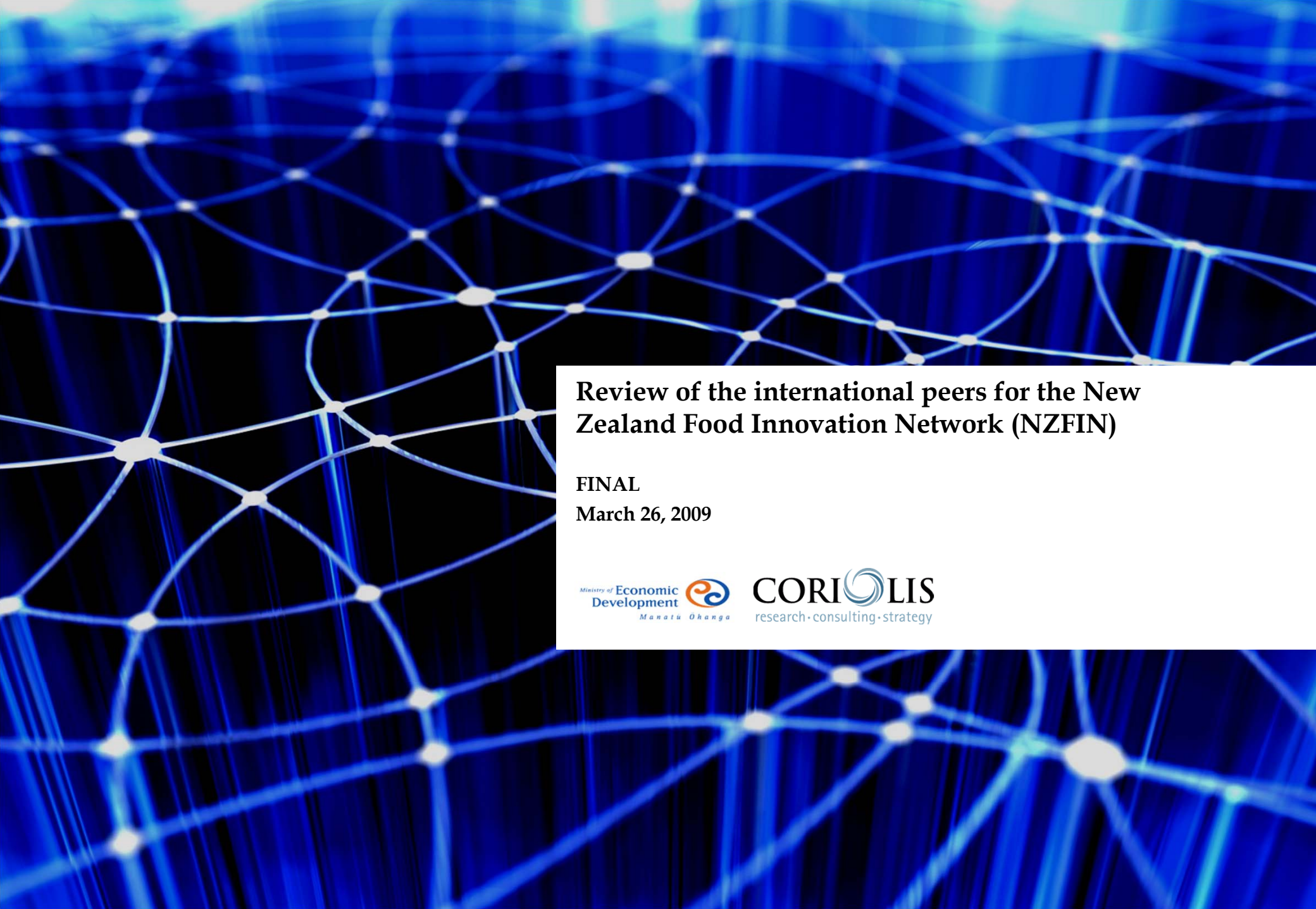

Review of the international peers for the New Zealand Food Innovation Network (NZFIN)

FINAL

March 26, 2009

Ministry of Economic Development Manatū Ōhanga

CORIOLIS research · consulting · strategy

Coriolis Research Ltd. is a strategic market research firm founded in 1997 and based in Auckland, New Zealand. Coriolis primarily works with clients in the food and fast moving consumer goods supply chain, from primary producers to retailers. In addition to working with clients, Coriolis regularly produces reports on current industry topics. Recent reports have included an analysis of Retail Globalization: Who's Winning" and an "Overview of the Growth of Foodservice."

❖

The coriolis force, named for French physicist Gaspard Coriolis (1792-1843), may be seen on a large scale in the movement of winds and ocean currents on the rotating earth. It dominates weather patterns, producing the counterclockwise flow observed around low-pressure zones in the Northern Hemisphere and the clockwise flow around such zones in the Southern Hemisphere. It is the result of a centripetal force on a mass moving with a velocity radially outward in a rotating plane. *In research it means understanding the big picture before you get into the details.*

❖

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CORIOLIS
RESEARCH

PROJECT SCOPE
This project has the following scope

- **The Government's Food and Beverage Taskforce in 2006 identified a number of innovation related weaknesses in the national food industry, particularly around nurturing and communicating innovation in some form of collaborative network**

- **In response to this, The Ministry of Economic Development, in conjunction with other interested parties, is developing a business case for "New Zealand Food Innovation Network" (NZFIN), which seeks to address these weaknesses by establishing a set of four coordinated food and beverage innovation and commercialisation facilities**

- **The preliminary business case gave a small number of examples of other similar projects - Netherland's Food Valley Network and the Food Innovation Network Europe (FINE) - but provides no details on these models**

- **This project seeks to fill-in some identified knowledge gaps regarding international peers similar to the NZFIN concept, specifically:**
    1. **What other concepts similar to the NZFIN proposal exist in other countries?**
    2. **How are these peers funded and structured?**
    3. **Who owns and operates them?**
    4. **Any available information on how successful have they been?**

- **In order to focus limited resources, research has been limited primarily to the United States, Canada and key Western European countries**

- *NOTE: This research was carried out primarily in 2009 as an input into development of business plans for the four hubs of the New Zealand Food Innovation Network. The proposals for NZFIN as finally approved and funded by government may differ from the proposals described in this document.*

PROJECT LIMITATIONS
This report has a number of limitations

- **The project has had a limited time and resource budget as it was *pro bono*.**

- **Available historical data on global food industry innovation networks and food industry focused pilot plants is, in places, limited and inconsistent.**

- **The numbers in this document come from multiple sources. While we believe the data are directionally correct, we recognise the limitations in what information is available. In many cases different data sources disagree. Many data sources incorporate estimates of industry experts.**

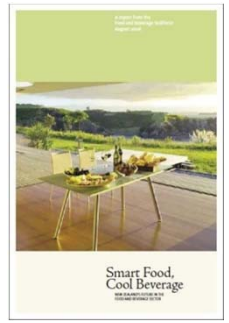
- **A number of the peer group identified have as their primary means of communication a language other than English. Some peers provide English translations of some or most of their information. In addition, we have translated some material ourselves. Please review material from non-English speaking countries with this in mind.**

- **If you have any questions about the source or meaning of a number in this report, please contact the project leader, Tim Morris at Coriolis Research on (09) 623 1848**

STRUCTURE

IDENTIFIED WEAKNESSES

The Government's Food and Beverage Taskforce in 2006 identified a number of innovation related weaknesses in the national food industry



"[W]eaknesses in the science and research system are:

- A tendency to focus too heavily on production efficiency while largely ignoring product enhancement;
- Patchy science uptake [anecdotal evidence suggests as much as 20 per cent of productivity gain may be left on the "laboratory shelf"];
- Poor connection between the science system and the innovation needs of business; and
- Problems of access to government-funded research by small and medium-sized businesses.

To address these issues the taskforce has prepared a detailed set of recommendations [see appendix one] designed around the following three strategic priorities:

- Better aligning the scientific effort with the productive potential of the sector;
- Improving technology transfer and knowledge uptake; and
- Linking R&D to commercialisation of new products and services.

One of the reasons New Zealand is failing to achieve the best benefit from its scientific and research capability is that there is a lack of national and often even regional coordination, integration and direction. The taskforce believes this must be addressed as a matter of urgency by the government and industry in partnership.

Action Point
Government and industry to develop a National Innovative Food Research Strategy covering both basic and applied research across New Zealand's research providers, including the universities and the Crown Research Institutes [CRIs]. The government to consider matching dollar for dollar new industry funds supporting this initiative.23

The taskforce is clear about the respective roles of the private sector and the government in the research area. Where the benefits of the research will be captured by a narrow segment of the economy, those who stand to capture the benefit should pay. Where the benefits will be broadly relevant to a range of industries and sectors, or where the adoption of new technology is hindered by market failure, the government should pay.

Economic transformation will not be achieved unless there is commitment from both government and business to make the necessary investment.

Also needed are channels of communication so that people with new ideas can feed them into the science "pipeline". The taskforce considered the merits of setting up a special website but concluded that the New Zealand Trade and Enterprise [NZTE] biz.org.nz site could be adapted to provide this facility. To deliver results, this will need to be actively promoted with the government sponsoring local networks of industry, university and science providers to publicise the portal, hold meetings and generate contacts.

Acceptance of the need to transform inevitably raised questions about how the necessary innovation activity would be structured and financed. The taskforce did not have the mandate to seek and evaluate proposals to provide research and commercialisation facilities but became aware of some of them, at times through direct representation from interested parties.

As examples:
- The University of Auckland indicated that it has research capabilities and a broad spectrum research portfolio that could underpin work in the functional foods, health and nutrition areas;
- A consortium of interests grouped around the Waikato Innovation Park proposed that various industry, local government, university and research organisations be funded to establish a livestock-derived, food and ingredient research, development and commercialisation campus; and
- A group centred at Massey University in Auckland is working on a concept for a Food Innovation Centre where the food industry and the education sector can share resources as a part of a wider "Food Bowl" development and promotion facility in South Auckland.

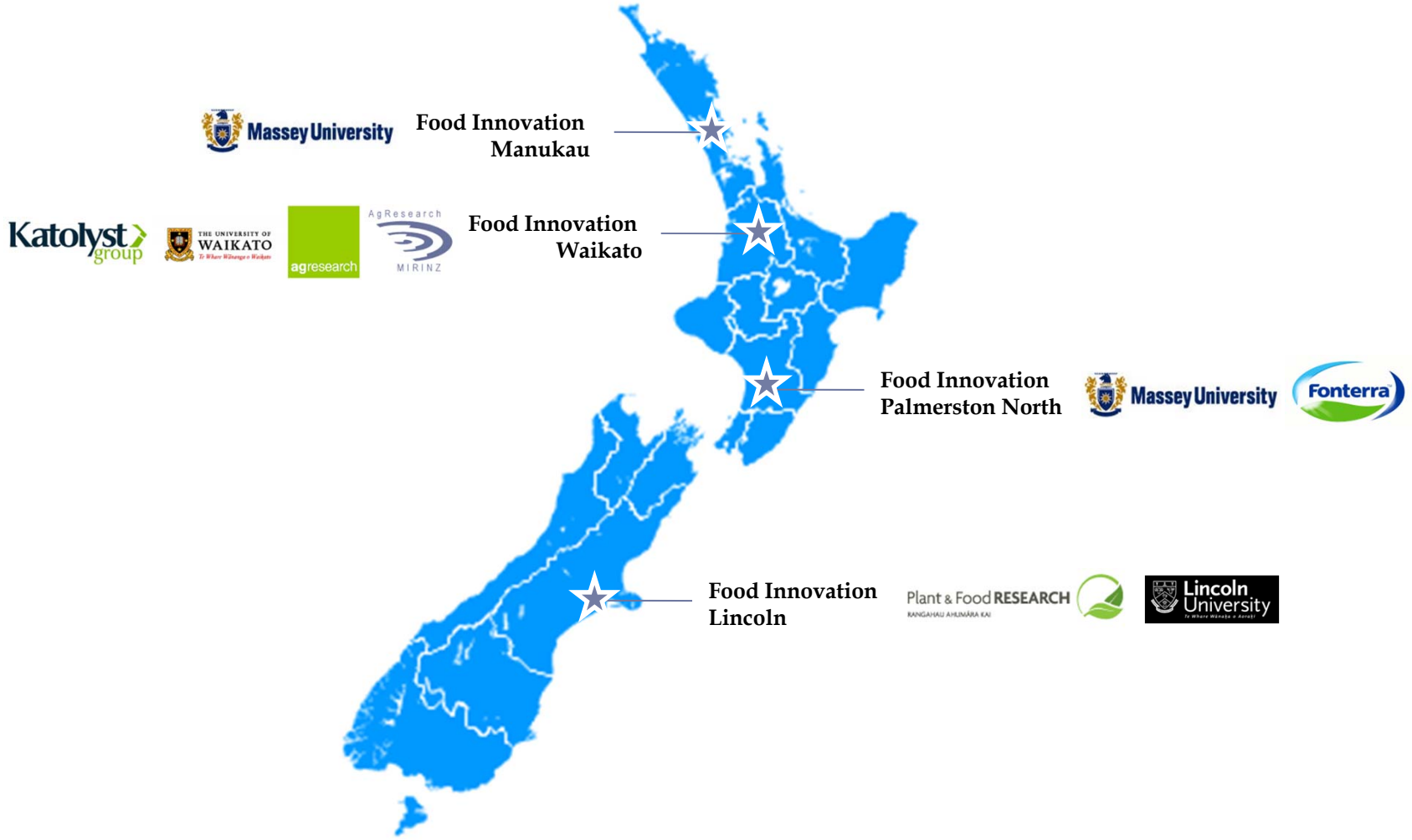
The taskforce recognises that some new innovation infrastructure might be needed. Whether this needs new organisations, or additional funding, what gaps it should seek to fill, where it should be located, and what conditions should be attached to additional support are all matters that need further analysis and a fuller opportunity for comment. A contestable process for the award of any contract[s] to provide the services is one component that would be required."

Source: Smart Food, Cool Beverage; a report from the Food and Beverage Taskforce August 2006; p29-30

PROPOSED STRUCTURE

The Food Innovation Network of New Zealand (NZFIN) seeks to address these weaknesses by establishing a set of four coordinated food and beverage innovation and commercialisation facilities

Current proposed structure of the New Zealand Food Innovation Network (NZFIN) and key involved parties
(February 2009)



FACILITIES DETAILS
Each of the four participating centres bring separate capabilities and focus

Details of four members of NZFIN
(February 2009)

Facility	Focus	Proposed facilities	Sponsor(s)	Lead
Food Innovation Manukau	- Fast moving consumer goods (FMCG) and consumer packaged goods (CPG)	- The Manukau Centre and Innovation Park, a 4,500m2 site near Auckland Airport	Massey University	Professor Ray Winger
Food Innovation Waikato	- Livestock-derived (dairy and meat) - Advanced ingredients - Processed foods	- Advanced Ingredient Facility - Meat Processing Facility - Food Manufacturing Unit (Ingredients focused) - Bioactives/Co-products Facility - Food Industry Learning Unit	AgResearch MIRINZ Centre	TBD
Food Innovation Lincoln	- Neutraceuticals - Plant-derived foods and ingredients	- Very small (90 m^2) lab sized pilot plant - Public/private Hi-Tech Foods facility at Rolleston Izone industrial park	Crop & Food Research	TBD
Food Innovation Palmerston North	- Dairy	- TBD	Massey University Fonterra	TBD

Source: NZFIN Business Case

IDENTIFIED SYNERGIES
The 'network' element of NZFIN will provide the following synergistic benefits

Details of four members of NZFIN
(February 2009)

Facility	Focus
Soft Services	- "Soft services" are consultancy like services offered by private sector providers, crown funded entities (universities, CRIs, NZT&E) and regional incubators that have skills and knowledge base built from experience and training in the private and public sectors. The Food Innovation Network must work to strengthen areas where the capabilities and resources have been traditionally weak or hard to access.
Hard Infrastructure	- A "hard infrastructure" of pilot plant and innovation centre buildings which house clusters of food and beverage companies and service providers.
Operating Network	- An "operating network" consisting of a team of independent and focused individuals who make the "links". They build relationships with network participants (services providers, private sector companies and the marketplace) to maximise the use of capabilities and resources. The operating network is the "glue" that will link those most able to provide the services to those who need them in order to fast track their products to market as efficiently as possible.
Funding Programs	- The "funding programs" which will support the private sector use of the network services and facilities. This financial support is required to kick start the use of the network, and also to help mitigate the financial risk incurred by the private sector which may otherwise inhibit the development of new products.

Source: NZFIN Business Case June 2008

HISTORICAL PARALLELS

There have been a number of historical concepts in New Zealand with strong parallels to the NZFIN concept; effectively all our major food industry exports have benefited from programs

Examples of historical New Zealand concepts with parallels to NZFIN

(1900-2000)

Facility	Year est.	Focus	Funding model	Pilot plant?	Outcome/current situation
NZ Dairy Research Institute (NZDRI)	1927	- Improving the quality of New Zealand butter and cheese exports - Later development of new manufacturing and production technologies (e.g. milk powder)	- All costs of establishing the unit were met by the government - Annual expenditure on dairy research, initially estimated at £6000 per annum was to be shared equally between the Government and the industry - Originally a branch of DSIR; set up along side Massey Agricultural College	Yes	- NZ dairy exports achieved massive growth - Now part of Fonterra
Meat Industry Research Institute of NZ (MIRINZ)	1955	- Improving the quality of New Zealand export sheep meat - Later expanded to include improving the quality of beef exports - Worked on early mechanisation of meat processing	- Initially proposed in 1920's but industry unwilling to fund at that time - Originally funded on the basis of a partnership between Government and meat processors - Government and the industry providing roughly equal contributions - Originally a branch of DSIR	Yes	- NZ meat exports achieved massive growth - Now part of AgResearch
DSIR Fruit Research Station	1936 1948	- Developing new fruit varieties, particularly apples	- Originally a branch of DSIR; initially DSIR Plant Research Station - Later reorganised as DSIR Fruit Research Station (later Division)	No?	- Developed/improved Braeburn and Royal Gala - Developed Kiwi Gold - Now HortResearch
Food Technology Research Centre	1966	- Improving food technology transfer - Assisting SME's doing food technology projects	- Dept of Food Technology at Massey - No direct government funding	Yes	- Massey restructured in 1998; amalgimated - lost focus
NZ Processed Meats PDC	1984	- Develop processed meat products from lamb	- JV company between Meat Board and Waitaki (#1 meat co. at the time) - Significant gvnt. funding planned	Yes	- Funding killed by incoming Labour Government

STRUCTURE

I. Summary of NZFIN concept

II. Review of international peers

A. Publicly accessible food industry pilot plant
   1. University department pilot plant
   2. Government or government-sponsored facility or agency

B. Food Industry Clusters

III. Lessons from peers

IV. Appendices

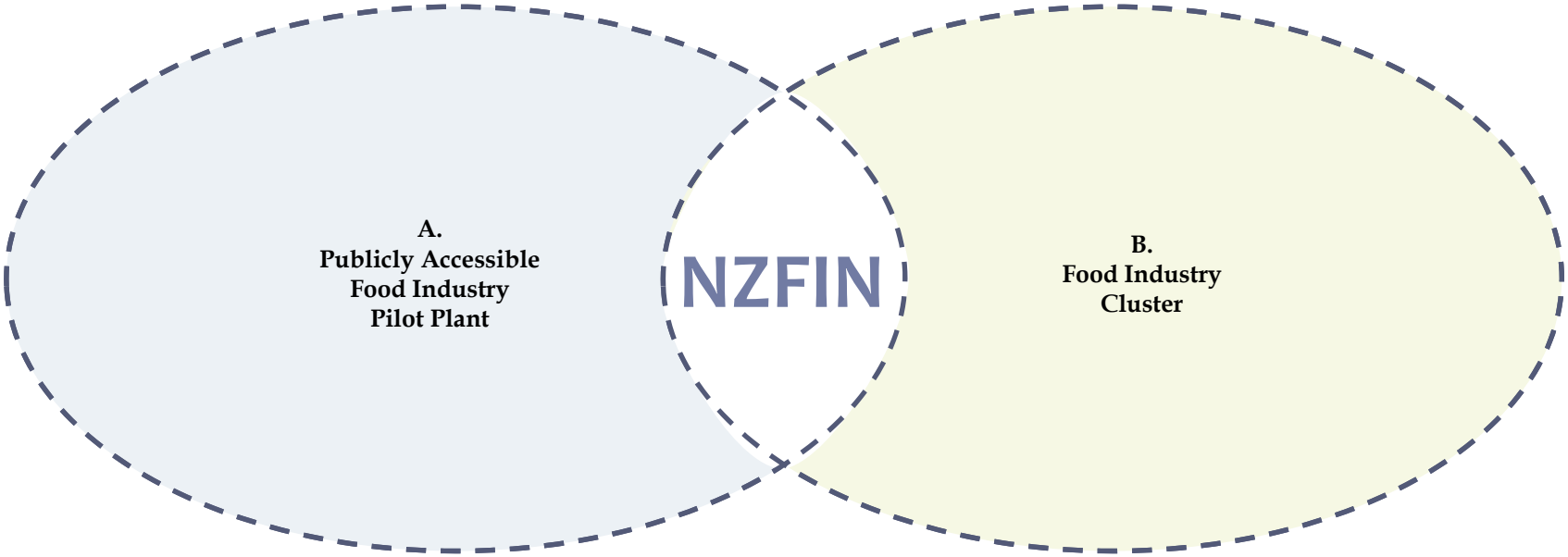
1. Appendix 1 - Food Valley case study
2. Appendix 2 - POS Pilot Plant case study
3. Appendix 3 - Details on identified peers

