FERMENTASMANIA:

International lessons for local regional development

A 2015 International Specialised Skills Institute Fellowship.

AGRIFOOD SKILLS AUSTRALIA

fermentasmania

UNIVERSITY of TASMANIA

TOM LEWIS (ISS INSTITUTE FELLOW), ANNA CAREW & NATALIE FRYAR

Sponsored by the International Specialised Skills Institute, Agrifood Skills Australia and University of Tasmania

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i. Executive Summary

With its ever-growing portfolio of nationally - and internationally - recognised beers, breads, cheeses, ciders, cocoas, gins, kombuchas, pickles and preserves, meats, miso, vanillas, vinegars, vodkas, whiskies, wines and yoghurts, Tasmania has great potential as a go-to region for excellence in the art, science and business of fermentation-based food and drink.

A 'triple-helix' collaboration between industry, university and government is working to convert this potential into reality.

This Fellowship project was jointly supported by Agrifood Skills Australia, the International Specialised Skills Institute (ISS Institute) and the University of Tasmania (UTAS). It enabled the ISS Institute Fellow, Dr Tom Lewis, and Dr Anna Carew and Ms Natalie Fryar, undertake three separate study tours to gain in-depth understanding of current trends in fermentation research, development and training in the United Kingdom (UK), Denmark, Sweden, Germany, France and the United States of America (USA). The researchers met with approximately 40 key organisations and individuals over the four-week study tour period. The information garnered during these study tours was distilled into 20 one-page fact sheets identifying key learnings from the richest site visits (see Appendix 2). The information and intelligence gathered will strongly shape future direction and activities of FermenTasmania and the UTAS Fermentation Research Group. These groups together will drive and support enhanced focus on research, development, production and promotion of regionally-focussed, fine food and drink, with the ultimate aim of attracting people to Tasmania.

Ms Fryar and Drs Carew and Lewis garnered insights from world-leading fermentation practitioners and experts, and from premier commercial production, education, training and research organisations. They visited training facilities for students across the full scale of technology innovation for fermented production, from basic home-scale kitchen set-ups, to a 6-star carbon-positive, water-positive research and education institution that is looking 20 years ahead of current 'best practice'. They also learned about front-edge scientific research, research training and bioprospecting to achieve ever-better production efficiency and quality, and the current research holy grail of entirely 'clean' biochemical and physical stabilisation of fine fermented products (zero chemical additives across the full production chain). The travellers also surveyed best practice in technical tourism - where businesses and institutions inducted visitors into the art, science and social significance of fermentation. This highlighted the crucial role of enthusiastic and/or well trained staff to leverage against high-end production facilities and practice, or a region's rich fermented food and drink cultural heritage.

From a skills, education and training perspective (the focus of this report), a set of common factors were seen to underpin best practice development of fermentation capability to support vibrant tourism, food and drink production and research activity:

» Design and deliver capability-building courses that are founded on best practice and that 'make sense' within regional context and culture

» Provide graded series of courses/units, through which participants can initiate their learning at the 'enthusiastic amateur' level and progress to high-level technical or theoretical competency, as their ambition and career needs dictate

- Provide opportunity for formal qualifications from courses recognised and respected amongst potential employers, preferably with international recognition.

From these common factors emerged several key, high level recommendations for those developing and delivering skills and education for current and future workers in the fermentation sector:

- Ensure all training has a connection to context/application and has clarity on transferability of skills (moveable skills mean a moveable workforce, which will support a diverse, adaptable industry)
- Provide a range of moments, spaces, inspiration and support for people to meet to make their own connections and explore mutually beneficial opportunities
  - For example, people who come together to hear stimulating speakers are likely to engage in innovation discussions given time and space to do so
- Provide a conduit to, or develop delivery agreements for, currently available internationally recognised training to reduce the investment risk and insularity associated with local development of courses.

Specific recommended actions for UTAS arising from this project are to:

- Facilitate industry-led forecasting and prioritisation of relevant (e.g. technical, marketing, business and tourism) education, research and technology transfer activities
- Invest in direct sector engagement and support by, for example, developing and delivering an intensive short course/graduate certificate on science and business for small to medium fermentation start-ups
- Pursue international partnerships to identify and agree opportunities for collaborative delivery of education, training, R&D and exchanges. Recommended partnerships priorities for UTAS engagement include: TUM, Heriot Watt, Danish Food Cluster, Plumpton College UK, Christian Hansen Denmark, IOC, UC Davis- Mondavi Centre, OSU (see P5 for abbreviations and acronyms)
- Undertake business case analysis on how UTAS could support or contribute to an independent revenue-based entity providing scientific services (e.g. analytics, analysis, sensory) to industry.

ii. Abbreviations & Acronyms

Chr. Hansen	Christian Hansen, Denmark
CPAc	Cider & Perry Academy
DFC	Danish Food Cluster
Eldrimner	Swedish National Resource Centre for Artisan Foods
ICBD	International Centre for Brewing and Distilling
IOC	Institut Oenologique de Champagne
LAB	Lactic Acid Bacteria
MOU	Memorandum of Understanding
FIC	Oregon State University (Food Innovation Centre)
NPD	New Product Development
NSEA	North Somerset Enterprise Agency
OSU	Oregon State University (Fermentation Science Program)
R&D	Research and Development
TasTAFE	Tasmanian Institute for Technical and Further Education
TUM	Technical University of Munich
UCCN	UNESCO Creative Cities Network
UCDavis	University of California, Davis - Institute for Wine and Food Science
UTAS	University of Tasmania
VET	Vocational Education and Training

1. Fellowship Background

1.1 Aims

This Fellowship and related project were managed under the auspices of Fermentation Tasmania Ltd (FermenTasmania), a not-for-profit company limited by guarantee. Incorporated in 2016, FermenTasmania is facilitating a 'triple helix'[1] collaboration of industry, research and government agencies.

FermenTasmania is focussed on establishing a world-renowned centre ***for*** excellence: supporting the research, development, production and promotion of regionally-focussed, fine food and drink produced through the skilled application of microbial fermentation processes.

A brief overview of FermenTasmania's structure, governance, aims and activities to date can be found at www.fermentasmania.com.au.

This project was designed to help all stakeholders understand what it will take to develop world-leading capability and capacity to support this growing and regionally-focussed agrifood sector, and to develop innovative, best-practice systems for supporting skills development.

The core aims, and associated benefits, of the Fellowship are as follows:

Aim: To develop strong, constructive and ongoing networks amongst world-leading fermentation-based enterprises and organisations.

Benefit: *We will keep abreast with and engage with the latest developments in capacity building programs around the world, increasing the speed and efficiency with which new ideas and programs can be introduced to the Australian workforce.*

These networks will also enhance our ability to foster international skills development exchanges, thereby accelerating innovation and skills development within Australia, and providing additional incentives for high-calibre individuals to build careers in this exciting agrifood sector.

Aim: To understand the capability and capacity required to develop and grow international best practice in the production of regionally-focussed fermented food and drink products.

Benefit: *We will build on international experience to map and plan for the local workforce that will be required to grow this sector.*

Aim: To build a strong understanding of the theory and practice of programs and innovations that have worked, and those that haven't, in terms of developing capacity and capability within fermentation-based enterprises.

Benefit: *We will use our new knowledge to design innovative, effective and efficient capability and capacity development projects.*

1 https://www.triplehelixassociation.org/ (accessed December 2016)

1.2 Methodology

Data to inform this project's objectives were obtained primarily through a series of meetings with leading organisations and individuals across Europe and the USA.

- The core activity for this project comprised three x 2-3-week international travel itineraries, during October 2016, designed to engage with key education, industry and research stakeholders in the USA, Europe and the UK.
  - Funding to support the itinerary for Tom Lewis was provided in part by the ISS Institute via an Agrifood Skills International Fellowship
  - The balance of funds to support the itineraries of the three travellers was provided through the University of Tasmania (UTAS)
- Itineraries were designed to provide broad and complementary engagement with leading agencies and individuals across the spectrum of food and drink fermentation sectors.
- The three researchers all had strong industry and research backgrounds and were skilled in stakeholder engagement, consultation and communication.
- A project advisory group, comprising UTAS and FermenTasmania representatives, contributed to final research foci and questions.
- Researchers provided real time updates via social media (Instagram, @fermentasmania) to elicit input and additional questions from colleagues in Australia.

The ISS Institute Fellow was:

Dr Tom Lewis (Ph.D, M.Bus, M.Sc, Dip.Proj.Mgt)

- Ph.D. (UTAS 2001) in fermentation-based production of omega-3 fatty acids
- FermenTasmania Executive Director
- Has successfully managed and delivered academic *(h-index 16)*[2] and commercial roles in the aquaculture and food safety sectors, ranging from hands-on development, design and delivery of technical projects to high-level strategic management
- Industry development consultant, focussing on projects that help develop Tasmania's burgeoning agri-food value adding sector
  - Ten years consulting to Tasmania's agri-food sector (industry, universities, CSIRO and government)
  - Four years managing a AUD$1million pa UTAS-CSIRO food safety research joint venture
  - Twelve years in aquaculture production and research (abalone, oysters, Atlantic salmon).

