final report

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Prepared by: Norman W. Leslie

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Locked Bag 991
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MINTRAC Meat Industry International Study Tour

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Executive summary

Introduction
In late 2005, the Australian Meat Processor Corporation and Meat and Livestock Australia provided funding for a study team drawn from within the Australian meat processing industry to undertake an international study tour.

In 1991, the findings and recommendations of a similar venture had been the stimulus for what is now the highly developed and internationally acclaimed MINTRAC industry training package.

The Challenge
Generally, the team was required to explore international trends in meat industry training and more particularly, gather and exchange information about:

- the scope and nature of training provided at all levels
- the application and dissemination of research findings through training programs
- delivery, evaluation and reporting strategies
- the relationship of training with the regulatory environment
- the role of training in the development, implementation and management of innovation
- the use of information communication technologies to support training
- the relationship of training within the industrial relations environment
- systems and levels of state and national funding support and quality control of training.

Perhaps of most importance however, was the need to recommend future initiatives for domestic training designed to keep Australia at the forefront of international meat production.

The Journey and the Systems
The team consisting of 5 team members visited industry conferences, educational institutions, meat processing plants, Trade Unions and Government authorities over a twenty-one (21) day period in February and March 2006 in:

New Zealand - "The 'Bankable' Agricultural Export Economy"
More than 40% of New Zealand's export income is dependent on agricultural exports. It has used its "clean green" image as a point of difference in global markets for many years. This enviable demand-side image, generous quota access for sheepmeat to the EU, coupled with its reliable rainfall and temperate climate enables New Zealand meat processors to be far more confident in predicting business conditions.

The New Zealand education and training system is very similar in structure to that of Australia. There are a range of nationally accredited meat industry vocational qualifications which are administered through the New Zealand Industry Training Organisation (NZITO), which operates under the Education Act and Industry Training Act. Massey University offers a Diploma in Meat Technology and a Graduate Diploma in Meat Industry Operations.

United States of America - "It's the world's biggest economy stupid!!"
The USA is the world's biggest economy and the world's premier consumer market. The US meat processing industry is currently protected by import quotas and subsidies for key inputs thereby discounting the red meat supply chain costs and underpinning output prices. In the US, the customer is king and fitness-of-product-for-purpose is its mantra for the definition of quality.

The structure of the USA education and training system is quite different to that of Australia. There is no national system of vocational education and training, and thus there are no national meat industry vocational qualifications. Training is however heavily focussed at the degree level with some sophisticated meat science degree programs.

Canada -"The phoenix rising in a run-away economy"
The Canadian meat industry is still transitioning through its post-BSE recovery phase. And the timing couldn't be worse because it is trying to do so whilst the country is also experiencing an almost unprecedented petroleum-based resources boom creating chronic labour shortages. The industry has been traditionally characterised as being a commodity-oriented manufacturing meat business that was highly dependent on the USA as an export market at a floor price set by the booming US domestic market. In addition, Canada is also anxiously awaiting the outcome of the US-Japan market access negotiations as the major US processors Tyson and Cargill, are both major players in Canada and hence there is a strong interrelationship between Canadian imports and US exports to Japan.

The Canadian training system bears a resemblance to the Australian training system of the early 1990s. Due mainly to its highly parochial, province-based political system a series of state-based colleges offer specific vocational education and training programs, some with limited government support. There are no national vocational education and training qualifications, no monitoring of qualification currency or quality, and minimal industry input into training programs offered. Like the USA, the majority of meat industry training in Canada is company specific and not accredited.

England - "The EU rising from the mire of agrarian socialism"
The British meat industry is one of proud tradition. It has a formalised three-tiered structure and is the product of a craft-based industry which has slowly evolved and adapted to environmental change over many centuries.

This rate of change has rapidly accelerated over the past 10 years and is conspiring to generate an enormous amount of pressure on the traditional structures and systems because of:
a rising consumer advocacy lobby
limited labour supply due to sustained economic growth
consumer expectation of convenience
current Common Agricultural Policy reforms which will result in further reductions in local red meat production
significant concentration of channels to market as global supermarket supply chains become more pervasive, and
further harmonisation of national standards with the requisite conditions of the new EU market.

Not unsurprisingly, the English and Australian education and training systems have a large number of similarities. The Business and Technology Education Council offers many vocational courses leading to the BTEC First Diploma (one year, full-time) or to the BTEC National Diploma (two to three years, full-time). A Higher National Diploma is conferred after three years' study by the Business and Technology Education Council.

Meat industry training in England is managed predominantly through the Meat Industry Training Council. The Meat Industry Training Council, formed in 1991, is an independent body responsible for training and education in meat and poultry sector.

Ireland - "*Striving for relevance in the 'miracle' economy"*
The Irish economy is enjoying the benefit of far reaching government interventions in the higher education system during the 1980's which sought to re-position Ireland as a player in the global knowledge economy. The outcome of this intervention has been the emergence of Ireland as a key player in the new economy of the EU. It now has a highly skilled workforce of knowledge workers engaged in hi-tech growth industries such as IT and biotech and the unemployment rate has fallen from 17% to 4% over the last 10 years.

The Irish meat industry has always had an export focus split between the UK and the rest of the EU (i.e. 70%:30%). The Irish industry is also relatively unique in that there is no foreign ownership, but it does have major interests in the UK supplying major supermarket chains with case ready product.

The Irish meat industry is under pressure. Local capital, labour, and government incentives now all have attractive investment alternatives and exciting opportunities are currently being presented by the "new economy".

The Irish education and training system is structured similarly to both England and Australia. Higher education in Ireland is offered by universities and institutes of specialized higher education.

Training for the meat industry is overseen by the Food and Drinks sector of FAS (Foras Aiseanna Sathair) – the Irish National Training and Employment Agency. In 2001, FAS embarked on a national strategy of in-company training in Ireland, aimed at training and upgrading the skills of workers in the Irish meat industry. The program is a competency-based system against prescribed Standard Operating Procedures, with well-established Recognition of Prior Learning, and rigorous Quality Assurance processes.

TEAGASC (Ashtown Food research Centre) is the primary national centre for the provision of Third Level training, which includes the meat industry qualifications.
The courses are accredited by the Higher Education and Training Awards Council.

Denmark - *"Sustaining competitive advantage in a global market through socialised capitalism"*
The Danish meat industry is dominated by one major player – Danish Crown. Over the past 30 years it has systematically consolidated processing capacity across Denmark and is now solely responsible for producing 2% of the global volume of pork.

The meat industry holds a very important position within the Danish economy and Danish Crown has been supported in the establishment of its competitive position based on its current level of critical mass and now successfully competes in an increasingly liberalised global market.

Denmark is not only a leader in terms of product quality and price, but also in "world's first" processing technology that underpins its competitive advantage. It intends to maintain its competitive position by supplying process automation technology and consulting services to the rest of the world.

Nonetheless, the Danish meat industry is still facing some key challenges in the future, including:
decreasing supply of local labour
further opening of the domestic economy to trade with other EU member nations
live export of Danish piglets to competitor EU nations
increasing environmental constraints on local production and processing.

Post-school education and training in Denmark comprises a university sector and a college sector, i.e. the professionally-oriented higher education sector. The university sector offers courses at three levels: Bachelor's Degree, Master's Degree, and the Ph.D. Degree. The college sector comprises more than 150 specialised institutions of higher education offering professionally-oriented programmes.

The Danish education and training system featured a well established and long-stranding centralised approach to meat industry training. Training for the meat industry in Denmark is located at the Danish Meat Trade College which is world-renown for a variety of innovative programs.

The other driving force is the Danish Meat Research Institute, internationally renowned for its results. Owned and financed by the meat industry, its research and development programme covers almost all areas of meat production, from pig transport and slaughtering technology, to processing and refrigeration methods, quality management and environmental protection.

Rating Australia's Performance

Each team member developed an evaluation template to assist with the benchmarking of their area of research against those of the countries the study team visited. The templates define what is considered to be the optimum system for the Australian Meat Industry as level 5, and then describes the four lower levels as graduated levels of achievement.

In undertaking the benchmarking exercise, the systems of the six countries visited were considered against the Australian 'ideal' template. It is recognised that the values, contexts and systems of other countries are quite different to those of Australia, and that there should be no expectation that all countries should achieve, or even aspire to reach the 'Level 5' that is described for the Australian system.

However, the template does serve to highlight strengths of other countries in some of the areas which are of value to the Australian system, and from these strengths it is possible to draw recommendations for improvements to the Australian system. The teams' assessment of the effectiveness of Australia's systems rated against that of the international counterparts visited, is demonstrated in Figure 1.

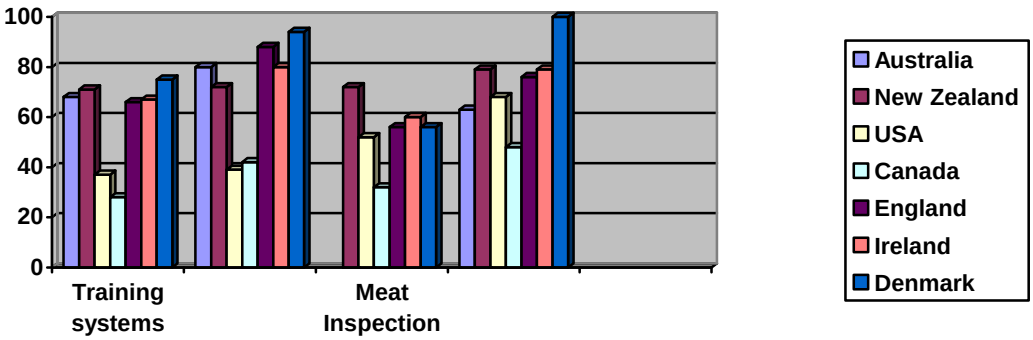


Figure 1: Benchmarking Australia's systems against those of the countries visited by the Study Tour Team

Recommendations

The following is a summary of the recommendations the team has developed and which it feels should, in the light of its findings, be adopted by and for the Australian meat processing industry.

Rec No	Topic Area	Summary of Recommendation	Recommendation made to
3.1	Australian Quality Training Framework auditors	Consider the development and training of meat industry-experienced AQTF auditors to monitor AQTF compliance by meat industry Registered Training Organisations.	DEST
3.2	Meat industry NAC's	Investigate the option of establishing a meat industry-specific New Apprenticeship Centre to apply a national approach to the management of traineeships and apprenticeships.	DEST
3.3 /3.4	Continuing international relations	Whilst MINTRAC staff must maintain a continuing relationship with representatives from the organisations visited overseas, key industry stakeholders must decide the extent to which the Australian standardised national training system is promoted and used in the international arena.	MINTRAC AFISC DEST
3.5	International student exchange	Existing international student exchange programs be further investigated with a view to developing similar programs across all levels of education and training in the Australian industry.	MLA MINTRAC
3.6 /6.1	An Australian meat science degree qualification	Investigate the feasibility of introducing a dedicated meat science degree in Australia.	MLA MINTRAC
4.1	Recruitment and retention in the Australian meat industry	Expand the current recruitment and retention project to develop structured career opportunities for Australians.	MLA AMIC AMIEU
4.2	Immigrant workers	A national strategy of training delivery and training systems for immigrant workers in the Australian meat industry be developed with an emphasis on accommodation of non-English speaking people.	MINTRAC AMIC AMIEU
4.3	Aus/ NZ collaboration	Investigate the feasibility of a vocational and education training collaboration between Australia and New Zealand ensuring mutual recognition and portability of qualifications.	MINTRAC
4.4	Meat cutting apprenticeship	Monitor the progress of the recently introduced Canadian meat cutting apprenticeship as a potential model of a trade apprenticeship in Australian meat processing	MINTRAC AMIC
4.5	Staff attitude training	Obtain further information and more closely examine the Danish “attitude” training program designed to provide a better understanding of the importance of the individual and the behavioural impact on other workers	MINTRAC
5.1	Commitments from regulatory employers	Obtain a clear and unambiguous endorsement from AQIS and the State Meat Authorities of the use of the Meat Safety and Quality Assurance qualifications in the National Training Package including delivery modes, assessment methods and materials utilised.	AQIS All State Meat Authorities

Rec No	Topic Area	Summary of Recommendation	Recommendation made to
5.2 /5. 3	Meat Inspector training	Ensure that a formalized, mandated and documented system for the on-the-job training of meat inspection trainees is implemented stipulating a minimum number of hours of on-the-job practice assessment process (under supervision) the nature of the training to be delivered in terms of tasks and competencies.	AQIS MINTRAC
5.4	Meat Inspector and QA standards	Formally map the Australian Meat Inspection and QA Units against international standards.	AQIS MINTRAC
6.2	Access to research material	Facilitate 24/7 access to a global source of meat industry specific knowledge services for Australian meat processors, on-plant regulatory staff, and selected Australian research providers.	MLA
6.3	DMRI resources	Review the current level of DMRI resource commitment to on-site prototype commissioning of process automation projects.	MLA
6.4	Site-based innovation	Significantly increase investment in the current initiatives whereby building of innovation capacity is focused on individual meat processing companies and encourage the closer engagement of companies in site-based R&D projects.	MLA
6.6	Executive leadership training	Ensure that the UK/Danish collaboration (the Cranfield Fellowship in Manufacturing Management for the Red Meat Industry) is considered during the development of Australian Executive Leadership training initiatives.	MLA MINTRAC
6.7	Involvement in AMSA	Encourage a significant increase in Australia's involvement in the AMSA "reciprocal meat conference" through key Australian meat researchers.	MLA
6.8	Engagement with US researchers	Increase the level of engagement between USDA – ARS and Australian research groups (e.g. initial focus would be directed toward sponsoring staff &/or student exchange programs).	MLA
6.9	Engagement with the EU	Re-engage with the EU Framework Program with a view to using the EU outputs as part of the planning for future R&D, as well as, identifying opportunities for future collaboration	MLA
6.10	PhD programs in Denmark	Explore a partnership with DMRI to co-finance PhD programs at a number of Danish graduate schools targeting the education and training of Australian researchers	MLA MINTRAC

Contents

1 Introduction

Project summary
The MINTRAC International Meat Industry Study Tour was a Research and Development project jointly funded in 2005/6 by Meat and Livestock Australia and the Australian Meat Processor Corporation. An Australian group of five people visited New Zealand, USA, Canada, England, Ireland and Denmark in order to make comparisons to the Australian training system and to assess the current trends and training strategies being adopted in these countries.

In particular the study tour gathered information about:
- systems and levels of state and national funding support and quality control of training
- scope and nature of training provided
- application and dissemination of research findings through training programs
- delivery strategies
- evaluation and reporting strategies
- relationship of training with the regulatory environment
- role of training in the introduction and management of innovation, and technology transfer
- use of information communication technologies to support training
- relationship of training with the industrial relations environment.

The objectives of the project were to:
- review the report and outcomes of the 1990 tour to provide background information
- research the current training initiatives, priorities and directions occurring in countries with a progressive or leading edge role in the international meat industry
- make recommendations for the future directions of training for the Australian Meat Industry
- disseminate findings and examples of best practice to the Australian Meat Industry
- apply the outcomes and recommendations to strategic planning for MINTRAC
- apply the outcomes and recommendations when negotiating with State and Federal governments for future financial support and training priorities for the meat industry.

This report
- presents the findings from each visit
- summarises key findings and trends
- makes comparisons to the Australian meat training system
- makes recommendations for the future planning of Australian training which seek to keep Australia at the forefront of international meat production
- identifies future strategies for Australian training to be implemented through MINTRAC.