TWO MODELS

Our review of both the existing business case and international peers leads us to suggest the NZFIN is the intersection of two concepts: publicly accessible pilot plant and a food industry cluster

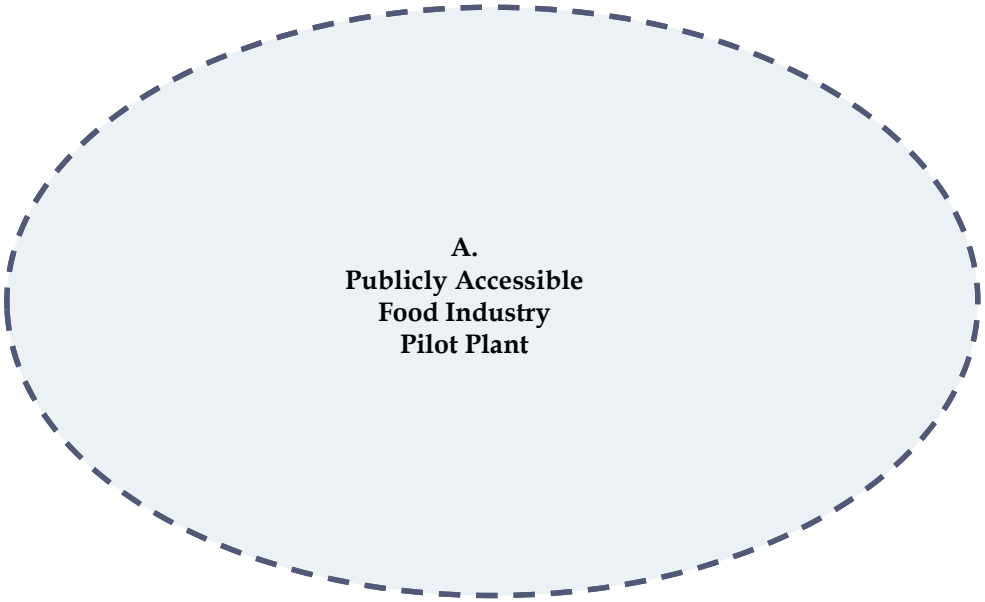
New Zealand Food Innovation Network (NZFIN) model

(model)



A. PILOT PLANT
The first part of our review looks at publicly accessible food industry pilot plant

Publicly Accessible Food Industry Pilot Plant model
(model)



A. PILOT PLANT - EMERGING CONCLUSIONS

From our work-to-date we make the following emerging conclusions about the pilot plant component of the NZFIN business case

- The pilot plant component of the NZFIN business case is <u>firmly in-line with global peer group</u>
  - Existing publicly available pilot plant targeting the food industry in New Zealand is sub-standard relative to global peer group
  - The requirement that the NZFIN pilot plant significantly funds itself is, if anything, more aggressive than the policies of the average peer group country

- Publicly accessible pilot plants are a common solution across the developed world to the challenges facing businesses in the food industry
  - Governments across the developed world recognise the need for public support for pilot plants for the food industry
  - Effectively every OECD country has some form of publicly accessible pilot plant targeted at the food industry

- Pilot plants are located in key food producing regions and focus on processing the foods of those regions (e.g. grain in Alberta)

- Sectors of the food industry with a high level of post-harvest processing (e.g. grains, dairy) have a greater need for pilot plants than others with less processing (e.g. fruit, seafood)
  - Some sectors need more complex and expensive pilot plants than others (e.g. grains)
  - Some sectors, typically those where either inputs can be processed in multiple ways or where technology is changing more rapidly, need more access to pilot plants than others where inputs are processed in fewer ways with less change

- There are three common business models for pilot plants:
  1. University: Associated with the Food Science departments of Universities
  2. Government: Part of a government research institute
  3. Government: As a stand-alone non-profit company (that is owned by government and receives government funding)

PILOT PLANT - DEFINITION
A pilot plant is a well understood and clearly defined concept in industry

- **"The pilot plant is a facility where the client can manufacture products for a market test or for commercial distribution. The pilot plant staff are skilled in processing and engineering to help clients develop a high quality product. Fees for support services and equipment rental are designed to create a cost-effective opportunity for clients to evaluate test markets before making capital budgeting decisions. Staff provide assistance to clients in developing cost-effective processes for products developed at FDC [Food Development Centre] or in the client's facility. Staff operate and maintain the FDC pilot plant, where clients can produce food products for export markets. Consulting services are provided, including process troubleshooting, equipment sourcing, design and evaluation. When developing or optimizing a food process, the Process Development staff work closely with the client and Product Development consultants to ensure the scale of the process will be consistent with the cost objectives and with the needs of the target market.**
- **The pilot plant is an on-site federally accredited processing facility for food production and packaging for test markets and for established markets. The client has the opportunity to identify and to overcome many of the operational difficulties inherent in the scale-up process before making costly equipment expenditures. Clients become better informed to estimate processing input and costs, which is vital information to have prior to initiating a product launch or proceeding with major capital acquisitions."** *Food Development Centre, Manitoba, Canada*

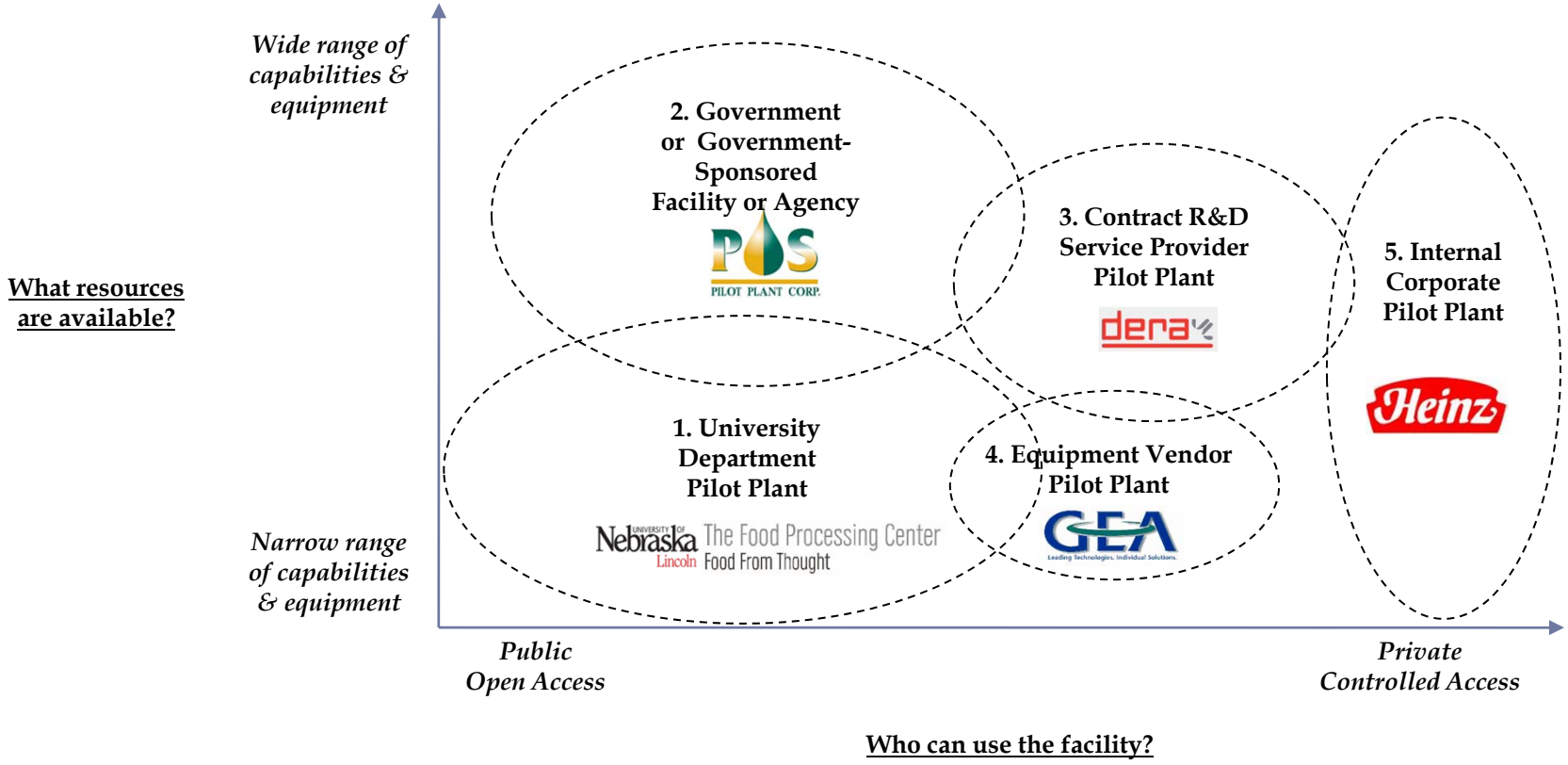
- **"A pilot plant is a small processing system which is operated to generate information about the behavior of the system for use in design of larger facilities… Pilot plants are used to reduce the risk associated with construction of large process plants. They do this in two ways:**
  - **1) They are substantially less expensive to build than full-scale plants. The business does not put as much capital at risk on a project that may be inefficient or unfeasible. Further, design changes can be made more cheaply at the pilot scale and kinks in the process can be worked out before the large plant is constructed.**
  - **2) They provide valuable data for design of the full-scale plant. Scientific data about reactions, material properties, corrosiveness, for instance, may be available, but it is difficult to predict the behavior of a process of any complexity.**
- **Pilot plant is a relative term in the sense that plants are typically smaller than production scale plants, but are built in a range of sizes. Some pilot plants are built in laboratories using stock lab equipment. Others are constructed of fabricated metal on dedicated concrete slabs and cost millions of dollars."** *adapted from Answer.com*

PILOT PLANT MODELS

From our research, we identified five different pilot plant business models based on access and resources

Identified models for different types of pilot plant based on access and resources

(model)



MODEL CHARACTERISTICS
Each of these five models have different characteristics

Characteristics of identified pilot plant business models
(model)

Model	Concept	Source(s) of funding	Examples
1. University department pilot plant	University food science department operates small scale pilot plant which is used in teaching and a lab; facility is also available to local/regional business, typically on a low cost basis	Tuition Donations/endowments Government-funding	Ohio State University Food Industries Center Columbus, OH USA
2. Government or government-sponsored facility or agency	Regional or national government funds food industry research facility to assist development which includes pilot plant facilities; often run as a non-profit corporation or a public/private partnership minimising need for subsidies	Government-funding Fees from users	POS Pilot Plant Corp. Saskatoon, SK Canada
3. Contract R&D service provider pilot plant	Company specialising in food industry new product development (NPD) operates small scale plant as part of complete package of NPD service for customers	Fees from customers	DERA Applications Centre Derbyshire , UK
4. Equipment vendor pilot plant	Equipment vendor provides access to production equipment it is selling to potential customers on a trial basis to help build investment case and make sale	Marketing cost	Tetra-Pak USA Pilot Plant Denton, TX USA
5. Internal corporate pilot plant	Large food manufacturer with extensive production capacity operates one or more small scale processing lines suitable for new product development	Corporate R&D budget	Heinz Global Innovation and Quality Center Pittsburgh, PA USA

Source: Coriolis research and analysis

MODEL CHARACTERISTICS
In addition, each of these five models also have strengths and weaknesses

Strengths and weaknesses of identified pilot plant business models
(model)

Model	Strengths	Weaknesses
1. University department pilot plant	- Public good function in education and in pure and/or applied industry research - Can tap into deeper pool of knowledge - Potential source of employees (graduate students)	- Often old, out-of-date and run-down - Challenges around maintaining confidentiality - Conflict between academic research and for-profit access
2. Government or government-sponsored facility or agency	- Public good function in pure or applied industry research - Potential to act as less-visible subsidy to industry - Public/private partnership minimising need for subsidies - Can act a nucleus for emerging industry cluster	- Cost to taxpayer - Potential for decisions to be made for political reasons
3. Contract R&D service provider pilot plant	- Seamless end-to-end develop-to-pilot service to customer - Efficient, real-world, results-oriented approach - No need to make large capital expenditure without having viable/tested product	- (Generally) access only available as part of a package - Limits customer capabilities/knowledge building
4. Equipment vendor pilot plant	- Ability to try before making a major investment - Access for user potentially a no cost	- Only available to potential customers (typically large firms) - No access for academics or researchers - May not be located in same country or continent - Access will typically be one-off rather than ongoing
5. Internal corporate pilot plant	- Immediate access for owner - Ensured confidentiality - Available for internal training - Can conduct equipment improvement R&D - Defensive barrier to entry for potential new entrants	- No public access - Myopic, inward facing facility - Only affordable by very large corporates - Large amounts of expensive capital may underutilised

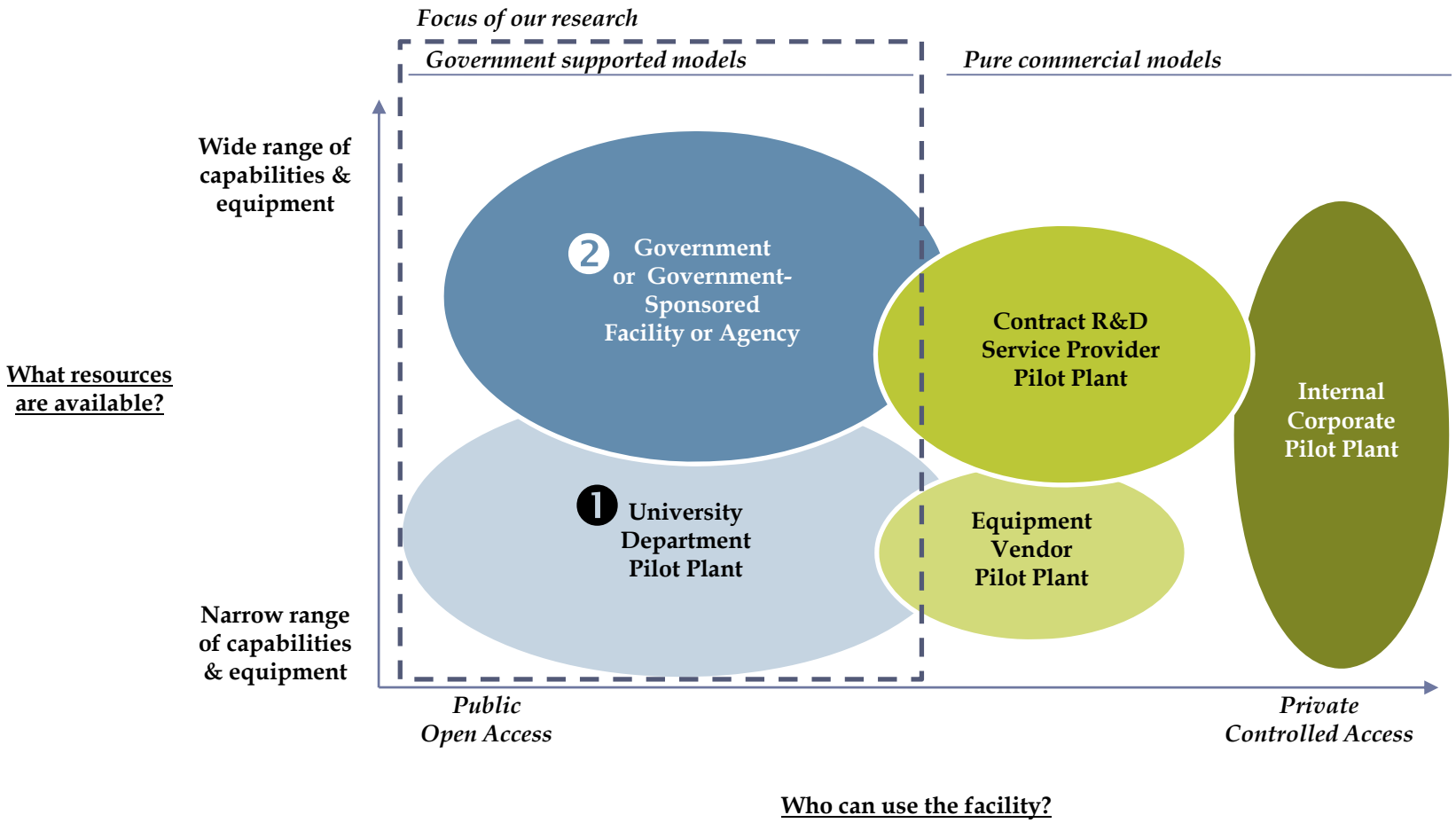
Source: Coriolis research and analysis

PILOT PLANT MODELS

Given the structure of the NZFIN concept, we focused our research on the two models with government involvement: university departments and government sponsored facilities

Identified models for different types of pilot plant based on access and resources

(model)



1. UNIVERSITY PILOT PLANTS
We found many Universities have significant pilot plant facilities focused on the food industry

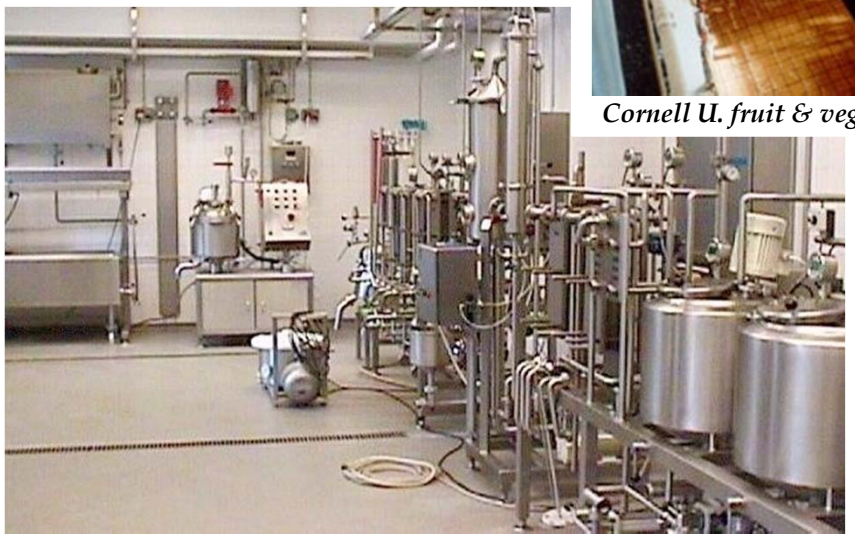
Examples of pilot plant equipment at universities
(2009)

Penn State wet pilot plant

Iowa State wet pilot plant

Cornell U. fruit & vegetable pilot plant

Joseph J. Warthesen Food Processing Center at UMinn.