Complementing Tom's experience and expertise were fellow researchers:

2 www.researchgate.net/topic/H-index

Dr Anna Carew [Ph.D., Ph.D.[3], B.Sc.(Hons)]

- UTAS Research Fellow in Wine and Fermentation Science
- PhDs in engineering education (University of Sydney 2005) and wine science (University of Tasmania 2015)
- FermenTasmania Technical Management Committee
- Awarded best oenology presentation at the Australian Wine Industry Technical Conference (2013) and has a growing publication record in wine science
- Has published extensively *(h-index 8)* in wine science and transdisciplinarity research (AUD$2.5m Category A wine science funds), has led or participated in ~$AUD1m worth of completed teaching and learning projects since 2006, co-authored an award-winning engineering education textbook, and has supervised student research across several science and engineering research fields
- Team member, 2016 'FermenTasmania: tracking the initiation, uptake and implementation of a Tasmania food futures vision', [UTAS (ABL Hub) Cross-Disciplinary Incentive Grant 2016 (Chief Investigator Dr Heather Lovell, with Dr Gemma Lewis, Dr Luke Mirowski and A/P Paul Turner)].

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Natalie Fryar [B.App.Sc. – Oenology and Viticulture]

- Chief sparkling wine maker, Pipers Brook Vineyard
- Director and chief distiller, Able Gin Company
- Member, FermenTasmania Technical Management Committee
- Member, Wine Tasmania Technical Committee
- Recipient, 2015 Don Martin Sustainable Viticulture Fellowship
- 25 years' experience in international best practice wine making and research
- World-class international wine industry network.

The three complementary itineraries were curated to gather data relating to FermenTasmania's four key aims, which are to:

1. Provide the space and facilities for development of new products
2. Facilitate research and development to benefit industries
3. Coordinate the design and delivery of training in fermentation principles and practices, and
4. Promote consumer education, short courses and other experiences as a tourist drawcard.

While Tom's itinerary was designed to focus on the objectives of this Fellowship, Anna and Natalie also aimed to capture data and information relevant to the Fellowship objectives, and these data and information were used to add value to Tom's work and this report.

The itineraries were as shown in Appendix 1.

2. The Australian Situation

2.1 Benefits to Australia of building fermentation-related capability and capacity

The FermenTasmania Board believes there is a great opportunity for the skilled application of world-class fermentation techniques to support regional development in Australia. We want to accelerate this transformation to a fine foods-regional foods future so that Australian regions (e.g. Tasmania) can capture more of the associated value and benefits of agricultural production and value adding. We believe that Australia can benefit from a world-class fermentation centre that would have four main streams (1) pure research, (2) product development, (3) skills and training, and (4) technical tourism.

An industry survey carried out by FermenTasmania in early 2015 received 96 responses providing indications of the strong level of support for the FermenTasmania concept, as well as respondents' views on skill gaps and skill development needs within the industry. It was clear from responses that the sector needed an increasingly skilled workforce, specifically in the areas that support technical production, new product development and business management.

Since then, a consultation survey of about 40 fermentation-based organisations in Tasmania has supported the need for additional training and education in technical, business and marketing skills.

The Agrifood Skills Australia 2015 Environmental Scan[1] identifies a need to research, pilot and evaluate collaborative models and to test how the formal Vocational Education and Training (VET) system and publicly funded research sectors can work together to expose students to new knowledge and practices.

1 Agrifood Skills Australia, http://www.agrifoodskills.net.au/?page=2015E_Scan 2015

We know that the pooling of information and support mechanisms can offer a good approach to skills development for small enterprises. We have identified that there is an additional gap in knowledge about cooperative solutions relating to fermented food and beverage training and development in Australia.

There are examples (such as the Orchard Centre in Gloucestershire, UK[2]) that highlight the way that collaborative models across training organisations, private enterprise and community trusts can work, and we investigated this area during this applied international research study tour.

We investigated regional community collaborative models relating to new and emerging fermented niche products:

- Identifying and assessing best practice collaborative capability and capacity building models
- Exploring and identifying how these models can be used to assist the VET systems research sectors and industry to work together to develop new knowledge and skills.

A specific benefit to Australia from this Fellowship, to be facilitated in part through FermenTasmania, will be that new and emerging fermentation technology methods and skills will be disseminated widely and quickly. The next generation of global fermented food and beverage innovations are emerging, and industry and skills development in Australia must be responsive to stay competitive. FermenTasmania believes that industry must lead by example and work collaboratively with training institutions to develop and deliver multi-sector flexible training opportunities.

2 http://www.tasteandexplore.com/cider-perry-centre.shtml

3. Skill Enhancements Investigated

The Agrifood Skills Australia 2015 Environmental Scan[1] noted that a major challenge for the food and beverage industry is the bifurcation of industry business models which focus on either niche production of premium, highly differentiated products or large-scale volume.

This Fellowship focused on the area of highly differentiated, niche products.

Fermented products play an important role in contributing to the livelihoods of rural and peri-urban dwellers.[2] The addition of more local and regional food processors may help "loosen" the bottleneck between producers and consumers by offering farmers more options on where to process their goods.[3] Around the globe, there is an emergence of regional economies developing skills in fermented products. Examples of food produced using fermentation processes include beers, breads, cheeses, ciders, cocoas, gins, kombuchas, pickles and preserves, meats, miso, vanillas, vinegars, vodkas, whiskies, wines, yoghurts . . .

A report (Best 2009[4]) completed for the ISS Institute and AgriFood Skills Australia identified a need for additional programs to encourage the growth of clusters for rural and regional producers. This need can be addressed through skill development in fermentation technology in regional food economies.

1 Agrifood Skills Australia, http://www.agrifoodskills.net.au/?page=2015E_Scan 2015

2 FAO, 2011, Traditional Food and Beverages for improved Livelihoods, http://www.fao.org/docrep/ 015/ i2477e/i2477e00.pdf, downloaded 10 July 2015 pg 3

3 Zezima K. 2010, Push to eat local food is hampered by shortage. New York Times. http://www.jhsph.edu/research/centers-and-institutes/teaching-the-food-system/curriculum/_ pdf/Food_Processing-Background.pdf, downloaded 10 July 2015

4 Best, A., 2009, International Study of the value adding of regional produce through the manufacture and distillation of spirits by Micro-Distilleries, http://c.ymcdn.com/sites/www.agrifoodskills.net.au/ resource/resmgr/ fellowship_reports/iss_fel_report_a_best_low_re.pdf, downloaded 10 July 2015

Best (2009) identified that Australia is losing its competitiveness with Europe and the USA in areas such as the micro-distillery industry, with priority training requirements identified in the area of fermentation and post handling of alcohol products. This author identified that there is a need for producers to access specialised and high quality product research and development facilities and services to maximise product quality and innovation.

Building on the findings of Best (2009), we identified technical and practical skills gaps in the area of process optimisation and fermentation scale-up strategies [that is, moving from new product development (NPD) micro-scale to commercially sustainable scale].

Skills for successful manufacture of fermented agrifood products include the ability to carry out complex procedures, be attentive to detail, be vigilant about hygiene and food safety, and have a solid understanding of marketing, particularly logistics, pricing, and product presentation. Industry possesses these production and operational skills at basic levels. There are, however, very few options for skill development or enhancement for those small-scale producers who wish to innovate with NPD and/or scale up. There are skill sets that cover the development of new products, however the emphasis of these pathways appears to be through the creative arts rather than through agrifood.

Domestically, our preparatory research revealed that the only unit of competency relating to fermented food processing and product development is for retail baking. For the growing area of fermented products and scale-up food processing, there is a need to address this specialist area, particularly with flexible delivery options and regionally collaborative models.

3.1 Present skill deficiencies identified

The Agrifood Skills Australia Environmental Scan 2015[5] identified emerging skills needs in the area of food innovation and product development, developing and managing seamless Hazard Analysis and Critical Control Point (HACCP) plans and systems, and lean and agile manufacturing processes. The same report identified skilled labour shortages in the area of production managers, food and drink factory workers, bakers and pastry cooks - to name a few. Our goal is to build skills in these identified labour shortage areas, within regional communities, by building the confidence of microscale fermentation enterprises to take the next steps to scale-up.

In our own research, we have identified that key skills deficiencies in fermentation technology to be explored through this Fellowship would include business management and business development in the areas of scale-up and reproducibility, cost effective processes and quality end products.

In this area, there was a need to investigate and record new and emerging skill development programs that support successful scale-up of niche fermentation businesses:

» Identifying and assessing best practice program and delivery models for fermentation process optimisation, configuration and design

» Identifying and assessing best practice programs and delivery models for micro to commercial scale fermentation businesses, specifically relating to skill development in hygiene and sanitation of processing equipment.