Presentation of findings and recommendations will be made to industry forums, such as:
- AMIC, AMPC and MINTRAC national conferences
- State Training Manager's networks
- State RTO networks
- Agri-Food Industry Skills Council
- Forums which include representatives from DEST and State Training Authorities
- Key industry stakeholders, such as AMPC and AMIC member companies.

Itinerary
Six countries were visited during the trip. The full itinerary is attached as Appendix 1.1. In brief, the tour included:

<u>New Zealand</u>

- Mainland Meats
- New Zealand Industry Training Organisation (NZITO)
- AgResearch
- Wallace Meats
- Asure

USA

- California
    - National Meat Association Congress, San Francisco
    - Superior Farms, Dixon
- Texas
    - Texas A&M University – Rosenthal Meat Science Centre
- Nebraska
    - USDA Technical Centre
    - University of Nebraska Meat Science Department

Canada

- Olds College
- Ranchers Beef
- Innisfail Meat Packers
- Alberta Agriculture, Food and Rural Development
- Northern Alberta Institute of Technology
- Southern Alberta Institute of Technology
- University of Alberta
- Beef Information Centre
- United Food and Commercial Workers' Union (UCFW)

England

- ABP (Anglo Beef Processors)
- Cranfield University
- Meat Training Council
- Red Meat Industry Forum

Ireland

- TEAGSC – Ashtown National Food Research Centre
- FAS Training & Employment Authority

Denmark

- Danish Meat Trade College
- Danish Meat Research Centre
- Danish Crown Processing Plant – Horsens
- Malcolm Harvey – MLA Regional Manager - Europe

A full summary of all locations visited is in Appendix 1.2

The Study Tour Team members:
John Salter - Team Leader
General Manager Human Resources, the Teys Group of Companies

Jenny Kroonstuiver
Chief Executive Officer, MINTRAC

Clive Richardson
Senior Project Officer, MINTRAC

Kath Evans
Secretary of the Australasian Meat Industry Employees Union (Newcastle and Northern NSW Branch)

Lewe Atkinson
Manager, Innovation Adoption Strategy, Meat and Livestock Australia (MLA) Ltd.

The MINTRAC International Study Tour Team
From left: Lewe Atkinson, Clive Richardson, John Salter,
Jenny Kroonstuiver, Kath Evans.

2 Country Contextual "Snap-Shot"

What is a contextual "snap-shot"?
These "snap shots" are not intended to be a definitive description of the economic and industrial situation in each country. But they are an attempt to profile the study tour team's perception of "how things were going" in each country at the time of making their observations and considering their assessment of the things they saw. The team agreed that it is critical to understand the situational context of the observations made in each country because what they have reported is a product of the industry and enterprise reaction to the **social** and **economic** environment within which it finds itself at this point in time.

2.1 Summary of Findings

2.1.1 Australia

"A Resilient Export Culture"

The meat processing industry in Australia is the fulcrum that balances many contradictory, and sometimes complementary, local supply-side and international demand-side forces which are beyond the influence of a small global player like us. This "balancing act" has been played-out over the entire history of the industry. Its survival and the subsequent evolution of an "export culture" has been largely due to the resilience of its people in the face of adversity.

The meat processing business model in Australia has been traditionally exposed to supply and demand forces that are well beyond its control. This exposure is further exacerbated by the absence of protective tariffs and supporting subsidy programs. In more recent times the industry has enjoyed greater stability. This has been largely due to the enviable animal health status of the herd. In view of this, global meat companies such as Swift & Co., Cargill, etc have sought to integrate key Australian meat processing facilities into their global meat supply strategies. In addition, the two major supermarket chains have emerged and developed sophisticated supply chains to satisfy the majority of the domestic demand for both beef and lamb. There has also been a concurrent growth in domestic consumer demand for value added red meat with processed meat companies who are now using 30% more red meat than they did 5 years ago.

Many individual meat processors have also implemented a number of strategies to manage their own business risk, such as:

- WorkCover self-insurance
- exchange rate hedging
- vertical integration of livestock supply
- preferred supplier livestock procurement programs
- employee training targeted at meeting key customer requirements (e.g. McDonalds)
- geographically distributed single species multi-plant capacity
- contract labour hire, and
- multiple export market listings for each plant.

Indeed, it is also appropriate that some of these risk management strategies are implemented at an all of industry level with government assistance. These have included; implementing traceability systems for market access, chemical residue testing and reporting program, animal disease surveillance and reporting programs, etc.

Australian meat processors have been traditionally exposed to high levels of business risk. Decision-makers at the enterprise level need to be very agile to ensure survival in such a volatile trading environment. In view of this, the industry looks to "share the risk" between themselves and government for industry-wide programs where significant market failure is evident.

2.1.2 New Zealand

"The 'Bankable' Agricultural Export Economy"

More than 40% of New Zealand's export income is dependent on agricultural exports. It has used it's "clean green" image as a point of difference in global markets for many years. This enviable demand-side image, generous quota access for sheepmeat to the EU, coupled with its reliable rainfall and temperate climate enables New Zealand meat processors to be far more confident in predicting business conditions.

This is evidenced by the fact that the major processors in New Zealand are all publicly listed on the NZSX, which demonstrates a far greater level of investor confidence relative to similar Australian companies. In addition, the New Zealand investment community is far more familiar with globally successful agricultural-commodity based companies (e.g. Fonterra) and is less likely to undervalue these shares. Thus these companies have access to sufficient capital and resources for pursuit of new global growth opportunities as they emerge.

In light of the above, the competitive behaviour of both New Zealand enterprises and the industry is quite different to that of Australia. For example, given the uniqueness and value of their access to the EU market, as well as its importance to GDP, significant investment has been made by both industry and government to assure compliance with access conditions. The same is true for the delivery and auditing of industry training programs. This is evidenced by demonstrating a more sophisticated approach to inspection and its verification relative to equivalent agencies in Australia. Furthermore, the recent decline in industry funded R&D activities (e.g. decline of industry support for MIRINZ) would suggest a shift toward a industry innovation model that is more focused on individual enterprises. This behaviour suggests a maturing of the processing sector in recognising that innovation is key to maintaining corporate competitive advantage and no longer considered a matter of market failure.

2.1.3 United States of America

"It's the world's biggest economy stupid!!"

The USA is the world's biggest economy and the world's premier consumer market. The US meat processing industry is currently protected by import quotas and subsidies for key inputs thereby discounting the red meat supply chain costs and underpinning output prices. In the US, the customer is king. This means that not only do consumer lobby groups have significant influence over the way that the US industry is regulated, but consumer advocacy is becoming increasingly mediated by major supermarket chains such as Wal-Mart.

US meat processors are very focused on customer needs within their own domestic markets. 'Fitness-of-product-for-purpose' is their mantra for the definition of quality (e.g. meeting shelf life requirements at retail). The fact that the US exports any meat at all is the result of the scale of the industry and the ability of savvy international meat traders to accumulate particular beef product items in sufficient quantity to ensure sustainable supply relationships with key North Asian customers. No other country has the ability to compete with US exports in the same unique combination of prices, perceived quality, and quantity of specific cuts. Furthermore, the customer perception of the quality of US product is even further enhanced by their respect for the unique USDA grade certification system.

Since the revelations of Upton Sinclair in 1909, regulatory pressure on the US processing sector has only just been applied in recent years as a consequence of two key events. The first was the 'Jack-in-the-box' food poisoning incident in 1995. The USDA-FSIS response to the subsequent

consumer outrage drove the creation of the "Mega-Regs" and the mandatory implementation of HACCP. And most recently, the industry's efforts to satisfy requirements to regain access to the $US1.4 billion Japanese beef market has lead to review and update of compliance systems in some 80 plants intending to export to this market. It is fair to say that the US meat processing industry does not appear to have an "export culture", and in the absence of a public health or market access crisis, US meat processors will simply seek to comply with the minimum fitness-for-use requirements of customers that are economically optimum – no more, no less.

BSE has cost the US industry $US7 – 8 billion. The impact of Avian Influenza resulting in lower chicken meat prices will put even further pressure on red meat sales. Managing capacity, i.e. raising utilisation rates, and adding value are the new mantras of the industry.

2.1.4 Canada

"The phoenix rising in a run-away economy"

The Canadian meat industry is still transitioning through its post-BSE recovery phase. And the timing couldn't be worse because it is trying to do so whilst the country is also experiencing an almost unprecedented petroleum-based resources boom. The industry has been traditionally characterised as being a commodity-oriented manufacturing meat business that was highly dependent on the USA as an export market for disposal of 75% of its product at a floor price set by the booming US domestic market. The re-opening of trade in boneless beef from Under-Thirty-Month old (UTM) cattle with the US has been a critical factor in facilitating a slow recovery by the industry. But the supply situation still needs further relief due to the significant numbers of Over-Thirty-Month old (OTM) animals still in the system that have not been processed since December 2003. This over supply situation represents about 25% of the total volume of beef production that would have otherwise been live exported to the USA. In addition, Canada is also anxiously awaiting the outcome of the US-Japan market access negotiations as the major US processors Tyson and Cargill, are both major players in Canada and hence there is a strong interrelationship between Canadian imports and US exports to Japan.

The key factors that are currently slowing the rate of recovery in the Canadian industry include:

- a very tight labour market due to the resources boom which is having the effect of limiting processing capacity
- over supply of OTM animals
- a lack of a shared industry innovation strategy due to provincial parochialism
- many years of relatively limited customer focus due to assumed market access security to the US, and
- a lack of a pre-existing integrated value adding capacity within Canada.

The paradox is that it seems to have taken the BSE event in 2003 to surface many of the underlying issues that would have eventually impeded the continued growth and global competitiveness of the Canadian beef industry. In view of this, it would appear that the Canadian beef industry has heeded the wake-up call and is starting to show good progress toward re-building its status as a globally competitive exporter of beef. Evidence of this can be seen in the effective implementation of its own National Livestock Identification Scheme which actually commenced pre-BSE event and the associated procedures for segregation and processing of OTM and UTM animals post-BSE event to meet the requirements of re-opening the trade with USA.

2.1.5 England

"The EU rising from the mire of agrarian socialism"

The British meat industry is one of proud tradition. It has a formalised three-tiered structure and is the product of a craft-based industry which has slowly evolved and adapted to environmental change over many centuries. This rate of change has rapidly accelerated over the past 10 years.

The industry is now faced with new pressures brought about by the emergence of a number of new economic drivers, including:

- a rising consumer advocacy lobby as a consequence of recent food safety scares
- limited labour supply due to sustained economic growth
- consumer expectation of convenience leading to a requirement for increasingly sophisticated in meat processing operations
- current Common Agricultural Policy reforms over the next 10 years which will result in further reductions in local red meat production leading to the increasing consumer demand being satisfied by even more imported product
- significant concentration of channels to market as global supermarket supply chains become more pervasive, and
- further harmonisation of national standards with the requisite conditions of participation as an exporter within the new EU market.

All of these emergent economic drivers are conspiring to generate an enormous amount of pressure on the traditional structures and systems that had adequately served the UK meat industry for at least the past 100 years. Although it does appear that the industry has adapted significantly over the past 10 years. The three tiered industry structure breaks down in the following way:

1 large companies which are primarily dedicated to provide case-ready product to the major supermarket chains (i.e. 35% of all meat product produced), as well as, limited capacity for value added manufacturing for food service (i.e. 10% of all meat product produced),
2 the middle tier of small to medium enterprises who are more focused on meat wholesaling and trading, rather than manufacturing consumer products, and
3 the small processors/butchers focused on local communities and villages.

It is the second tier that is struggling the most with the changing environment. They are still only focused on local markets, but are still expected to comply with same European Union requirements as specified for export under the new regulations introduced in January 2006.

In light of the above, the Department of Trade and Industry has partnered with the Meat & Livestock Commission to target small to medium enterprises with the intent of providing tools and building capacity to undertake plant-based continuous improvement programs. The notion is that this middle tier needs to see how the introduction of more process analysis and rigour will lead to immediate cost savings, as well as, sustaining competitive advantage in the longer term. Despite the fact that this work is co-funded by the DEFRA through MLC, these small-medium enterprises are still reluctant to engage in this program. This behaviour would indicate that there is still some industry inertia to overcome before the UK meat industry can be regarded as globally competitive.

2.1.6 Ireland

"Striving for relevance in the 'miracle' economy"

The Irish economy is enjoying the benefit of far reaching government interventions in the higher education system during the 1980's which sought to re-position Ireland as a player in the global knowledge economy. This goal was particularly important in the context of the formation of the EU within which Ireland felt that it had to differentiate itself from other member countries reliant on an agri-based GDP such that it would maximise the opportunity presented by the formation of the EU. The outcome of this intervention has been the emergence of Ireland as a key player in the new economy of the EU. It now has a highly skilled workforce of knowledge workers engaged in hi-tech growth industries such as IT and biotech and as a consequence of the concurrent growth spurt in the global economy the unemployment rate has fallen from 17% down to 4% over the last 10 years. The challenge for the Irish meat industry is to maintain its relevance to the Irish economy in this new context.

The Irish meat industry has always had an export focus with 9 out of every 10 cattle being destined for export markets and beef makes up about 70% of total meat exports. The story is the same for sheep and pigs, which make up 20% and 10% of export production, respectively. The destination for this product is split between the UK and the rest of the EU (i.e. 70%:30%). The Irish industry is also relatively unique in that there is no foreign ownership, but it does have major interests in the UK, primarily through Anglo Irish Meat Processors Ltd, Dawn Meats, and Dungannon Meats which all supply major supermarket chains with case ready product. The key challenges that lie ahead for the industry include:

- establishment and maintenance of all-of-supply chain traceability and QA systems
- responding to shifting trade policy which will lead to a reduction in on-farm subsidies, new regulatory directives and liberalisation of access to EU markets
- responding to consumer demand for convenience through value-added ready-to-eat products, and
- integration with global supermarket supply chains by meeting their need to pass value adding activities back up the supply chain.

The Irish meat industry is under pressure. It is in danger of being overwhelmed and losing commercial relevance in the "miracle economy". Local capital, labour, and government incentives now all have attractive investment alternatives and exciting opportunities are currently being presented by the "new economy". A particular response by the industry is a focus on facilitating how Small-to-Medium Enterprises (SMEs) (NB. 55% of plants have <50 people) can seamlessly integrate value adding capability into their upstream operations to meet the needs of the global supermarket supply chains which will ultimately crowd-out any of the other alternative channels to consumers within the EU.

2.1.7 Denmark

"Sustaining competitive advantage in a global market through socialised capitalism"

The Danish meat industry is dominated by one major player – Danish Crown. Over the past 30 years it has systematically consolidated processing capacity across Denmark and now owns 90% and 59% of pork and beef processing capacity, respectively. Danish Crown is now solely responsible for producing 2% of the global volume of pork production. About 85% of all meat produced in Denmark is exported. Major market destinations include; UK/Germany 60% and Japan/USA 12%. The total value of meat exports represent about 10% of the total value of Danish exports. So, it is fair to say that the meat industry holds a very important position within the Danish economy. In view of this, the company - Danish Crown - has been supported by Denmark in the establishment of its competitive position based on its current level of critical mass. It now successfully competes in an increasingly liberalised global market.

The Danish meat industry is still facing some key challenges in the future. These include: decreasing supply of local labour, further opening of the domestic economy to trade with other

EU member nations, live export of Danish piglets to competitor EU nations, and increasing environmental constraints on local production and processing. Danish Crown is responding to these threats through a combination of strategies, including; investment in process automation to reduce dependence on labour supply, locating slaughter and processing in other EU countries to access labour at lower cost, as well as, being closer to key markets, and vertical integration of company owned supply chains through to retail. Danish Crown has also taken up a “first-mover” position in development and commercialisation of process automation technology through its ownership of SFK Systems/Danfotech.