U. Of Copenhagen dairy processing pilot plant

US MODEL FOR UNIVERSITY DEPARTMENT PILOT PLANTS

The United States model is one of public pilot plants operated by land grant[1] agriculture-related public universities located in key food producing regions

Details of identified university food industry pilot plants in the United States

(various; 2009)

State	Facility or industry program name	University	Land grant?[1]	Department
California	California Institute of Food and Agricultural Res.	U of C (Davis)	Yes	Food Science & Technology
California	Dairy Products Technology Center	Cal Poly San Luis Obispo	No	
Indiana	Center for Integrated Food Manufacturing	Perdue University	Yes	Food Science
Iowa	Center for Crop Utilization Research	Iowa State	Yes	Office of Biotechnology
Kansas	Kansas Value-Added Foods Lab	Kansas State U.	Yes	Animal Sciences and Industry
Louisiana	Dept. of Food Science - AgCenter	Louisiana State	Yes	Food Science
Maine	Dr. Matthew Highlands Pilot Plant	U. of Maine	Yes	Food Science
Minnesota	The Food Industry Center	U. of Minnesota	Yes	Food Science & Nutrition
Mass.	Food Science Strategic Research Alliance	U. of Mass. (Amherst)	Yes	Food Science
Nebraska	The Food Processing Center	U. of Nebraska	Yes	Food Science & Technology
New York	NY State Agricultural Experimental Station	Cornell University	Yes	Food Science
N. Carolina	Food Science Process Applications Laboratory	N. Carolina State	Yes	Food Science
Ohio	Food Industries Center	Ohio State U.	Yes	Food Science
Oregon	Food Innovation Center	Oregon State U.	Yes	Food Science
Penn.	Center for Food Manufacturing	Penn State U.	Yes	Agricultural Science
S. Dakota	SDSU Dairy Research & Training Facility SDSU Meat Lab	S. Dakota State U.	Yes	Food Science
Virginia	Food Processor Technical Assistance Program	Virginia Tech	Yes	Food Science
Wisconsin	Department of Food Science	U. of W (Madison)	Yes	Food Science

1. Land-grant universities are those in the US which receive the benefits of the Morrill Acts of 1862 and 1890 (see http://en.wikipedia.org/wiki/Land_grant_college)

UNIVERSITY PILOT PLANTS ALSO AN INTERNATIONAL MODEL

We also identified a number of publicly-accessible, food industry focused pilot plants operated by universities around the world

Details of identified university food industry pilot plants in other countries

(various; 2009)

State or Country	Facility or industry program name	University	Department
Europe			
Belgium	Food2Know Centre of Excellence	U. Of Ghent	Food Science
Denmark	Dept. of Food Science Dairy Technology	University of Copenhagen	Food Science
Netherlands	Top Institute Food and Nutrition (former Wageningen Centre for Food Studies)	Wageningen University	Agrotechnology & food sciences
Poland	Institute of Dairy Science and Technology Development	University of Warmia and Mazury	Food Science
UK	Processing Research Centre	U. Of Reading	Food Biosciences
Canada			
British Columbia	Food Processing Resource Centre/Food Industry Services	U.B.C. & BC Inst. Of Tech	Food Science
Manitoba	Richardson Centre for Functional Foods and Neutraceuticals	U. Of Manitoba	*Separate centre*
Nova Scotia	Canadian Institute of Fisheries Technology	Dalehousie U.	Engineering
Ontario	Guelph Food Technology Center	U. Of Guelph	Food Science
Saskatchewan	The Saskatchewan Food Industry Development Centre	U. Of Sask.	*Separate centre*
Australia			
Victoria, Aus	Innoven Food Industry Centre	Goulburn Ovens Inst. of TAFE	*Separate centre*
Other			
Dubai	Department of Food Sciences	UAE University	Food Sciences

Note: We believe there are more - likely one in most OECD countries; our research is being slowed by language translation issues and the expansion /clarification of this list would likely require us to hire external translators across a range of languages

EXAMPLE - FEE SCHEDULE FOR UNIVERSITY PILOT PLANT

Universities allow industry access to pilot plant facilities, typically at clear and reasonable fees

IOWA STATE UNIVERSITY
Center for Crops Utilization Research

CCUR Services, Equipment, and Facilities

Fee Schedule

CCUR has 35,000 square feet of pilot plant processing and support space available for wet processing, dry processing, fermentation and product recovery, hazardous solvents extraction, industrial product development, food preparation, and consumer and sensory testing.

Services*

All charges are based on days of equipment usage, cost of supplies and materials and need for equipment operators.

On Campus No Charge

Off Campus

Soy protein concentration (acid washed, 15 kg soy meal)	$2,542.00
Soy protein isolation (15 kg soy meal)	3,825.00
Wet corn milling (20 kg corn for products only)	2,400.00
Wet corn milling (1 kg corn for products only)	600.00
Wet corn milling (100 g corn for products only)	300.00
Wet corn milling (100 g corn for products and mass balance)	400.00
Feed-grade soybean extraction (1 bu soybeans)	2,100.00
Food-grade soybean extraction (1 bu soybeans)	2,400.00

Assistance Fees*

On Campus

Manager assistance (per hour)	$29.29
Student equipment operator (per hour)	8.00

Off Campus

Manager assistance (per hour)	$43.36
Student equipment operator (per hour)	8.00

Facilities*

Industry Incubator Space**	
Pilot plant (per sq. ft, per year)	$29.25
Laboratory (typically 440 sq. ft.) (per sq. ft., per year)	26.60
Office (typically 120 sq. ft.) (per sq. ft., per year)	21.95
Technology Transfer Theatre (non-CCUR affiliated members)	
Up to four hours	$25.00
Full day	50.00
Additional services (base charge)	50.00
Additional services per hour (if more than 90 minutes labor required)	35.00
Test kitchen and sensory labs (per day)	$50.00

1041 Food Sciences Building
Iowa State University
Ames, Iowa 50011

phone: 515-294-0160
e-mail: ccur@iastate.edu

www.ccur.iastate.edu

Equipment Available*

On Campus* ** No charge for equipment, listed below

Off Campus***

Prater vibrating screen	$22.50
French Oil Machine 3-stack seed cooker/conditioner	52.50
Insta-Pro autogenous extruder with cutter	82.50
Kice cascade aspirator	33.00
Anderson International cooker extruder/expander with oil cage	135.00
Corn degerminator	7.50
Blount Ferrel Ross cracking rolls	33.00
Glen Mills disc mill	28.50
Insta-Pro drum cooler and spray coater	6.00
Witt Corrugation dry-corn-milling system	60.00
Roskamp flaking rolls	18.00
Kamas Westrup gravity table separator	31.50
Horvick Manufacturing hammer mill	10.50
Entoleter impact mills	63.00
Fitzpatrick impact mills (comminuting)	160.50
Blount/Ferrel Ross Lapage cutting rolls	33.00
Flexifeeder mobile screw grain conveyor	7.50
Sweco oscillating separatory screen	10.50
California Pallet Mill pellet mill	78.00
Rapids Machinery ribbon mixer	42.00
Hander Oil machinery screw press	49.00
Seed tempering device	6.00
Tyler Ro-Tap sieve shaker	6.00
Carter-Day small aspirator	3.00
Komet screw press	16.50
Tempering conveyor	16.50
Bauermeister turbo/pin mill	262.50
Retsch ultra-centrifugal mill	33.00
Andritz Sprout-Bauer 12-inch disc mill	57.00
Vibra Screw Corp. variable speed feeder	19.50
Nelson variable speed feeder	6.00
Pfaudler swept surface, thin-film evaporator	492.00
Fluitron 3-gal Hastelloy high-pressure reactor	165.00
Wabash 150-ton press (compression molding)	163.50
Wabash 2-ton hydraulic press (compression molding)	40.50
Boy Machine 20-ton injection molding machine	94.50
Black Brothers glue spreader	11.00
Brabender single or twin-screw extruder (plastics)	253.50
Brabender plastic pellet pelletizer	25.50
Leistritz twin-screw extruder	253.50
Instron universal testing machine	156.00
Fisher Scientific incubators (each)	15.00
True-Food reach-in freezers (each)	9.00
Walker 200-gal stainless tank w/variable speed mixer	75.00
Walker 80-gal stainless tank w/air and electric mixer	102.00
70-gal mobile jacketed tank with agitator	16.50
Stainless steel 70-gal tank	15.00
Process Storage 70-gal jacketed feed tank	15.00
St. Regis 50-gal mobile tank with agitator	$16.50
Cherry Burrell 50-gal mobile jacketed tank withagitator	9.00
50-gal mobile tank with agitator	16.50
10-gal oil refining and bleaching kettle	33.00
Waukesha 6-16-gpm rotary lobe pump	22.00
Waukesha explosion-proof lobe pump	33.00
Robbins/Myers 1-9-gpm sanitary Moyno pump	30.00
Robbins/Myers 1-5 gpm Moyno pump	37.50
Mobile centrifugal pumps	9.00
Takai automatic soymilk plant with tofu press	249.00
Weightronix 125lb-max bench scale	3.00
Tippen cheese press	6.00
Chiller	12.00
Day Equipment cider press	27.00
Chemicolloid Labs colloid mill	36.00
Lattner culinary steam boiler	33.00
Weightronix deck scale	21.00
Groen variable-speed twin-agitator heated kettle	46.50
Yale Materials Handling 3,000-lb cap. forklift truck	55.50
Mixco variable-speed gear batch mixer	4.50
North Carolina SRT sanitary-rotary-vane high-pressure pump	33.00
Gaulin homogenizer	35.00
Centrisys horizontal-decanter-continuous centrifuge	485.00
Alfa-Laval separator-type disc continuous centrifuge (BPTX 205)	323.00
Hydro-therm hydroheater jet cooker with pump	117.00
Pick jet cooker	40.00
North Carolina SRT membrane-filtration unit	200.50
Micro-brewery production line	270.00
Stephan Machinery Corp. microcut grinder	52.50
Lightnin Mixer mixer and lifting cart	16.50
Weigh-Tronix mobile platform deck scale	21.00
Kason Vibroscreen oscillating screen with sweep washing system	27.00
Star Systems plate and frame filter press	60.00
Hobart mechanical potato peeler	4.00
Dixie Canner Equipment vegetable blancher	4.00
F.H. Langson Kamp vegetable pulper	4.00
Dixie 50-gal retort	49.50
C.E. Rogers single-effect evaporator	48.00
Dorr-Oliver germ hydroclone	10.00
Dorr-Oliver starch-gluten hydroclone	10.00
Starch-protein separation table	16.50
Fitration Engineers rotary vacuum drum filter	132.00
Industrial Filter vertical plate filter with horizontal plates	15.00
Microtherm water heater, circulator and controller	10.50
National Dryer Machine tray dryer	277.50
APV Crepaco Inc., spinning-disk atomizer feed spray dryer	316.50

* All prices subject to change.
** Limited industry incubation space may be available to off-campus users.
*** All fees are daily user fees, not including manager or student equipment operator, available for fee (see above).

Source: "http://www.ccur.iastate.edu/facilities/ccurfees.pdf"

RANGE OF FEES

University pilot plants were found to charge a range of fees, however these were typically quite low, and most of which seemed somewhat negotiable

Examples of fee structure for usage of University pilot plant - select facilities

(Feb 2009)

Facility	Charges
Babcock Hall Dairy Plant Department of Food Science University of Wisconsin	$1,000/day plus packaging materials, ingredients, and supplies are additional. Research projects requiring more than several days are bid on an individual basis.
Joseph J. Warthesen Food Processing Center Dept of Food Science & Nut. University of Minnesota	- Plant manager $50.50/hour; Student help $24.60/hour - Equipment rental varies by machine used (e.g. UHT/HTST Microthermic Unit $1,159/day) - Packaging materials, ingredients, and supplies are additional
Food Industry Service	- Post graduate students $40/hour; Food Science Professionals $80/hour - Facilities, equipment rental and other services - nominal charges depending on the project
Center for Crops Utilization Research, Iowa State U.,	- CCUR's pilot plants provide commercial enterprises a cost-effective way to test new products and processes without interrupting their usual production regimens. CCUR's involvement can take an number of forms--- from simple equipment rental, through technical assistance with equipment usage, through cooperative research contracts or proprietary agreements. Equipment rental and support staff payment can take a number of forms including equipment donation and in-kind services.

Source: various university websites and brochures

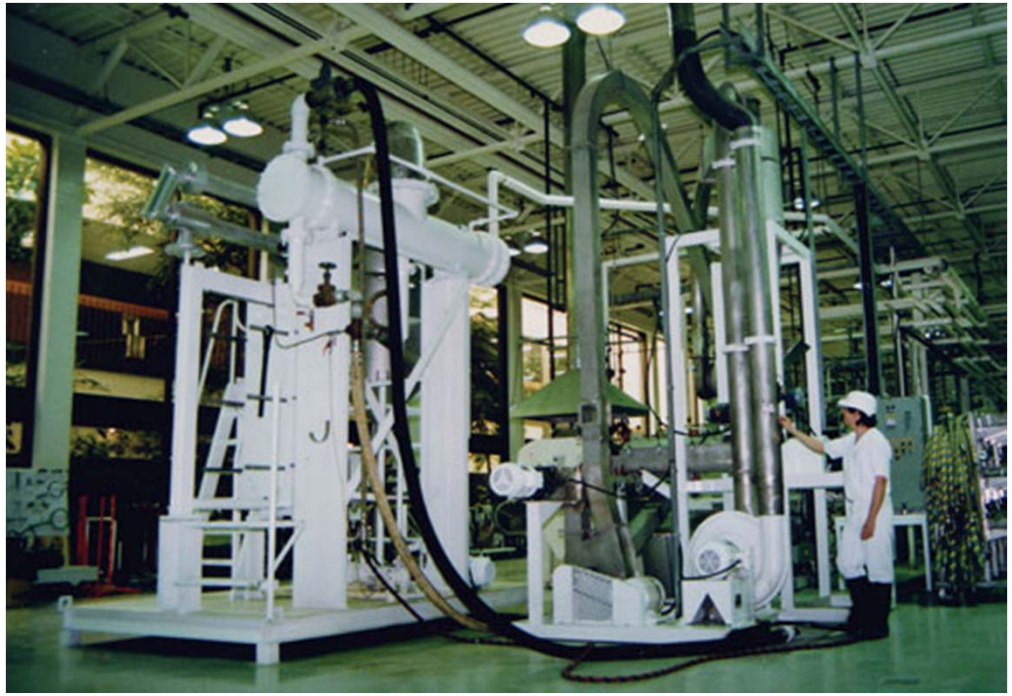
MEMBERSHIP

A number of university food science departments with pilot plants had some form of industry membership

- **"Membership in our Strategic Research Alliance program is an investment which brings your company into close collaboration with our scientific staff, providing a continuous stimulus for new ideas and enabling us to align our research expertise with your needs. It will assure you of priority access to our faculty by telephone and in person. You will be able to get to know our graduate students, and you will be provided with the latest research results of interest to you. Your membership will involve you directly in the generation of innovative ideas and will put you at the head of the line for scheduling client-funded research projects.**
- **Your $6,000 annual membership fee will help us to maintain state-of-the-art equipment, reducing the need to add on equipment costs for projects directly tailored to your needs. Membership may be renewed for a second year at the same cost.**
- **Additional Benefits:**
  - **As part of the stimulating interchange of ideas and information, you'll receive:**
  - **Invitations to annual research briefings and individual meetings with Faculty.**
  - **A semi-annual newsletter presenting research innovations and regulatory bulletins.**
  - **Timely updates on new technologies.**
  - **Reprints of faculty research articles.**
  - **Preferential use of our Pilot Plant at reduced rates.**
  - **Links to national and international networks of scientific and regulatory experts.**
  - **Reduced registration fees at Department conferences and programs.**
  - **A listing of your company's name on our World Wide Web site."** ***Website, University of Massachusetts, Food Science Dept., Feb 2009***

2. GOVERNMENT OR GOVERNMENT SPONSORED

Government or government sponsored pilot plants - sometimes set up as stand alone non-profit corporations - were also found to be a common response to food industry pilot plant needs



POS Pilot Plant Corp., Innovation Place, University of Saskatchewan Saskatchewan, Canada

GOVERNMENT PILOT PLANTS - NORTH AMERICA

From our research to date, we have identified eight publicly accessible, directly government funded food industry pilot plants in North America - interestingly the concept is more common in Canada

Details of identified government or government sponsored food industry pilot plants in North America

(various; 2009)

Country or region	Facility name	Sponsorship/Ownership	Website
United States			
Chicago, IL	National Center for Food Safety and Technology (NCFST)	US Food and Drug Administration (FDA) Center for Food Safety and Applied Nutrition (CFSAN), Illinois Institute of Technology (IIT) and the food industry	*www.ncfst.iit.edu*
5 locations (CA, LA, IL, PA)	National Center for Agricultural Utilization Research (NCAUR)	US Department of Agriculture	*www.ncaur.usda.gov*
Canada			
Alberta	Food Processing Development Centre (FPDC)	Ministry of Agriculture and Rural Development via Alberta Heritage Savings Trust Fund	*www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/fpdc5012*
Manitoba	Food Development Centre (FDC)	Special Operating Agency of Manitoba Agriculture, Food and Rural Initiatives	*www.gov.mb.ca/agriculture/fdc/*
PEI	PEI Food Technology Centre (FTC)	Gov. of Price Edward Island	*www.gov.pe.ca/ftc/*
Saskatchewan	The Saskatchewan Food Industry Development Centre (FIDC)	Ministry of Agriculture, the Saskatchewan Food Processors Association and the University of Saskatchewan	*www.foodcentre.sk.ca*
Saskatchewan	Saskatchewan Research Council (SRC)	Province of Saskatchewan	*www.src.sk.ca*
Saskatchewan	POS Pilot Plant Corp.	JV between Provincial government and industry; not-for-profit company	*www.pos.ca*

GOVERNMENT PILOT PLANTS - EUROPE

From our research to date, we have also identified six publicly accessible, directly government funded food industry pilot plants in Europe

Details of identified government or government sponsored food industry pilot plants in Europe

(various; 2009)

Country or region	Facility name	Sponsorship/Ownership	Website
Europe			
Basque, Spain	AZTI-Tecnalia Basque Marine and Food Research	Research Institute of the Basque Regional Government	*www.azti.es*
Belgium	Institute for Agricultural and Fisheries Research (ILVO) Technology & Food Unit	Research Institute of the Government of Belgium	*www.ilvo.vlaanderen.be*
Catalonia, Spain	IRTA (Institut de Recerca I Technologia Agroalimentaires)	Research Institute of the Catalan Regional Government	*www.irta.es*
Rennes, France	Caractérisation et Elaboration des Produits Issus de l'Agriculture	Institute for Agricultural Research (INRA)	*www.inra.fr*
Ireland	Moorpark Technology Limited	Teagasc - The Irish Agriculture and Food Development Authority	*www.moorepark.net*
Switzerland	Forschungsanstalt Agroscope Liebefeld-Posieux ALP	Government of Switzerland	*www.alp.admin.ch*

Note: We believe there are more - likely one in most OECD countries; our research is being slowed by language translation issues and the expansion /clarification of this list would likely require us to hire external translators across a range of languages

GOVERNMENT PILOT PLANTS - OTHER

From our research to date, we have also identified five publicly accessible, directly government funded food industry pilot plants in other countries, including Australia

Details of identified government or government sponsored food industry pilot plants in other countries

(various; 2009)

Country or region	Facility name	Sponsorship/Ownership	Website
Australia			
Victoria	Food Science Australia	JV between CSIRO and Victoria State Government	*www.foodscience.csiro.au*
Queensland	Health Benefits from Tropical Foods Research Program	Department of Primary Industries & Fisheries, Queensland Government	*www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/4791_9259_ENA_HTML.htm*
Other			
Osaka, Japan	Kinki Bio-industry Development	Osaka Prefecture, Kansai Economic Org., others	*http://kinkibio.com/english/01.html*
South Africa	CSIR Agroprocessing & Food	The Council for Scientific and Industrial Research	*http://www.csir.co.za/biosciences/foodplant.html*
Thailand	Food Tech & Engineering Section of National Center for Genetic Engineering and Biotechnology	National Center for Genetic Engineering and Biotechnology (BIOTEC) and King Mongkut's University of Technology Thonburi (KMUTT)	*http://www.biotec.or.th/biotechnology-en/Person/Unit-BEC.asp*

Note: We believe there are more - likely one in most OECD countries; our research is being slowed by language translation issues and the expansion /clarification of this list would likely require us to hire external translators across a range of languages

GOVERNMENT FUNDING
Peer governments recognise the need for public funding for food industry pilot plant

Examples of public funding sources of food industry pilot plant
(various; 2008)