Action: Document the key elements that have been integrated into these programs.

Action: Based on this investigation, draft a list of components that can be built into new contextualised units of competencies.

5 Agrifood Skills Australia, http://www.agrifoodskills.net.au/?page=2015E_Scan 2015

3.2 Specific skill enhancement areas

We note the Certificate/Diploma in Brewing courses in Australia offered by Federation University (Ballarat).[6] The wine industry across Australia is richly supported with training options for tertiary qualifications in wine making from University of Adelaide, Curtin University and Charles Sturt University alongside wine-related units across the VET system.[7] We propose, however, that there are broader trade skill gap areas, particularly from micro to scale-up in sub-sectors such as cider, spirits, pickled fruits and vegetables and dairy products. Again, we note that some undergraduate courses in the wine sector offer engineering components.[8] And again, our industry colleagues would argue that there remain substantial skills gaps in trades relating to fermentation technology.

We investigated developing skills programs relating to new and emerging fermented niche products:

» Identifying and assessing best practice program and delivery models for new fermentation trades (food, beverage, hospitality)

» Exploring the fermented niche product sector and associated trades and identifying the skill development and training programs aligned to these

» Identifying effective learning techniques and practical skills in new product development (NPD) for fermented products

» Identifying effective strategies for building capacity in scale-up (moving from micro-scale to commercially sustainable scale), cost effective processes and quality end products relating to fermented products (both food and beverage).

6 Federation University, 2015, http://programfinder.federation.edu.au/ProgramFinder/displayProgram.jsp?ID=41227

7 e.g. TAFE SA, 2015, http://www.tafesa.edu.au/xml/module/crsemod_TP00236.aspx?src=\xml\course\aw\aw_ TP00236&S=APP&Y=2015, and http://www.tafesa.edu.au/xml/module/crsemod_AC00040.aspx? src=\xml\course\aw\aw_AC00040&S=AWD&Y=2015

8 Charles Sturt University, http://www.csu.edu.au/handbook/subjects/ENG302.html 2015

3.3 Personal and professional benefits to accrue from this Fellowship

The following are the top-level personal and professional benefits that accrued to the three researchers on this study tour:

- Increased understanding of relevant skills development practices in international settings
- Increased understanding of relevant sectoral development priorities in international settings
- Broadened network of relevant industry and sectoral development practitioners
- Broadened network of relevant national and international industry players:

  (e.g. production, new product development, supply, research, development, technology transfer, skills development)

- Increased appreciation and enjoyment of the broad church (i.e. the players, the cultures and the products) encompassed by the global food and drink fermentation sector.

4. International Experience and Discovery

4.1 Experience and discovery against the three project aims

A summary of progress against this project's three key aims follows:

4.1.1 To develop strong, constructive and ongoing networks amongst world-leading fermentation-based enterprises and organisations

The design and delivery of this Fellowship and associated study tour forged the foundation of an international network of aligned, engaged and enthusiastic partners for FermenTasmania and related stakeholders. Each of the organisations described in Appendix 2 has expressed interest in further engagement with FermenTasmania.

Formalisation of key partnerships within this group will provide FermenTasmania with opportunities to facilitate the development and delivery of locally-relevant research, education and training activities informed by the experience of these partners. Specifically, and acknowledging that formal partnership discussions are yet to commence, we feel that partnership opportunities could be explored along the following lines:

- Governance and Structure
  - Cider & Perry Academy (CPAc)
  - Danish Food Cluster (DFC)
  - North Somerset Enterprise Agency (NSEA)
  - Östersund City of Gastronomy
- Product Development
  - Chr. Hansen
  - Cider & Perry Academy
  - Dr Andrew Lea
  - Lye Cross Farm
  - Oregon State University Fermentation Science Program (OSU)
  - Oregon State University Food Innovation Centre (FIC)
  - Swedish National Resource Centre for Artisan Foods (Eldrimner)
  - Technical University of Munich (TUM)
  - The Bread Lab
  - University of California Davis, Institute for Wine and Food Science (UCDavis)
- Research and Development
  - Chr. Hansen
  - Cider & Perry Academy
  - Danish Food Cluster
  - Dr Andrew Lea
  - Institut Oenologique de Champagne (IOC)
  - International Centre for Brewing and Distilling (ICBD)
  - Oregon State University Fermentation Science Program

  - Oregon State University Food Innovation Centre
  - Technical University of Munich
  - The Bread Lab
  - University of California Davis, Institute for Wine and Food Science
- Skills, Education and Training
  - Chr. Hansen
  - Cider & Perry Academy
  - Danish Food Cluster
  - Institut Oenologique de Champagne
  - Institute of Brewing and Distilling
  - International Centre for Brewing and Distilling
  - North Somerset Enterprise Agency
  - Oregon State University Fermentation Science Program
  - Oregon State University Food Innovation Centre
  - Östersund City of Gastronomy
  - Plumpton College
  - Swedish National Resource Centre for Artisan Foods
  - Technical University of Munich
  - The Bread Lab
  - University of California Davis, Institute for Wine and Food Science
- Technical Tourism
  - Cider and Perry Academy
  - Pickering's Gin
  - Östersund City of Gastronomy
  - Swedish National Resource Centre for Artisan Foods
  - Noilly Prat

4.1.2 To understand the capability and capacity required to develop and grow international best practice in the production of regionally-focussed fermented food and drink products

This project provided the opportunity to explore this topic with world-recognised enterprises ranging from two people (e.g. CPAc) to many tens of people (e.g. ICBD, OSU, TUM, UCDavis). In these discussions, we differentiated between intellectual and infrastructural **capability** (***what*** an organisation has the potential to achieve) and **capacity** (***how much*** an organisation is able to achieve). From these discussions, and those with industry representatives (e.g. Lye Cross Farm, Yeo Valley Farm, Noilly Prat, Pickering's Gin) we heard and observed the following:

Intellectual capability and capacity

- While *ad hoc* and unplanned combinations of theory and hands-on experience can be an effective mechanism, progress can be slow, and can lead to dead-ends in terms of continuous improvement. Best practice is best learned from material developed, and preferably delivered, in collaboration with world leading practitioners in terms of expertise, experience and wisdom.

As an example, the likes of Peter Mitchell (CPAc) and Andrew Lea are leaders in the world of cider production and marketing, and their names crop up time and again amongst those making their living from commercial production.

Similarly, the success and reputation - in terms of developing and growing international best practice in the production of fermented food and drink products - of organisations such as TUM, OSU, the Bread Lab, UCDavis (amongst others) is based on 1) the fact that their lead staff are world-leaders in their fields and 2) the organisational ability to harness and deploy the skills, expertise, experience and wisdom of these leaders.

This suggests that ambitions to provide best-practice skills and education must be supported by input from world-leading practitioners.

- It therefore follows that a training organisation's intellectual capacity – the number of people in the organisation, and therefore the scale and diversity of courses that can be delivered – will only effectively facilitate the development and growth of international best practice if those within the organisation have, or are led by, world leaders in their respective fields.

Infrastructure capability and capacity

- Observations during this project highlighted that infrastructure requirements varied with training objectives:
  - For the 'enthusiastic amateur', facilities can be simple, basic and should be reproducible at home
    - Eldrimner conducted most courses in a commercial kitchen environment, with, for example, beer fermenters scaled at the home production level
  - For researchers, facilities require capacity for replication and capability for reproducibility
  - For industry training, there were a number of approaches:
    - The ICBD and OSU favoured equipment, software and interfaces that were current within industry, so students could become familiar with a commercial operating environment
    - UCDavis operated along similar lines for some courses, but also worked with new and developmental infrastructure that makes '*current best practice'* look 20 years old.
- The need for flexible, adaptable - even mobile - infrastructure was highlighted. Representatives from those institutions with fixed infrastructure and little flexibility discussed how lack of flexibility was an impediment to keeping abreast of new equipment, techniques and support infrastructure.

IOC in France has taken an adaptive approach to this matter, providing equipment in containerised form, so that infrastructure required for a given project is loaded from their warehouse into purpose-built, truck-mounted containers, ready for off-site operation. In this way, equipment is never fixed, and can be replaced with newer models as they become available and resources allow.

4.1.3 To build a strong understanding of the theory and practice of programs and innovations that have worked, and those that haven't, in terms of developing capacity and capability within fermentation-based enterprises.

Discussions undertaken by the three researchers on this project revealed a consistent theme with regard to successful training programs and innovations aimed at developing capacity and capability within fermentation-based enterprises.

Context- and application-based training

A common factor amongst successful programs was their program leaders' focus on the design and delivery of meaningful capability-building experiences founded on best practice and informed by regional context and culture. By this we mean that the successful programs – those with an ongoing history of interested and engaged participants – delivered content informed by world best practice (usually from in-house expertise) and pitched to align with student needs and regional inputs.