The Danish meat industry, particularly in pork, is generally recognised as being a world leader. This is largely due to the fact that it has always been export focused which has meant that it has always had to satisfy the needs of relatively sophisticated export customers rather than simply meet the needs of its own domestic market. Denmark is not only a leader in terms of product quality and price, but also in “world’s first” processing technology that underpins its competitive advantage buy establishing “best practice” in the minds of its customers. Indeed, it intends to maintain its competitive position by supplying process automation technology and consulting services to the rest of the world. The rationale for this strategy is that by doing so it is the best position to stay at the cutting edge of technology and thereby maintain its world leadership position in pork processing and export sales.

Danish Crown processing plant, Horsens, Denmark

3 Education and Training Systems

Jenny Kroonstuiver

3.1 The Australian context

The Australian education and training system comprises three distinct sectors – school, vocational educational and training, and higher education.

3.1.1 Vocational Education and Training (VET)

Of particular significance to the Australian meat industry is the vocational education and training sector, which had roots in the traditional technical training offered through Technical Colleges. Since 1996, the Australian Government has reinvigorated vocational education and training — with record numbers of people in training, record numbers in New Apprenticeships and significant progress made towards developing a high quality, truly national system. More than 1.7 million students or about 13 per cent of the working age population take part in vocational education and training each year, with increasing participation by Indigenous Australians, and people in rural and remote areas. The Australian Vocational Education and Training (VET) sector is now a significant component of Australia's tripartite education system.

This transition saw the development of the Australian National Training Packages. Training Packages are sets of nationally endorsed competency-based standards and qualifications for recognising and assessing people's skills. A Training Package describes the skills and knowledge needed to perform effectively in the workplace. They do not prescribe how an individual should be trained. Teachers and trainers develop learning strategies - the "how" - depending on learners' needs, abilities and circumstances.

Training Packages are developed by industry to meet the identified training needs of specific industries or industry sectors. To gain national endorsement, developers must provide evidence of extensive consultation and support within the industry area or enterprise. In January 2005, there were 81 endorsed Training Packages.

The Australian Meat Industry Training Package was first developed and endorsed in 1998. The range of qualifications was extended in 2000, at the time of the first review. The second review commenced in 2004 and is due for completion in early 2006.

The Australian Meat Industry Training Package comprises six levels of qualifications against the Australian Qualifications Framework, from Certificate level I to Advanced Diploma, and provides qualifications for the Abattoirs, Smallgoods, Meat Retailing and Foods Services sectors.

Since inception, the uptake of formalised training in the Meat Processing sectors has been significant, particularly in the Abattoirs sector where participation rates have exceeded 85%. The industry now supports around 8,000 Trainees and Apprentices annually, with a further 2,000 participants in higher levels of training.

The administration and financing of education in Australia is shared between the Federal Government and the States and Territories. The Federal Government is mainly concerned with the development of national policies and strategies for education, whereas the States and Territories are responsible for delivering education within their borders. The Federal Government provides significant funding for education across the educational sectors and administers some national programmes.

Funding of the Australian VET system is provided by the Federal government through an annual agreement with the State Governments. Administration of the VET system is a state responsibility, but conducted within the context of a tightly defined and federally prescribed national training framework. Since the endorsement of the Australian Meat Industry VET qualifications, the meat industry has received in excess of $300m in publicly funded training.[1]

Quality Assurance of the Australian VET system is prescribed by the Australian Quality Training Framework (AQTF), a national Quality Assurance system introduced in July 2002.The AQTF provides the basis for Australia's nationally consistent, high quality vocational education and training system.

There are two sets of standards under the AQTF:

- Standards for Registered Training Organisations, and
- Standards for State and Territory Registering/Course Accrediting Bodies.

Auditing of the AQTF is undertaken by state-based auditors attached to the respective State departments of education and training.

In Australia, all Registered Training Organisations commit to collecting data under AVETMISS, the Australian Vocational Education and Training Management Information Statistical Standard. Data collections undertaken on VET Activity are:

- VET Provider Collection;
- New Apprenticeship Contract of Training (COT) Collection; and
- Financial Collection.

AVETMISS provides a common language for the collection of data on training delivery. It enables analysis and comparisons at all levels of the training system in Australia.

In recent years there has been increasing participation by the schools sector in VET. Over 95 per cent of Australia's secondary schools offering senior secondary programs now offer vocational education and training (VET) to their senior students. This means students can gain practical work skills and nationally-recognised VET qualifications as part of their school education. In 2003, over 202,935 school students undertook programs at school that could lead to Certificate I, II or III qualifications as well as a senior secondary certificate.

Opportunities to undertake VET training in meat industry qualifications whilst still at school, however, are limited. Meat retailing and a limited meat processing (abattoirs) program can be undertaken in New South Wales and Queensland only.

3.1.2 Higher Education

Under the Australian Constitution, the main responsibility for higher education rests with the Australian States and Territories. Universities are autonomous self-accrediting institutions established by Federal, State or Territory legislation. The relevant legislation vests responsibility for governance and management of the university in a governing body in the form of a Council or Senate. The Council or Senate is accountable to the relevant government for the operations of the university.

The role of the Federal Government derives from its responsibility for funding of public higher education institutions. Higher education is administered at the Federal level through the Department of Education, Science and Training (DEST). DEST has responsibility for the Federal Government's higher education policy development and program administration. In addition, the

[1] MLA (2006) MINTRAC Final Report (unpublished)

Australian Research Council makes detailed recommendations to the Federal Minister on the allocation of targeted research funds. Other Federal Government departments also provide some funding to higher education institutions.

There are forty-three Australian universities. They are both teaching and research institutions. A full range of academic and professional disciplines is offered with awards ranging from associate diploma to doctorate being offered.

Quality Assurance of Higher Education is the responsibility of the Australian Universities Quality Agency (AUQA), an independent, not-for-profit national agency which promotes, audits, and reports on quality assurance in Australian higher education.

There are no dedicated meat science degree programs in Australia. However, the meat industry has invested significant funds in supporting higher education programs through a range of strategies, including:

- the funding of Professorial chairs at James Cook University, University of Queensland & Sydney University
- a range of Undergraduate and Postgraduate scholarship programs administered through Meat and Livestock Australia (MLA) and MINTRAC.

In addition, a number of Universities house specialist facilities which provide services to the Australian meat industry, for example:

- University of New England: Neil Yeates Meat Research Laboratory, which includes modern laboratories and teaching facilities for all aspects of meat science
- Adelaide University – supporting partner of the Beef Cooperative research Centre
- University of Queensland - School of Food and Land Sciences
- University of Tasmania - Department of Microbiology

Support is also provided to a number of Cooperative Research Centres (CRCs), namely:

- Beef CRC
- Sheep CRC
- Environmental Biotechnology CRC

3.1.3 Qualification pathways between sectors.

In recent years there has been increasing emphasis placed by State and Federal governments on the development of clearly articulated pathways between education sectors in Australia. In 2002 the High Level Review of Training Packages[2] found that articulation between VET and Higher Education is based on agreements made between institutions, usually based on VET Diploma level courses and above and usually providing credits into three- and four-year Bachelor Degrees. Currently multiple such agreements exist between institutions and there is evidence of increasing formal articulation from VET to Higher Education.

Despite this, the reviewers acknowledged a continuing reluctance by some universities to offer fair and reasonable credit transfer for VET qualifications and they encouraged the Commonwealth to systematically encourage close liaison between the VET and higher education sectors on a broad range of issues including articulation and credit transfer arrangements; overlapping qualification structures; and assessment reporting arrangements for entry and credit for streamlined progression into higher education.

The meat industry, through MINTRAC, has approached this issue directly with Registered Training Organisations who have responsibility for delivering the industry-funded Diploma of

[2] Scholfield, K. & McDonald, R. (2204) *Moving on – report of the high level review into Training Packages*

Meat Processing programs. Each of these RTOs has been required to identify and develop suitable pathways into further qualifications as part of their contracts with MINTRAC to deliver the Diploma program.

3.1.4 MINTRAC

The National Meat Industry Training Advisory Council (MINTRAC) was established by the Australian meat industry in 1992 to represent the industry in matters related to education and training. It has managed the development of the Australian Meat Industry Training Package[3], represents the industry to State and Federal governments in the negotiation of VET funds for meat industry training, and annually manages a wide range of Research and Development projects (including scholarship programs) on behalf of the industry.

MINTRAC is managed by its Board of Directors. The Board includes representatives of:

- Australian Meat Processor Corporation
- Australian Meat Industry Council
- Australasian Meat Industry Employees Union
- Meat Companies.

3.1.5 Evaluation template

An evaluation template was developed to assist with the benchmarking of the Australian education and training system against those of the countries the study Team visited.
The template defines what is considered to be the optimum training system for the Australian Meat Industry as level 5, and then describes the four lower levels as graduated levels of achievement.

In undertaking the benchmarking exercise, the meat industry education and training systems of the six countries visited were considered against the Australian 'ideal' template. It is recognised that the values, contexts and systems of other countries are quite different to those of Australia, and that there should be no expectation that all countries should achieve, or even aspire to reach the 'Level 5' that is described for the Australian system.

However, the template does serve to highlight strengths of other countries in some of the areas which are of value to the Australian system, and from these strengths it is possible to draw recommendations for improvements to the Australian system.

A numerical value has also been attached to the template. It is stressed that the evaluation of other countries has been undertaken against the Australian context, and that the percentage weighting is simply a comparison to the Australian system. It is in no way intended to be a ranking of the effectiveness of the systems of the other countries, since the contexts and structures of training and meat industry requirements are so different from country to country.

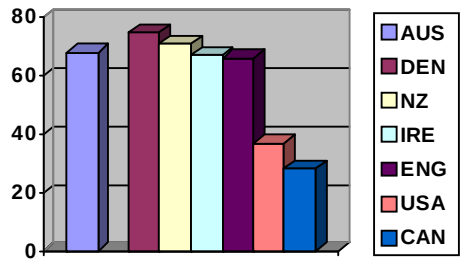


Table 3.1: Comparative strengths of visited countries when considered against the Australian context

[3] The Australian Meat Industry Training Package is owned by the Australian federal government.

Table 3.2: Seeking structural excellence in the Australian Education and Training System

	National Structure	Quality and funding arrangements	Structure of meat industry training system	Strategic approach to meat industry training	Meat industry participation and data collection	Supply chain
Importance	3/20	2/20	5/20	7/20	1/20	2/20
1	No nationally recognised qualifications. No established pathways between sectors. No government support of meat industry training.	No government funding support for VET or HE. No independent monitoring of VET delivery quality.	No qualifications or training beyond company level. Ad hoc approach to training to achieve compliance.	Crisis approach to addressing industry needs through training. No united industry approach to education and training.	No national collection or monitoring of participation rates or outcomes. Company records meet minimal regulatory requirements.	Training focuses on immediate sector scope. Customer impact not incorporated into training programs.
2	Qualifications available with some recognition. Transitions between sectors available through negotiation. Minimal government support of meat industry training.	Generic programs available to the meat industry. Government response to industry crises. Some monitoring of quality of training outputs.	Company training supports company needs and priorities. Some evidence of training throughout structure. Programs available to address training needs.	Industry has some processes for articulating priorities to government. Some programs available to address industry needs.	Record keeping and participation satisfies auditing requirements. Some evidence of Human Resources planning No national collection of data.	Training focuses on immediate sector with some understanding of supplier and customer requirements and impacts.
3	Recognised qualifications available. Some established pathways between sectors. Some government support to address specific priorities.	Targeted programs address industry needs. Some independent monitoring of quality of training outputs.	Some qualifications available at systemic level. Some systemic responses to training needs.	Industry has structured approach to identifying and addressing training needs. Forward planning evident	Data collection enables some identification of meat industry participation rates. Partici-pation in structured training evident in at least two levels.	PtoP principles evident in some aspects of training Impact of customer requirements explained.
4	Recognised qualifications with some transferability between sectors. Outcomes based assessment. Government support to ensure meat industry training priorities are addressed.	Government funds available to address industry training priorities. Quality of training outcomes regularly monitored. Industry expresses satisfaction with training outputs.	Recognized qualifications address training priorities. Training generally accepted as part of business process. Industry priorities reflected in qualifications.	Industry strategic planning priorities recognized and generally addressed. Industry planning identifies education and training priorities to support business growth.	National data collection. Participation outcomes monitored. Data interrogation informs training planning.	PtoP principles incorporated in most aspects of training Understanding of customer requirements informs training programs
5	Clearly articulated qualifications structure. Proactive approach to ensuring currency. Well established cross-sectoral pathways. VET & HE sectors with an industry focus. Government support to ensure emerging industry training priorities are planned for and addressed.	Targeted programs identify and address industry needs in a timely manner. Strategic approach to identifying and addressing emerging needs and trends. Transparent approach to decision making. Continuous improvement approach to ensuring quality of training +education outputs	Nationally accepted training programs available to support strategic directions of the meat industry. Training accepted as contributing to business growth and market effectiveness. Emerging priorities supported in a timely manner.	Government and industry collaboration to ensure future training needs are identified and planned for. Qualifications and administrative structures sufficiently flexible to respond to rapidly changing environment.	Regular interrogation of data identifies trends and emerging needs. Sophisticated reporting enables data to identify and support training and education priorities.	PtoP principles embedded in all aspects of training. Understanding of customer requirements informs all aspects of training. Global changes and impacts incorporated into training.

3.2 Summary of findings

3.2.1 New Zealand

The New Zealand education and training system[4] is very similar in structure to that of Australia. In New Zealand individual schools and tertiary institutions have considerable responsibility for their own governance and management, working within the framework of guidelines, requirements and funding arrangements set by central government and administered through its agencies.

The Tertiary Education Commission's (TEC) (www.tec.govt.nz) key role is to oversee implementation of the Tertiary Education Strategy and associated set of priorities. TEC takes an active role in facilitating collaboration and cooperation in the tertiary education system, and a greater system connectedness to wider New Zealand businesses, communities, iwi (tribes) and enterprises.

It is also responsible for funding all post-compulsory education and training offered by universities, polytechnics, colleges of education, wananga (public tertiary institutions that provide programmes with an emphasis on Maori tradition and customs), private training establishments, foundation education agencies, industry training organisations and adult and community education providers.
There are a range of nationally accredited meat industry vocational qualifications which are administered through the New Zealand Industry Training Organisation (NZITO), which operates under the Education Act and Industry Training Act. Massey University offers a Diploma in Meat Technology and a Graduate Diploma in Meat Industry Operations.

There were three key differences between NZITO and MINTRAC:

- NZITO is responsible for the administration of Quality Assurance of meat industry training
- NZITO is responsible for the administration of apprenticeships and traineeships (a role comparable to that of Australian NACs)
- NZITO is dependent on government income gained from managing traineeships to cover most of its operational costs.

There is minimal meat industry activity in schools, and no apparent equivalent to the Australian VET in schools program. Nor are there clearly articulated pathways between VET and Higher Education qualifications. This is largely because meat industry training activity tends to focus predominantly on Certificate II and III levels, and training undertaken in higher levels is in the more generic First Line Management programs, whereas there are specific meat industry qualifications in Australia across the full spectrum of qualification levels. This was illustrated in the Study Tour team's visit to Mainland, where it was clear that there was strong participation in the lower levels of training, but less likelihood of participation in First Line Management, and no examples of staff having moved on to undertake diploma level qualifications.