Region or country	Facility	Year Est.	Public Funding (07/08)	Funding
Saskatchewan, Canada	POS Pilot Plant Corp	1977	11%	- 90% of initial start-up funding in 1977 provided by national and regional government - Ongoing operating funding provided for 30 years (start-up to present); facility is now 89% self-sufficient - Top-up funding provided by various government agencies for equipment and facility upgrades
Victoria, Australia	Food Science Australia	1997	73%	- Joint-venture between CSIRO (Australian national body for scientific research) and the Victorian State Government - Funding in 2007 was 73% various government agencies and programs and 27% from the private sector
Catalonia, Spain	IRTA	1985	90%	- Created by Law 23/1985 on 28th November 1985 by the Parliament of Catalonia - Funding from range of Spanish national and regional governments and agencies and the European Union - Organisation is somewhat similar to a NZ-style CRI (e.g. AgResearch)
United States	National Center for Agricultural Utilization Research (NCAUR)	1938	100%	- Established by an act of Congress in 1938 - Operated by the US Department of Agriculture with funding from regular budget - No expectation to be self-sufficient

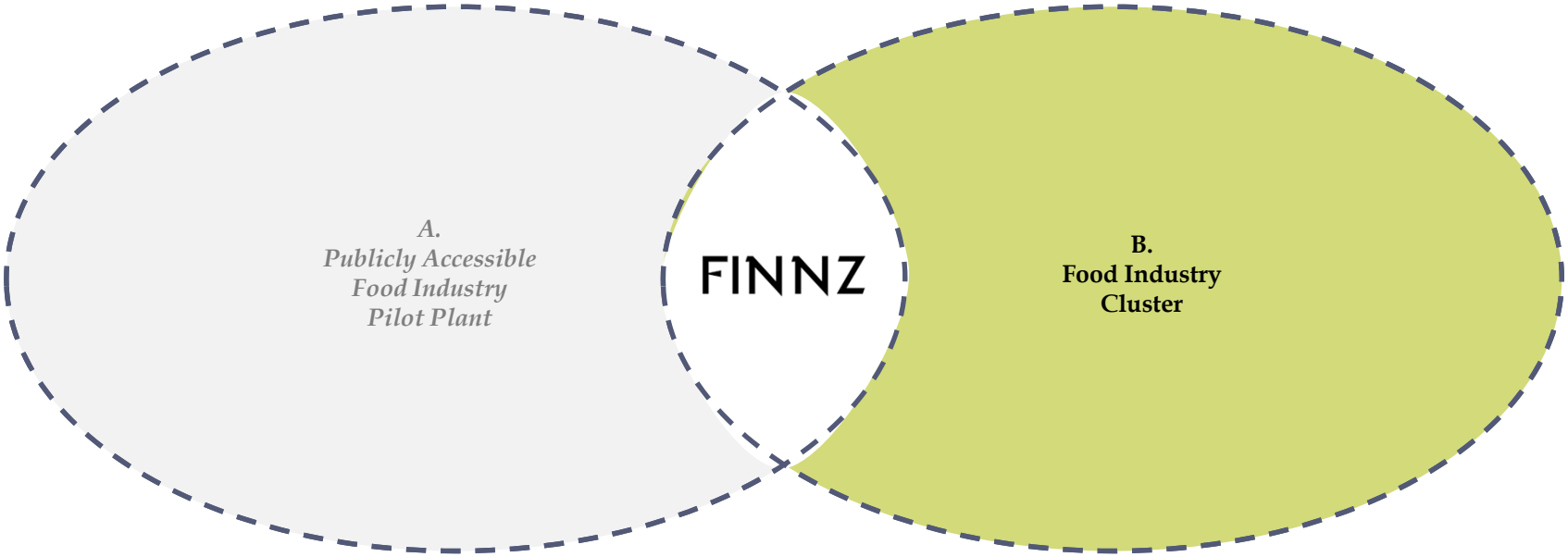
Note: IRTA is based on "http://www.irta.es/eng/qui/xifres/2006/recursos_per_conceptes.asp"
Source: various websites; various organisation annual reports; various press articles; Coriolis analysis

B. FOOD INDUSTRY CLUSTER

The second part of our review looks at the concept of the formation of a publicly supported/initiated industry cluster

Food Industry Cluster model

(model)



B. FOOD INDUSTRY CLUSTER - EMERGING CONCLUSIONS

From our work-to-date we make the following emerging conclusions about the food industry cluster component of the NZFIN business case

- **The concept of government involvement in the formation of industry clusters has a long global history (with a mixed track record of success)**

- **"Food Innovation Networks" are a relatively new concept (in the current form or iteration of the idea)**
  - **The creation/formation of Food Valley in the Netherlands in 2001 highlighted and promoted the concept *[see appendix 1]***
  - **A number of governments and regions around the world have directly or indirectly imitated the Food Valley concept**

- **The success of these innovation networks has varied significantly**

- **None of the global networks identified explicitly include investment in a pilot plant component; however most (all???) have various pilot plant available in their region (usually via a university or private providers)**

REGIONAL OR NATIONAL NETWORKS

We identified a range of food industry related networks, primarily in Europe, which ranged from proper innovation networks to "branded clusters"; all of which were geographic in focus[1]

Details of identified major food innovation networks in Europe & Canada

(various; 2009)

PRELIMINARY

Network	Location	Year est.	Sponsorship/Ownership	Website
Food Valley	Wageningen, Netherlands	2001 (announce)	Ministry of Economic Affairs and Development Agency East Netherlands (Oost NV); Prov of Gelderland; others; FINE memb.	*www.foodvalley.nl*
ØRESUND FOOD NETWORK	Copenhagen, Denmark	2001	Danish-Swedish network: Ministeriet for Fodevarer, Landbrug og Fiskeri [DK]; Skånes Livsmedelsakademi [SWE]; others Includes Skane Food Cluster in Sweden; FINE member	*www.foodoresund.com*
Flanders' FOOD	Essene, Belgium	2005	Flemish government and IWT en Fevia Vlaanderen (federation of the Flemish food industry); FINE member	*www.flandersfood.com*
måltidsarena	Stavanger, Norway	TBD	Food Safety Authority of Norway and Rogaland Regional Government; FINE member	*www.maltidsarena.no*
FOOD-PROCESSING INITIATIVE	Bielefeld, Germany	1998?	Funded by Northrhine-Westfalian Government; FINE member	*www.foodprocessing.de*
fcp	Helmond, Netherlands	TBD	Samenwerkingsverband Regio Eindhoven (Eindhoven Regional Government)	*www.foodconnectionpoint.nl*
Organics cluster in rhône-alpes	Rhone-Alpes, France	2005	Funding from Rhone-Alpes regional government and EU There is also a Biotech cluster in the region	*www.organics-cluster.com*
LEBENSMITTEL LC CLUSTER	Oberösterreich, Austria	2000	Funding from Oberösterreich regional goverment and others	*http://www.lebensmittel-cluster.at/index.php?id=574*
F I N E	Europe	2005	Loose network of networks coordinated by Food Valley Funding to date from EU; indications of limited success to date	*www.networkfine.net*
INNOVATION PLACE.	Saskatoon, SK Canada	1980	Project of Province of Saskatchewan to construct two research parks, one of which (Saskatoon) has an ag/food focus and is associated with U. of Sask (Ag College)	*www.innovationplace.com*

1. Other than FINE, which is a network of networks; Source: various reports, websites and news articles; Coriolis analysis

REGIONAL OR NATIONAL NETWORKS

We identified two Asian food networks, both of which are driven by government and strongly modeled on Food Valley - the Korean version even shares the same name

PRELIMINARY

Details of identified food innovation networks in other countries

(various; 2009)

Network	Location	Year est.	Sponsorship/Ownership	Notes
푸드밸리 (Food Valley)	Iksan, North Jeolla, South Korea	2008 (announced)	Ministry of Agriculture and Forestry	Modeled on Food Valley (NL) and Oresund Food Network (DK) Gvnt. will spend SKW1t (US$776m) by 2015
Agropolis	Serdang Valley, Malaysia	2005 (announced)	Ministry of Agriculture and Agro-Based Industries	Modeled on Food Valley (NL) Centered on Universiti Putra Malaysia, Malaysian Agriculture Research and Development Institute (Mardi) and Department of Agriculture Funding authorised 2006; current status unclear (?)

KOREAN FOOD VALLEY

As an example, The South Korean food cluster, modeled on Food Valley, is very ambitious and has a budget to match

- **"1 Trillion Won (US$776m) Invested to Create National Food Cluster in North Jeolla Ministry of Food, Agriculture, Forestry and Fisheries (MIFAFF) disclosed on December 26 that a 'National Food Cluster" is to be created in North Jeolla province's Iksan City as a food industry hub of Northeast Asia.**

  MIFAFF held a National Food Cluster Site Location Council this day to appoint 400ha of land in Iksan City's Wanggoong-myeon to nest Korea's National Food Cluster.

  The government had selected North Jeolla province as a National Food Cluster candidate at the end of last year and was to decide on the final location after receiving applications from 14 cities and counties in North Jeolla.

  The National Food Cluster project aims to cultivate a Northeast Asian food hub by attracting domestic and international food companies, private research centers and other related institutes after establishing a food specialized complex by supplying 1 trillion won beginning next year until 2015.

  The recent development seeks to upgrade the food industry at a higher value-added and to secure stable demand channels for agricultural and fishery businesses.

  As a primary stage, MIFAFF is to create a national industry complex specialized in foods of a 400ha scale and further establish exclusive complexes taking development progresses and corporate investment demands into consideration.

  A MIFAFF official said, "Over 100 domestic and foreign food corporations and over 10 private research centers will be induced to the food cluster to allow approximately 15 percent of total sales generated in the food manufacturing industry to be yielded by the cluster by year 2015."" *Maeil Business News, December 28, 2008*

KOREAN FOOD VALLEY COMPLEX
The planned Korean Food Valley research park is extensive

Source: 푸드밸리(Food Valley) 조성과 도농 상생; 정부의 한미FTA 보완대책에 부응하는 대구경북의 자생적 실천 방안

REGIONAL OR NATIONAL NETWORKS

We also identified a number of food industry clusters in Europe which were emergent but not branded or networked

Details of identified food innovation networks in Europe

(various; 2009)

PRELIMINARY

Network	Location	Year est.	Sponsorship/Ownership	Website
Parma Food Cluster	Parma, E-R Italy	*Historical*	FINE member; food industry cluster identified by EU Govt.	-
SE England Food Industry Cluster	Norwich Cambridge Reading	*Emergent*	food industry cluster identified by EU Govt.	-
Scottish Food Industry Cluster	Scotland, UK	*Emergent*	FINE member; food industry cluster identified by EU Govt.	-
Polish Food Industry Cluster	Wielkopolska. Poland	*Emergent*	FINE member; food industry cluster identified by EU Govt.	-
Spanish Food Industry Cluster	Castilla y León , Spain	*Historical*	FINE member; food industry cluster identified by EU Govt.	-

Note: We have not put too much emphasis on the identification or analysis of emergent or historical food industry clusters. There are clearly lots in existence all around the world (e.g. Chicago=grain)

STRUCTURE

I. Summary of NZFIN concept

II. Review of international peers

A. Publicly accessible food industry pilot plant
1. University department pilot plant
2. Government or government-sponsored facility or agency

B. Food Industry Clusters

III. Lessons from peers

IV. Appendices

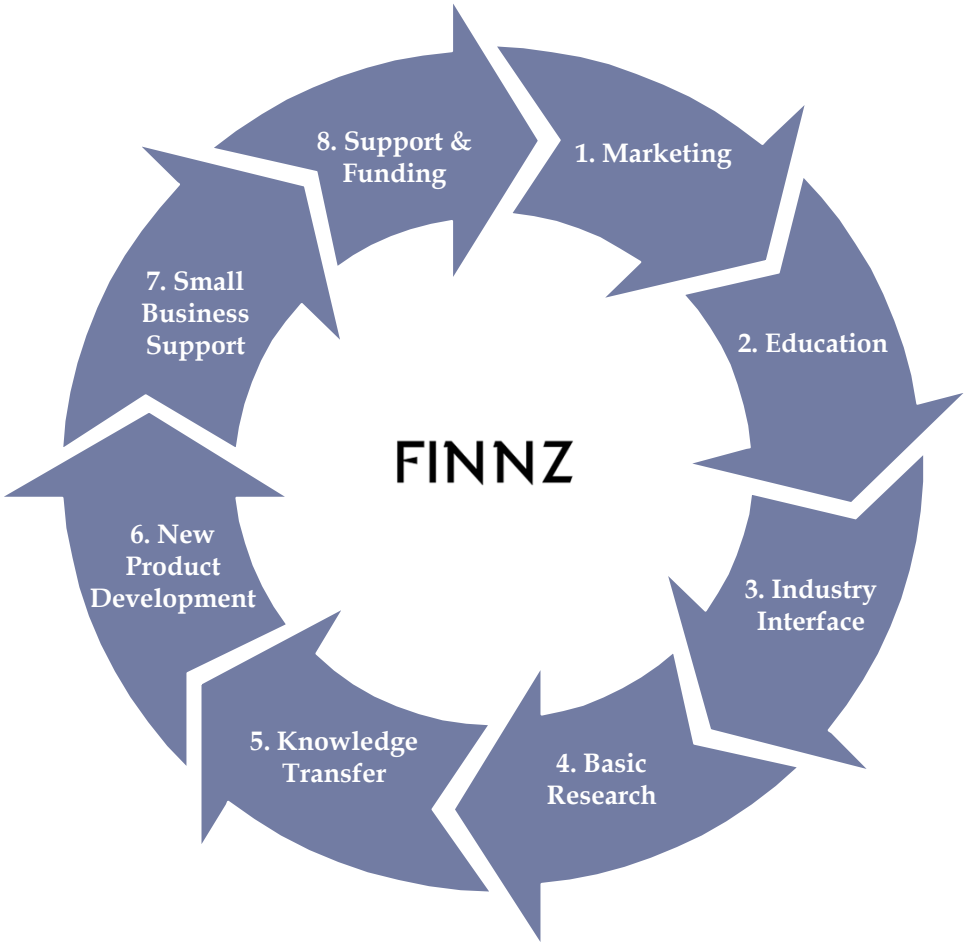
1. Appendix 1 - Food Valley case study
2. Appendix 2 - POS Pilot Plant case study
3. Appendix 3 - Details on identified peers

POTENTIAL COMPONENTS OF NZFIN PLAN

Our analysis identified the following important components in many of the identified peers; all of these have a role in any NZFIN business plan *[see Coriolis Review of International Peers]*

Potential components of NZFIN identified in peer screen

(model; 2009)



IDEAS FROM PEERS - 1 - MARKETING

One of the key roles will be marketing and promoting the role and achievements of the cluster/network, in order to raise awareness and attract new members and new investment

Ideas from screened peers - marketing

(Feb 2009)

Concept	Details	Examples from peers
Publish a newsletter	- Publish a regular newsletter to inform interested parties (industry, alumni, others) of recent developments and changes	- "Processing Profile" by POS Pilot Plant published quarterly - Food-Processing Initiative (Northrhine-Westfalia, Germany)
Media kit and releases	- Provide media kit (fact sheet and key contacts details) on website - Regularly publicise the research and activities of the centre through media releases - Provide publication-ready centre images and logo for press use	- National Center for Ag. Utilization Research (NCAUR) - Food Science Australia - Azti-Tecnalia (Spain)
Publish an annual report	- Publish an annual report celebrating and documenting the achievements of the centre over the year - Often includes either summary or full financials	- POS Pilot Plant Corp. (Canada) - Azti-Tecnalia (Spain)
Publish team presentations	- Publish copies of presentations made by centre team at industry conferences	- Food Valley
Provide brochures and videos	- Provide a brochure outlining the activities of the centre - Provide an online video outlining the activities of the centre	- Azti-Tecnalia (Spain)
Publish profiles of key scientists	- Provide online short bio and cv of key scientists in the network/cluster/facility	- POS Pilot Plant Corp (Canada)
Company lists and profiles	- Provide a list of key food industry companies operating in the region/cluster/network, including contact details and business description	- Oresund Food Excellence / Skane Food Cluster
Provide sector/cluster overviews	- Provide brochures or presentations outlining the capabilities of the centre and/or regional network/cluster - Provide a video outlining the activities of regional network or cluster	- "Skåne's food cluster creates fertile grounds for growth" by Oresund Food Excellence / Skane Food Cluster

IDEAS FROM PEERS - 2 - EDUCATION

There is clearly a strong role to play developing and providing various forms of education to both cluster/network members and the wider food industry

Ideas from screened peers - education

(Feb 2009)

Concept	Details	Examples from peers
Organise and run seminars and conferences	- Bring together research scientists and industry members to network and share learning's - Usually organised around a currently topical theme	- 7th Annual Food Valley Conference, October 2009 - National Small Food Manufacturers' Conference run by U. of Neb.
Run workshops and short courses	- Provide short courses and/or hands-on workshops, often targeted at small-and-medium businesses - Workshops often focused on understanding a specific process in the pilot plant	- "Extrusion Technology in the Food Industry," 4 days/hands-on at U. of Minn - "From Recipe to Reality 2009" workshops by U. of Neb. - "Food Process Automation Workshop" at Purdue U. - "Starting a Food Business" at Virginia Tech - "Advanced Food Process Engineering" at NCFST
Industry event calendar	- Publish an up-to-date calendar of food industry related events occurring in the region	- Food Science Australia - Flanders' Food (Belgium)
Publish scientific papers and publications	- Make scientific papers produced by facility team available on centre website	- National Center for Food Safety and Technology (NCFST)
Scholarships to study at centre	- Provide scholarships to graduate students to research and study at the facility	- Scholarships at Azti-Tecnalia (Spain)

IDEAS FROM PEERS - 3 - INDUSTRY INTERFACE

The concept should make industry feel welcome and "part of the project" by acting as an interface between the food industry and academia/research

Ideas from screened peers - industry interface

(Feb 2009)

Concept	Details	Examples from peers
Have membership or sponsors	- Encourage business to become members of a industry-centre organisation, generally for a fee - Membership provides defined benefits - Industry-membership can also provide guidance in centre strategic, operational or research direction	- Food Valley Society - Center for Food Manufacturing at Penn State - Food-Processing Initiative (Northrhine-Westfalia, Germany) - National Center for Food Safety and Technology (NCFST) - The Food Industry Center at U. of Minn. - Food Science Australia - Food Tech initiative membership (two levels: participating or project)
Industry on Board of Directors	- Have representatives of key companies on the Board of Directors of NZFIN	- Food Valley has executives from Friesland Campina (Dairy Coop) on its Board (as well as other industry leaders)
Offer conference/ meeting rooms and facilities to industry	- Allow industry to use centre facilities for presentations or as an off-site venue for internal conferences and meetings	- The Technology Transfer Theatre at the Center for Crops Utilization Research at Iowa State U.
Create a multidisciplinary Food Industry Centre	- Agricultural-focused university combines multiple departments with an agri-food focus into a single centre - Typically business studies and food science	- Center for Food Manufacturing at Penn State - The Food Processing Center at U. of Neb. - The Food Industry Center at U. of Minn.