Graded training

Successful programs also favoured a graded series of courses/units, in which participants could start at the 'enthusiastic amateur' level and progress from there, as their enthusiasm and need dictated.

As an example, the Swedish National Resource Centre for Artisan Foods (Eldrimner) typically offered 0.5 day, 2-5 day, 5 week and 1 year courses in, for example, bread making, brewing and cheese making. Of these, only the one year courses were accredited through a formal qualification scheme. There was little demand for accreditation for the shorter courses. The majority of participants wanted to learn and apply their new knowledge, not accrue formal qualifications.

Respected qualifications

Another example of a successful training model, and one that is perhaps more applicable to those seeking a career in larger enterprises, was where formal qualifications from a training institution conferred increased employment opportunities. This is an outcome that can only come through a history of continued high standards and a solid reputation of graduates amongst potential employers.

An example in this case is the IBD Master of Brewing qualification. There is strong demand for this qualification by those wanting work within the brewing and distilling sectors. While the IBD does provide training courses for those wishing to gain this qualification, it is also possible to sit the examination, for which there is a fee, without studying through IBD.

There are limitations with this approach, however. Our discussions revealed that IBD sometimes struggles to maintain connection with students following their graduation. To bolster continuing engagement, IBD recently introduced, under a different brand, a course to engage the 'enthusiastic amateur' in brewing. This course is reportedly gaining traction as its existence becomes more widely known.

5. Considerations and Recommendations

5.1 Solutions and recommendations regarding the skill enhancement areas

The proposed skill enhancement areas forming the basis of the Fellowship were:

- *Identifying and assessing best practice program and delivery models for new fermentation trades (food, beverage, hospitality)*
- *Exploring the fermented niche product sector and associated trades and identifying the skill development and training programs aligned to these*
- *Identifying effective learning techniques and practical skills in new product development (NPD) for fermented products*
- *Identifying effective strategies for building capacity in scale-up (moving from micro-scale to commercially sustainable scale), cost effective processes and quality end products relating to fermented products (both food and beverage).*

When assessing the individual achievable and tangible solution/s and specific recommendations and recommended actions, these skill enhancement areas can be considered as a whole.

Individual achievable and tangible solution/s to skills challenges and opportunities identified during the Fellowship proposal were:

1. Build and maintain personal networks with the international training providers with whom we met during the study tour
2. Use these networks to explore existing and developing education and training solutions in the fermentation sector
3. Consolidate this information through FermenTasmania to provide a clear and accessible contact point for all training-related stakeholders.

Specific recommendations and suggested actions are as follows. These are all aimed at FermenTasmania in the first instance, as it will be through FermenTasmania that relevant stakeholder activity is coordinated.

Governance and Structure

- Ensure an industry majority in governance, priority setting and activity driving
  - It is essential for efficient and appropriately focussed activity that industry has 'ownership' of FermenTasmania
  - Industry investment is essential to make it work: if industry invests, then industry will have the required majority voice
  - Larger enterprises will invest to obtain access to innovation, intellectual property (IP) and smaller companies
- Ensure governance (decisions and budgets) structures mitigate risks surrounding potentially competing activity (e.g. R&D vs. analytical services vs. community)
- Maintain a key focus on product development and technology transfer
  - Use new and existing networks to inform research and training priorities
- Prioritise and foster new international relationships
  - Build on and broaden our international partnership base

- Explore partnership MOUs to support initial collaboration and exchanges
- Work to maximise leverage with potential international partners
  - Tasmania occupies a unique geophysical place in the global aspirations of big companies, which operate on global scales
- Don't duplicate, crowd or compete.

Product Development

- Ensure that people working within the facility are using the latest, as well as pre-release, equipment and software
  - It will be important for success and credibility to get suppliers involved
  - Flexible and adaptive resourcing of FermenTasmania infrastructure will be helped through targeted relationships with equipment and software suppliers
  - Use equipment and software that will be used in/by industry (future focus)
- Provide, where possible, flexible, even mobile, infrastructure
  - Well-designed infrastructure can be useful at different points in the production chain for different scale enterprises: i.e. commercial scale for some is pilot scale for others and R&D scale for others.

Research and Development

- Consider cutting edge analytics plus expert analysis of data as a fee-for-service offering
- Consider sensory analysis and evaluation as a fee-for-service offering
  - Overseas, demand is growing, as consumer palates improve
  - There is a need for trained evaluators and the provision of a trained evaluation service
- Be brave on behalf of industry by stepping into their future ahead of them
  - Stakeholders are experts in what they need right now; experts in their future needs (noting that they will always have wants and dreams)
  - The most impressive physical exemplar of a multi-disciplinary fermentation facility and approach was UCDavis. Our architect, engineer etc. must go there. Not only do we need to understand the design, but also the underpinning values and considerations.

Skills, Education and Training

- Ensure all training has a connection to context/application and has clarity on transferability of skills (moveable skills mean a moveable workforce which will support a diverse industry)

  [Key contacts: Heriot Watt, TUM, Eldrimner: training and course development informed through strong industry contacts; Plumpton College: very industry geared with different sizes of training offered in response to need (half-day courses to Masters); OSU: multi discipline approach at main campus, total industry engagement at FIC]

- Provide a range of moments, spaces, inspiration and support for people to meet and make their own connections and explore mutually beneficial opportunities

  [Key contacts: Danish Food Cluster, Eldrimner: The process of inspiration and innovation is organic and needs to be nurtured and not dictated; Sylva Foundation (www.sylva.org.au): workshop area that provides 'sandpit' for training of apprentices, community woodcraft activity, 'carpenter in residence' program, and space/equipment for fine woodcraft start-up businesses; The Bread Lab: inspirational, cluster approach, identifying gaps in existing agricultural models and using collaboration to create significant new opportunity for primary production, value adding and routes to market]

  - People who come together to hear stimulating speakers are likely to engage in innovation discussions

- Provide a conduit to world class courses from around the world to reduce the investment risk associated with local development of courses

  [Key contacts: Heriot Watt, TUM, CPAc, UCDavis, OSU, Rutgers University: build on material that is already developed and tested to design locally and globally-relevant training and education; IBD: have off-the-shelf courses which can be run by separate providers and assessed by IBD, or IBD can run and assess]

  - FermenTasmania now has good relationships, and potential partnerships, with many world-class training providers
  - There is always a problem with scale: even where a clear industry need exists, there needs to be enough potential students to justify the course development. This will especially be the case for courses offered in Tasmania. We need to attract the world
  - OSU is an exemplar of popular and highly subscribed tertiary courses.

Technical Tourism

- Staff are the key: they must be people-people, well trained and with technical knowledge – because increasing numbers of enthusiastic amateurs are seeking technical information and knowledge
- 'Hero' stories are important for context and connection.

Recommended actions for UTAS arising from this project are to:

a. Facilitate industry-led forecasting and prioritisation of relevant (e.g. technical, marketing, business and tourism) education, research and technology transfer activities

b. Invest in direct sector engagement and support by, for example, developing and delivering an intensive short course/graduate certificate on science and business for small to medium fermentation start-ups

c. Pursue international partnerships to identify and agree opportunities for collaborative delivery of education, training, R&D and exchanges

   Recommended priorities for UTAS engagement include: TUM, Heriot Watt, Danish Food Cluster, Plumpton College UK, Christian Hansen Denmark, IOC, UC Davis- Mondavi Centre, OSU.

d. Undertake business case analysis on how UTAS could support or contribute to an independent revenue-based entity providing scientific services (e.g. analytics, analysis, sensory) to industry.

6. Knowledge Transfer, Application and Dissemination

What	Who	How	When
FermenTasmania business model	FermenTasmania Board and stakeholders	Meeting presentations	2017
Industry discussions and presentations	Interested stakeholders	FermenTasmania industry gatherings (2-3 in planning) based on visiting experts Presentations to state and national sector groups and their annual conferences	2017
The inaugural FermenTasmania conference	State, national and international delegates	Presentations, discussions	2018 Q1
Consideration of TasTAFE or UTAS units or courses	TasTAFE and UTAS colleagues	Discussions regarding possible fermentation units and qualifications.[1] UTAS-funded industry consultation regarding additional units and courses	2017 Q1,2
International Training and Research partnerships	FermenTasmania, UTAS, TasTAFE and key international partners	Meetings; Memoranda of Understanding	2017

The ISS Institute Fellow will be involved closely in the design and delivery of all activities, with support from FermenTasmania, UTAS and other colleagues.

1 Since her return, Dr Carew and colleagues already have designed and delivered a new unit at UTAS: XBR211 Fermented Food and Drink

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8. Acknowledgements

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International Specialised Skills Institute (ISS Institute) – The Awarding Body

The ISS Institute exists to foster an aspirational, skilled and smart Australia by cultivating the mastery and knowledge of talented Australians through international research Fellowships.