The NZITO Strategic Plan relates to the Meat Industry Association strategic plan and expresses a long term goal of growth to ensure sustainability and a fit with both government expectations and a focus on core training. The plan is updated regularly through consultation with NZITO

[4] A summary of the New Zealand education and training system is provided in Appendix 3:1

committees, use of an on-line survey to gather information on skills gaps and the regular analysis of demographic information.

It is evident that only traineeships and targeted programs such as the *Job Partnerships with Industry* program (described in Chapter 4) receive government funding, and all other programs are delivered on a fee-for-service basis.

Butchery training is offered through access to six qualifications at three Polytechnics: Manuaku Institute of Technology, Wellington Institute of Technology and Christchurch Polytechnic Institute of Technology.

The MINTRAC International Study Tour team prepares to visit Mainland Meats, in Hamilton, New Zealand.

Two features of the New Zealand training and education system warrant closer examination with a view to adopting some or all of the practices in the Australian context:

- monitoring of the Quality Assurance of meat industry training and assessment by a meat specific body – this has the advantage of ensuring that the auditor has familiarity with the meat industry context and is able to ensure that appropriate industry standards are observed as part of the training delivery and assessment.
- National coordination and management of meat industry traineeships. The New Zealand system enables consistency of management, advice and application of traineeships. While the geographic nature of Australia is vastly different to that of New Zealand, there is an appeal in the opportunity for greater national consistency of approach. NZITO claimed an 85% success rate in the completion of traineeships, and this can be attributed in part to the central control and management of the program.

Table 3.3: What are the strengths of the New Zealand system, when compared to the Australian system?[5]

	National Structure	**Quality and funding arrangements**	**Structure of meat industry training system**	**Strategic approach to meat industry training**	**Meat industry participation and data collection**	**Supply chain**
	4	4	4	3	4	3

[5] For full details of this table, refer to Table 3.2

3.2.2 United States of America

The structure of the USA education and training system[6] is quite different to that of Australia. Responsibility for, and funding of education and training is largely State-based and there is far greater independence of individual bodies to determine curriculum, qualifications and delivery strategies.

As a result there is no national system of vocational education and training, and thus there are no national meat industry vocational qualifications. It is evident that initiative for the development and delivery of meat industry training for blue collar workers resides firmly with meat industry companies, and on the whole is restricted to compliance requirements.

There appears to be minimal government input and contribution to meat industry training at vocational level, although there are some generic labour market programs which can be accessed to include meat industry personnel. As a result the availability and quality of training tends to be in response to market forces, company priorities and food safety requirements.

The USA appears to have far less cross-company worker mobility than in Australia, and therefore there would seem to be less need for qualifications which are transferable across the industry. However, turnover rates and labour supply are evidently critical issues to the industry.

Peak bodies, such as the National Meat Association (NMA), tend to encourage sponsorship and support of education and training through their own structures, rather than through government processes. This is evidenced in strong scholarship programs and industry support and recognition of scholarship students at university level.

At the NMA convention, the Study Tour team was introduced to an entry-level worker training program developed by Alchemy Training Systems which was evidently being well received by a number of companies. The increasing need for recognised entry-level worker training was acknowledged by a number of people at the convention, and was explained in terms of customer (such as McDonalds and Wal-Mart) requirements for the documentation of training.

The US blue collar workforce is predominantly non-English speaking, which has posed challenges to the implementation of training. Given the rapid growth of the number of migrant workers in Australian meat plants, there is opportunity for a continuing relationship with companies such as Alchemy, to identify strategies and suitable materials for delivery to meat industry workers.

In the United States it is evident that the universities take a far-reaching and proactive role in the delivery of education and training programs to the meat industry than in Australia. The Study Tour team visited both Texas A&M University and Nebraska University[7], and found the following features:

- well structured outreach programs which ensured availability of on-hand technical and research expertise to meat industry companies and individuals
- a close relationship between research and education programs which provided timely and targeted training across the supply chain

[6] A description of the USA education and training system is included in Appendix 3:2
[7] Nebraska have developed a bovine program complete with 3D imaging. This is available at http://bovine.unl.edu/eng/

- an increasing preference by companies to seek out and employ graduates in meat processing plants (For example, A&M produces about 800 graduates per year. Of these 30% go directly to industry, 30% government)
- programs which regularly bring together practitioners from across the supply chain and which result in a far greater awareness of producer to customer relationships than is evident in Australia. Of particular interest was a program offered at several Universities, known as 'Beef 101'. It is recommended that this type of program be investigated further with a view to offering a version of the content in Australia
- a range of meat-specific undergraduate qualifications which were producing high calibre graduates to the meat industry
- high participation rates in competitions such as meat judging programs which created interest in the meat industry and were often a source of potential recruits.

There are a number of schools which offer Agricultural streams and these are often a source of students into the meat programs offered at Universities, although it was indicated by several parties that student numbers were steadily declining.

Table 3.4: What are the strengths of the US system when compared to the Australian system?[8]

	National Structure	Quality and funding arrangements	Structure of meat industry training system	Strategic approach to meat industry training	Meat industry participation and data collection	Supply chain
	2	1	2	1-2	1	3

The National Meat Association Congress, San Francisco.

[8] For full details of this table, refer to Table 3.2

3.2.3 Canada

The Canadian training system[9] bears a resemblance to the Australian training system of the early 1990s. A series of State-based colleges such as Olds College, and technical colleges such as the Northern and Southern Alberta Institutes of Technology (NAIT/SAIT), offer specific vocational education and training programs, some with limited government support. There are no national vocational education and training qualifications, no monitoring of qualification currency or quality, and minimal industry input into training programs offered. Like the USA, the majority of meat industry training in Canada is company specific and not accredited.

Canada has a very strong state (provincial) identity, and the Study Team was advised that there would be little likelihood of a move to establish a national system of qualifications.

The Institutes of Technology provide short intensive (5-6 month) courses predominantly in the meat cutting areas. The programs contain a work experience focus and it is rare for a student to finish the program without having been offered employment. Two members of the Study Tour team toured the facilities at SAIT, and collected details of a program which has the potential for adoption in Australia, with some modifications.

Olds College is the only College which offers a meat processing program. The five-month program can accommodate up to 12 students. The College has a small meat processing plant, plus the students undertake industry-based work experience. Most students have 10-12 job offers before completion of the program. The College maintains a close allegiance to the Canadian Professional Meat Cutters Association which assists with the development of reference material.

There is a strong desire to develop a slaughtering apprenticeship in Alberta, led by the Food and Rural Development unit of Alberta Agriculture. Representatives indicated that there was good support from industry, and anticipated that there would be about 250 applicants annually into such a program.

The only form of national recognition of programs in Canada is the 'Red Seal'[10] system, whereby an apprenticeship qualification gained in one province is recognised in other provinces.

There is no University level meat science degree in Canada, although representatives from the University of Alberta are involved in the development of a strategy to promote the development of value-added product through the development of a Centre of Innovation for Meat Science and Technology (described in more detail in Section 6).

In 2004, Olds College was awarded a government grant to undertake a national study into the possible development of a National Meat Training centre. This study is now in its final phase,

[9] The Canadian education and training system is described more fully in Appendix 3:3

[10] The Red Seal Program was established to provide greater mobility across Canada for skilled workers. Through the program, apprentices who have completed their training and certified journeypersons, are able to obtain a "Red Seal" endorsement on their Certificates of Qualification and Apprenticeship by successfully completing an Interprovincial Standards Examination. The program encourages standardization of provincial and territorial apprenticeship training and certification programs. The "Red Seal" allows qualified tradespersons to practice the trade in any province or territory in Canada where the trade is designated without having to write further examinations. Source: http://www.red-seal.ca/Site/about/redseal_e.htm

and the report was due to be published by the end of March 2006. The study has focused on issues such as training, recruitment and retention, and technology, and is expected to make recommendations relating to the introduction of national training standards. Following the visit of the Study Tour team, where the presentation about the Australian Meat Industry training system was received with considerable interest, Canadian representatives have indicated an intention to make a reciprocal visit to Australia following the release of the report.

It is evident that the Australian Meat Industry training system is a model which has many features which could be transplanted into the Canadian environment, and that MINTRAC, in particular, has expertise which could assist in the development of a Canadian system. One of the recommendations arising from this report, is to further consider the extent to which the Australian Meat Industry is prepared to encourage and support the promotion of the Australian standardised national training systems in the international arena.

Olds College has developed a program with a meat college in Kulmbach (located two hours from Frankfurt, Germany) which supports a student exchange program funded through the National Beef Industry Development fund. The exchange agreement enabled 12 students from Germany to tour the meat industry in Alberta and to meet Canadian students for the first week of the Meat Processing program at Olds College. The students also toured a variety of meat processing facilities in Alberta, as well as touring Alberta. Olds College Meat Processing alumni, students and other industry professionals from Alberta, in turn, toured Kulmbach's college and attended an international meat conference in October 2005. A second group of German students is due to arrive in Alberta in August 2006. While the details of this program were only scant, the principle of fostering international exchange through student programs is appealing, and warrants further consideration in Australia.

Table 3.5: What are the strengths of the Canadian system when compared to the Australian system?[11]

	National Structure	Quality and funding arrangements	Structure of meat industry training system	Strategic approach to meat industry training	Meat industry participation and data collection	Supply chain
	1-2	1-2	2	1	2	2

Meat section in a typical Canadian supermarket.

[11] For full details of this table, refer to Table 3.2

3.2.4 England

Not unsurprisingly, the English[12] and Australian education and training systems have a large number of similarities. While the structure of the Higher Education system closely resembles that in Australia, non-university level post-secondary technical education is provided by technical colleges, colleges of further and higher education and accredited independent colleges. The Business and Technology Education Council offers many vocational courses leading to the BTEC First Diploma (one year, full-time) or to the BTEC National Diploma (two to three years, full-time). A Higher National Diploma (HND) is conferred after three years' study by the Business and Technology Education Council.

Meat Industry training in England is managed predominantly through the Meat Industry Training Council. The Meat Industry Training Council, formed in 1991, is an independent body responsible for training and education in meat and poultry sector, and provides a number of services, including:

- training advice and consultancy
- design and publication of training materials
- development, accreditation and awarding of meat vocational qualifications.

The Meat Industry Training Council is a sub-council attached to Improve, the Sector Skills Council for Food and Drink Manufacturing, and is responsible for the administration and Quality Assurance of National Vocational Qualifications (NVQs - SVQs in Scotland) which are available for all meat and poultry functions at every occupational level. They are often assessed in-company by nationally qualified personnel. The qualification system is a dual system of competency-based vocational (NVQs – levels 1-4) and the more academic institution-based qualifications (VQs).

A national Traineeship system is offered with funding mainly channelled through Colleges – Companies must be authorized to accept Trainees.

For technician, supervisory and management staff, HNDs in meat technology are available and there is an MSc in meat science. There are also higher-level S/NVQs. In addition the Red Meat Industry Forum (RMIF) gave the Study Tour team a presentation about a Management Development program which has been developed in conjunction with Cranfield University.

There are three levels of butchery apprenticeships: Young Apprentices (level 1), Modern Apprentices, (level 2) and Advanced Modern Apprentices (level 3) – at this level, apprentices will have completed NVQs at levels 2 and 3, plus an Advanced Certificate in Meat and Poultry (VQ).

There is an Intermediate Certificate in Meat and Poultry Management which targets new and existing supervisors, and which appears to parallel the Australian Certificate IV level Leadership qualifications.

Meat industry workforce priorities are identified within the Sector Workforce Development Plan (SWDP)[13], a strategic document describing the industry and its labour market, workforce and skills development needs. A SWDP outlines the scale and nature of improvements necessary for business, sectoral and national competitiveness. The SWDP is a strategic resource plan for the

[12] A description of the United Kingdom education and training system is located at Appendix 3:4

[13] This plan is available on the Improve website at http://www.improveltd.co.uk/improve/Downloadable_Documents/Live_Docs/Sector_Workforce_Development_Plan_for_the_Red_and_White_Meat_Industries_20012005_.c1230.aspx

whole industry as represented by the Meat Training Council (MTC) and it prioritises the main skill and staff development needs for the red and white meat industries, over the next three to five years and identifies how these needs might best be met.

A presentation was made to the Study team by Richard Dilworth, Group Health, Safety and Training Manager from Anglo Beef Processors. This presentation demonstrated company commitment to national qualifications, although the increasing number of English as Second Language workforce members meant that numbers were dropping. The company also had a scheme for supporting trainee managers in technical and management skills over a period of 18-24 months. In addition the company had a regular intake of University graduates, and indicated that a 1/10 success rate in retaining graduates was regarded as a positive outcome.

Table 3.6: What are the strengths of the English system when compared to the Australian system?[14]

	National Structure	Quality and funding arrangements	Structure of meat industry training system	Strategic approach to meat industry training	Meat industry participation and data collection	Supply chain
	2	3	3	2	1	2

Butcher's Hall. London.

3.2.5 Ireland

The Irish education and training system[15] is structured similarly to both England and Australia. Higher education in Ireland is offered by universities and institutes of specialized higher education. Universities are financed for the most part by the State in the form of annual grants-in-

[14]For full details of this table, refer to Table 3.2

[15] A description of the structure of the Irish education and training system is located in Appendix 3:5

aid and non-recurrent grants for capital expenditure. Each college has its own governing body and exercises full control over its finances.

Higher technical and vocational education is offered by Institutes of Technology (formerly Regional Technical Colleges) and specialised colleges. They offer two-year Certificate, three-year Diploma and four-year Degree programmes in the applied fields of Engineering, Science and Business Studies, as well as some postgraduate courses.

The Further Education and Training Awards Council (FETAC) is a statutory body established under the Qualifications (Education and Training) Act, 1999. FETAC represents a relatively new departure for learners engaged in further education and training, in that it unifies former certification agencies under one banner. The organisation carries out the functions of the former National Council for Vocational Awards (NCVA) and validates programmes for and makes awards on behalf of CERT/NCTB, FÁS, Teagasc and BIM.

All FETAC awards are part of a new inclusive national framework, which is being developed by the National Qualifications Authority of Ireland (NQAI). This framework provides national recognition of achievement and access and progression opportunities for all learners in Ireland. The national framework of qualifications has the capacity to facilitate international recognition of Irish awards through its linkages with counterpart frameworks in other countries.

Training for the meat industry is overseen by the Food and Drinks sector of FAS (Foras Aiseanna Sathair) – the Irish National Training and Employment Agency.

In 2001 FAS embarked on a national strategy of in-company training in Ireland, aimed at training and upgrading the skills of workers in the Irish meat industry. The project has been supervised by the National Meat Standards Steering Group, and involved the development and accreditation of nationally recognised standards.

The program was described to the Study Tour group by John Simon, FAS Project Manager – Industrial Meat Sectors. He described a competency-based system against prescribed Standard Operating Procedures, with well-established Recognition of Prior Learning, and rigorous Quality Assurance processes. All participants, trainers and assessors are registered on a government data-base.

Over 80% of meat producers/processors in Ireland are now participants in the program and participation is fully funded by the companies, unless they have received a grant to pilot the program. Very few participants receive the whole Certificate, the training is directly aligned to pay structures and is conducted as the need arises. Meat workers who achieve the agreed industry standard are awarded a FETAC National Skills Certificate.

There are a large number of ‘non-nationals’ employed in the Ireland (particularly people of Brazilian origin) and this factor has raised language issues in relation to company training systems.