IDEAS FROM PEERS - 4 - BASIC RESEARCH

The concept should have at its core a strong science and research capability conducting basic and applied research into the challenges facing the food industry

Ideas from screened peers

(Feb 2009)

Concept	Details	Examples from peers
Association with basic research	- Have as a core component of the network one or more Universities and research institutes conducting basic research in food science and other food industry related fields	- Effectively every food industry network and publicly-accessible pilot plant identified

IDEAS FROM PEERS - 5 - KNOWLEDGE TRANSFER

The concept should facilitate knowledge transfer between academia, research institutes and industry

Ideas from screened peers

(Feb 2009)

Concept	Details	Examples from peers
Match up knowledge seekers and providers	- Act as an intermediary to match companies seeking research with providers able to deliver on requirements	- Food Valley Innovation Link system

IDEAS FROM PEERS - 6 - NEW PRODUCT DEVELOPMENT

Clearly use of the pilot plant is only the last step in a well developed new product development pathway that offers companies the full range of required support and services

Ideas from screened peers - new product development

(Feb 2009)

Concept	Details	Examples from peers
Operate test kitchen and sensory evaluation lab	- Provide a test kitchen facility as a precursor to full pilot plant production - Offer the services of a full sensory evaluation lab for both product development/improvement and NPD	- Center for Crops Utilization Research at Iowa State U. - Food Innovation Center at Oregon State U. - Food Science Process Applications Laboratory at NC State U. - Sensory Evaluation Laboratory in the Penn State Department of Food Science - University of Maine Consumer Testing Center
Provide food safety, packaging and shelf life testing	- Provide contract services to confirm and validate the food safety of both new and existing products - Provide contract services to confirm and validate the shelf life of new products	- Food Innovation Center at Oregon State U. - NCSU Sensory Service Center at Food Science Process Applications Laboratory at NC State U.
Provide product and process consulting to industry	- Provide contract services to evaluate the nutritional makeup of products (to meet labeling requirements) - Offer product development advice and consulting across a range of needs (e.g. production efficiency, flavour)	- Food Innovation Center at Oregon State U. provides technical assistance and services - KSU Kansas Value-Added Foods Lab offers consulting and technical services

IDEAS FROM PEERS - 7 - SMALL BUSINESS SUPPORT

As a recipient of significant government support, the concept has a strong responsibility to help support and grow small businesses in the food industry

Ideas from screened peers - small business support

(Feb 2009)

Concept	Details	Examples from peers
Provide business incubator facilities	- Have business incubator facilities available at low rents for start-up ventures - Incubator should be co-located with research facilities and include access to pilot plant - Appears to function most successfully when it acts as a clear path for the commercialisation of academic research produced in the network or cluster	- CCUR Industry Incubator Program at Iowa State U. - Cornell Agriculture & Food Technology Park "The Technology Farm"
Web portal for food business startups	- Provide a current and regularly updated web portal that provides information for business start-ups	- PA Food Ventures portal run by Penn State Dept. of Food Science - Virginia Food Processor Technical Assistance Program portal website
Assistance in applying for small business government support and grants	- Provide support to SMB in applying for government grants or support - These grants are typically to fund work to be undertaken by the network/cluster/facility	- Virginia Food Processor Technical Assistance Program

IDEAS FROM PEERS - 8 - FUNDING AND SUPPORT

The concept should actively seek funding and support for the cluster/network from a wide range of sources, with the ultimate objective of becoming self-funding

Ideas from screened peers - funding and support

(Feb 2009)

Concept	Details	Examples from peers
Membership fees	- Make an offer to industry such that they willingly pay a membership fee for network participation	- Food Valley Society - POS Pilot Plant Membership: industry (C$5,000/year); Canadian Provincial Governments (initial C$100k; $50k/year); associate members (C$1,000/year) - Food Science Strategic Research Alliance at U. Mass ($6,000/year fees)
Solicit sponsorship and/or donations from industry suppliers	- Actively seek out sponsorships for research from industry suppliers - Actively seek out pilot plant equipment donations from key equipment suppliers to food industry	- Sponsors Purdue U. Center for Integrated Food Manufacturing

STRUCTURE

I. Summary of NZFIN concept

II. Review of international peers

A. Publicly accessible food industry pilot plant
1. University department pilot plant
2. Government or government-sponsored facility or agency

B. Food Industry Clusters

III. Lessons from peers

IV. Appendices

1. Appendix 1 - Food Valley case study
2. Appendix 2 - POS Pilot Plant case study
3. Appendix 3 - Details on identified peers

APPENDIX 1 - FOOD VALLEY CASE STUDY

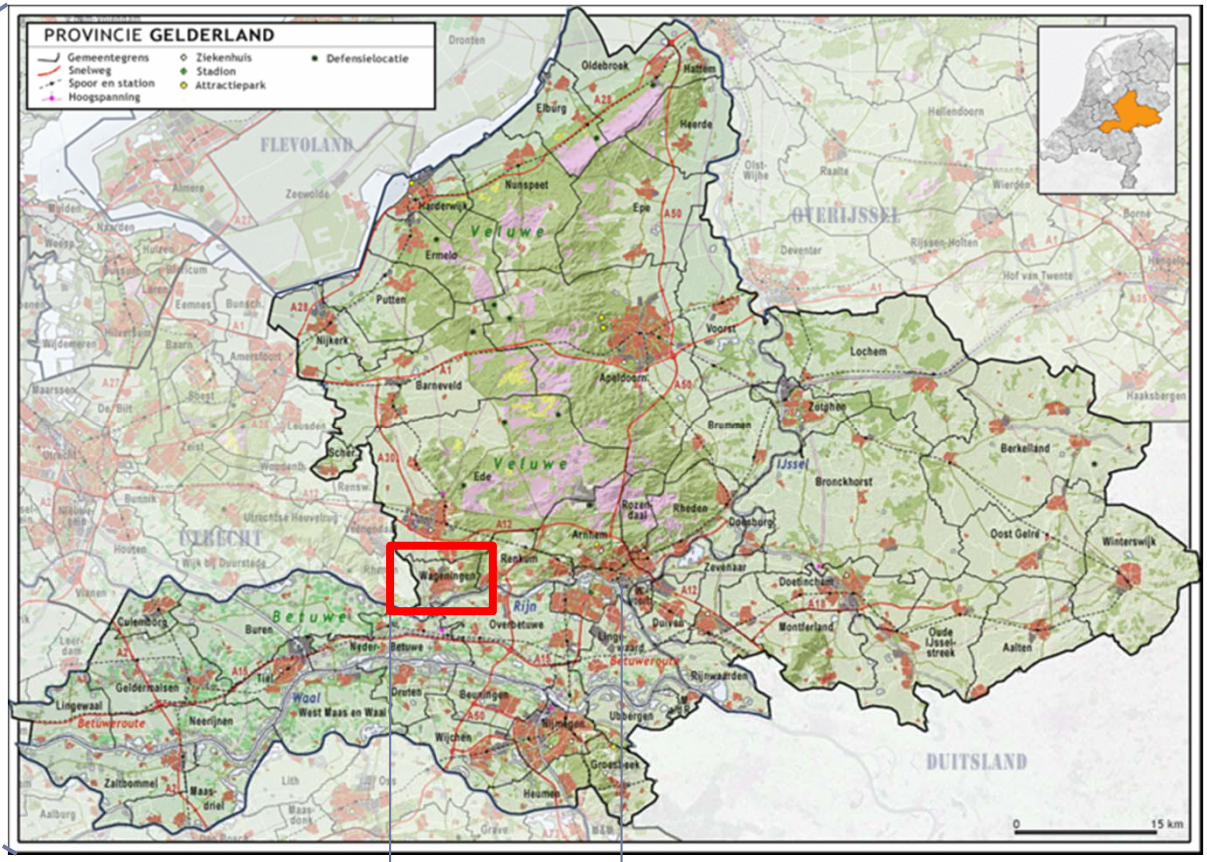
This case-study examines Food Valley in the Netherlands, the most successful food innovation network in existence, and the model being imitated by other regions around the world

LOCATION

Wageningen (pop 35,700), is a small college town located in the Gelderland region in the Eastern part of the Netherlands

Location of Food Valley in the Netherlands

(location; 2009)



The Netherlands
Pop: 16.4m
GDP: US$648b (07)
GDP/capita: US$46,774 (07)

11% of population

Gelderland Province
Pop: 1.9m

Wageningen
Pop: 35,700

Arnhem (major city in province)
Pop: 773,679

WAGENINGEN UNIVERSITY

Wageningen University and Research Centre focuses exclusively on life sciences and natural resource related education and research

Profile of Wageningen UR

(2008)

	Details
Name	Wageningen University and Research Centre
Key components	Wageningen University Van Hall-Larenstein School of Professional Ed. Dienst Landbouwkundig Onderzoek (Ag research institute
Established	1918 (successor to an agriculture school established in 1876)
Focus	Life sciences and natural resources Awards BSc, MSc and PhD
Staff	6,500 total; 185 full professors
Students	9,700 total 6,300 undergraduate 2,300 postgraduate 1,100 doctoral
Website	www.wur.nl

Wageningen UR budget €300m/year on R&D research

List of MSc degrees offered in 2006/06

- Agricultural and Bioresource Engineering
- Animal Sciences
- Aquaculture and Fisheries
- Bioinformatics
- Biology
- Biotechnology
- Communication Science
- Earth System Science
- Environmental Sciences
- European Masters Degree in Food Studies
- Food Quality Management
- Food Safety
- Food Technology
- Forest and Nature Conservation
- Geo-information Science
- Hydrology and Water Quality
- International Development Studies
- International Land and Water Management
- Landscape Architecture and Planning
- Leisure, Tourism and Environment
- Management of Agro-ecological Knowledge and Social Change
- Management, Economics and Consumer Studies
- Meteorology and Air Quality
- Molecular Life Sciences
- Nutrition and Health
- Organic Agriculture
- Public Health and Society
- Plant Biotechnology
- Plant Sciences
- Soil Science
- Urban Environmental Management

PILOT PLANT

Wageningen University has a range of food industry pilot plants available; there are also various pieces of pilot plant available in the regions from a range of private suppliers

Food industry/food science related pilot plant available at Wageningen University

(2009)

	Details of pilot plant available at the University of Wageningen
Dry fractionation	With dry separation processing costs are reduced, while proteins loss is minimal. Functionality of the protein fraction is not affected. The purity is somewhat lower, yet the dry process is valuable when high protein purity is not required e.g. in feed applications and for substitution of meat protein. Furthermore, dry separation may precede wet purification as a tool to lower extraction and purification costs. AFSG is able to design and optimise your milling process, resulting in both a technically and economically feasible process thanks to its extensive know-how and facilities on dry processing. AFSG is able to carry out milling and air classification treatments at 2-200 kg/h scale. Various breaking mechanisms can be applied (pin, hammer, ultra rotor, jet, cross beater and impact), at different speeds and with different air throughputs, optionally in combination with sieves. The milled products can be separated into enriched fractions with sieves or different types of air classifiers. Characterisation of products (e.g. size, composition) provides insight into the effects of milling and air classification.
Extrusion	AFSG conducts fundamental and applied research into the processing of polymers, biopolymers, food and feed by means of extrusion technology. For its extrusion research, AFSG has five double-screw extruders, three single-screw extruders and a co-extrusion line. The core aspects of the research are optimisation of existing processes, process renewal, product development and technological innovations in extrusion.
Packaging	Packaging is developed and evaluated in the AFSG packaging laboratory. We have a range of packaging machines and a very extensive assortment of packaging materials and test equipment.
Separation	AFSG has facilities for other standard separation technologies at both the laboratory and pilot scale.
Aquaculture	(1) Outdoor algae culture systems (2) Indoor algae culture systems (3) Recirculation Aquaculture Systems (RAS) (4) Flow through systems (5) Shellfish hatchery and nursery (6) Fin fish hatchery and nursery
Custom	Pilot-scale facilities for food and non-food processing: Biodegradable and synthetic plastic - Electromagnetic energy - Extrusion - Modification of oils - Supercritical CO_2-extraction of high-grade natural compounds

Source: various pages on the U of W website; Coriolis analysis

RESEARCH INSTITUTES NEAR WAGENINGEN UNIVERSITY

Wageningen University, and the area around it, is the home of a wide range of agricultural or food-industry focused research institutes

Profile of research institutes at Wageningen University

(2008)

	Details	Website
Kluyver CENTRE	Kluyver Centre for Genomics of Industrial Fermentation	*www.kluyvercentre.nl*
BioSystems GENOMICS The Netherlands Plant Genomics Network	The Centre for BioSystems Genomics	*www.cbsg.nl*
TNO Knowledge for business	TNO Quality of Life division	*www.tno.nl*
WCFS	Wageningen Centre for Food Sciences	*www.wcfs.nl*
NIZO THE FOOD RESEARCHERS	NIZO BV (former NL dairy industry research institute now privatised)	*www.nizo.com*
Centre for Human Nutrigenomics	Centre for Human Nutrigenomics	*www.nutrigenomics.nl*
LEI WAGENINGEN UR	Agricultural Economics Research Institute (LEI)	*www.lei.wur.nl/UK/*
AGROTECHNOLOGY & FOOD SCIENCES GROUP WAGENINGEN UR	Agrotechnology & Food Sciences Group (AFSG)	*www.afsg.wur.nl/UK/*
ALTERRA WAGENINGEN UR	Alterra - Research Institute for the Green World (ALTERRA	*www.alterra.wur.nl/UK/*
ANIMAL SCIENCES GROUP WAGENINGEN UR	Animal Sciences Group (ASG)	*www.asg.wur.nl/UK/*
APPLIED PLANT RESEARCH WAGENINGEN UR	Applied Plant Research (PPO)	*www.ppo.wur.nl/UK/*
CIDC-LELYSTAD WAGENINGEN UR	Central Institute for Animal Disease Control (CIDC-Lelystad)	*www.cvi.wur.nl/UK/*
PLANT RESEARCH INTERNATIONAL WAGENINGEN UR	Plant Research International (PRI)	*www.pri.wur.nl/uk/*
RIKILT INSTITUTE OF FOOD SAFETY WAGENINGEN UR	RIKILT-Institute of Food Safety	*www.rikilt.wur.nl/UK/*

TIMELINE

The Food Valley concept emerged from efforts by the Province of Gelderland to nurture the agri-food and life sciences cluster in Wageningen

Timeline for the development of Food Valley in Wageningen

(1876-2001)

	Event
1876	Wageningen Agricultural School founded
1918	Wageningen State College of Agricultural established (from above)
1980's	Agro Business Park for science-driven enterprises created (Metroconsult, Keygene, CTA, Stoas as key tenants)
1980's	Compotex Busines Centre created (Noldus IT and Triqua as key tenants)
1986	Renamed Wageningen Agricultural University
1997	Wageningen Foundation City of Life Sciences project started
1999	WFCOL (*above*) begin process of creating incubator which becomes Biopartner Centre Wageningen; €3.6m gvnt. financing provided (by M. of Economic Affairs and Province of Gelderland)
1999	Numico (*then Dutch owned; now part of Danone [FR]*) builds research centre in Wageningen
2000	Creation of WCFS, the Wageningen Centre for Food Sciences (*now called Top Institute Food & Nutrition*) in which the major food corporations and knowledge institutes promise five years' worth of research. The € 14 million would be funded by businesses and government together.
2001	Michael Porter, Professor of Economics and Management at the Harvard Business School praises the Wageningen food cluster as one of the few in the Netherlands that met with his approval, and he concluded that in his view Wageningen was the only university that to a reasonable extent managed to cooperate with the business community. These conclusions provided a welcome foundation for the Food Valley concept.
2001	Report entitled "The Wageningen Knowledge Cluster in View", assessing the opportunities of the food theme made the explicit recommendation of choosing Food Valley as the title for the future programme of this knowledge cluster; idea quickly takes hold: this is soft start of Food Valley

TIMELINE

Following the "soft start" of the Food Valley concept in 2001, more and more organisation and structure has evolved around the concept

Timeline for the development of Food Valley in Wageningen

(2002-2009)

	Event
2002	Province of Gelderland decided the knowledge economy will be the main engine of regional growth; proposes four clusters (agri-food life sciences, medical technology, environmental and energy technology, and ICT); Provincial development agency charged with implementing focuses more on food, and much less on agribusiness and/or life sciences, as this is easier to communicate
2002	Campina (*then #2 NL dairy co-op; now merged with Friesland (#1 dairy coop)*) decided to concentrate its R&D in Wageningen, merging three existing research units into one new department called Campina Innovation. DMV International, Campina's industrial-ingredients division, also decided to move to the Wageningen incubator
2002+	Province of Gelderland and later EU Innovative Action Programme (IAP) funds have served as lubricant for the creation of Food Valley and helped considerably to raise the interest among companies and research institutes
2003	Creation of Food Valley Society, a membership group of companies involved in the Food Valley (initially 25 members, now 85+)
2003	Province of Gelderland and EU sponsor creation of an Innovative Action Programme (IAP). This opened up ample possibilities for parties in the East Netherlands to receive co-funding for innovative projects and support from knowledge institutes and the business community. In 2003, eight Food Valley projects were funded, at a total amount of €2 million. The project that most appealed to the imagination was the milk genomics project. In this project the following parties participated: the dairy industry, the livestock industry and the Wageningen UR departments of animal breeding and genomics. The Milk Genomics project (IAP contribution €120,000) was so successful that it was soon expanded with the support of other funds, which resulted in an overall budget of €1.7 million.
2004	Official start of Food Valley in September 2004 with creation of Food Valley offices
2004	First Food Valley Conference held; this become an annual event
2005	Melk op Maat project builds on Milk Genomics project above, works on developing milk with special properties. The project is based on new applications of the area of genomics and will provide insight into the genetic variation of the Dutch cattle population in order to develop differentiated dairy products.

Source: various Food Valley documents and presentations; various published articles; various other websites; Coriolis analysis

MISSION
Food Valley describes its mission as follows

Food Valley organisation mission statement
(2009)

"Food Valley aims to stimulate the innovative power of the Dutch agro-food cluster through a demand-driven combination of enterprise and knowledge. By making optimal use of the excellent Dutch knowledge infrastructure, Food Valley steps up the competitiveness of the Dutch business sector. Headquartered in Wageningen, Food Valley is located at the heart of a region with tremendous food expertise. Food Valley's range of tailor-made services facilitates innovation."

Food Valley website

OBJECTIVES

By combining a number of sources, we believe these are a summary of the details of the objectives of the Food Valley organisation

Objectives of the Food Valley organisation

(2006)

	Objective	Details	Activities by Food Valley organisation in support of objective
1	Stimulation of cooperation between companies and institutes	We bring together businesses, research institutes and specialists in clusters focusing on specific issues. This method produces results that businesses can seldom achieve on their own	- Organise meeting and seminars - Organise annual Food Valley Conference - Manage and support Food Valley Society (business organisation of Food Valley related companies) - Initiated innovative "food themes" (e.g. milk genomics, food diagnostics) - Created "Innovationlink" matchmaking service between companies with 120+ matches made to date
2	Knowledge transfer to small-and-medium enterprise (SME)	We support innovation by individual food businesses by putting them in touch with the right knowledge suppliers. We mediate via Food Valley Innovation Link, a free service	- Innovationlink (*see above*)
3	Attract the R&D departments of food companies to locate in Food Valley	We publicize the great potential of the Food Valley region both nationally and internationally We promote the establishment of new food companies, both Dutch and foreign, in Food Valley	- Generate publicity for Food Valley in press - Conduct tours and organise meeting for visiting delegations
4	More start-ups and spin offs	We support the development of spin-offs and start-ups	- Support start-ups - Started Wageningen Business Generator (funding €1.9m)
5	Improving company conditions and infrastructure		- Lobby for additional regional infrastructure spending
6	Support funding seekers	We help businesses and research institutes draft project proposals and procure available funding	- Provide assistance with funding proposals
7	Lobby government		- Lobby regional and national Netherlands government for support - "Lobby for EU money"

Source: Food Valley website; various Food Valley brochures; various Food Valley presentations; "From 'Wageningen City of Life Sciences' to 'Food Valley'"; Crombach, et al; 2008; Coriolis analysis

FUNDING

Funding for Food Valley comes primarily from local, regional, national and EU Government

- **Initial funding for four years: €440,000/year**
  - **"In the late Summer of 2003, a business plan was written for a virtual organization consisting of the Development Agency East Netherlands NV, Syntens, Wageningen UR and the four WERV municipalities. Based on the business plan, the funds these parties would contribute in the period 2004-2007 were € 130,000 (the Development Agency East Netherlands NV), € 85,000 (Syntens), € 90,000 (Wageningen UR), €45,000 (WERV), € 45,000 (Wageningen) and € 45,000 (Ede). This resulted in an annual budget of € 440,000. In September 2004, the Food Valley office was set up; this was the official start of Food Valley."** *"From 'Wageningen City of Life Sciences' to 'Food Valley'"; Crombach, et al; 2008*