The International Specialised Skills Institute (ISS Institute) is proud of its heritage. The organisation was founded over 25 years ago by Sir James Gobbo AC CVO QC, former Governor of Victoria, to encourage investment in the development of Australia's specialised skills. Its international Fellowship program supports a large number of Australians and international leaders across a broad cross-section of industries to undertake applied research that will benefit economic development through vocational training, industry innovation and advancement. To date, over 350 Australian and international Fellows have undertaken Fellowships facilitated through ISS Institute. The program encourages mutual and shared learning, leadership and communities of practice.

At the heart of the ISS Institute are our individual Fellows. Under the International Applied Research Fellowship Program the Fellows travel overseas and upon their return, they are required to pass on what they have learnt by:

- Preparing a detailed report for distribution to government departments, industry and educational institutions
- Recommending improvements to accredited educational courses
- Delivering training activities including workshops, conferences and forums.

The organisation plays a pivotal role in creating value and opportunity, encouraging new thinking and early adoption of ideas and practice. By working with others, ISS Institute invests in individuals who wish to create an aspirational, skilled and smart Australia through innovation, mastery and knowledge cultivation.

For further information on ISS Institute Fellows, refer to www.issinstitute.org.au

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AgriFood Skills Australia – Fellowship Sponsor

Agrifoods Skills Australia was the Industry Skills Council for the Agifoods Industry: the rural and related Industries, food processing (including beverages, wine and pharmaceuticals), meat, seafood, and racing. The Fellow, and the project team, would like to thank them for providing funding support for this Fellowship.

University of Tasmania – Research Sponsor

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- All those we visited, for their time, generosity, openness and enthusiasm for the FermenTasmania concept.

9. Appendices

Appendix 1: Travel itineraries for Tom Lewis (ISS Institute Fellow), Anna Carew and Natalie Fryar

Itinerary: Tom Lewis		
Date	**Country and Location**	**Organisation**
03-Oct 2016	UK, Redhill	Lye Cross Farm
04-Oct 2016	UK, Redhill	Lye Cross contacts
05-Oct 2016	UK, Hartpury	Cider and Perry Academy
06-Oct 2016	UK, London	*Institute of Brewing and Distilling
07-Oct 2016	UK, Edinburgh	The International Centre for Brewing and Distilling (ICBD), Heriot Watt University
08-Oct 2016	UK, Edinburgh	Distillery tours with ICBD
10-Oct 2016	Denmark, Aarhus	Danish Food Cluster
11-Oct 2016	Denmark, Aarhus	Danish Food Cluster
12-Oct 2016	Sweden, Ostersund	UNESCO City of Gastronomy
13-Oct 2016	Sweden, Ostersund	UNESCO City of Gastronomy
16-Oct 2016	Germany, Munich	Technological University of Munich, Research Brewery
17-Oct 2016	Germany, Munich	Technological University of Munich, Research Brewery
18-Oct 2016	Germany, Munich	Technological University of Munich, Research Brewery

* With Anna Carew

Itinerary: Anna Carew		
Date	**Country and Location**	**Organisation**
06-Oct 2016	UK, London	*Institute of Brewing and Distilling
07-Oct 2016	UK, Plumpton	Plumpton College, Viticulture and Winemaking Team
08-Oct 2016	UK, Little Wittenham	Community Apple Day, Sylva Foundation,
09-Oct 2016	UK, Little Wittenham	Dr Andrew Lea (Cider) expert
11-Oct 2016	Denmark, Copenhagen	Chr Hansen
12-Oct 2016	Denmark, Copenhagen	Chr Hansen, Danish Design Museum
15-Oct 2016	France, Epernay	Institut Œnologique de Champagne
16-Oct 2016	France, Marsellian	Noilly Pratt, Vermouth production facility and visitor centre

* With Tom Lewis

Itinerary: Natalie Fryar		
Date	**Location (all in the USA)**	**Organisation**
12-Oct 2016	Davis (nr Sacremento)	UC Davis
17-Oct 2016	New Jersey	Rutgers University
19-Oct 2016	Boston	Massachusetts Institute of Technology
13, 22-Oct 2016	Portland	OSU Food Innovation Centre
25-Oct 2016	Mt. Vernon	Washington State University - The Bread Lab
28, 29-Oct 2016	Corvalis	OSU - Distilling
28, 29-Oct 2016	Corvalis	Oregon State University (OSU) -Brewing
29, 30-Oct 2016	Corvalis	OSU -Dairy
29, 30-Oct 2016	Corvalis	OSU - Wine

Appendix 2: Organisational summaries and observations

Organisational summaries and observations were conducted with the following organisations and individuals:

- Lye Cross Farm
- Yeo Valley Family Farm
- North Somerset Enterprise Agency
- Cider & Perry Academy
- International Centre for Brewing & Distilling
- Pickering's Gin
- Danish Food Cluster
- Östersund: UNESCO City of Gastronomy
- Swedish National Resource Centre for Artisan Foods
- Technical University of Munich: Research Centre for Brewing and Food Quality
- Dr Andrew Lea, Cider Expert
- Christian Hansen
- The Institute of Brewing and Distilling
- Institut Oenologique de Champagne
- Noilly Prat, Marsellian, France
- Plumpton College
- Robert Mondavi Institute for Wine and Food Science
- OSU Food Innovation Centre
- The Bread Lab
- Oregon State University

Lye Cross Farm

Since 1952 the Alvis family have been making Farmhouse Cheeses at Lye Cross Farm, situated at the foot of Somerset's Mendip Hills - a few miles from the village of Cheddar.

More than 1,000 cows on three family farms supply about 20% of the milk needed to produce 4,500T pa of traditional and organic Cheddars. Whether farming organically or conventionally, the company professes a total and ongoing commitment to the care of the environment, the animals, employees and education for schoolchildren.

www.lyecrossfarm.co.uk (Redhill, UK)

Product Development

» Specialise in Protected Designation of Origin (PDO) Farmhouse Cheddar

Science and Research

» Follows farm management and dairy-related research; not cheese making

Skills, Education & Training

» Reputation as good employer (longest serving staff member 52 years)

» Mainly provide in-house training for production staff

» QA/QC staff all undertake regular external training

Technical Tourism

» Onsite (profitable) shop a good public interface

Business model observations

» £35m turnover: markets as boutique, bespoke, niche

» Move to organic (but not all products) in 1980's: one of their best decisions

» Rolling 3-year contract with major retailer gives confidence

» Established and strongly supports FarmLink – farmlink.org.uk – engage with 30,000 schoolchildren pa

» Family ownership means decisions made along generational timeframes

» Draws workforce and supplies locally whenever possible

Insights

» Advocates specific product lines for specific markets

» Very strong links to local community and producers

Yeo Valley Family Farm

Yeo Valley is a family-owned farming and dairy company based in the village of Blagdon, in the Yeo Valley, and in Cannington, near Bridgwater, Somerset, England. It produces the Yeo Valley Family Farms range of yoghurt, the Roscombe Dairy Ice Cream brand and operates two cafe / restaurants in Blagdon.

Yeo Valley is the largest organic business in the UK with a turnover of ~£250m and producing over 2,500 tonnes of yoghurt, butter, milk cream and ice cream each week. The company has been owned by one family since foundation in 1961.

www.yeovalley.co.uk (Blagdon, UK)

Product Development

» Driven by retailer range reviews

» Open to new ideas, but slow to take on work that isn't retailer driven

» Core is always yoghurt

Science and Research

» Partnerships with universities are important

Skills, Education & Training

» Seen a massive labour shift as EU opened up

» Technical courses have 'dried up'

» Mostly in-house training for production staff

» Increasing interest in staff attending informal courses: 'getting a feel for it'

» Reaseheath College (reaseheath.ac.uk/) is a model worth exploring: range, facilities, industry links

Technical Tourism

» Farm shops and cafes only. Public courses run through these

Business model observations

» Still based, and marketed, on a local farm philosophy

» Long term (2-3 year) agreements with local suppliers

» Supplier quality is demanded and supported

» 'Organic' certification important for some products, not all

» Keep ability to do small (200kg) runs for selves and clients

Insights

» As the company grows, markets have become more competitive

North Somerset Enterprise Agency

A team of North Somerset Enterprise Agency (NSEA) business advisors provides free business advice and services: information, support and free or low-cost training to all businesses located in their region.