TEAGASC (Ashtown Food research Centre) is the primary national centre for the provision of Third Level training, which includes the meat industry qualifications.
The courses are accredited by the Higher Education and Training Awards Council (HETAC) and in most situations holders of Higher Certificates are eligible to progress to Level 7 or Level 8 degree programs. Recruitment to the courses is through the Central Applications Office (CAO)

system with a number of places reserved for mature students and holders of designated FETAC awards.

The Meat Technology Department of TEAGASC focuses on developing science-based technologies that will enable the Irish meat industry produce a high quality product. Research priorities include the following:

- establish the influence of production factors on meat palatability, nutrition, colour and health aspects
- develop a core competency in biotechnology of meat quality
- develop early post-mortem carcass intervention technologies to enable the meat industry produce a consistent quality product
- improve the convenience, nutrition and economic viability of existing and new meat products by evaluating new processes and/or functional ingredients.

Table 3.7: What are the strengths of the Irish system when compared to the Australian system?[16]

	National Structure	Quality and funding arrangements	Structure of meat industry training system	Strategic approach to meat industry training	Meat industry participation and data collection	Supply chain
	3	4	4	3	3	3

3.2.6 Denmark

Post-school education and training in Denmark[17] comprises a university sector and a college sector, i.e. the professionally-oriented higher education sector. The university sector includes 11 universities, 5 of which are multi-faculty universities. The other 6 are specialized in Engineering, Education, Veterinary Medicine, Agriculture, Pharmacy or Business Studies. The university sector offers courses at three levels: Bachelor's Degree, Master's Degree, and the Ph.D. Degree. The universities also award the traditional higher Doctoral Degree after a minimum of 5-8 years' individual and original research.

The college sector comprises more than 150 specialized institutions of higher education offering professionally-oriented programmes. Colleges offering medium-cycle higher education have started merging into more comprehensive Centres for Higher Education (Centre for Videregående Uddannelse (CVU)). Vocational colleges have formed Vocational Academies (Erhvervsakademier) as a framework for regional cooperation.

The Ministry of Science, Technology and Innovation is responsible for university education except for certain higher education programmes which come under the Ministry of Cultural Affairs. The Ministry of Education is responsible for short- and medium-cycle education. The legislation covers the aims and framework of education, funding and in some cases curricula, examinations and staffing. Higher education institutions are publicly financed and State-regulated.

The quality of higher education is ensured by ministerial approval of new programmes and

[16] For full details of this table, refer to Table 3.2
[17] The Danish education and training system is described more fully in Appendix 3:6

institutions, external examiners and an evaluation system. Although they have institutional autonomy, institutions must follow general regulations concerning teacher qualifications, award structures, study programmes and quality assurance.

The Danish education and training system featured a well established and long-stranding centralised approach to meat industry training. The Danish Meat Trade College, founded in 1964, by the Danish slaughterhouses, is responsible for the provision of Vocational education and training, technical education and continuing training. Funded through a combination of government funding, student fees and industry contributions, the College has its own modern export-approved slaughterhouse with 1100-1600 killings weekly, de-boning facilities and further processing equipment, and offers a wide range of short programs, school-based programs, and training programs for all levels of the industry.

A feature of the Danish Meat Trade College program is the five-week Basic Educational Programme in slaughtering, cutting, de-boning and further processing of pigs. The program introduces the students to all the basic elements in running an abattoir according to EU standards through practical experience at the College's slaughterhouse.

An example of a proactive approach to management training was a program of critical thinking developed in partnership with Danish Crown, which sought to influence the attitudes of workers through the raising of quality consciousness and a better understanding of the organisational and industry context in which workers operate.

The programs described to the Study Tour Team had a far more structured approach than is generally experienced in the Australian context, with a more fixed arrangement of units and programming schedules. For example every program has a 1/3 general and a 2/3 industry focus.

Despite the programs on offer through the Danish Meat Trade College, the Study Tour team's visit to Danish Crown at Horsens indicated that that company, responsible for 90% of production in Denmark, conducted its entire basic worker training in-house, and did not require any formal qualifications. It did, however, have a continuing relationship with the Danish Meat Research Institute, as described below.

One of The Danish Meat Trade College's objectives is to participate in the development and implementation of training activities internationally, and the team encountered one example of this with the management training program being offered through RMIF and Cranfield University in England, and which is currently being adapted for delivery through the Danish Meat Trade College.

The Meat Trade College's international training activities are developed in close co-operation with the client and specially designed according to the trainees' training needs and requirements. The training is often based upon the principle of training of trainers, and the actual training may take place at The Danish Meat Trade College's facilities or the client's premises abroad, depending on which solution best meets the specific training requirements.

The other driving force is the Danish Meat Research Institute, internationally renowned for its results. Owned and financed by the meat industry, its research and development programme covers almost all areas of meat production, from pig transport and slaughtering technology, to processing and refrigeration methods, quality management and environmental protection. Recent work has focused on the automation of slaughtering, cutting and boning processes. The Meat Research Institute works with the two slaughterhouse companies, universities and other research

establishments all over the world and carries out consultancy and advisory services at home and abroad.

Institute staff often work extended periods with particular companies to train operators, technicians and supervisors on new technology – and the Study Tour team saw examples of this at the Danish Crown plant at Horsens. The Institute Director acknowledged that there was a greatly increased need for basic technical skills among meat industry workers and that the industry was working to address this.

At the Higher Education level, most students undertake a generic Food Science undergraduate degree and then move to a meat specialisation as part of a Master's degree through the University of Copenhagen. However, it is evident that very few of the graduates in Meat Technology or Meat Science are directly employed by companies. Danish Crown did indicate that they employed a wide range of graduates across all areas of management and administration.

Table 3.8: What are the strengths of the Danish system when compared to the Australian system?[18]

	National Structure	Quality and funding arrangements	Structure of meat industry training system	Strategic approach to meat industry training	Meat industry participation and data collection	Supply chain
	3	4	4	4	4	4

Part of the conveyor system at Danish Crown, Horsens, Denmark.

[18] For full details of this table, refer to Table 3.2

3.3 Discussion of research areas

3.3.1 Meat industry education and training structures

The Study Tour team generally found that the more involved a country was in meat industry export, then the more likelihood there was of a formal, government-administered vocational or technical training regime to be in place for the meat industry. The system described in Ireland was probably the most rigorous in prescriptiveness and Quality Assurance measures. At the other end of the spectrum, the USA, predominantly a domestic meat producer, had very little in the way of formalised training beyond company structures. Almost universally, however, those countries without national qualifications or formalised training arrangements expressed a desire to move in that direction, and acknowledged that such requirements were gradually being imposed on them by larger customers such as McDonalds and through the need to demonstrate compliance and currency in the addressing of food safety requirements.

Another variable affecting training was the availability of potential blue collar workers. Nearly every country visited indicated an increasing reliance of non-citizen labour sources, often non-English speaking. In countries, such as the USA, where the sources of such labour were relatively unlimited, there seemed to be far less interest on the provision of structured training at that level, than in countries where it was more difficult to fill positions, and hence there was more focus on training and retaining existing workers.

Most countries had some form of apprenticeship or traineeship equivalent training system, usually government supported. On the whole the Australian system appears to work as well as most, although the New Zealand system of administration of meat industry traineeships through a single body (the NZITO) possibly helps to explain the high level of trainee retention, and warrants further exploration for the Australian context.

There are quite marked differences between countries in relation to Higher Education. The United States model of university meat science programs and the outreach and advisory support certainly has potential application in Australia. Although many of the outreach activities described are fulfilled by MLA in Australia, it is proposed that it is timely to explore the development of a dedicated meat science degree with at least one University in Australia.

In terms of creating pathways between school, vocational and higher education, the team encountered no outstanding examples which suggested that these were better established and smoother than in Australia. On the whole, such transitions were not expressed as a priority in any country.

3.3.2 Funding arrangements

Vocational education and training in Australia seems as adequately funded as in any other country. The comparisons ranged from countries where there was minimal or no government support for vocational or technical meat industry training (USA), to countries such as Denmark, England and New Zealand which had well established, government-supported vocational systems which operated similarly to Australia.

In no country did we come across a level of industry support for training and education which equalled that of the Australian meat industry. For example, the MINTRAC equivalents of NZITO and the UK Meat Training Council both experience varying levels of government funding support,

whereas MINTRAC is fully supported by the meat industry. It is not suggested that this should change for MINTRAC, however, as MINTRAC is more able to directly represent the interests of the industry than its international counterparts, which are far more subject to changes of direction and structure in government policy and priorities.

3.3.3 Quality Assurance of vocational education and training processes

In three countries (NZ, UK and Ireland), the team witnessed examples of responsibility for meat industry training QA vested in the industry training councils or their equivalent. While it was difficult to gain a full understanding of the methodologies and outcomes of these processes, anecdotally it would appear that such responsibility enables the Quality Assurance audits to be undertaken with a far greater understanding of industry processes and requirements than currently occurs in Australia. In an environment where some disquiet has been expressed at the effectiveness of QA processes in ensuring quality training outcomes in the Australian Meat Industry, it is recommended that consideration be given to the development and training of industry-experienced AQTF auditors.

In terms of ensuring standardisation of training and assessment outcomes, we found no system which equalled the moderation processes currently undertaken through MINTRAC, although MINTRAC's efforts are far from comprehensive in the retail and smallgoods sectors.

3.3.4 Strategic approaches to providing training for the next generation of meat industry workers

Because the Study Tour team had very little time or opportunity to meet with peak industry bodies, it was reasonably difficult to ascertain the level of input the industry had into determining education and training priorities for the industry. Generally there were plentiful examples of industry representation on Board and Committees of peak training bodies, and examples of consultation of demographic and labour market data. In the case of New Zealand, England and Ireland there were also examples of Strategic or Business planning processes which related or were linked to industry planning processes. No strategies or processes stood out as being more effective or of greater value than those currently in place in Australia.

3.3.5 Meat industry participation rates and data collection strategies

This area was researched in an attempt to identify whether there were any examples where data collection was more efficiently collected than in Australia, and what use was made of the data collected. The team encountered several examples (NZ, Ireland) where peak training organisations were responsible for data collection, but overall there were no examples which suggested a more comprehensive data collection process than that of Australia. Nor were there any examples of data reporting which suggested a more far-reaching or effective use made of data collected.

3.3.6 Understanding of the supply chain and customer impact on training models

This section of the research was explored to gain an understanding of how other countries were addressing issues of traceability and customer requirements within their training systems. It quickly became evident that the level of distinction that the Australian meat industry makes between its sectors (processing, retail and smallgoods) is not evident in other countries. In many

cases, there were examples where training programs not only included content from across the supply chain, but also attracted personnel from across the supply chain.

This was particularly evident at Texas A&M and the University of Nebraska[19], where many of the short courses offered focussed on a particular product or customer requirements, and therefore attracted people from producers to retailers in the audience. This fostered discussions and understandings across the supply chain which are generally not mirrored in Australia because of the compartmentalisation of sectors.

It is recommended that MINTRAC, in consultation with MLA, undertake to investigate the development of a range of professional development programs which encourage cross-sectoral participation.

3.4 Recommendations

Recommendation 3.1
It is recommended that consideration be given to the development and training of industry-experienced AQTF auditors, and that state authorities be encouraged by the industry to use these auditors to monitor AQTF compliance by meat industry Registered Training Organisations. This will ensure that the auditor has familiarity with the meat industry context and is able to test that appropriate industry standards are observed as part of the training delivery and assessment.

Recommendation 3.2
It is recommended that the meat industry investigate the option of establishing an industry-specific New Apprenticeship Centre to apply a national approach to the management of meat industry traineeships and apprenticeships. This will ensure that there is greater national consistency in the promotion management and monitoring of Traineeships.

Recommendation 3.3
It is recommended that MINTRAC staff maintain a continuing relationship with representatives from the organisations visited overseas, in order to draw on expertise to address emerging issues such as providing training for migrant workers, and to develop versions of overseas programs which have a relevance or application in the Australian context.

Recommendation 3.4
It is recommended that a decision is made in relation to the extent to which the Australian Meat Industry is prepared to encourage and support the promotion of the Australian standardised national training systems in the international arena.

Recommendation 3.5
It is recommended that the meat industry international student exchange programs currently being undertaken be further investigated with a view to developing similar programs across all levels of education and training in the Australian meat industry.

Recommendation 3.6

[19] Examples of programs which were viewed are: Pork – exploring quality, consistency and value / Principles of processed meat product development / Beef 101 / Dry and semi-dry sausage short course / Meat Culinology / Texas Beef Quality producer program

It is recommended that MINTRAC, in consultation with MLA, investigate the feasibility of introducing a dedicated meat science degree with at least one University in Australia.

4 Training Delivery

Kath Evans

Introduction

The assessment of training delivery used in each county was reliant upon research of resource material provided by training personnel in each country or by internet research. The research methodology consisted of interviews which were conducted with meat industry representatives, employer representatives, vocational education and training organisations, university personnel, and college personnel or trainers in each country visited. Other than by the provision of written training material, the information provided in the training delivery report is derived from notes taken during interview sessions. Information was exchanged with each country in this way.

It is unfortunate that time did not allow for the opportunity to visit and speak with industry unions and industry employer associations. Additionally we were not able to speak to individual workers who were undertaking training. I feel that this may have broadened the scope of information and provided examples of practical impact of the implementation of training at the workplace. It is recommended that this aspect of research be included in future study tours.

Training in the meat industry in Australia compares favourably with countries such as New Zealand, United Kingdom, Ireland and Denmark. Over 80% of Australian meat workers have received structured accredited training. Training of Australian workers is undertaken on-the-job by accredited trainers, and assessment is undertaken by accredited assessors. The New Zealand training qualifications framework is closely aligned to the Australian standard.

Improvements to the Australian training structure can be made to the quality assurance of training as is evident from the evaluation outcomes.

A national qualifications framework exists in countries with a high focus on the export market. There are more expectations by customers with focus on food safety and HACCP and hygiene standards.

The meat industry in the countries visited by the study team is facing similar problems with recruitment and retention of the labour force. The use of immigrant workers is becoming more prevalent in each of the countries visited. No formal training existed where the use of immigrant workers has been in place for many years, in countries such as such as United States and Canada.

It was apparent that where a national qualifications framework was in existence, immigrant workers usually had no access to formal training other than training performed on-the-job to specific tasks.

If Australia is to become a world leader in vocational education and training in the meat industry there is an immediate need to ensure that all workers have access to and are trained to meet the Australian training standards.

A key issue facing the meat industry in Australia is the training of immigrant workers to meet Australian training standards. The immediate needs are to address training of immigrant workers in key areas such as Occupational Health and Safety and food safety, develop training resources

to train workers from non English speaking backgrounds, training trainers, and development of bilingual training resources.

Evaluation template

A comparison was made between vocational education and training of all countries visited and the Australian training system within the context of delivery models, assessment strategies, meat industry qualifications and training and quality control. An evaluation template was developed which assumed Australia was 80% of a possible 100%. The assumption of Australia as 80% does not reflect Best Practice, but a base from which to measure the Australian system of vocational education and training in the meat industry.