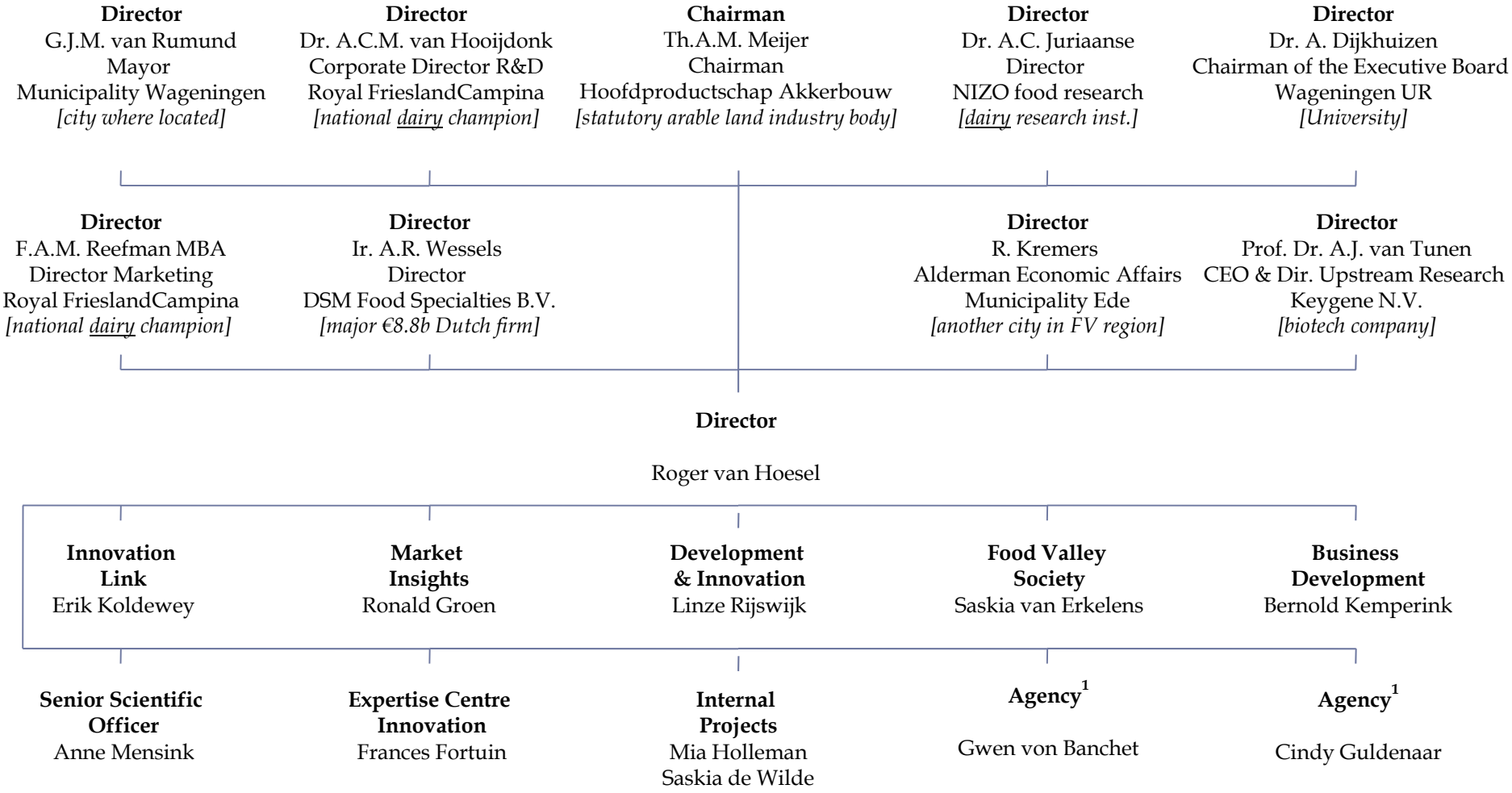
- **"Food Valley's office expenses are covered by different sources: the European Union (EFRO), the Dutch Ministry of Economic Affairs, the Province of Gelderland, the municipalities of Wageningen, Ede, Rhenen, Veenendaal and Barneveld, Wageningen University and Research Center, and contributions from the Food Valley Society member companies. The projects are paid for through regional, national and EU innovation programs."** *Food Valley website*

STRUCTURE

Food Valley is structured with a high powered, nine person board [with three dairy industry members] overseeing an eleven person operational team

Organisation structure of Food Valley Organisation

(current; Feb 2009)



1. Dutch word is "bureau"; meaning unclear; Source: Food Valley website

FOOD VALLEY CONFERENCE
Food Valley now hosts an annual conference

- **"Each year a Food Valley Conference is held to feature important developments in food innovation. The annual Conferences strengthen the fabric of science and business in food, nutrition and health, and draw national and international attention to innovative solutions. Moreover, through press coverage public awareness of the food industry as an innovative sector is enhanced. On the road to establishing Food Valley the Conferences were a major factor in spreading the concept to the relevant interest groups on a national level."** *"From 'Wageningen City of Life Sciences' to 'Food Valley'"; Crombach, et al; 2008*

MEMBERS - MAJOR FOOD COMPANIES

The Food Valley society - the associated business membership group - has many of the Netherlands major food companies as members…

Members of the Food Valley society - major Dutch food companies

(2008)

Company	Sector	Parent	Home Country	Global Sales	Global Employees	Notes
Dutch (or Dutch origins) Food Businesses						
Numico	Infant nutrition	Groupe Danone	France	US$18.8b	76,044	Former NL infant fomula leader acquired recently by Danone
Friesland Campina	Dairy	-	Netherlands	€9.1b	22,000	Friesland (merger of 4 NL dairy co-op) recently merged with Campina (NL dairy co-op); 17,000 member farmers
Grolsch	Brewing	Molson Coors	USA	US$6.2b	9,700	Former leading NL brewer acquired by Molson Coors
DSM	Life science	Royal DSM nv	Netherlands	€8.8b	23,254	Life sciences and materials sciences
Imtech Food & Feed	Production systems & tech	Imtech nv	Netherlands	€2.8b	16,000	Engineering services to building, industry, marine, infrastructure, and telecom
Johma	Foodservice	Uniq Foods plc	UK	£1.5b	7,649	Uniq is major ready-meal producer in UK
Aviko	Foodservice prod.	Royal Cosun	Netherlands	€1.7b	4,300	Cooperative of 11,000 arable farmers; acquired Aviko 2002; largest producer of sugar in NL
Baltussen	Canned veg.					
Fruitmasters	Fruit	K. Fr. Groep	Netherlands	US$0.3b	525	Fruit trading co-op of farmers
Unimills bv	Oils & fats	Sime Darby bhd.	Malaysia	US$0.3m	196	Formerly part of Unilever; parent is now Malaysian rubber grower/other
Buisman bv	Sugar	K. Buisman bv	Netherlands	n/a	n/a	Private sugar, both consumer and ingredient

MEMBERS - MAJOR FOOD COMPANIES
… as well as a number of major foreign food multinationals

Members of the Food Valley society - major foreign multinationals
(2008)

Company	Sector	Parent	Home Country	Global Sales	Global Employees	Notes
Foreign Food-Focused Multinational						
Cargill	Diversified food	Cargill	USA	US$120.4b	160,000	grain, cotton, sugar food processing, other
Sodexo NL	Catering/foodserv.	Sodexo	France	US$20.0b	355,044	Global #2 contract foodservice provider
Heinz NL	Packaged food	H.J. Heinz	USA	US$10.1b	32,500	Global leader in sauces
Syngenta	Agrichemicals	Syngenta AG	Switzerland	US$9.2b	15,500	Global #2 or 3 agrichemicals
Nippon Suisan	Seafood	NSK/Nissui	Japan	US$4.6b	1,174	#2 seafood company in Japan
Kikkoman	Sauces; foods	Kikkoman Group	Japan	US$3.1b	6,422	#1 soy sauce; diversified food/bev in Japan
Herbalife NL	Vitamins	Herbalife Ltd.	USA	US$2.1b	3,644	Nutritional supplements via direct sales
Givaudan SA	Flavours/frag.	-	Switzerland	n/a	6,056	Global market leader in flavours/fragrances
Foreign Multinational not focused on food (but with a small food related division)						
Actemium	Food proc. equip.	Vinci	France	US$44.8b	158,000	Construction co. w/food proc equip div
Fuji Res. NL	Nano-scale tech	Fujifilm Hold.	Japan	US$28.7b	77,000	#2 global film; indust. films & chem; other
CPKelco	Food Ingredients	J.M. Huber	USA	US$2.1b	4,500	World's leading hydrocolloid solutions Parent is diversified conglomerate (e.g. tyres)

Source: Food Valley website; various companies websites; Hoovers; TG Goliath; Coriolis analysis

MEMBERS - SECONDARY
The Food Valley society also has a range of smaller or secondary Dutch members

Members of the Food Valley society - smaller/secondary Dutch companies
(2008)

Company	Sector	Parent	Home Country	Global Sales	Global Employees	Notes
Smaller domestic companies						
Adifo	Agribusiness software	-	Belgium	n/a	n/a	Farm and food processing systems software
Agri Info. Part.	Agricultural IT	-	Netherlands	n/a	n/a	
Blgg	Ag Lab	-	Netherlands	n/a	n/a	Sampling, analytical and advisory activities
BFactory	Medicinal honey	-	Netherlands	n/a	n/a	Wound healing, skin problems and vaginal complaints
CatchMabs	Biotech startup	Danisco/others	Netherlands	n/a	n/a	Designer affinity proteins for industrial
Chainfood	Food ind. software	-	Netherlands	n/a	n/a	Supply chain tracking software
Contined	Food Ingredients	-	Netherlands	n/a	n/a	Broker/ingredients supplier
De Heus	Animal feed	De Heus Beheer	Netherlands	n/a	780	Produces 2.5m tons of animal feed
Isolife	Stable isotope tracers	-	Netherlands	n/a	n/a	Spin off of Wageningen Uni PRI
KeyGene	Genomics		Netherlands	n/a	125	leader in the field of DNA marker tech.
Lactive bv	Food ingredients	-	Netherlands	n/a	n/a	Focused on dairy extracts
Peeze bv	Coffee	-	Netherlands	n/a	n/a	NL retail coffee company located in Arnhem
Scelta Mushr.	Mushrooms	-	Netherlands	n/a	n/a	Major Dutch mushroom producer
Top bv	Food R&D	-	Netherlands	n/a	n/a	Food R&D firm based in Wageningen

...plus 50+ other companies not listed (briefly screened, primarily small, local; see http://www.foodvalley.nl/Paginas/Food%20Valley%20Society/Leden.aspx)

Source: Food Valley website; various companies websites; Hoovers; TG Goliath; Coriolis analysis

CLEAR REGIONAL IDENTITY

Food Valley has succeeded in creating a clear geographical identity for the Wageningen food cluster

BIKE RACE
There is a now a Dutch Food Valley Classic bike race around the valley

Poster and photo of Dutch Food Valley Classic bike race
(2008)

Source: Dutch Food Valley Classic website

DRIVERS OF SUCCESS

An article on Food Valley, by an ex-Food Valley employee, identified the following nine success factors

Note: From our research we would propose a somewhat different list highlighting the preexisting strength of the cluster and presence of numerous research institutes

Identified success factors on the "road to Food Valley"

(2008)

	Details
1. Launching platform	Small and flexible Wageningen "The Foundation City of Life Sciences" program/platform provided platform and working base for emergence of idea
2. Fast recognition & support	The name Food Valley was short, powerful and inspiring to many. The name and idea got the immediately support of people and organisations. Before there was a plan, there was a network of influential professionals and 'ambassadors' from various organizations who were willing to take part in the development of Food Valley.
3. From regional to national	What started as a regional initiative developed into a concept with national appeal and support. The Dutch agri-food industry as a whole supported the concept.
4. The time was right	The concept of Food Valley fitted perfectly into the so-called Knowledge Cluster Policy of the Province of Gelderland and the regional Development Agency East Netherlands NV. This generated a strong and continuous support from the Province. Secondly, at a national level the political emphasis on the knowledge economy and innovation was of great importance for the development of Food Valley.
5. EU support for innovation projects	The European Innovative Action Programme (IAP) resources provided a financial incentive for parties to cooperate and create innovative solutions
6. Attention in the press	The ambitious Food Valley idea aroused a great deal of curiosity as well as criticism, sometimes even envy. There was a lot of political attention, which led to visiting programmes by various national and international delegations. This, and the attention from local, national and international media created the conditions for a speedy expansion.
7. Involvement of companies	The active participation of the food and related industries materialized in the Food Valley Society. Attracting national as well as foreign companies to the Food Valley area was organized with support from the region as well as from the national government.
8. Incubator facilities for new business	The development of the Biopartner Centre Wageningen, the incubator facility for starting and young companies, was an essential step in the formation of Food Valley. It became an attractive place to locate and grow for R&D departments of existing companies like Campina, as well as for start-ups.
9. Conferences	The first Food Valley Conferences held in 2003 and 2004 made the ambitions visible to the various target groups, with an emphasis on a business community that was heavily involved from the outset. Influential speakers made sure that the essential subjects were put on the agenda.

Source: adapted from "Pathways to High-Tech Valleys and Research Triangles. Innovative Entrepreneurship, Knowledge Transfer and Cluster Formation in Europe and the United States; chapter 14 "From 'Wageningen City of Life Sciences' to 'Food Valley'"; Crombach, C.; Koene, J.; Heijman, W.J.M.; p308-309

PERFORMANCE MEASUREMENT

Food Valley reports that its performance is measured across the following five indicators; various facts and numbers have been reported to demonstrate the results of the network

Food Valley organisation performance measures and results

(2009)

	Success measure	Reported results
1	the number of jobs created in the research heart of the Food Valley region as a direct result of Food Valley's activities	- +300 new jobs
2	the total investment in new business activity resulting directly from Food Valley's activities	- +20 new start-ups (no investment value given)
3	the number of innovations Food Valley has contributed to	- ?
4	the total investment in innovation projects that Food Valley is co-responsible for	- ?
5	the number of companies with innovation queries Food Valley assists	- Matchmaking service between companies (aka. Innovationlink) with 120+ matches made

Measures are from FAQ section
Food Valley website, Feb 2009

Various sources
Most recent data

	Results
1	20 new start-ups
2	Innovation link: 120x
3	50+ Food Valley society members
4	+300 new jobs
5	New innovation projects
6	Wageningen Business Generator
7	Webportal
8	Publicity
9	Acknowledgement

"Food Valley: Past, present and future"
Presentation by Roger van Hoesel
Nov 2005

Source: Food Valley website; various Food Valley brochures; various Food Valley presentations; "From 'Wageningen City of Life Sciences' to 'Food Valley'"; Crombach, et al; 2008; Coriolis analysis

EVOLUTION OF SCOPE
Over time, the scope of the project and the vision has had a tendency to expand

Evolution of scale and scope of cluster centered on Wageningen, Netherlands
(model)

Wageningen
"City of Life Sciences"
City of Wageningen
1997

Food Valley
"Where food ideas grow"
Region surrounding Wageningen
2001 (soft) / 2004

Food & Nutrition Delta
"We're going to do it together" **[?]**
The Netherlands
2006

Food Valley organisation a key driver in this EU funded program

Food Innovation Network Europe
"European food regions joining forces to encourage innovation and cooperation to make Europe more competitive in world food markets"
Europe
2005

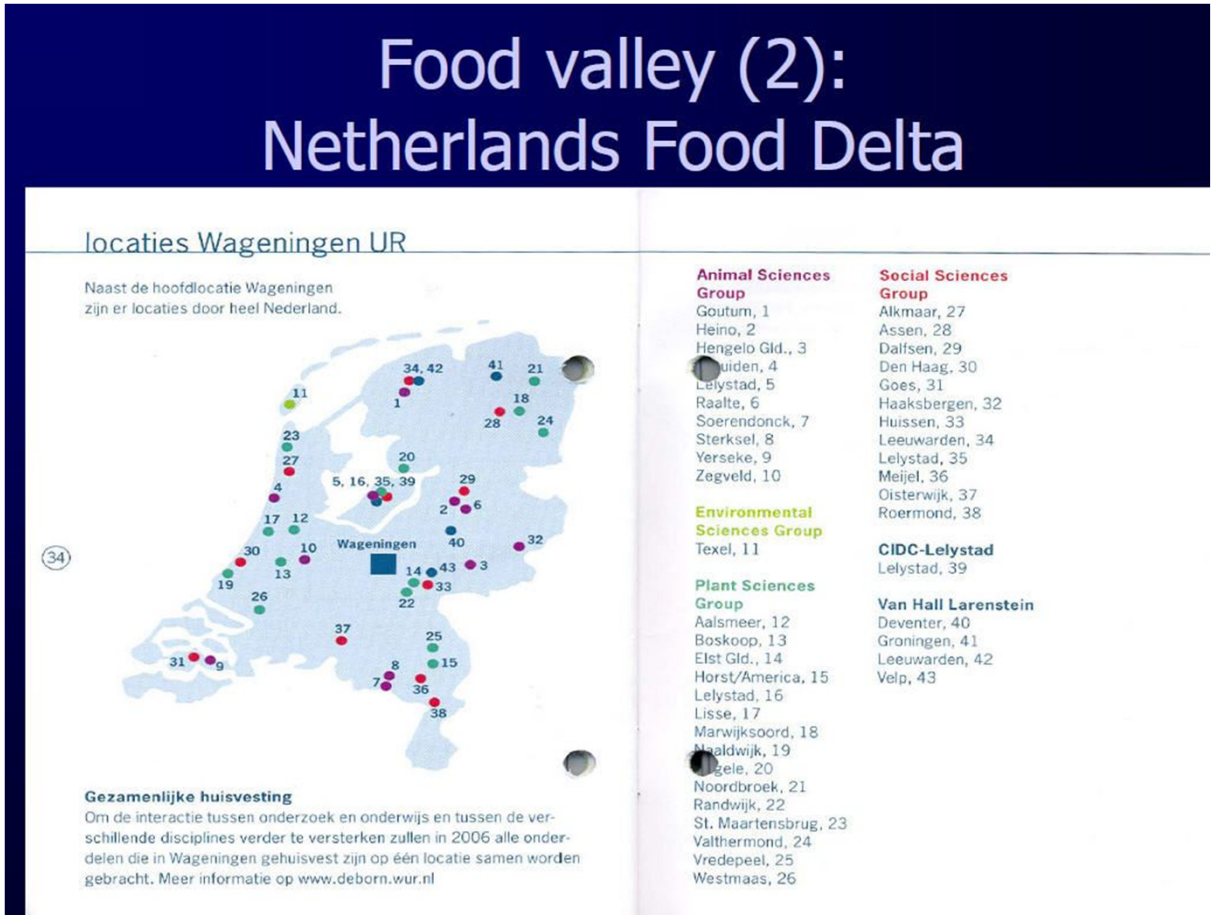
LAUNCH OF FOOD & NUTRITION DELTA
The NL Government has now launched a larger Food Delta concept

- **"In 2006, the innovation programme Food & Nutrition Delta started. Traditionally, the agrofood sector is an important pillar of the Dutch economy and the Ministry of Economic Affairs wants to invest EUR 63.5 million to make the Netherlands the leading food innovation region in Europe. SMEs and the larger companies must work together with knowledge institutes. They can submit joint project proposals and share knowledge with each other, which will result in an open innovation structure. Kees de Gooijer, Director of Food & Nutrition Delta (FND) says, 'The new part is that we're going to do it together. It's like the small sieve that they made at Friesland Foods for extracting micronutrients. To make it in an industrial setting, you need external parties who have an understanding of how you attach this kind of sieve to a holder, how you clean it, etc. That knowledge needs to be available as quickly as possible in an open setting'."** *article, Holland Trade website, May 2007*

- **"The Food & Nutrition Delta is an innovation program, aiming at making the Netherlands a leading Food Innovation region in Europe. Networks and platforms will be created in an integrated manner to develop new technologies in order to enhance the new business development along the food industry, with special attention to Small and Medium Enterprises. This will lead to the development of innovative, new or enhanced food products that fulfill consumer needs and expectations. Those products, combined with recommended changes in lifestyle and eating patterns, will have a positive impact on public health and the quality of life. Moreover, the competitive edge and market position of the food industry will be enhanced. The agro-food industry is of paramount importance for the Dutch economy. It accounts for 10% of GDP and employs over 600.000 people. The Netherlands have to create a higher added value in this sector via an enhanced competitive edge. A means to get there is through open innovation. 75 companies, amongst which all major companies and some larger SME's have identified the largest business growth areas for Food, resulting in the following themes:**
    1. **Food & Health,**
    2. **Sensory & Structure**
    3. **Bioingrediënts & Functionality**
    4. **Consumer behaviour**
    5. **Safety and Preservation**
    6. **Adjacent technology for Food & Nutrition**
- **Action lines for these themes are**
    1. **Market driven innovation: the intensification and acceleration of the business renewal in the F&N Delta,**
    2. **Invest in competence development: get enough brains & hands of excellent quality in the F&N Delta."** *Food and Nutrition Delta website, Feb 2009*

COVERAGE OF FOOD & NUTRITION DELTA

The Food & Nutrition Delta covers all of the Netherlands, with Wageningen UR (and Food Valley) as its center