The NSEA is structured to provide a "one-stop-shop" providing impartial and confidential guidance (northsomersetenterpriseagency.co.uk/services/) on every aspect of business start-up and growth to help businesses, including social enterprises, launch, establish and grow.

www.n-somerset.gov.uk (Weston-super-Mare, UK)

Product Development

» N/A (client responsibility)

Science and Research

» N/A (client responsibility)

Skills, Education & Training

» Working closely with private multinational scientific, technical and advisory company Campden BRI (www.campdenbri.co.uk/) to establish training needs and delivery methods

» Seeking input from business to set training standards

» Establishing networks and opportunities for 'organic' growth between participants

Technical Tourism

» N/A (client responsibility)

Business model observations

» The Agency operates as a social enterprise, underpinned by government funding

» Planning a £7m food innovation incubator for the North Somerset region

» Require government grant plus ongoing operating costs subsidy

» Finding gaps between what industry need, want and are willing to purchase

» See the need for and are seeking stronger industry engagement on advisory group

Insights

» A multifaceted government support approach, but seems to be lacking strong industry engagement

» See the need for and are seeking stronger industry engagement on advisory group

Cider & Perry Academy

One of the world's most respected source of information and experience, the Cider and Perry Academy provides tuition, training and advice through master cider and perry maker Peter Mitchel. Peter's courses have a world-wide reputation for excellence!

In the UK, courses are primarily held at The Orchard Centre at Hartpury in Gloucestershire, where Peter also operates his own demonstration commercial production facility. In North America, Peter regularly lectures at Cornell University, New York State and in Washington & Oregon States, in association with the Northwest Agriculture Business Center (NABC). Cider & Perry production classes are also run at other locations in the UK, North America and throughout the world subject to demand and as required.

www.cider-academy.co.uk (Hartpury, UK)

Product Development

» Cider and Perry focus

» New fermentation protocols

» New/novel yeasts

» Base juice storage and mixtures

Science and Research

» Storage of cider in 'bag-in-a-bin" systems

» Cultivar propagation

» Combining 'wild' and standard yeasts within fermentation runs

Skills, Education & Training

» World-leading training provider

» Well-developed suite of courses at all levels

» Students seeking knowledge at all levels

Technical Tourism

» Consumer-focussed courses are increasingly popular

» Many of their students are technical tourists

Business model observations

» Compact, simple infrastructure, backed by great knowledge and experience

» Facilities for hands-on training and small scale production

» Looking at 'franchise' models

Insights

» Small can be beautiful if backed with knowledge

International Centre for Brewing & Distilling

Since 1989 the brewing and distilling interests of Heriot Watt Life Sciences have been incorporated into the International Centre for Brewing and Distilling (ICBD), which has received substantial financial support from the industries.

The Centre is based on a partnership between industry and academics. The research programme emphasises the biochemical and microbiological aspects of brewing and distilling, especially cereals, including malting and fermentation.

www.icbd.hw.ac.uk (Edinburgh, UK)

Product Development

» N/A

Science and Research

» Milling, malting, extraction efficiencies

» Grain mixes

» Cut analytics for distilling

» Not as industry-focussed as some would like to be

Skills, Education & Training

» Undergraduate, Masters, PhD

» Rapidly increasing interest in fermentation and distilling from international students

» Honours students integrated into research – 10 week projects

» Courses set up and available for delivery

» Facilities (equipment and controllers) replicate commercial enterprises

» Target employers are own businesses, analytics, QA/QC

Technical Tourism

» Collaborate with local companies to hold public talks, displays etc.

Business model observations

» Fee paying Masters students (~50pa)

» International students important

» Bi/Triennial conference increasingly important

Insights

» Analytic capability and capacity very important to research and to services for industry

» Ensure plenty of brew storage to allow more ferments to be done

Pickering's Gin

Pickering's Gin is hand crafted at Summerhall Distillery – the first exclusive gin distillery to be established in Edinburgh for over 150 years.

Summerhall Distillery is housed on the site of an old animal hospital. Part of a veterinary school known locally as the Dick Vet. Or it was. Now it's an arts venue called Summerhall. With a pub - called The Royal Dick - in the middle of it, and Pickering's is next door.

Based on an original Bombay recipe, kept secret since 1947, Pickering's comes in 3 styles as well as the occasional limited edition.

www.pickeringsgin.com (Edinburgh, UK)

Product Development

» Aiming for less sweet styles as consumer preference changes

» Have three main products; will do small batches on commission

» Hope to produce their own spirit one day

Science and Research

» N/A

Skills, Education & Training

» All in house. No budget or appetite for formal training

» Would value more semi-formal contact with other makers of all sorts

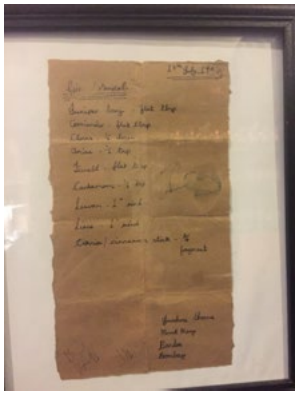
Technical Tourism

» Tours only at present: strong generator of sales and loyalty

» Run max 6 a day; ~8 pax @ £10 each

» Planning gin making days

Business model observations



» Seat of pants passion by owners generates strong engagement with customers

» Kept it small and asset poor/labour intensive while establishing

» Owners are builders so minimal set up cash

» Official gin of the Royal Military Tattoo

Insights

» The right tour guide is a crucial asset

» Training is important, but passion and personality trumps

Danish Food Cluster

The Danish Food Cluster is a membership organisation for businesses, research institutions and public authorities working within Denmark's food and agriculture sector. Members currently represent around 75% of the nation's food industry turnover.

The cluster aims to maximise the sector's potential for global growth by facilitating collaboration and knowledge sharing, and attracting international business, talents and investors.

www.danishfoodcluster.dk (Aarhus, Denmark)

Product Development

» N/A: They intentionally don't do product development

Science and Research

» N/A: They intentionally don't do research

Skills, Education & Training

» Special interest groups, Round tables work well

» Small, interactive meetings

» Large, visible meetings to raise awareness of (e.g. Tasmania) as a fermentation innovation hub

» Build trust between members increases training outcomes

Technical Tourism

» N/A: They intentionally don't do technical tourism

Business model observations

» Industry majority on Board essential

» Start with smaller networks: build value for them first

» Income AUD$650,000 (~1/3 each memberships, projects, consultancy)

» Membership fee AUD$500 (below cost) to AUD$6000 (>100FTE)

» Leave asset ownership to others

Insights

» Act as a 'night club owner', set the right environment

» Create many and varied opportunities for people to meet, make the introductions, and then get out of their way

» Industry ambassadors for the organisation are very important

» Work to maintain visibility for the organisation

Östersund: UNESCO City of Gastronomy

Located in a sparsely populated region in the centre of Sweden, Östersund, UNESCO City of Gastronomy, is widely appreciated for its gastronomic culture, based on local sustainable food inspired from longstanding culinary traditions.

The management of the food sector in Östersund is shared between the city of Östersund and the Region of Jämtland Härjedalen. The city is the main market for food products, and the rural areas provide a workspace for the producers, thereby strengthening urban-rural connections. Other organisations connected to the food, culture and tourism sector are also involved in these efforts.

www.en.unesco.org/creative-cities/Östersund (Östersund, Sweden)

Product Development

» N/A

Science and Research

» N/A

Skills, Education & Training

» N/A

Technical Tourism

» The UNESCO Creative Cities Network (UCCN) provides a great springboard for promoting technical food tourism

Business model observations

» Membership aligns with the UNESCO 2030 sustainability goals (en.unesco.org/sdgs)

» Network membership provides:

  » Global connectivity, recognition and validation

  » 'Huge' sustainable regional development resource base

  » Opportunities for cross promotion through other UCCN members

  » Pride and inspiration to food sector companies

» Current Swedish food manufacture regulations make some foods uncompetitive

» Recognise niche opportunities: promoting quality over quantity

Insights

» There is no single definition of 'gastronomy': it can mean what you want it to mean

» This network could help put Tasmania on new, food oriented maps

Eldrimner: Swedish National Resource Centre for Artisan Foods

Eldrimner was established in 1995 in the county of Jämtland and became Sweden's national resource centre in 2005. Eldrimner shares knowledge and supports and inspires food artisans all over Sweden and Scandinavia as they start up, and as they develop their craftsmanship.

Eldrimner helps food artisans with courses, advice, seminars, field trips, development and experience exchange – 'whatever is needed for artisan food-making to bloom'.

Eldrimner actively engages participating artisans in shaping strategy, plans and activities.

www.eldrimner.com (Östersund, Sweden)

Product Development

» At discretion of participants in more advanced courses

Science and Research

» N/A

Skills, Education & Training

» Wide range artisan food skills taught: cheese, dairy, meat, fish, bread, fruit, vegetables

» Theory and practice training through in-house courses, visiting specialists, site visits, study tours

» Courses focus on the basics (annual) and demand (ad hoc)

» Courses designed with sequential levels: results in multiple returns and upgrading of skills

» Educators are mainly producers themselves, accessed from a number of countries

» Courses range from 2-5 days to 5 weeks to 1 year (part time)

» Only the 1 year course is linked to formal accreditation

Technical Tourism

» Some students interested in the knowledge for themselves, some want to start business

Business model observations

» Board with industry majority is crucial

» Use sector reference groups to discuss industry news and needs

» Requires 'state' and EU support

» Facilities from lecture rooms to full scale commercial kitchen and fermenters

» Typically charge ~AUD$150/day for courses

» Averaging 500 students pa

Insights

» Participant networking time is very important in building capacity

Technical University of Munich: Research Centre for Brewing and Food Quality

The Research Centre is a high-tech enterprise on a small scale. Occupying an area of just 300 square metres, the premises provide all the facilities the students need to practise all the usual brewing techniques. They learn the brewing process step by step, from preparing the wort from water, malt and hops to fermentation and aging right through to the bottling process. The research brewery also teaches the microbiological principles of yeast and lactic acid bacteria as well as the basics of process automation.