Table 3.1: Comparative strength of visited countries when considered against the Australian context

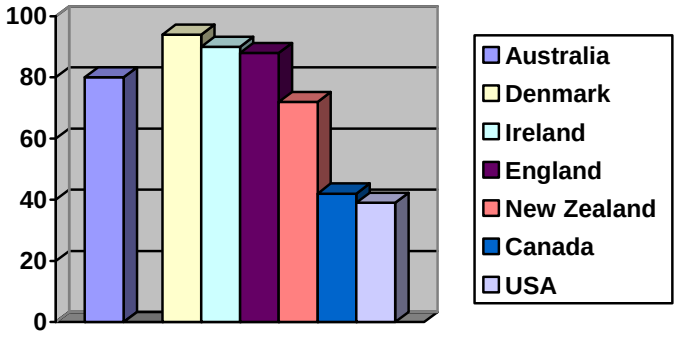


Table 3.2: Seeking vocational education and training excellence in the Australian Education and Training System

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
Importance	**5/25**	**6/25**	**7/25**	**7/25**
1	Training is delivered by buddy system. No formal training for trainers Training delivery on-the-job. Government does not support traineeships.	No assessment undertaken.	No national qualifications framework that provides for national recognition of a trade qualification and portability of qualification. No structure of consultation in training with the meat industry / No career path	No formal system of record of training. No audit of training delivery. Audit only by government regulators for compliance
2	Training delivery by workplace trainer. Training delivery is all on-the-job No formal industry training framework.	Assessment undertaken by trainer or supervisor. No formal accreditation of assessors	No national qualifications framework. Training needs determined by worksite only. No national industry involvement in the development of training. No career path.	Record of training delivery for employees. No audit and monitoring of training delivery. Audit only by government regulators.
3	Training delivery by workplace trainers. Trainers are trained as trainers eg Train the Trainer qualification. Training against Standard Operations Procedures (SOP).	Trainee is assessed by workplace assessors. Completion of an assessors course Internal or external Assessors at the workplace.	No qualifications framework that provides for national recognition of a qualification and portability of qualification. No national qualification that reflects the requirement of industry. No formal industry consultation. No structured career path.	Formal system of record of training delivery for employees. No audit and monitoring of training delivery. No audit of training providers. Audit only by government regulators.
4	Training outcomes are developed and delivered from National Standards to meet performance criteria. Competency based training delivered by accredited trainers. Training delivery on-the-job and off-the-jo. Government financial support for traineeships.	Assessment undertaken against requirements of the National Standards. Trainee is assessed by accredited assessors. Formal structure of accreditation of assessors. Internal and external accredited assessors.	Structured national qualifications framework. Portability of qualifications across states and territories. Meat industry committed to and supports national qualifications. Structured career path.	Formal record of training. Data collection by government regulators. Formal audit and monitoring of training delivery across states and territories. Formal audit by government regulators.
5	Training outcomes are developed and delivered from National Standards to meet performance criteria. Competency based training delivery by work experienced and accredited trainers. Training delivery off-the-job and on – the-job in a non productive environment. Government financial support for traineeships.	Assessment undertaken against requirements of the National Standards. Trainee is assessed by industry experienced accredited assessors. Formal structure of accreditation of assessors. Internal or external accredited assessors.	Structured national qualifications framework. Portability of qualification across states and territories. Meat industry committed to and supports national qualifications framework. National qualifications that reflects the requirement of industry for fully trained and competent workforce. All employees undertake accredited training. Structured career paths. Individual can choose own career path.	Formal record of training. Data collection by government regulators who have industry knowledge. Formal audit and monitoring of training delivery across states and territories undertaken by auditors who have industry knowledge. Formal audit by government regulators.

4.1 Summary of findings

4.1.1 New Zealand

4.1.1.1 Delivery model and strategies

The New Zealand National Qualifications Framework

The National Qualifications Framework is made up of nationally endorsed standards and qualifications and is supported by:

- the quality assurance and registration of national standards and qualifications
- the accreditation and audit of the organisations that use the national standards and qualifications
- the moderation of standards to ensure national consistency, and
- the periodic review of national standards and qualifications [20]

The New Zealand Industry Training Organisation (NZITO) is recognised by the Tertiary Education Commission and the New Zealand Qualifications Authority as the national standards body for the meat industry along with the dairy and Occupational Health and Safety industries.[21] Responsibilities of NZITO include the development and review of national qualifications and unit standards, the registration of on-the-job assessors and the administration of qualification records.

The NZITO is controlled by a Board of Directors and operational policy for the meat industry is steered by a Meat Sector Advisory Group comprising of human resources, training and employee/union representatives.

Meat qualifications available include national certification in:

- Meat Inspection Services
- Meat Retailing – Curing Smoking and Smallgoods Manufacture
- Meat Processing and Fellmongery Processing
- Management
- Meat Processing – Further Processing
- Meat Processing Grading
- Meat Processing – Introductory Level
- Meat Processing Petfood Safety
- Meat Processing Petfood Safety
- Processing Preparation of Livestock
- Meat Processing, Slaughter and Dressing
- Meat Processing Small Goods
- Meat Processing Venison
- Fellmongery Processing.

Certification is provided by the New Zealand Qualifications Authority and are issued by the New Zealand Industry Training Organisation

Quality Management Systems

Providers and Industry Training Organisations must be accredited by a recognised Quality Assurance body before they can register credits from assessment against standards. Accredited Providers and Industry Training Organisations assessing against standards must engage with the

[20] Paper by New Zealand Qualifications Authority: The New Zealand National Qualifications Framework
[21] New Zealand government: Summary Job Partnerships with Industry

moderation system that applies to those standards. Accreditation requirements and the moderation system are outlined in the associated Accreditation and Moderation Action Plan (AMAP) for each standard.

4.1.1.2 Role of Training in Recruitment and Career Planning

SkillNZ

SkillNZ is a joint initiative between government, business and New Zealand and the New Zealand Council of Trade Unions that aims to promote workplace learning to students, employees and employers. [22]

Gateway

The Gateway project is managed by schools through delegated facilitators and is co-ordinated and funded by the Education Commission as part of a new tertiary education initiative. [23]

Job Partnerships with Industry

The New Zealand Government has introduced an employment initiative which aims to increase the flexibility and speed of response to genuine skills and labour shortages experienced by industries by targeting skills training of specific client groups to meet areas of industry need.

The New Zealand Industry Training Organisation facilitates this initiative for the meat industry. Participants receive pre-employment training that covers:

- food safety
- Occupational Health and Safety
- product knowledge.

Trainees can achieve six NZQA credits towards a National Certificate in Meat Processing Level 1. The six remaining credits required to complete the qualification can be done on-the-job. Once placed in employment, clients will be supported to negotiate a formal Industry Training Agreement or a Modern Apprenticeship. [24] Traineeships are funded by the Government.

A system of modern apprenticeships also exists, and these are designed to complement and build on existing work-based industry training and other pathways into tertiary education. [25]

The Study Tour team visited Mainland Products. A case study of the training provided at Mainland is provided in Appendix 4.1

Table 3.3: What are the strengths of the New Zealand Vocational Education and Training System, when compared to the Australian system?[26]

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
	4	4	4	4

[22] Industry Training: ***www.skillnz.org.nz/industry-training/employers.html***
[23] Gateway: A new gateway to careers for young people ***http://www.hhs.school.nz/sr_business.html***
[24] New Zealand Industry Training Organisation: Straight To Work – Meat Industry
[25] Tertiary Education Commission: http://www.modern-apprenticeships.govt.nz/ReneredAbout.html
[26] For full details of the table, refer to Table 3.2

4.1.2 United States

4.1.2.1 Delivery model and strategies

The United States has no national qualifications framework for vocational education and training. Emphasis has been placed on compliance and in particular HACCP, food safety, hygiene and work practices. It was apparent that training occurs at the workplace with high dependence on workplace structures for training delivery. Training appears to be designed to be task-specific and formal assessment of competence is undertaken by the trainer or person in charge.

There was a high focus on customer demands, and workplace training was designed to cater for customer requirements and achieve a company-driven competitive edge.

The workforce can consist of higher than 90% non-English speaking immigrant workers. There appeared to be no formal system for training for immigrant workers, but the team did encounter examples of training delivered by an interpreter to colour-coded specifications with constant reinforcement of compliance requirements. A driver for training has been compliance with regulators, prevention of litigation and customer driven training requirements.

Recruitment and retention of workers was identified as an issue in the US. Increasing numbers of illegal immigrants is an issue which has resulted in the introduction of legislation by the government. The legislation introduced is the "Secure Border Initiative Enforcement Plan" which features:

- increasing interior enforcement of the immigration laws – including more robust worksite enforcement
- increased funding for enforcement
- encouragement of state and local law enforcement
- Guest Worker Legislation pending (issues relating to current illegal worker status).

Whilst there was no evidence of industry-driven initiatives to address recruitment and retention issues, individual workplaces have adopted their own strategies for recruitment and retention with some incentive systems implemented. Examples of workplace recruitment and retention strategies are described in Appendix 4.2.

Several reports have been developed on the labor standards in meat packing plants in the US. A submission by Human Rights Watch on "protecting the rights of all migrant workers as a tool to enhance development' made a list of wide ranging recommendations for reform, and stated: "Immigrant workers make up the majority of the labour force in the US meat industry. Instead of integration into the host society with full application of labour rights and labour standards they are marginalized in a huge underclass labouring in substandard employment conditions. There are a high number of illegal immigrants working in meat packing plants across the US". [27]

In 2005, Eric Schlosser found that: "The injury rate in a slaughterhouse is about three times higher than the rate in a typical American factory. Every year more than one-quarter of the meatpacking workers in this country- roughly forty thousand men and women – suffer an injury or a work-related illness that requires medical attention beyond first aid. There is strong evidence that these numbers, compiled by the Bureau of Labour Statistics, understate the number of meatpacking injuries that occur. Thousands of additional injuries and illness most likely go unrecorded."[28]

[27] Human Rights Watch: Submission on Protecting the rights of all migrant workers as a tool to enhance development
[28] Bureau of Labor Statistics, Fast Food Nation: Eric Schlosser 2005

The United Food and Commercial Workers International Union (UFCW) contends that for immigrant workers language and cultural barriers make it nearly impossible for many workers to know their rights on the job and to implement anti-discrimination measures provided to them under the Law. The Union is promoting a new training program, designed to give immigrant workers the tools to better protect themselves. In addition, the UFCW will produce a Spanish-language culturally sensitive educational video to educate workers of their rights under the Law. [29]

There appeared to be no formal structure of assessment other than assessment on ability to perform the task.

On the surface there appeared to be no formal record keeping of training, although it is apparent that training records of tasks are maintained for compliance with HACCP and customer requirements.

Training has been identified in areas of high litigation, for example EEO principles.

In the USA, emphasis has been placed on training at tertiary level, college graduates rather than vocational education and training. Texas A & M University is an excellent example of Meat Science Education i.e. Certificate in Meat Science Department of Animal Science.

The Study Tour team encountered few examples of entry level training programs. One exception is the Alchemy Employee Training Project which was described at the National Meat Association Congress in San Francisco. It featured the introduction of an electronic training tool for entry level employees which appeared to have good anecdotal results in recruitment and retention. The tool demonstrated excellence in record keeping of training outcomes.

Vocational education and training in schools was once available and many schools included vocational education in curriculum including meat processing. However placement of graduates was mainly in retail and hospitality. These types of programs have gradually declined.

Table 3.4: What are the strengths of the United States Vocational Education and Training system, when compared to the Australian system?[30]

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
	2/3	2	1/2	2

4.1.3 Canada

4.1.3.1 Delivery model and strategies

Canada, like the United States has no national qualification framework for vocational education and training. Training is workplace-specific and driven by company/regulatory and customer requirements.

Canada has generally moved away from separate secondary institutions for vocational or work-related training and academic or university preparatory streams. Vocational courses are typically offered during the last two years of school, and some can be undertaken earlier with short

[29] http://www.union-network.org/unisite/Sector
[30] For full details of the table, refer to Table 3.2

programs being offered that prepare students who do not wish to prolong their studies or who do not want to obtain specialized vocational training to practice various trades.

Human Resources Partnerships - Sectoral Partnerships Initiative

This is the catalyst that brings together employers, workers, educators, governments and other stakeholders to define and address the human resources challenges facing their industry. Key objectives are:

- develop effective partnerships in and with the private sector
- improve the relevance of the learning system
- foster a lifelong learning culture within industry
- support the mobility of labour across Canada and
- contribute to Canada's labour market information.

The range of activities includes:

- sector councils
- national occupational analyses and standards
- the Red Seal and Apprenticeship programs
- youth initiatives
- sectoral and occupational studies
- National Sectoral Adjustment Service (NSAS).

Creation of a designated meat trade under the Apprenticeship and Industry Training Act

The Canadian Cattlemen's Association National Beef Industry Development Fund has announced the creation of a designated meat trade under the Apprenticeship and Industry Training Act. Funding has been allocated to complete a feasibility study into establishing a designated trade or occupation for the Alberta meat processing industry. Funding will be used to achieve the following objectives:

- determine industry support
- gather required materials to submit an application to Alberta Learning
- work with Alberta Learning and AFPA to develop an industry survey
- develop industry certification standards based on survey results
- gather industry input and commitment to proposed standards to ensure the creation of a sustainable apprenticeship program.

This initiative should be monitored by the Australian Meat Industry with a view to establishing the feasibility of a similar initiative in Australia.

4.1.3.2 Role of Training in Recruitment and Career Planning

Technical Colleges provide short vocational education and training courses, for example:

Southern Alberta Institute of Technology (SAIT) Polytechnic, Retail Meat Cutting Program

The program provides students with theoretical and practical knowledge of the meat cutting industry. Training is hands-on, involving the meat cutting techniques of beef, pork, veal and lamb into retail cuts. The program is of 24 weeks duration inclusive of work experience in a butcher shop, supermarket retail meat market or delicatessen.

Students who successfully complete the program receive a Retail Meat Cutting Certificate. Over 97% of graduates have found employment in independent butcher shops, store retail facilities,

meat plants, meat processors and manufacturers, hotel, resorts, restaurants and catering organisations.[31]

Olds College - Meat Processing Certificate

The program provides students with skills in sanitation, food safety, slaughter, meat cutting and value-added processed meats and sausages. The program is nineteen weeks in duration and is the only one of its kind in Canada. It is hands-on training in an industry-like environment. The program provides professional skills in meat cutting, trimming, boning breaking wrapping sausage making and curing. [32]

Northern Alberta Institute of Technology (NAIT) - Retail Meat cutting Program

This program is designed for participants in meat cutting industry.[33] Its focus is retail (small retail provisions at NAIT). Of five months duration, the program accommodates sixteen students, most of whom move into retailing careers.

Workforce

Canada has a high immigrant workforce similar to the United States. An interview with an official from the United Food and Commercial Workers Union (UFCW) in Canada has revealed that there is very little formal training undertaken in meat packing sites. An orientation training program is undertaken before commencing work. The Union official advised of high chain speeds and high injury rates. Each province has its own labour laws. [34]

There are ongoing issues relating to recruitment and retention. The UFCW official advised of high turnover rates of 200 to 300 people per month at a major company site. The average seniority statistics maintained by the Union for that specific site equals an average employment duration of 2 years. Another has an average of 10 years. It was explained that workers tended to stay if they achieved the higher recognised skill and pay rate with an improved turnover rate of 100 per month on average.

The Canadian Federal Government has introduced a short term visa arrangement where a shortage of skilled workers has been identified in an industry. [35]

Union Scholarships

Scholarships are provided to Union members or their children to upgrade their education.

