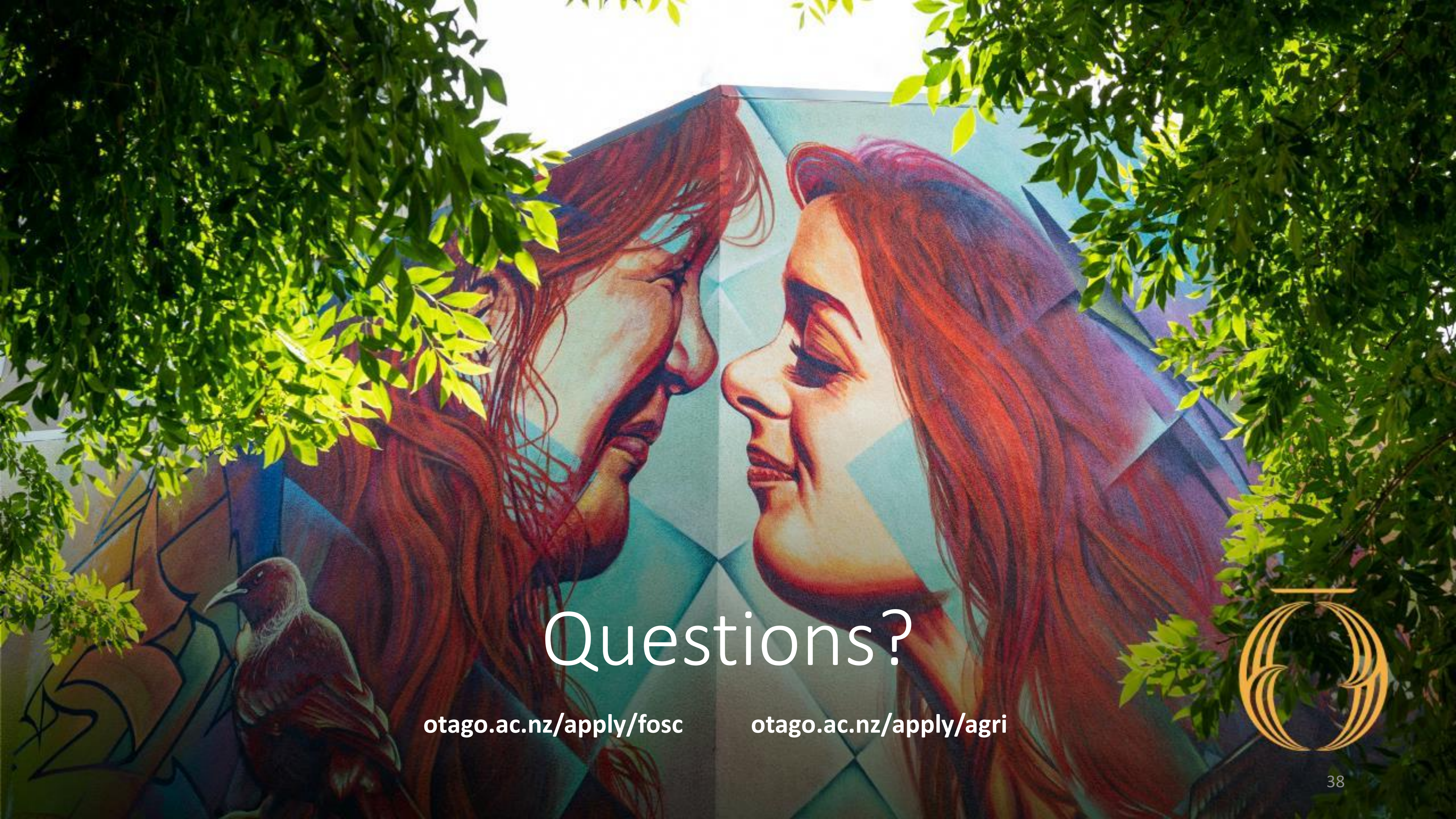
- A comprehensive "farm-to-fork and beyond" degree, with its strong emphasis on future foods, will empower you to improve food systems' social, environmental, and economic sustainability
- **Coursework + Supervised Independent Study/ Workplace-based Project**
- **Admission**: **Bachelor's degree in any field** with GPA equivalent to Otago B (70%).

Modules: Regen (NZ) Agriculture | Agricultural Plant Science | Agritech | Livestock Animal Physiology | Seeds Industry |Intro to Food Processing | Intro to Food Chemistry | Intro to Sensory and Consumer Science | Sustainable Food Production | Food Packaging | Thermal Processing | Food Enzymology | Flavour Science | Food Waste | Food Biotechnology | Fermented Foods and Beverages | Brewing | Sensation and Perception

Don’t just take our word for it…






Questions?
otago.ac.nz/apply/fosc
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