Food Safety Centre:
Future Directions

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Future Directions? What and how?

CHANGE IS GOOD.

you go first!

Aspirations
Food Safety or Food Systems?
The Tasmanian Institute of Agriculture (TIA) Food Safety Centre (FSC) is a central portal for all issues related to Food Safety for the Australian food industry, Small to Medium Enterprises, government and the research community. A four-tiered subscription service gives users access to a variety of important time- and cost-saving services.

The FSC provides subscribing members with:

- Personalised Resource Locator Service
- Customised Food Safety News
- On-line R&D Capability Map - FREE
- Journal Alert Service
- Training and Risk Management tools - FREE
- Up to 50 active logins for your organisation and customers
- Customised data-mining of ComBase - FREE

LIST IN THE CAPABILITY MAP ....It's FREE!

BECOME A SUBSCRIBING MEMBER
University of the future?

Democritisation of knowledge

Digital Technologies
- Online learning
- Hardware
- Blended learning

Markets & Funding
- Competition for students
- Government funding
- Funding sources

Global Mobility
- Elite brand emergence
- Emerging competition
- Talent sourcing

Integration with industry
- Industry tenures/training
- Partnerships
- Industry as competitors for training

Adapted from Ernst & Young 2012 report
Working in the RDE&E space not just the RE (education) space
Food Safety, Security & Sovereignty
Improved agrifood security locally & for our trading partners through innovation platforms; excellence in food & supply chain safety & quality through modelling of microbial hazards, predictive tools, scenarios &foresighting

New Products, Proc & Value Chains
Functional value chains through new products and process development with emphasis on premium products and innovation
Proposed SLAF Model

School of Land & Food

- Undergraduate Teaching Income [student numbers - UTAS margin]
- MGT/CORP Salaries & Exps
- Course Delivery
- Infrastructure
- Development

Tasmanian Institute of Agriculture

- UTAS Research Income [grants + PhD completions + publications - UTAS margin]
- State Govt Contribution
- MGT/CORP Salaries & Exps
- RD&E Leadership
- Infrastructure
- Enablers
- Service to Industry/GOVT
- Externally Funded

Teaching
Non TIA centric research
e.g. ARC Discovery

TIA centric research
e.g. R&D Corp, Industry etc.
Teaching and Learning

Mixed Mode delivery – redirects learning to being more self-directed and online

• Online self-directed learning combined with face-to-face skill development (required for food safety/microbiology/science)

• Training/skills focused – microbiology (general), food microbiology, diagnostic skills, food chemistry etc.

• Intensive training could occur outside or within of normal semester possible collaboration with TAFE or other VE providers

• Provides for more flexibility

• Requires appropriate resourcing and staff
10-day Intensive teaching period in Feb → Learning through e-platforms during Mar-July → 10-day Intensive teaching period in Aug → Learning through e-platforms during Sept-Jan

Three dimensions:

Spatial or geographic distribution of teachers and learners:
- Face to face (F2F) → Mixed Mode → Distance Education
  - On Campus → Off campus

Extent of ICT support:
- No digital support → Digitally Supported → Internet-supported → Internet-dependent → Fully online
  - Offline → Online

Pedagogical approach / level of mediation:
- Independent Learning → Mixed Mode → Interactive Learning
  - Low mediation → High mediation
Existing and Possible Research Directions

- Supply chain analysis
- Food Innovation (Prof. Roger Stanley, CFI)
- Interventions with applicability in agriculture
- Food animal:bacterial interactions for production sustainability and safe products
- Shelf life extension to reduce food wastage
- Predictive modelling integrating microbiology and product quality
ARC Industrial Transformations Training Centre in Innovative Horticultural Products
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- 2015 – 2017
- > $6 million project
- 10 research projects
  - horticulture, plant physiology, marketing/consumer research, fruit/vegetable preservation/processing/packaging
- 10 new PhD students
- 3 new post-docs
- predominantly TIA/CFI staff but also Business, AMC, Chemistry
- very active collaboration with industry, including student training in innovation process
- Industry partners include: Woolworths, Houston’s Farm, Hansen’s Orchards, & many others including interstate businesses and research organisations
Use of bacteriophages as biocontrol agents for fresh produce

- Primarily target food-borne pathogens (Salmonella)
- Use phages previously isolated and characterised
- Application in irrigation or processing water used for fresh produce e.g., seed sprouts
  - Control pathogens in the processing stream?

Univ. Sunshine Coast (Ipek Kurtböke) is studying this for in-field application to strawberries currently

Scale bar = 100 nm
Future directions – shelf-life

reduce wastage, economic efficiencies, market access, improves safety & logistics

- modelling supply chains
- antimicrobials in RTE foods?
  - addition of suppressing microbiota or phage
  - chemical (antimicrobial films)
  - nanoparticles (antimicrobial)
- probiotic and nutriceutical delivery in RTE foods (encapsulated, novel processing technology e.g. microwave assisted sterilisation)
ARC Transformational Hub: Pathways to Market project

Capturing brand equity for producers via environmental, safety, quality and ethical credentials to the market
Pathways to Market

Problem definition – capturing brand equity for producers by proving environmental, safety, quality and ethical credentials to the market.

• Tasmanian supply chains
  • *Greenham’s Meats* – beef into USA markets
  • *Epoh Health Tasmania* – baby formula into China

• Partner Organisations
  • *Tasmanian Farmers & Graziers Association*
  • *Grey Innovation*
  • *ABS, ABARES, CSIRO, NAB, Uni Adelaide*
Targeted research in Shelf-Life Extension

Spoilage control in red meat products

- models to predict time to market and quality
- develop supply chain technology

Role of lactic acid bacteria in spoilage of MAP fish products

- as above
- technology to lengthen

Spoilage control in mixed ingredient products

(w/ Roger Stanley, CFI)

- value added food-products
- processing technologies i.e. microwave-assisted sterilisation
Questions to be answered that could lead to practical solutions

• Which species in particular are a problem
  **Rapid ID technologies – lab-on-the-chip technologies**
• At what numbers do they affect the product
• What effect do they have (specific off odours & flavours)
  **Rapid assessment technologies – NIR, Raman**
• What limits their growth and how can that be used to control them - i.e. inhibit quorum sensing
• Can we integrate sensory data with metabolite profiles/spectra?
• Application of predictive models to assess microbial growth, food product quality
Gut microbiome and probiotic research

• Understand more how food-borne pathogens might be controlled via probiotics, probiotic development in innovative food products (e.g. possibilities DSTO/CFI)

• Research on pathogens that might and know to have food links: Clostridium spp. (C. perfringens, C. difficile), Mycobacterium avium subsp. paratuberculosis
Example: *Mycobacterium avium* subsp. *paratuberculosis* (MAP) research

- Expanding dairy industry (and cold chain) offers a unique opportunity to investigate the epidemiology of MAP and links to gut microbiome related research (Crohn’s disease)

- Scope exists for the investigation of novel methods to ‘decontaminate’ dairy of MAP and reduce the incidence of MAP in herds

- Establishment of MAP-free/reduced dairy products will have massive marketing potential as evidence linking MAP to Crohn’s disease strengthens
Need to be able to translate microbiome-based studies to useful advice for improving outcomes: for example animal production, health & downstream food safety

For example: Atlantic salmon

In farm production data

Gut microbiome data (diet studies) (Zarkasi et al 2015)
Main requirements to support these endeavours:

- A stable research environment
- Accessible funding streams - work closely with industry and government
- Sufficient staffing within the FSC/CFI (TIA/SLAF)
- Talented graduates and postgraduates
- Ability to train future graduates that have capability (intellectually prepared)