The Centre comprises two main units: The Research Centre, which operates on fully commercial principles and the School for Brew and Drink Technology, which provides training for undergraduate, postgraduate and industry students with access programs designed around industry needs.

blq-weihenstephan.de/en.html; www.lbgt.wzw.tum.de (Freising, Germany)

Product Development

» Support industry product development through analyses, R&D projects, brewery design, yeast development

» Students often research new products with industry partners

» Yeast characterisation and optimization

Science and Research

» ~40 PhD, 80 Masters enrolled: both blue sky and industry-focussed

» Largely funded through Research Centre income

» Analytical development

» Consequences of technology improvements

Skills, Education & Training

» Integrated program for university and industry students

» Strong practical and theoretical elements including sensorial

» Can produce 250x800L brews pa

» Strong industry input to curriculum

» Industry-focussed, hands-on courses: maximum 10 participants

» Annual seminar series: Brewing for non-brewers; Microbiology and yeast; Practical brewing

Technical Tourism

» Increasing demand for courses from interested amateurs

Business model observations

» Operating under competitive neutrality laws, compete by excellence in data and interpretation

» Sell some of what they produce

Insights

» Industry engagement vital to success

» Analytics are a key requirement

Dr Andrew Lea, Cider Expert

Dr Andrew Lea is the world's foremost English-speaking cider expert, with over 30 year's research experience in cider and allied foods and beverages. He is a sought after speaker at cider conferences and for masterclasses in cider chemistry and production. As an 'elder' in cider, Dr Lea offered a range of insights as opposed to information specific to FermenTasmania.

Now retired, Dr Lea supports production locally, fosters community appreciation of apple fermentation (e.g. Little Wittenham Community Apple Day) and runs the informative Wittenham Hill Cider Portal (www.cider.org.uk).

Product Development

» N/A

Science and Research

» N/A

Skills, Education & Training

» N/A

Technical Tourism

» N/A

Insights

» During extensive career, observed common point of tension between fee-for-service analysis (especially for external clients) and R&D activity, where the same resources are used (e.g. staff, instrumentation, space)

» Recommended clear and frequent negotiation, and explicit governance of the split between 'bread winning' and 'blue sky' work in the lab

» Recommended separate budgets and strategic plans/objectives for fee-for-service and R&D activity

» Need for regional differentiation in cider making (e.g. Tasmania-specific nitrogen and sulphur application recommendations to reflect dessert fruit base, local growing conditions and practices)

» Future focus on 'bioprotection' (manipulation of microbiome to achieve biochemical stabilisation) as opposed to use of additives in cider making

» Bioprotection rests on correct choice of back-sweetener for non-dry cider styles (e.g. avoiding older artificial sweeteners)

» Australia could develop greater capacity to make and use concentrate more effectively

Christian Hansen

Based in Copenhagen, Christian Hansen is the world's largest manufacturer of cultured bacteria for food production, human and animal health, and as a basis for natural colours. Initial focus was rennet for cheese making and enzymes of fungal origin. Chr Hansen are world leaders in lactic acid bacteria culture, and have transitioned from a focus in cheese and fermented dairy, to include salamis, and now a diverse set of Lactic Acid Bacteria (LAB)-related industries including wine, silage and probiotics. Their uniquely Danish organisational culture supports a highly socially and environmentally responsible, and community-focused business model. They have separate but co-operative research and development and production facilities, businesses and teams.

www.chr-hansen.com/en

Product Development

» Bioprospecting for grape and wine yeast strains in vineyards and wineries (OIV requirement that winemaking strains come from grape or wine origin)

» Exhaustive trialling for new strains by R&D team prior to trialling scale-up and freeze dry or alternate stabilisation

» Focus on non-*Saccharomyces* yeast as gap in the market

Science and Research

» Team of 600 (400 in R&D, 200 in marketing/admin)

» Strong focus on LAB in dairy as defensive community to yeast and mould (spoilage) is part of push to 'bioprotection' approach

Skills, Education & Training

» Strong training focus with 15 current PhD candidates in-house. These are brought to contact with industry through Chr Hansen sales team

» Strong company commitment to disseminating in-house expertise in fermentation fundamentals to compliment client expertise in fermentation specifics (e.g. wine)

» Future focus on development of skill base in metagenomics, foodgenomics, bioinformatics ('big data' analyses)

Technical Tourism

» N/A

Business model observations

» Separation of R&D from production important, supported by very strong base of company social values.

Insights

» Bioprospecting and bioprotective communities of microbes appear to be the main intersection points for FermenTasmania

The Institute of Brewing and Distilling

The IBD is the world's leading professional body for people working in brewing and distilling.

The Institute aims to advance education, especially in the sciences of brewing, fermentation and distilling and to be recognised as the world's leading members' organisation in this sector.

The Asia Pacific Section hosts a biennial Convention and a range of technical symposia relevant to brewing. Members within each State of Australia aim to organise technical and social meetings.

www.ibd.org.uk (London, UK)

Product Development

» N/A

Science and Research

» N/A

Skills, Education & Training

» Focus is on theory, no current practical course offerings

» Client base are largely hands-on technical workers who need theoretical knowledge for career progress

» Flexible as a training deliverer or certifying organisation (examiners of technical skill in ~100 countries)

» Largely 'City and Guilds' (TAFE/VET) focus but collaborate with Universities for higher education (e.g. Herriot Watt MSc.)

Technical Tourism

» Have established the Beer Academy to cater for technical tourists/hobbyists – 1500 pa but not sufficiently subscribed

Business model observations

» Income ~ 40% membership, 20% training, 40% exam fees

» Membership driven by demand for IBD qualifications (Diploma, Master Brewer)

» Don't have to train with IBD to do their exams

» Broadening offering to include malting and packaging

» Broadening to offer more online

» Starting to collaborate with universities to co-deliver courses and qualifications

Insights

» Members tend to leave once qualified

Institut Oenologique de Champagne

The site at Epernay, France encompasses three arms; an analytical services laboratory that processes up to 40,000 Champagne wine and juice samples each vintage period, R&D group focussed on new chemical and biochemical products and processes to make and stabilise wines, and a fleet of 25 re-purposable trucks providing a 'travelling production facility' for each stage of the Champagne making process (tartaric stabilisation, disgorging, filtration etc…).

www.ioc.eu.com/en (Epernay, France)

Product Development

» Products responding directly to consumer current and future needs (e.g. low/no sulphur addition wines)

» Approval from the International Organisation of Vine and Wine mandatory, R&D group attempting to replicate successful competitor products

Science and Research

» Analytical Services & R&D labs run as separate entities

» Small R&D laboratory with staff of 4 but with highly motivated, respected and creative leader (Dr Bertrand Robillard)

» R&D leveraging off wide network of collaborators to fill capability and instrument/analysis gaps

Skills, Education & Training

» N/A

Technical Tourism

» N/A

Business model observations

» Key to success is independent operation of analytical, R&D, wine processing arms of the business.

» Contract wine processing ~35% of turnover

» Approx. 25% of R&D business is troubleshooting for clients. The rest is self-sustaining innovation aligned with Lallemand strategy - www.lallemand.com.

Insights

» Strong future R&D focus on 'clean production'; no chemical additions and using biochemical and physical means to stabilise wines.

» Containerised, re-purposable, transportable production capability

Noilly Prat, Marsellian, France

Established in 1855, this French Vermouth production house runs a strong technical tourism program at its cellar door in Marsellian in the South of France. The parent company is Bacardi-Martini and product is exported internationally. Some production continues at the original site but it has been remodelled as a venue and supports a 4-person team running a range of tour and experience options at different price points.

www.noillyprat.com/Home.aspx

Product Development

» Four vermouth product lines since 1855, with the most recent developed in 1960s and 1980s

» Ambre vermouth pitched as highly exclusive (only available at cellar door)

Science and Research

» N/A

Skills, Education & Training

» N/A

Technical Tourism

» Very strong paper and website promotional materials

» Strongly differentiated 'grades' of technical tour with clearly stated offer and price points starting at ~$AUS35/head. Tours range from basic 30-minute talk and taste, to fully catered functions

» Tour commences with 'hero' story of Anne-Rosine Noilly (1825-1907), through facility with 'secret' element (herbals in vermouths) and culminates in high-end cocktail bar for tasting

» Technical tour guides are selected based on communication capacity (incl. English), personal presentation and technical nous, and are 'apprenticed' for approximately two weeks

» Approximately 80,000 visitors in the first 9 months since opening

Insights

» Substantial capacity to grow Tasmania offerings of technical tourism

» Site needs history/a story, at least three production stages, relaxing taste experience, and opportunity to purchase

Plumpton College

Plumpton College on the South Downs Way (Southern UK) is the region's only recognised viticulture and oenology training facility. The College runs a wide range of programs from half-day vocational training to Masters by Research (in association with University of Brighton).