Table 3.5: What are the strengths of the United States Vocational Education and Training system, when compared to the Australian system?[36]

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
	2	2	2	2

[31] SAIT Retail Meat Cutting www.sait.ca

[32] http://www.oldscollege.ab.ca/

[33] NAIT http://www.nait.ca/

[34] www.ufcw401.ca

[35] http://www.gov.ab.ca/home/index.cfm

[36] For full details of the table, refer to Table 3.2

4.1.4 England

4.1.4.1 Delivery model and strategies

The UK National Qualifications Framework (NQF) sets out the levels against which a qualification can be recognised in England, Wales and Northern Ireland. NVQ's are work-related, competency-based qualifications. They are based on national occupational standards and cover all the main aspects of an occupation, including current best practice, the ability to adapt to future requirements and the knowledge and understanding that underpin competent performance.
The Qualifications and Curriculum Authority regulates awarding bodies that deliver and manage qualifications. The Meat Training Council (MTC) is a sector specific awarding body for the meat and food sectors. It is a company by guarantee and is governed by a board of directors. The MTC has a network of approved centres which are independently quality assured by MTC. The role of the Meat Training Council is to develop training programs in consultation with industry.

Qualifications are based on standards of competence as determined by the meat industry. There are mandatory units from which employers may select. Individuals learn at their own pace – there is no time limit.

MTC approves organisations to deliver nationally recognised qualifications that are publicly-funded. MTC can assist meat companies by directing the company to an approved program provider with funding or to assist that company to become the approved program provider enabling access to funding more directly. Alternately MTC can accredit and certificate a company in-house program. [37] A map outlining possible qualifications is provided in Appendix 4.3.

Assessment can be carried out in the workplace by industry experienced assessors in partnership with an approved centre or wholly delivered by an approved centre.

Workforce
Approximately 40-50% of employees in meat processing plants are from non-English speaking backgrounds. The meat training package is not multi-lingual, therefore the immigrant workforce currently has no access to qualifications, although in-house training occurs.

There is an increasing use of immigrant labour to fill the labour gap, and Sector Skills Councils are currently undertaking research to identify skills gaps. The Meat Training Council has developed a Sector Workforce Development Plan for the Red and White Meat Industries. [38]

Role of training in recruitment and career planning
The following are industry-identified changing training needs:

- more automation
- reduction in skill level required for key work
- predominately non-English speaking workforce
- reduction of retail butchers
- deskilling – using machines to perform the work
- more further process into retail and processing
- less skills for retail areas
- operator and basic machine maintenance training gap
- companies delivering English as second language training
- training foreign trainers.

[37] Meat Training Council documentation and pamphlets
[38] Sector Workforce Development Plan: Meat Training Council

Table 3.6: What are the strengths of the England Vocational Education and Training system, when compared to the Australian system?[39]

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
	4	4	4/5	4

[39] For full details of the table, refer to Table 3.2

4.1.5 Ireland

4.1.5.1 Delivery model and strategies

Ireland has introduced a National Framework of Qualifications (NFQ). Three new organisations were established in 2001, the National Qualifications Authority of Ireland and two new awards councils, Education and Training Awards Council (FETAC) and the Higher Education and Training Council (HETAC). [40]

Vocational Education and Training is managed by FAS, the National Training and Employment Authority.

Meat industry training programs

The meat industry vocational level qualifications are:

- Industrial Abattoir Worker - Beef Sector
- Industrial Abattoir Worker - Pigmeat Sector
- Beef Boner
- Pigmeat Boner
- Industrial Abattoir Worker - Sheep/Lamb Sector
- Poultry Processing
- Certificate in Meat Technology
- Diploma in Meat Technology

The aim of the FAS training program is to equip trainees with the skills and knowledge that will enable them to carry out their jobs to the highest international standards of best practice for workers in the Industrial Meat Sector. Particular emphasis has been placed on food safety and quality and the standards will reflect the growing health concerns of the consumer and the economic demands of the sector. In addition, the program seeks to develop a clearly defined career structure for the sector which will assist meat companies attract and retain the proper caliber of worker.

FAS through its Certification and Standards Department, has developed a process of Accreditation of Prior Learning (APL) which allows existing employees to gain certification using the APL system. The process is by formal assessment using the national standard and candidates must demonstrate their competence against this standard.

Meat Workers who achieve the agreed industry standards will be awarded a FETAC National Skills Certificate.

The training program is delivered and managed in-house by suitably qualified company personnel. FAS empowers participating companies to do this work by conferring them with *Assessment Centre Status* which equips them to carry out the in-house training of their workforce and the assessment of their employees. Assessment Centre Status is awarded to companies which successfully undergo an audit by FAS of their training arrangements.

FAS Approved Assessment Centres - Food Sector

FAS has also developed an “Approved Assessment Centre” system for companies in the Food Sector. This system empowers registered companies to assess workplace competencies in house using assessments which are based on national occupational industry standards. It also

[40] http://www.nfq.ie/nfq/en/The Framework/Aframeworkof qualifications- what and why/

entitles these companies to apply for certificates in respect of their workforce which have achieved the relevant industry standard.

Training programs are developed from Sectoral studies. Such a study was undertaken and produced on 28th April, 2003 described in a report titled '*The demand and Supply of Skills in the Food Processing Sector'*. In this report, recommendations were made for an integrated human resource development for the Irish Food Processing Industry. [41]

Many of these recommendations are worthy of consideration by MINTRAC, for example the recommendation for the development of an induction program for immigrant workers with particular emphasis on health and safety and food safety.

Meat training piloted in the meat industry

The meat training package which was developed in Ireland established Standard Operating Procedures. All tasks were identified by industry by the Steering Committee. The training was piloted in 1999 in the meat sector. To participate in the training, three key personnel were required by each participating company:

- verifier (takes responsibility for assessment)
- trainer pre requisite - competent in all aspects of the job and technical experience – taught teaching methodology Food Safety and HACCP
- assessor (must present before independent assessors to prove their competence).

The cost of training trainers and assessors is borne by the company. Training commences on the job for new employees and existing employees. Recognition of Prior Leaning (RPL) is undertaken by assessment, and is not available by portfolio assessment, as in Australia.

A register of trainees is maintained by government and records initial registration and achievement. This register is also used for audit purposes.

Trainers and assessors are registered against five modules, and are tested themselves by a review panel of independent assessors. They are required to undertake a written examination and have food safety and HACCP qualifications.

This training was rolled out in 2001 across the meat industry in Ireland. Currently 80% of meat processing and 90% of beef producers have the program in place. The training system is not funded by government. It was initially funded in the pilot phase but not after this. Despite this companies have embraced the training program and have reaped financial rewards in other ways. For example, the program is used for due diligence purposes by some companies. An interesting fact is that companies can have 10-15% reduction of public liability insurance by virtue of the implementation of the training system. It is also used as a defence in litigation proceedings including workers compensation.

4.1.5.2 Workforce

There is a very low unemployment rate in Ireland of less than 4%. Today there are approximately 50,000 non-Irish nationals working in Ireland. This has been identified as a big issue for training. The trend is moving towards immigrant labour performing the work in the meat processing industry.

[41] The Demand and Supply of Skills in the Food Processing Sectors Recommendations page 101

It was identified that immigrant labour was mostly utilised in the Consumer Foods Program (Portion Foods Products) because of the highly regulated and technological advancement of the industry. The labour requirement was for low skilled workers to undertake the labouring functions with training on a need-to-know basis.

4.1.5.3 Role of training in recruitment and career planning

It was acknowledged that the more qualified the employee in the meat processing industry the more money could be earned. The achievement of a qualification was linked to pay structures on an enterprise basis.

The report "*The Demand of supply of Skills in the Food Processing Sector*"[42] made a recommendation for the development of an image program for the food sector, communicating its attractiveness as a career opportunity with a focus on attracting second level students into relevant third level food courses and attracting graduates into food sector employment. Further initiatives were recommended as employee focus initiatives including promotional activities.

Table 3.7: What are the strengths of the Ireland Vocational Education and Training system, when compared to the Australian system?[43]

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
	4/5	4/5	5	4

4.1.6 Denmark

4.1.6.1 Delivery model and strategies

The Danish vocational education and training system can be characterized as having a high degree of stakeholder involvement. There is co-operation between the Ministry of Education and the social partners (the Advisory Council for Initial Vocational Education and Training, The Trade Committees, The Local Training Committees, Providers, Colleges, Enterprises and Trainees,) vocational colleges and the enterprises also share responsibility of training for each individual trainee.

The Danish VET system is a highly flexible system offering a wide range of possibilities for trainees. The Legislative framework for the Danish VET programs is a decentralized system; the overall objectives and framework for VET are drawn up at national level and the colleges, enterprises and the trainees are autonomous within the framework. The Colleges receive taximeter grants per trainee and have the responsibility for management issues. [44]

4.1.6.2 The Danish Meat Trade College

The Danish Meat Trade College in Roskilde is an independent Education and Training College which was founded in 1964 by the Danish slaughterhouses. It has developed into a modern educational institution, covering education and training at the following levels:

- vocational education and training
- technical education
- continuing training.

The college services the entire Danish Food Manufacturing Industry especially the meat industry. The Danish Meat Trade College plans and implements relevant training activities. It has

[42] The Demand and Supply of Skills in the Food Processing Sectors Recommendations page 101
[43] For full details of the table, refer to Table 3.2
[44] The Danish Vocational Education and Training System: National Education Authority Danish Ministry on Education

approximately 5,000 students, and of these 500 students are from abroad. Training is conducted at the colleges facilities or as in-service training locally.

Meat areas of education and training

- Slaughtering – and meat industry.
- Retail meat cutting and delicatessen, industry slaughtering and processing industry.
- Meat Inspection and Veterinary regulations.
- Training of veterinarians and meat inspectors, meat inspection technique and food inspection.[45]

Training in the meat sector is conducted over two years with one year focusing on areas of specialization. There is 10 weeks basic training. The student obtains a contract with a slaughterhouse and continues training for 35 weeks. The trainee can specialize in beef or pig slaughtering and can also enter into a contract with a retail butcher.

There are four streams in the meat training courses.

- Basic course.
- Meat Industry.
- Retail Meat.
- Nutrition Assistant.

Other courses include:

- skilled worker education
- industrial butcher
- casing cleaning education
- unskilled and recruitment courses
- basic introduction courses supplemented with specialized courses
- further training activities
- attitude courses (many thousands of workers on this programme, an initiative of Government)
- veterinarians and veterinarian assistants training
- HACCP
- hygiene and own check systems

Workforce

Denmark has very low unemployment with levels currently at 3%. The study tour team was told that some production is moving out of Denmark, necessitated by the tight labour market.

The team was also told about an innovative program currently being run for Danish Crown by the Danish Meat Trade College. The training was developed to ensure that workers understood their individual importance and that what they did at work had an impact upon other workers and departments. A range of different and innovative strategies were being used, for example red, blue, and green rooms. Curriculum was being developed in Denmark with Danish companies contributing a percentage of funds.

Companies advise the college when they need people. The college provides the company names to students and the students apply direct to the company, as well, the college promotes itself to individual companies. A reward system applies whereby the company obtains a bonus if the number of students who are placed on an employment contract increases or if the student is

[45] http:/www.srts.dk

over 18 years of age. The government funds the training during the first 10 weeks of basic training and when the student obtains the employment contract the company continues to fund the training. The trainee is paid by the company when undertaking duties on-the-job. Assessment is by examination both written and practical examinations which are set by the Council.

Completion rates are an issue at the moment and as a consequence a Certificate has been introduced which provides credits towards the whole qualification. The non completion rate is 30% for the meat industry. To overcome the non-completion rate the college is investigating more exciting ways to deliver courses, for example looking at simulating practical learning; in addition flexible delivery of modules.

Danish Meat Trade College slaughterhouse, Roskilde

4.1.6.3 Current national vocational education goals

The VET system has traditionally focused on school leavers aged 16-19. Payment is linked to the number of students coming through the VET system.

As a result of the current economic climate, the Minister of Education has recently implemented adjustments to the concepts of training programs. The Danish government has determined that by 2010, 85% of young people should carry on with some form of education after secondary school. By 2015 this should increase to 95%. The current rate is 76-78%.

Future training development strategies are being formulated in order to achieve this objective.

'*Retention in Vocational Education in Denmark – A Best Practice Study'* was published by the Danish Ministry of Education in November, 2005. The Study includes some interesting developments, especially with the transition from school-based to vocational education. Examples include Bridge Building with primary and lower secondary schools, vocational college students as ambassadors, and institutionalized collaboration between school and municipality.

The current issues of *wellness* and *lifestyle* are being investigated as a new initiative.

A new reform is being introduced during 2006-2007 with the objective of making it simpler for young people to choose a career. There are different streams such as 'Soil to Table', another new initiative. Other streams consist of Retail Butcher/slaughterhouse, Reception, Primary Production and Industry Slaughter- Specialised. The focus is for all VET education to be on-the-job and off-the-job. With this initiative the trainee can start education without a contract however must obtain a contract with an employer to continue.

4.1.6.4 Danish Crown - Horsens

The study tour team visited Danish Crown at Horsens. The company employs 10,000 employees and markets include UK 31%, Japan, 13% Germany 10%, Denmark 9% EU and Others 9% USA 7%.

Training of workers is conducted and developed in-house and is specific to the task to be undertaken. No details of the training program were supplied. The company has had some problems recruiting employees and up to 10% of current employees are not Danish.

The company employs a large number of highly technically skilled employees. Training development is influenced by the requirement to operate and maintain machines. The company also applies training in employee attitude in order to sustain high and consistent quality outcomes.

It is unknown what the specific requirements of a future worker will be in a highly technologically advanced plant such as Danish Crown. It poses a question of training a meat processing worker or technical operator?'

Table 3.8: What are the strengths of the Danish Vocational and Education Training system when compared to the Australian system?[46]

	Delivery Models	Assessment Strategies	Meat Industry Qualifications and Training	Quality Control
	5	5	5	5

4.2 Recommendations

Recommendation 4.1
That MINTRAC commence discussions with Meat and Livestock Australia (MLA) to progress the current recruitment and retention project to develop a structured process of career opportunities for Australian resident workers to ensure the future sustainability and viability of the Australian Meat Industry.

It was evident in every county visited that recruitment and retention was an issue facing the meat industry. Denmark has developed sound recommendations in their most recent benchmark study covering retention. The Australian meat industry has the opportunity to progress recent studies into recruitment and retention. '*Labour Market Issues of the MINTRAC Review 2006'* (page 96) supports the concept. "MINTRAC has developed significant credibility within the industry as a body that can establish agreement and implement initiatives that impact upon the lives of the workforce." MINTRAC, some believe can assist in the marketing of the industry through positioning careers and providing resources that will be attractive to prospective recruits and available for enterprises to use. In addition, there has been significant progress in South Australia which should also be monitored.

[46] For full details of the table, refer to Table 3.2

Recommendation 4.2
That a tripartite national strategy of training for immigrant workers in the Australian meat industry be developed. The strategy should address all issues relating to the socialization and integration of immigrant workers including English as a second language training. MINTRAC should develop an induction program for immigrant workers with specific emphasis on Occupational Health and safety and food safety standards.

It was evident immigrant workers do not have access to formal training and are provided task specific training in addition to training requirements of regulators. The Australian meat industry has an increasing number of immigrant workers in the meat industry. It is an opportune time for the Australian meat industry to take the initial steps towards the development of a tripartite national strategy to ensure that the Australian training system produces best practice training outcomes for all Australian residents. Such training should ensure that workers have access to English as a second language training, initial Occupational Health and safety and food safety training and access to accredited training with formal qualification outcomes.

Recommendation 4.3
That in order to further enhance career and employment opportunities MINTRAC investigate a possible Vocational Education and Training collaboration between Australia and New Zealand with reference to mapping qualifications to achieve mutual recognition and portability of equivalent qualification outcomes.