APPENDIX 2 - POS PILOT PLANT CORP CASE STUDY

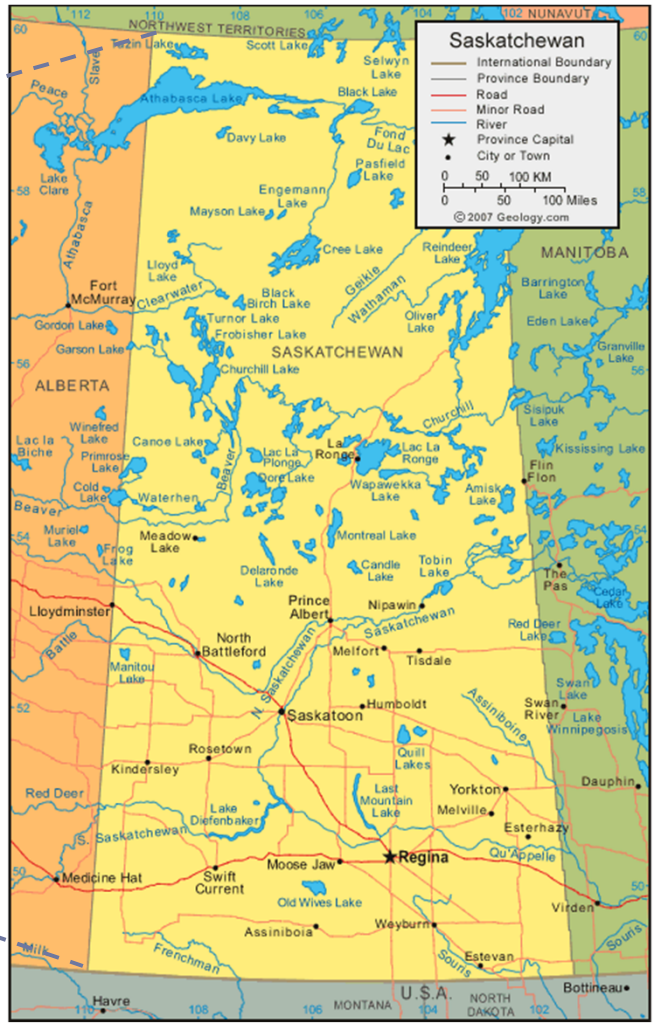
This case-study examines POS Pilot Plant Corp, the most successful government-created food industry pilot plant in existence

LOCATION IN CANADA

The POS Pilot Plant is located in Saskatoon (population 200,000) located in the Province of Saskatchewan (population 985,000) in Canada

Map of Canada and the Province of Saskatchewan

(map; 2009)



Effectively twice the size of NZ with the population of the South Island

Area:	**591,670km² (NZ 268,680km²)**
Population:	**985,386**
Ethnicity:	**German 30%; English 27%; Scottish 19%; Irish 15% Ukrainian 14%; French 12%; others; Amerind 12%**
GDP:	**C$45.9b**
Key sectors:	**Mining, petroleum & agriculture**
Structure:	**Many of the largest companies are cooperatives or full/part government owned**

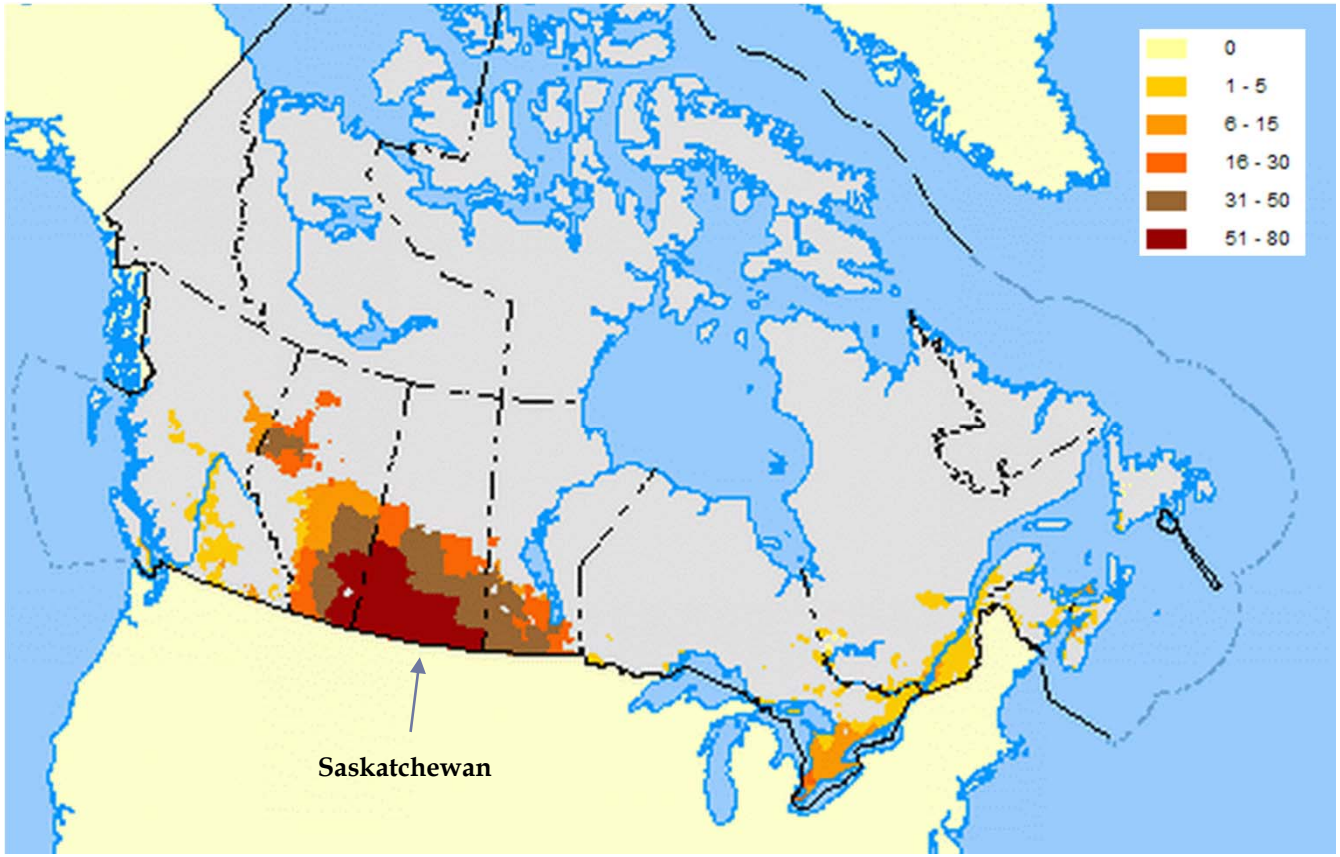
Source: Wikipedia

CENTRE OF WHEAT PRODUCTION

Saskatchewan is at the centre of Canadian wheat (and other grains) production and wheat is the "most important economic crop in Canada"; effectively all wheat in Canada is marketed by Viterra, a corporatised cooperative and former marketing board

Wheat as a percent of area in crops

(%; 1996)



"Wheat is the most important economic crop in Canada. Wheat is grown commercially in all provinces except Newfoundland and Labrador, with most of the production being concentrated in the Prairie Provinces.

In 1996, production was just short of 30 million tonnes. The domestic use of wheat crop totals about 8 million tonnes per year. The rest, about 19 million tonnes depending on the current year's production is exported, almost all of it as grain. All Canadian wheat exports are handled by Viterra, a farmer owned cooperative [former marketing board].

Exports of Canadian grown wheat are shipped around the world. The largest market is in Asia (China, Bangladesh, and Japan). Although Canada produces and exports a large volume of wheat, it rivals with Australia and the European Union only for second place among the world's exporting nations. The perennial leader is United States."

The Atlas of Canada, Feb 2009

LOCATION IN CITY

The POS facility is located on the campus of the University of Saskatchewan, near the Innovation Place a research park and agricultural biotechnology cluster

Aerial photo of the location of the POS Pilot plant

(photo; 2008)

1. POS Pilot Plant
2. Innovation Place
3. University of Saskatchewan
4. City of Saskatoon
5. Canadian Light Source (Synchrotron)

INNOVATION PLACE.

Source: "Extraction and downstream processing of bioproducts and biofuel from marine biomass" Janice Paslawski, POS Pilot Plant, Nov 2008

POS IN BIO CLUSTER
POS is located in the middle of an agriculture and biotechnology research cluster

- **"In Saskatchewan, we have everything it takes; a perfect growing environment for an industry with international appeal. As people the world over look to the marketplace for quality, nutritious food, the marketplace is looking to Saskatchewan to provide the biotechnology to produce it. We have the agricultural background; a history of research, development and innovation that traces it's roots back to the 1940s to important work being done at the University of Saskatchewan; a strong infrastructure in Innovation Place, a research park housing 81 research companies; scientists who are the best in their field. A network of research agencies - Saskatchewan Research Council, National Research Council, Plant Biotechnology Institute, POS Pilot Plant, Agriculture Canada Research Centre, the Feed Resource Centre, the U of S Crop Development Centre, the Transgenic Plant Centre - provide ongoing basic and contractual research and development support. Over the past decade, Saskatchewan has become a firmly established world leader in agricultural biotechnology."** *Saskatchewan Business, July 1995*

- **"Saskatoon brings a natural advantage to the biotechnology field because of the concentration of research capabilites located on the university campus. The university itself offers the five life sciences, a rarity, while the campus grounds include a variety of other research facilities such as the National Research Council, The Plant Biotechnology Institute (PBI), the Saskatchewan Research Council, the POS Pilot Plant, VIDO, Agriculture Canada facilites, the Prairie Migratory Waterfowl Research Institute, potash research, facilities and the National Hydrology Centre. These facilities, coupled with private sector researchers, provide a critical mass of 'brain power' that allow wide-ranging research advances to be achieved. One common denominator in much of this research is agriculture, particularly now as farmers face a financial crunch brought on by chronically low grain prices."** *Saskatchewan Business magazine, April 1988*

- **"Upon entering Saskatoon's Innovation Place, visitors first notice the glittering gold-paned Saskatchewan Economic Development Corp. (Sedco) building. The pyramid-like, four-story office is the flagship of this research park. Richard Quittenton, executive director of Innovation Place, said Sedco will add a 60,000-square-foot building to its present 94,000-square-foot structure some time this year. Planned is a third building, which will be 120,000 square feet. Innovation Place is managed jointly by Sedco and the University of Saskatchewan. Located on university land, it offers contract support from university departments and other park installations… Toward the back of the park near the railway tracks, a low-cost 50,000-square-foot, multi-use laboratory will allow small manufacturers to lease space to conduct development work. The university's soil science department and two local agricultural machinery manufacturers will be the prime tenants. The park still has 350,000 square feet for pilot plant space, and 35 acres for other research centres."** *The Globe & Mail, June 1981*

STRONG GOVERNMENT SUPPORT

The Saskatchewan biotechnology cluster has received strong government support over the years

- **"Saskatchewan Premier Roy Romanow was host at a breakfast for visiting biotech companies during the recent conference. Over Saskatoonberries and pancakes he regaled the audience with a list of reasons to locate or expand in the city, including tax incentives, government funding, and an $18-million investment of public funds in a new biofermentation facility and expanded greenhouses for transgenic plants. He pointed to the 120-acre research park that abuts the University of Saskatchewan, and state-of-the-art facilities such as POS Pilot Plant Corp., which handles research and development on 200 projects for some 60 clients each year. "Saskatchewan's agbiotech companies today realize more than $40 million in annual sales," Romanow says. "That number is expected to jump to over $300 million by the year 2000, and approach $1 billion by 2010."" *The Financial Post, June 1996*

VISION/MISSION
Two different directors of POS have described the mission of POS as follows:

POS Pilot Plant Corp. vision
(1982/1985)

"The existence of POS is a response to the need for new technology in food processing and agriculture that will keep the agricultural and food industries profitable while providing sufficient food to meet the world's demand"

Dennis Jones, Executive Director, POS Pilot Plant Corp, 1982

"Getting an idea from the laboratory model to mass production is a hurdle to most food companies. That's why we have nine scientists, ten technicians, and fifty scaled-down processing machines in service. Once something is made to work in our pilot plant, it can be taken by a client and built on a commercial scale… At least one firm from the United States will soon be opening a plant in Saskatchewan as a result of pilot work carried out at POS. This "scaling-up" capability is the proof investors like to see. Too many factories designed on laboratory patents have failed. The minifactory approach of POS also makes for reliable testing of new field crop varieties."

Roy Carr, Executive Director, POS Pilot Plant Corp, Feb 1985

PROFILE
The key details about POS can be summarised as follows:

Brief profile of key details about POS Pilot Corp
(various; 2007/08)

	Details
Name	POS Pilot Plant Corporation [Protein, Oil and Starch]
Year founded	1973
Ownership	Not-for-profit corporation JV between government and industry
Funding sources	1. Clients on a fee-for-service basis 2. Annual membership fees 3. Funding from the Government of Canada and the Government of Saskatchewan
Turnover	$6.3m total $4.8m from 173 projects (R&D & custom processing) $0.8m from analytical services $0.7m in government funding [confirm]
Facility	56,000 sqft. Total 5 pilot plants 11 laboratories Also warehousing and quarantine areas, library, client rooms and administrative areas
Employees	90 staff covering scientific, technical [24 technicians], project management, operational and administrative functions
Hours	24 hr/day, 5 day/week operating schedule

Soruce: various published articles; various POS brochures; POS Annual Report; Coriolis analysis

FOCUS ON EXTRACTS

Related to its position in the heart of Canada's prairie, POS has traditionally focused on extracts from grains/cereals, oilseeds and legumes

- **"We specialize in extraction, fractionation, purification and modification of bio-based materials."** *POS website*

- **"POS specializes in extraction, fractionation, purification and modification of biologically derived materials. Bioprocessing industries served include food and ingredients, fats, oils and lipids, nutraceuticals and functional foods, animal feeds and functional feeds, cosmetics, cosmeceuticals and fragrances."** *POS information brochure*

- **"While the major part of POS' work is devoted to technology for separating oilseeds, legumes and cereals into proteins, oil and starch, POS was designed to be flexible enough to deal with all major nutrients in food raw materials as well as with many other constituents. POS' capabilities extend to such diverse areas as conversion of damaged vegetables and fruits to stable powders, recovery of protein from animal carcass residues, and fermentation. POS even can produce some finished products, including pet foods, snack-type items and milk substitutes."** *Pioneering food technology at the POS Pilot plant, JAOCS [journal], April 1982*

- **"POS Pilot Plant is dedicated to finding personalized solutions for clients' bioprocessing needs. Services provided include: process and product development, optimization and scale-up; hazard analysis and critical control points; protocols and good manufacturing practice plans; and ingredient sourcing, shelf-life testing and analytical development.**
- **There are also consulting services, and support services concerning materials management, maintenance, and information. POS Pilot Plant serves bioprocessing industries including nutraceuticals and functional foods; cosmetics and fragrances; fats, oils and lipids; food and ingredients; animal feeds; and Biotechnology and agricultural biotechnology."** *The Encyclopedia of Saskatchewan*

EXAMPLES
The following provide some examples of what POS does:

- **"When Polish and Argentine rapeseed was first sown on the Prairies, it produced on oil and meal little better than mustard seed. The meal, or what is left after the oil is pressed and removed by solvents, is a high-protein ingredient in livestock and poultry feed. Because of early impurities, only small portions of the rapeseed meal could be blended for feed, and the dark oil was tinged with a mustard flavour. Faced with the choice of removing undesirable chemicals via plant breeding, or by developing costly refining procedures, people in the oilseed business succeeded in producing a new plant known as Canola. While almost purging the glucosinolate, eracic acid and phenol content of rapeseed, and thereby marketing quality oils, margarine and shortening, Canola barons are careful not to lose the superior processing properties of the original plant.**
- **Since the entire procedure of crushing, rolling, cooking, solvent distilling and protein-testing of Canola seed can be simulated at POS, the non-profit corporation is relied upon to test new varieties as they come onstream, and modify the process if warranted by new strains. Another natural advantage Canola growers want retained is the "fatty-acid balance" of refined oil. It is this property which keeps salad oil from crystallizing and becoming discoloured when put in the fridge.**
- **Dr. Paul Fedec, director of research at POS, says they test-crush two or three new varieties of Canola seed each year, and have proven the milling capability of a new soy bean, "Maple Presto," which can be grown across southern Canada.**

- **"Besides steering the development of new plant varieties, POS has found new uses for established crops. The Alberta Industrial Mustard Company is one example. Building on lab work done by Universal Foods Ltd. of Edmonton, who were aware of the natural gumming qualities of ground mustard, POS was able to commercially inactivate the "heat enzyme" from mustard seed, and grind it fine enough to work as a clear binder in weiners, sausage and other processed meats. Their documentation of the steps involved formed a blueprint for the Warner, Alberta firm, which is now exporting a de-heated mustard product to France, Denmark and Japan."**

- **"Since food processing techniques are so fiercely guarded, it sometimes behooves entrepreneurs to "re-invent the wheel" in order to enter an existing market. Such was the case for Belle Pulses Ltd., a grower of legumes near St Isadore-de-Bellevue. Instead of shipping his crop to eastern mills, Ron Gaudet, in co-operation with the Agricultural Development Corporation, approached POS with the problem of de-hulling and polishing field peas. By adapting equipment designed for other crops, and starting from scratch on the polishing technique, POS put things in order. A $5,000 R & D investment by Belle Pulses led to plant construction worth $200,000 and a healthy export contract with the Canadian Industrial Development Agency, among other buyers. It also earned Gaudet a new export product award."** *Saskatchewan Business magazine, Feb 1985*

REGULAR EXPANSION
POS regularly expands and upgrades its facilities, usually with government funding

- **"POS Pilot Plant Corp in Saskatoon, Canada has expanded its solvent extraction plant in 1997. The plant will install its new equipment, which will allow daily extraction capacity of around 7-12 tons of oilseeds, by April 1998. The new facility was expanded from 3,800 sqft to 5,200 sqft. Randy Kruger will head the oils and oilseeds processing research and development at the plant."** *International News on Fats & Oils, Jan 1998*

- **"POS Pilot Plant Corporation in Saskatoon will undergo a significant upgrade that will allow it to meet the highest food manufacturing standards and regulations. Saskatchewan Economic and Co-operative Development is providing $465,000 in funding."** *press release, April 2000*

- **"POS Pilot Plant Corp based in Saskatoon, Canada is upgrading its facilities, which will allow it to providecustomers with improved miniscale bioprocessing and extraction capabilities… The Model V Crown Solvent Extractor has a capacity of 5 to 10 kg/hr of raw material and can be used for extraction of many materials including oils, oilseeds, botanicals, nutraceuticals and legumes."** *Chemical Marketing Reporter, Sept 2002*

- **"A new biomass extraction processing line has been assembled at POS Pilot Plant. The purpose is to maximize the amount of oil extracted from biomass, yield profitable byproducts, and recycle the solvent used during processing. Depending on the biomass composition, extraction capacity will approach 2 tons of dried biomass per day, making the technology ideal for contract R & D at the pilot plant scale, as well as for small scale specialty toll processing. The bead mill in this processing line can also be used to generate nano-sized particles."** *Nutraceuticals World, Mar 2008*

FACILITY PROCESSING AREAS

There are five main processing areas in the 56,000 sqft. POS pilot plant: (1) flammable, (2) primary, (3) secondary, (4) oils and (5) isolation and purification

POS Pilot Plant Corp market segmentation

(2007/08)

Focus	Details
1. Flammable	Two areas for solvent extraction, hydrogenation, desolventization
2. Primary	Milling, oilseed crushing, air classification, blending, screening
3. Secondary	Aqueous extraction, drying, concentrating, filtering, centrifuging
4. Oils	Edible oil degumming, refining, water washing, bleaching, esterifying, deodorizing and hydrogenation
5. Isolation & Purification	State of the art centrifugal partition chromatography (CPC) area for R&D or custom manufacturing

Primary Processing area (#2 page prior)

- *Crushing of oilseeds*
- *Dehulling of grains legumes*
- *Milling of seeds, plant and biomass raw materials*
- *Separation of components by screening or air classification*

- *Wet milling, aqueous extraction & fractionation of cereal components*
- *Preparation of protein concentrates & isolates*
- *Aqueous extraction & purification of bioactive components from plant materials*

Secondary Processing area (#3 page prior)

Oils Processing area (#4 page prior)

- *Degumming*
- *Refining*
- *Pretreating/bleaching*
- *Steam stripping*
- *Fatty acid concentration*
- *Inter-esterification*
- *Winterization*
- *Deodorization*

MARKET SEGMENTATION

POS currently segments its markets into four activity based segments: (1) food, (2) fuel, (3) crops and (4) health and wellness

POS Pilot Plant Corp market segmentation

(2007/08)

Focus	Details
1. Food	Over the past year we assisted clients in the development of new food ingredients from cereals, grains, oilseeds and vegetable crops. New plant sources for high value proteins and peptides were successfully explored, and food additives such as natural emulsifiers and flavours with enhanced properties were developed. Novel oils were processed and stabilized for entry into food markets. To minimize environmental impacts, modifications to oilseed extraction procedures were developed and implemented.
2. Fuel	Biofuels became our fastest growing client segment over the past year. Our role in the on-going global search for sustainable biofuel involved lab and pilot plant scale bioprocessing investigations of various feedstocks. Projects included the development of biofuels from algae biomass, waste plant material, waste fat, non-food oilseed crops, and waste products from oilseed processing operations. In the spring of 2008 we ramped up our ability to service this growing sector, by acquiring and installing a new biomass processing line which allows clients to optimize yields of oil extracted from algae biomass.
3. Crops	During the year, POS executed lab and pilot plant scale processing trials for newly developed oilseed varieties. The new crops offer greater disease resistance, improved yields, and healthier properties. They will be used both as commodities and as a source of compounds for specific food and wellness ingredients. A laboratory scale project aimed at boosting fertilizer effectiveness further expands the range of our crop enhancement projects carried out previously, such as development of processes to manufacture micronutrients and inoculants for vegetables, grains, legumes, oilseeds, cereals, and botanicals.
4. Health & Wellness	Health & Wellness remains our largest client segment. During 2007–2008 we developed processes for manufacturing immunostimulants and extracted high value compounds from fish and marine oils for functional foods. Unique antioxidants from botanicals and vegetables were prepared for wellness applications, anti-inflammatories extracted from specialty oils, and anti-cancer compounds were derived from lipids. Our staff also provided processing support for purification of high value designer biomaterials targeted for clinical use. Over the coming months we look forward to using our new biomass processing line for production of health ingredients from algae and yeast-based biomass.