Close association by staff in their local wine networks, in part through spread of alumni, means this group are forefront in internationally recognised emergence of southern England as a sparkling wine region to watch. Current wine grape planting is approximately 2,000ha (Tasmania current planting is approximately 1,800ha). The 2014 opening of a custom Wine Research Centre has not yet resulted in strong research activity.

www.plumpton.ac.uk

Product Development

» In-house winemaking started as student-focused teaching; transitioned to professionally staffed wine production as a supplementary revenue stream

Science and Research

» Aspiration to research but limited largely to student projects due to staff workload model and status as a College

» Academic staff turnover may be associated with need/ desire/ pressure to research vs reality of teaching load

Skills, Education & Training

» Very strong and diverse training and teaching portfolio from half-day pruning workshops to Masters by Research through local Universities

» Very active industry consultation process to justify new training offers

» Strong network of industry alumni feeding into training program ideas and delivery

Technical Tourism

» NA

Business model observations

» Highly effective as lone local operator in grape and wine training and accreditation

» Attractive to international students for proximity to Old World wine regions and English program

Insights

» Industry often responds to invitation to suggest curriculum or training with a 'more of the same' request. Need to be cautious re industry-driven agenda

» Heavy lean on training revenue may preclude capacity for wider activity (e.g. research)

Robert Mondavi Institute for Wine and Food Science

UC Davis is one of the oldest agricultural universities in the world. The Oenology and Viticulture course has been operating for 120 years; as such it is the "mother school" for all O&V degree courses in the New World.

The Institute is the gateway between UC Davis and a broad community of scientists, engineers, entrepreneurs, policymakers, industry professionals and technologists engaged in all dimensions of wine- and food science-related activities.

www.fic.osu.edu

Product Development

» N/A

Science and Research

» Pure and applied research: wine, beer, dairy, fruit growing and packaging, honey and sensory science

» Philosophy is that world's best practice is 20 years ago

» Experiment on semi-commercial scale. Engage heavily with industry to make it happen

» Big data: looking for any correlations

Skills, Education & Training

» Multi-level training and education

» Short courses, public education, industry & staff training, career change

» Produces more wine graduates than all other universities

Technical Tourism

» N/A

Business model observations

» Infrastructure funded by philanthropy (Mondavi, Jackson). Strong philanthropist: staff relationships are vital.

» All research funded internally

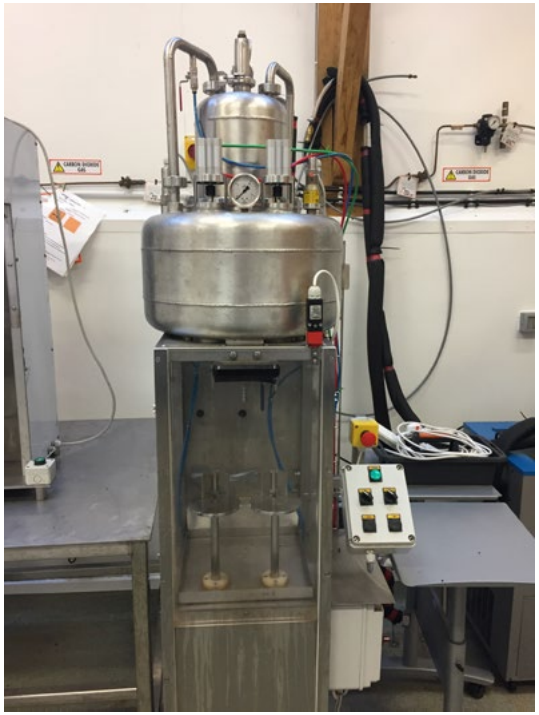
» Industry only contributes small percentage

» Sensory science is large and growing and in demand by industry

Insights

» Jackson building: energy, water positive. Carbon neutral. Highest rated US building

» Their building and operational design must be captured for Tasmania



OSU Food Innovation Centre

The Food Innovation Center (FIC) is a unique urban Agricultural Experiment Station located in Portland, Oregon. As part of Oregon State University, the FIC serves the Northwest food industry and communities, as well as national and international businesses. The FIC has three areas of excellence: a product and process development team to help new and established entrepreneurs bring products to market; a full-service consumer sensory testing laboratory; and a food safety hub for education and testing.

www.fic.osu.edu

Product Development

» Through the Food Innovation Center (FIC), OSU offers a fee-for-service NPD service to industry: package design, food safety, sell by date etc

» Technical and market expertise

Science and Research

» Significant research in the post packaging space

Skills, Education & Training

» Weekly beginners workshop series for food entrepreneurs, start-ups, and industry members, teaches basic food safety laws and concepts

» Multi-day certificate workshops in Preventive Controls for Human Food practice

» Marketing and economics are a vital part of the FIC educational offering

Technical Tourism

» Significant short course activities

Business model observations

» FIC is an extension-focussed unit – a joint venture between Oregon State University and the US Dept of Agriculture

» FIC only works with industry partners – only on industry projects

» Main revenue is from technical services

» The funding model for the FIC is highly complex, with university funding representing <50% of requirement

» Sensory analysis is biggest revenue stream, oversubscribed

Insights

» The FIC industry engagement model is one to be studied

» The focus on layered course offerings keeps clients engaged

The Bread Lab

The Bread Lab began in 2011 in a small laboratory in the Washington State University (WSU) Mount Vernon Research Centre. Today it occupies 12,000 square feet at the Port of Skagit and includes the Bread Lab research and baking kitchen, a cytology lab, and the King Arthur Flour Baking School at the Bread Lab. In 2017, construction will add a milling laboratory and a professional kitchen overseen by James Beard Best Chef Northwest Blaine Wetzel.

The programs of the Bread Lab work to breed and develop publicly available varieties of grains and other crops that will benefit farmers, processors, and end-users while enhancing access to affordable and nutritious food for all members of our communities.

http://thebreadlab.wsu.edu/

Product Development

» Philosophy of taste first, followed by nutrition and other health promoters

Science and Research

» Plant breeding with a local food system focus

» Aim to add to the long-term environmental and economic health of farming in western Washington

Skills, Education & Training

» WSU extension facility – largely self-funded

» Courses for passionate consumers to PhDs

Technical Tourism

» Courses for passionate amateurs

Business model observations

» Built from recognition of an underutilised resource – building niche high value products

» Spun off maltings company, several mills (one specialised buckwheat)

» Close partnership with local council

» Conference earns revenue and provides vital needs analysis and feedback loop to/from producers

» The lab is heavily embedded in industry – they created the industry

Insights

» Work with university and industry

» Effective sponsorship model

» A fantastic model – doing with grain what we want to do with fermentation

Oregon State University

The Fermentation Science program is a "hands-on" applied science addressing the use of microorganisms as processing agents in the production of wine and beer, as well as a variety of other fermented foods such as cheese, yoghurt, soy sauce, pickles, breads and fermented vegetables. Courses distinguishing the fermentation science option include brewing science; brewing analysis; wine production principles; wine production, analysis, and sensory evaluation; fermentation microbiology; and topics in fermentation.

www.oregonstate.edu

Product Development

» OSU offers a full NPD service to industry through the Food Innovation Center (FIC; reviewed earlier)

» Science and Research

» Very significant players in research into fermented food and beverage

» Multi-disciplinary approach

Skills, Education & Training

» Teach across the board of fermentation, most students join the program as post-graduates, or from another undergrad program

» Students get a degree in Fermentation, not an individual discipline

» Degree graduates automatically receive qualified food technologist (IFT) status. Broadens employer interest

Technical Tourism

» Short courses for amateurs and industry participants

Business model observations

» Good IP framework for capturing value (royalties) from NPD work – operate a royalty system

» Strong focus on industry connections

» Reinforced need for consultative scoping: They took two years' consultation to determine direction and infrastructure needs

» New dairy research centre: USD$15million – 12 industry partners because they took time to canvass idea and ownership

Insights

» Inviting Tom Shellhammer to Tasmania is highly recommended

» Personal relationships lead to philanthropy

» We need relationships through student/academic/ producer exchanges

International Specialised Skills Institute

ISS Institute
Level 1, 189 Faraday Street
Carlton VIC 3053

T 03 9347 4583
E info@issinstitute.org.au
W www.issinstitute.org.au

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