Source: POS annual report 2007/08

STRUCTURE

POS is structured with a high powered, eight person board [including CEO] overseeing a tight management team and 85 staff

Organisation structure of POS Pilot Plant Corp.

(current; Feb 2009)

Director
Tom Gottemoller
Manager - Food Processing Research
Archer Daniels Midland (ADM)
[US$70b agribusiness conglomerate]

Director
John Cross
Chairman
Philom Bios Inc.
[ag biotechnology]

Chairman
Dennis Mulvihill
MD Corporate Finance
RBC Capital Markets
[#1 bank in Canada]

Director
Dr. Abdul Jalil
Director of Ag Research
Ministry of Ag, Sask
[Provincial government]

Director
Dr. Murray McLaughlin
Ex-CEO
Foragen
[Gvnt. bio invest fund]

Director
Mark Pickard
President
InfraReady Products
[grain processing]

Director
Johann F. Tergesen
President/CEO
Burcon NutraScience
[protein ingredients]

President/CEO
Robert E. Morgan

VP Scientific & Regulatory Affairs
Dr. Paul Fedec

CFO
Colin Luciuk, C.A.

Dir. Bus Development and HR
Heather Ryan

Director of Technology
Dr. Rick Green

85 staff

Source: POS Pilot Plant website

PROFILE OF BOARD MEMBERS

The current members of the POS board of directors have strong backgrounds in industry, research and finance

Profiles of members of POS Pilot Plant board of directors

(2009)

Dennis Mulvihill	Dennis is Chairperson of the POS Board of Directors. He is Managing Director, Corporate Finance with RBC Capital Markets. He has over 30 years of experience in the investment industry in Canada, specifically in institutional sales, investment banking, management and capital markets. He is a graduate of the University of Saskatchewan and has been employed with Royal Trust Corporation, Houston Willoughby, and Pemberton Securities. Dennis has worked with RBC Dominion Securities since 1974 and is presently responsible for RBC Dominion Securities global banking operations in Saskatchewan and Manitoba.
John Cross	Trained as a chemical engineer John Cross joined the Food Research and Development Department of John Labatt in London, Ontario in 1965. His work centered on the development and commercialization of new products in the fermentation, food, beverage, dairy and animal feed industries. In 1980, he was a founding partner, President and CEO, and is now Chairman, of Philom Bios Inc. Philom Bios develops, manufactures, and markets high value inoculants which enhance fertility efficiency of crops and increase farmer profit, and is the leading inoculant supplier to Western Canadian and North Dakota farmers. Products include JumpStart, the world's first commercial phosphate inoculant; a line of Phozobium products under the N-Prove label; and TagTeam the world's first combination nitrogen and phosphate inoculant.
Tom Gottemoller	Tom Gottemoller is Manager, Food Processing Research at Archer Daniels Midland Company in Decatur, Illinois, and has been with ADM since 1992. Tom is responsible for management of all food processing pilot plant research. Over the years he has served in various capacities at ADM including ADM's Protein Specialties Division specializing in process development and application development for soy products. Prior to joining ADM, Tom worked for Germantown US in research for the development and use of hydrocolloids and emulsifiers in foods. He also worked in the area of operations for three dairy companies. Tom attended the University of Maryland, Villanova University in Pennsylvania, and Illinois State University. He holds degrees in Agricultural Biochemistry, Mechanical Engineering, and Business Administration.
Dr. Abdul Jalil	Dr. Jalil is a Director of Agriculture Research Branch of Saskatchewan Ministry of Agriculture. He is responsible for the administration and management of provincial Research and Development investments in agriculture. He is secretary to the Agriculture Development Fund (ADF). Dr. Jalil is currently serving on various boards of non-profit organizations including Ag. West Bio Inc., Prairie Agricultural Machinery Institute (PAMI) Flax Canada 2015, and Agri-Food Innovation Fund. Prior to joining the Ministry, he worked for three years as a visiting scientist for Agriculture and Agri-Food Canada. His diverse career includes experiences in many areas including teaching, research, and administration. Dr. Jalil was born and raised in Pakistan. After obtaining his M.Sc (honours) in Agriculture moved to California, USA in 1985 and earned his Ph.D. in Soil Science from the UC Davis.
Dr. Murray McLaughlin	(B.Sc. McGill University, M.Sc. and Ph.D. Cornell University) has and continues to be active in Canadian agriculture. He was President and CEO of Foragen for 7 years, the only early seed stage venture fund focused on advanced agricultural technologies in Canada. He stepped down in July 2005 once the fund was fully invested. Dr. McLaughlin has held various positions in the private, government and non-profit sectors including Adjunct Professor at the University of Saskatchewan, President of Ontario Agri-Food Technologies, Deputy Minister of Saskatchewan Agriculture and Food, President of Ag-West Biotech Inc. where he helped build the Saskatoon cluster, and several assignments with ELANCO. He recently accepted the position of Director of Business Development for the Canadian Light Source (Synchrotron) in Saskatoon.
Mark Pickard	Mark was raised on a farm in southern Saskatchewan and graduated from the University of Saskatchewan. He is President of InfraReady Products (1998) Ltd., which specializes in the processing of cereals, pulses and oilseeds, and uses infra-red energy to make products ready or more convenient. InfraReady Products continues to invest in science to improve its products and expand its markets, including the sale of precooked lentils and peas to Latin America, organic ingredients to the United States, and blended bakery products to Asia. In 2000, InfraReady was awarded the Saskatchewan Trade and Export Partnership (STEP) Exporter of the Year Award. In addition to serving on the POS Board, Mark is also on the Board of the Saskatchewan Food Development Center and the Saskatchewan Nutraceutical Network, and is a member of the Canadian Agri-Food Marketing Council (CAMC).
Johann F. Tergesen	Mr. Tergesen is the president and chief operating officer of Burcon NutraScience Corporation as well as president of Svaren Financial Consultants, a private investment and financial advisory company. Burcon NutraScience (TSX-V: BU), in conjunction with Archer Daniels Midland (NYSE: ADM), is currently focusing its efforts on developing the world's first commercial canola proteins, Puratein™ and Supertein™: proteins with properties comparable to egg and with valuable nutritional profiles which are expected to participate with soy, dairy and egg proteins in the multi-billion dollar global protein ingredient market. Prior to these roles he was vice president and treasurer of Burcon Properties Limited, a real estate development and ownership company with assets in excess of $3b. Mr. Tergesen has been with the Burcon group of companies since December of 1995. Before joining Burcon, Mr. Tergesen was a manager in the corporate finance group of the Vancouver office of Coopers & Lybrand, Chartered Accountants. Mr. Tergesen is a former director of and past-chair of the WCFN (The Western Canadian Functional Food & Natural Health Product Network). Mr. Tergesen holds a B.A. in econ from the U. of Winnipeg, and an MBA from McGill University.

Source: POS Pilot Plant website

CONFIDENTIALITY
POS has a very strong focus on client confidentiality

- **"POS Pilot Plant Corp. is a not-for-profit, confidential R&D facility. Operating revenue is generated from clients on a fee-for-service basis, annual membership fees, funding from the Government of Canada and the Government of Saskatchewan.**
- **POS is governed by a Board of Directors which includes representatives from industry, government and university. The Board believes that sound corporate governance practices are essential to the effectiveness of POS and our stakeholders. These practices are reviewed regularly by the Board's Corporate Governance Committee. As well, all Board members must sign a Code of Ethics Agreement.**
- **Strict systems of confidentiality are in place to protect our clients' valuable intellectual property. Furthermore, our bylaws state that the Board of Directors do not have any right to access the work or the results of any POS client work carried out on a confidential basis by POS. An independent third party technical auditor provides feedback on client satisfaction levels.**
- **Protection of confidential information is rated as one of our clients' top concerns. Accordingly, it is one of our top concerns.**
- **Strict confidentiality protocols are in place for employees, clients, visitors, sub-contractors and service providers alike. These include protocols for:**
  - **Physical access**
  - **Confidentiality agreements**
  - **Client rooms**
  - **Document control**
  - **Project scheduling**
  - **Tours**
  - **Warehousing**
  - **Shipping and Receiving**
  - **Security**
  - **Contract Management System."** *POS website*

- **See also POS Pilot Plant Corporation Code of Ethics, reprinted at "http://pos.ca/governance/ethics.php"**

MEMBERSHIP
POS Pilot Plant has as members many of the worlds largest food/grain based companies

Key members of POS Pilot Plant
(2009)

	Turnover	Employees	
Archer Daniels Midland	US$69.8b	27,600	One of the world's largest processors of oilseeds, corn and wheat. Vegetable oils, animal feeds, emulsifiers, corn syrups, sweeteners, citric acids, ethanol, etc.
Cargill	US$120.4b	160,000	An international marketer, processor and distributor of agricultural, food, financial and industrial products.
Dow Chemicals	US$53.5b	45,856	Subsidiary Dow Agroscience os a crop protection company which develops & markets genetically modified crops as well as researches and develops new crop protection & plant biotechnologies.
Monsanto	US$11.3b	26,400	Monsanto is a leading provider of agricultural products and solutions. They use innovation in plant biotechnology, genomics and breeding to improve productivity and to reduce the costs of farming. They produce leading seed brands, including DEKALB and Asgrow, and they develop biotechnology traits that integrate insect control and weed control into the seed itself. Monsanto makes Roundup, the world's best-selling herbicide, and other herbicides, which can be combined with their seeds and traits to offer farmers integrated solutions. They also provide other seed companies with genetic material and biotechnology traits for their seed brands. Monsanto manages its business in two segments: Seeds and Genomics, and Agricultural Productivity.
Solae, LLC (DuPont/Bunge JV)	Dupont $30.6b Bunge $37.8b	60,000 23,889	The Solae Company is an alliance between DuPont and Bunge Limited to bring more great tasting, nutritious soy-foods to the marketplace. As more and more consumers are discovering the many health benefits of consuming soy, a growing number of food manufacturers have introduced new and innovative products using Solae™ soy
McCain Foods	C$6b	20,000	A manufacturer of potato products, appetizers, specialty items, frozen pasta products.

This group alone has turnover 6 times NZ GDP

Source: POS website; various company websites; Hoovers; Coriolis analysis

STRONG GOVERNMENT SUPPORT
POS has received strong levels of government funding since it was founded

- **"Start-up financing for POS was largely supplied by Industry, Trade and Commerce Canada [ITCC]. The who's who of Canadian food processing corporations made up the remaining ten per cent. "** *Saskatchewan Business, Feb 1985*

- **"The federal government will provide $10 million in funding for the POS Pilot Plant Corporation in Saskatoon over the next five years… The federal government provided POS with $8.6 million in funding over a five-year period which expired March 31, 1989. The decision to extend funding for another five years is based on the findings of an evaluation by Agriculture Canada's Audit and Evaluation Branch. The 1988 program evaluation concluded that POS provides state-of-the-art service to processing companies and recommended continued funding."** *press release, Government of Saskatchewan, Feb 1990*

- **"Many smaller companies simply cannot afford extensive product testing. By working with researchers at POS, both large and small businesses are on a more equal footing. It is evidence of the government's dedication to agricultural research and diversification."** *Charles Mayer, Minister of Grains and Oilseeds, Government of Saskatchewan, Feb 1990*

- **"Saskatoon's P-O-S pilot plant has been given $1.8 million to upgrade its facilities. P-O-S develops research that helps other companies and farmers process food, medicines from food and cosmetics. About 1.3-million dollars comes from the joint federal-provincial Canada-Saskatchewan Agri-Food Innovation Fund. Saskatchewan Economic and Co-operative Development provided $465,000. The new equipment allows P-O-S to provide industry with state-of-the-art technology for product development and processing. The research helps clients scale-up to commercial production. "** *Broadcast News, Jan 2001*

- **"The Saskatchewan government says it has reached an agreement with the federal governmenton the use of $41.5 million in federal Agricultural Policy Framework (APF) wedge and rollover funds… Provide $3 million funding for the POS Pilot Plant."** *Canada Business News, Feb 2007*

BECOMING SELF SUFFICIENT
POS is moving towards being self-sufficient from government funding

- **"We fit into a very thin third category [of Pilot Plant] where there is very little subsidization, and most of our fees come from industry. Because we're in the testing business and we have to attract clients to stay in the business, we have to provide a high quality of service. The sophistication of our clientele varies; it ranges from venture capitalists who don't really know anything about food production, to multinational corporations that know exactly what they want to do. The nature of the work also varies. Last year a large number of clients wanted formulation work; this year, scale-up and preliminary production seem to predominate."** *Bill Caldwell, Manager, POS Pilot Plant Corp., Aug 1999*

- **"POS realized net earnings of $176,610 for the year ending March 31, 2008. An increase in the facility utilization offset by a $300,000 reduction in federal funding from the previous year, resulted in a net increase of total revenues by approximately $600,000.**
- **Net of government funding, the year ending March 31, 2008 was the most successful year for the organization in becoming a self-sustaining organization. Our self-sufficiency level reached 89% for the year, an increase of 15% from 74% achieved last year.**
- **Research and development and custom processing revenues from 173 projects were $4.8 million compared to $3.8 million for 152 projects in the previous year.**
- **The Analytical Services group had another strong year with external revenues in excess of $800,000. Although this was a decrease from the prior year, work supporting pilot plant activity increased by over 20% during the year.**
- **Expenditures remained relatively unchanged from the previous year at $7.2 million as compared to $7.3 million last year.**
- **The cash position at the end of 2007/08 was $2.4 million compared to $559,000 at the end of last year.**
- **Capital expenditures for the year were $506,752. The majority of these expenditures related to expanding the capabilities of our flammable area."** *Annual Report, POS Pilot Plant Corp, 2007/08 fiscal year*

APPENDIX 3 - DETAILS OF IDENTIFIED PEERS

This appendix provides website details for some of the global peers for the NZFIN identified in the initial screen

US MODEL FOR UNIVERSITY DEPARTMENT PILOT PLANTS
For additional details, please review the associated website links…

Details of identified university food industry pilot plants in the United States
(various; 2009)

State	University	Website(s)
California	U of C (Davis)	*http://www.dateline.ucdavis.edu/011097/Can-do.html* *http://foodscience.ucdavis.edu/people/staff/smays*
California	Cal Poly San Luis Obispo	*http://www.calpoly.edu/~dptc/#*
Indiana	Perdue University	*http://cifmc.foodsci.purdue.edu/*
Iowa	Iowa State	*http://www.biotech.iastate.edu/service_facilities/crop_products.html* *http://www.ccur.iastate.edu/facilities/technologytransfer.html*
Kansas	Kansas State U.	*http://www.oznet.ksu.edu/kvafl/DesktopDefault.aspx* *http://www.ag.iastate.edu/centers/directory/valueaddedfoods.html* *http://www.asi.ksu.edu/DesktopDefault.aspx?tabindex=999&tabid=920*
Louisiana	Louisiana State	*http://text.lsuagcenter.com/en/our_offices/departments/Food_Science/Featured_Sites/food_processing_tech_pilot_plant/facilities/Pilot+plant+facilities+part+2.htm*
Maine	U. of Maine	*http://www.umaine.edu/fsnpilotplant/*
Minnesota	U. of Minnesota	*http://foodindustrycenter.umn.edu/* *http://fscn.cfans.umn.edu/researchandservices/pilotplant/index.htm* *http://www.ag.iastate.edu/centers/directory/deptfoodsciencenutrition.html*
Mass.	U. of M (Amherst)	*http://www.umass.edu/foodsci/faculty/researchAlliance.html*
Nebraska	U. of Nebraska	*http://fpc.unl.edu/PilotPlant/index.shtml* *http://www.ag.iastate.edu/centers/directory/foodprocessingcenter.html*
New York	Cornell University	*http://www.nysaes.cornell.edu/fst/pilotplant/* *http://www.thetechnologyfarm.com/*
N. Carolina	N. Carolina State	*http://www.cals.ncsu.edu/food_science/PilotPlant/PilotPlantHomePage.htm*

US MODEL FOR UNIVERSITY DEPARTMENT PILOT PLANTS
... continued

Details of identified university food industry pilot plants in the United States
(various; 2009)

State	University	Website(s)
Ohio	Ohio State U.	*http://foodindustries.osu.edu/* *http://www-fst.ag.ohio-state.edu/food_science_facilities_at_ohio.htm* *http://fst.osu.edu/links/facility.htm*
Oregon	Oregon State U.	*http://oregonstate.edu/dept/foodsci/pilotplnt.htm*
Penn.	Penn State U.	*http://foodscience.psu.edu/facilities/pilot-plants*
S. Dakota	S. Dakota State U.	*http://dairysci.sdstate.edu/departmentinfo/facilities/dairyplantandsalesbar/dairyplant.htm* *http://ars.sdstate.edu/meats/*
Virginia	Virginia Tech	*http://www.fst.vt.edu/department/aboutus.html* *http://www.fst.vt.edu/extension/valueadded/index.html*
Wisconsin	U. of W (Madison)	*http://foodsci.wisc.edu/services/pilot/*

UNIVERSITY PILOT PLANTS ALSO AN INTERNATIONAL MODEL
Associated website links

Details of identified university food industry pilot plants in other countries
(various; 2009)

State or Country	University	Website(s)
Europe		
Belgium	U. Of Ghent	*http://www.food2know.be/en/*
Denmark	Kobenhavns Universitet	*http://uk.ifv.kvl.dk/dairy/dairytech.htm*
Netherlands	Wageningen University	*See Food Valley case study for details*
Poland	University of Warmia and Mazury	*http://www.kpk.gov.pl/centra_doskonalosci/coe/midi/data/619.html*
UK	U. Of Reading	*http://www.reading.ac.uk/Study/Departments/foodbiosciences.asp* *http://www.accessmylibrary.com/coms2/summary_0286-23107016_ITM*
Canada		
British Columbia	U.B.C. & BC Inst. Of Tech	*http://www.fis.agsci.ubc.ca/about2.html* *http://www.bcit.ca/health/industry/foodcentre/* *http://www.bcfpa.ca/services/ubc.htm*
Manitoba	U. Of Manitoba	*http://www.umanitoba.ca/research/rcffn/capabilties/pilotplant.html*
Nova Scotia	Dalehousie University	*http://cift.engineering.dal.ca/Major%20Equipment/Fish_and_Food_Proces.php*
Ontario	U. Of Guelph	*http://www.gftc.ca/index-e.cfm* *http://www.uoguelph.ca/campus/map/foodtech/*
Saskatchewan	U. Of Sask.	*http://www.foodcentre.sk.ca/*
Australia		
Victoria, Aus	Goulburn Ovens Inst. of TAFE	*http://www.ncdea.edu.au/news/leadStory.cfm?ID=457*
Other		
Dubai	UAE University	*http://cfa.uaeu.ac.ae/dfs/dfs_pilotplant.shtml*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