The New Zealand training system is closely aligned to the Australian system. The mapping of qualifications that can be portable between both Australia and New Zealand will assist in recruitment and retention outcomes for the Australian meat industry.

Recommendation 4.4
That MINTRAC monitor the progress of the meat cutting apprenticeship in Alberta as a model of a trade outcome for meat processing industry.

The Australian Meat Processing Certificate has a level III outcome however is not recognised nationally as a trade qualification. Canada does not have a structured qualification framework at the present time, however is progressing towards the development of an apprenticeship in Meat Processing. The status of trade equivalent for the meat processing industry may assist in recruitment and retention strategies that promote a career in the meat industry with a national trade outcome.

Recommendation 4.5
That MINTRAC obtain further information relating to the training program "better understanding of the importance of the individual and the impact on other workers and other departments" being undertaken at Danish Crown in Horsens, Denmark (referred to as 'attitude training').

This aspect of training was evident in Denmark. The expected outcome of this type of training was to ensure that all employees understood the importance of the role that each individual plays as part of an end result of a high quality product. The Australian training system does not include this aspect in the current training system.

5 Meat Inspection and Quality Assurance training

Clive Richardson

Introduction

When assessing the training delivered to meat inspection staff in other countries it is often difficult to establish the rigor of the training and assessment programs without access to the training materials and training quality audit results. Therefore, this report to a large extent represents a retelling of the information given to the team in each country. In some cases further information and clarification is still being sought as to the content or nature of the training. With the exception of the Denmark and New Zealand there has been a relatively slow response to our request for a detailed exchange of training information. There was never any reluctance to discuss what was happening in-country but there seems some reticence to actually document what is delivered and how it is assessed.

Therefore the information gathered may or may not paint the true picture of the nature of the training delivered in terms of consistency or effectiveness. This is particularly going to be the case where training is delivered by the Regulatory Authorities themselves and subject to no external audit of the quality of the training delivered.

However, since our return to Australia a quite lively e-mail discussion is developing between MINTRAC and a number of trainers/ lecturers from overseas. I am hopeful that this will prove the catalyst for a fruitful exchange of ideas etc which in turn will lead to a more candid dialogue and a better understanding of the state of play in other countries.

The nature of the QA training being delivered in other countries is on the other hand a little easier to ascertain in that it is mostly delivered by tertiary educational institutions and the curriculum, delivery mode and assessment process are a matter of public record. In addition these institutes have usually got well structured quality assurance programs and are subject to audit.

A rating system

In order to assess which countries we have most to learn from a matrix to rate the various components of training programs was developed. It must be stressed that this matrix was developed against the yardstick of what was best practice for the Australian environment in terms of regulatory authorities, educational structures and government funding. Thus a training program that was ideal for say the USA and meets all its requirements may only rate a 3 out of 5 in applicability to our training and regulatory environment. This rating does not seek to assess its effectiveness in achieving student competency, consistency of assessment or applicability of curriculum.

The rating matrix appears as Appendix 5.1 (Meat Inspection Training) and Appendix 5.2 (Quality Assurance Training). The matrix seeks to rate the following aspects of training (in terms of their applicability to the Australian environment):

- delivery of meat inspection training
- assessment process of meat inspection competencies
- materials for training and assessment
- curriculum for meat inspection training, and
- professional development opportunities for qualified meat inspectors and trainers.

A weighting of these factors was then made and a total overall applicability score was given to the training programs and in large part indicates which countries we may have most to learn from.

N.B. In compiling a rating system for QA training it was relatively easy to develop a rating matrix. However, it is currently next to impossible to rate the huge range of courses available within each country and until further research has identified those courses most commonly undertaken by meat industry personnel, a rating of QA training in each country will not be included in this report.

A detailed graphical summary of the comparisons between the countries' meat inspection training programs is included as Appendix 5.12

5.1 Summary of Findings

5.1.1 New Zealand

Regulatory environment
The Food Safety Authority (FSA) in NZ is the regulatory body for both domestic and export meat processing works. It is an agency of the Ministry of Agriculture and Fisheries. It staffs processing plants with supervising veterinary officers who oversee the implementation of the food safety programs in plants as well as compliance with NZ regulations and importing country requirements.

Meat Inspection services on the other hand are provided on contract to FSA by Asure, a State Owned Enterprise. Asure trains and employs meat inspectors who perform on line meat inspection duties. It has a unique quality audit system where it audits the effectiveness of its own staff in detecting both pathology and contamination of carcase and offal meats. These audits rate the performance of meat inspectors and form one of the enterprise's key performance indicators.

Another aspect of the NZ inspection system is that inspectors are warranted (or authorized) for specific species and these warrants require current experience in the inspection of that species. In addition trainee inspectors can be partially warranted for specific inspection positions on the processing chain while they are trained and assessed.

Meat Inspection training
The national meat inspection competencies were developed by Asure and the training is delivered by Asure to its own full time permanent employees. The course, which is a nationally accredited Certificate, is delivered and assessed by registered trainers and assessors (again Asure staff). The delivery of the training and assessment of competency is audited by the NZ Industry Training Organisation as part of the nation's training quality assurance system. The on-the-job component of the course focuses essentially on inspection tasks and disposition while the off-the-job component provides comprehensive training in anatomy, physiology and animal diseases. The bulk of the off-the-job training is provided in the first three months of employment. Ante mortem is not part of the basic meat inspection course but can be undertaken as part of the extended program. The structure of the meat inspection training certificates forms Appendix 5.3. The details of each Unit can be viewed on the NZITO website.

Training is delivered at a small number of plants with the space and facilities for training and the training is species specific. Meat Inspectors who have not worked on a specific species for more than twelve months are required to undergo refresher training before being re-warranted.

Senior Inspectors have access to accredited on line supervisor training and inspectors returning to the industry have access to refresher training including legislation and knife usage.

Similarities with Australia

- formal qualifications with national accreditation
- documented competencies with training and assessment subject to external audit
- significant involvement of the regulatory authority in the development of the course content.

Differences between Australia and New Zealand

- delivery of training by the regulatory authority (or their agent)
- assessment of training by the regulatory authority (or their agent)
- ante mortem inspection only compulsory in the Advanced Meat Inspection Services stream
- industry QA and HACCP Units not part of the meat inspection training
- competencies and training in species and inspection station/task focused
- formal arrangements are in place for on-the-job training and assessment at each inspection work station
- less structured links to processing training and qualifications
- a very specific meat sampling unit
- underpinning anatomy and physiology knowledge is dealt with in a discrete unit separated form the post and ante-mortem units.

Things to learn from NZ and possible improvements that can be made to the Australian system

- provision of formal arrangements for on-the-job training and assessment at dedicated sites where plant facilities and inspection site layout makes them appropriate
- greater involvement of the regulator/employer in the assessment of competencies.

Table 5.1: Rating of the NZ system against the Australian context[47]

Best Practice rating against Australian requirements	Delivery of meat inspection training	Assessment of meat inspection competencies	Materials for training and assessment	Curriculum for meat inspection training	Professional development opportunities for meat inspectors and trainers
Rating 1-5 5-most applicable 1-least applicable	4	4	4	3	3

Quality Assurance Training

Asure delivers HACCP training and internal audit training to its own staff. NZFSA has not mandated any particular HACCP or QA training. These courses are available from a wide range of Polytechnics and Universities as well as private but accredited training organisations.

5.1.2 United States of America

Regulatory environment

The Food Safety Inspection Service (FSIS) in USA is the regulatory body for both domestic and export meat processing works (in some States plants trading exclusively intrastate come under the supervision of State regulatory authorities). FSIS is an agency of the United States Department of Agriculture (USDA). It staffs processing plants with supervising veterinary officers and inspection staff who oversee the implementation of USA regulations and the provision of online inspection procedures. FSIS also employs a range of other technical staff to oversee the implementation of its food safety programs and compliance with regulations (Appendix 5.4).

[47] Refer to Appendix 5.1 for full detail of this table.

Meat Inspection training

The meat inspection training programs were developed by FSIS and the training is delivered by FSIS staff to its own full time permanent employees. The entry level courses are implemented nationally by FSIS utilizing on and off site facilities and staff.

The on-the-job component of the training focuses essentially on inspection tasks and disposition, while the off-the-job component provides training in anatomy, physiology and animal diseases.

Inspection staff have access to a range of professional development opportunities including the Food Safety Required Essentials courses (Appendix 5.5), auditing, HACCP, SSOP and GMP training.

The Service is taking a very pro-active role in its up-skilling of its inspection and enforcement staff with a new emphasis on recruiting graduates and making professional development and on-going training a feature of employment with the FSIS (Appendix 5.6).

'Manny' Rosenthal Meat Section, Texas A&M University.

Differences between Australia and the USA

- delivery of training by the regulatory authority
- assessment of training by the regulatory authority
- industry QA and HACCP units not a compulsory part of all meat inspection training
- competencies and training in species and inspection station/task focused
- formal arrangements are in place for on-the-job training and assessment at each inspection work station
- no structured links to processing training and qualifications.

Things to learn from USA and possible improvements that can be made to the Australian system

- provision of formal arrangements for on-the-job training and assessment
- greater involvement of the regulator/employer in the assessment of competencies.

Table 5.2: Rating of the USA system against the Australian context[48]

Best Practice rating against Australian requirements	Delivery of meat inspection training	Assessment of meat inspection competencies	Materials for training and assessment	Curriculum for meat inspection training	Prof. development opportunities for meat inspectors and trainers
Rating 1-5 5-most applicable 1-least applicable	2	3	N/A	N/A	3

[48] Refer to Appendix 5.1 for full detail of this table.

Quality Assurance training
A wide range of training providers including universities deliver HACCP training accredited by the International HACCP Alliance. This organization has developed a number of HACCP courses and accredits specific organisations to deliver these courses. The FSIS has mandated attendance at the basic HACCP course for meat packer personnel managing HACCP programs.

In addition stand alone courses in internal auditing, sampling, Good Manufacturing Practice and Sanitary Standard Operating Procedures (SSOPs) are provided by a wide range of training organisations through out the country. The industry also recruits well trained graduates in food and meat science who have comprehensive training in QA, process and product control.

FSIS runs a wide range of training for industry at regional centers such as Food Safety Required Essentials (FSRE), sampling, auditing, HACCP, SSOP and GMP. In addition it runs workshops and round-table sessions for industry and the regulator to exchange views.

5.1.3 Canada

Regulatory environment
The Canadian Food Inspection Authority (CFIA) in Canada is the regulatory body for both domestic and export meat processing works (in some Provincial plants trading exclusively intrastate comes under the supervision of Provincial regulatory authorities). It staffs processing plants with supervising veterinary officers and inspection staff who oversee the implementation of Canadian regulations and provide online inspection.

Meat Inspection training
The meat inspection courses are developed by CFIA and the training is delivered by CFIA to its own full time permanent employees. The courses are delivered by CFIA trainers and assessors. The on-the-job component of the training focuses essentially on inspection tasks and disposition while the off-the-job component provides training in anatomy, physiology and animal diseases (See Appendix 5.7).

Differences between Canada and Australia
- delivery of training by the regulatory authority
- assessment of training by the regulatory authority
- competencies and training is species and inspection station/task focused
- formal arrangements are in place for on-the-job training and assessment at each inspection work station
- no structured links to processing training and qualifications.

Things to learn from Canada and possible improvements that can be made to the Australian system
- provision of formal arrangements for on-the-job training and assessment
- greater involvement of the regulator/employer in the assessment of competencies.

Table 5.3: Rating of the Canadian system against the Australian context[49]

Best Practice rating against Australian requirements	Delivery of meat inspection training	Assessment of meat inspection competencies	Materials for training and assessment	Curriculum for meat inspection training	Professional development opportunities for meat inspectors and trainers
Rating 1-5 5-most applicable 1 - least applicable	2	3	N/A	N/A	3

[49] Refer to Appendix 5.1 for full detail of this table.

Quality Assurance training
The CFIA has developed a specific meat industry HACCP curriculum and delivers this training to both industry and its own personnel. In addition a wide range of training providers including universities deliver HACCP and QA training for meat industry personnel. The industry also recruits well trained graduates in food and meat science who have comprehensive training in QA as well as process and product control.

Ranchers Beef meat packing plant, Alberta, Canada

5.1.4 Ireland

Regulatory environment
The Food Safety Authority in Ireland is the regulatory body for both domestic and export meat processing works. It is an agency of the Department of Agriculture Food and Regional Development. It staffs processing plants with supervising veterinary officers who oversee the implementation of the food safety programs in plants as well as meat inspectors who perform on line meat inspection duties.

Meat Inspection training
The national meat inspection competencies were developed in conjunction with the FSA and the training is delivered by veterinarians employed on staff at the National Food Centre (TEAGSC) to full time permanent employees of the Department. The course which is a nationally accredited 600 hour Certificate is delivered and assessed by registered trainers and assessors. The delivery of the training and assessment of competencies is audited as part of the nation's training quality assurance system.

The course consists of on and off job components. The on-the-job component which focuses on inspection tasks and disposition is delivered at plants with the space and facilities for training.

The off-the-job component is delivered at the National Food Centre. The on campus component provides comprehensive training in anatomy, physiology and animal diseases. It should be noted that a new European Economic Union directive has mandated a training course for meat inspectors through out the European Economic Union and this will mean changes to the current course being delivered.

The Irish Meat Inspection course has pre-requisite courses in HACCP, food hygiene and micro-biology not unlike Australia's prerequisite of the Core Units from Certificate II.

Similarities with Australia
- formal qualifications with national accreditation
- documented competencies with training and assessment subject to external audit

- significant involvement of the regulatory authority in the development of the course content.

Differences between Ireland and Australia

- formal arrangements are in place for on-the-job training and assessment at each inspection work station.

Things to learn from Ireland and possible improvements that can be made to the Australian system

- provision of formal arrangements for on-the-job training and assessment at dedicated sites where plant facilities and inspection site layout makes them appropriate.

Table 5.4: Rating of the Ireland system against the Australian context[50]

Best Practice rating against Australian requirements	Delivery of meat inspection training	Assessment of meat inspection competencies	Materials for training and assessment	Curriculum for meat inspection training	Professional development opportunities for meat inspectors and trainers
Rating 1-5 5-most applicable 1-least applicable	4	4	N/A	3	4

Quality Assurance training

The National Food Centre and other accredited training providers deliver a wide range of meat industry specific QA courses (see Appendix 5.9) including HACCP, auditing, sampling, meat industry trainers training and internal audit training to its own staff. FSA has not mandated any particular HACCP or QA training. These courses are available from a wide range of Polytechnics and Universities as well as private but accredited training organisations.

[50] Refer to Appendix 5.1 for full detail of this table.

5.1.5 England

Regulatory environment
The Food Standards Authority (FSA) in England is the regulatory body for both domestic and export meat processing works. It is an agency of the Ministry of Agriculture and Fisheries. The Meat Hygiene Service (MHS) is also an agency of the Ministry and staffs meat processing plants with supervising veterinary officers as well as meat inspectors who perform on line meat inspection duties.

Meat Inspection training
The national meat inspection competencies were developed in conjunction with the MHS and the training is delivered by a variety of Colleges around the country. The course which is a nationally accredited 600 hour Certificate is delivered and assessed through a combination of on and off campus activities.

The Meat Inspection certificate course requires an industry placement where the student is trained in the practical components of inspection and disposition. The off-the-job component is delivered on College campuses. The on campus component provides comprehensive training in anatomy, physiology and animal diseases. A description of the meat inspection role and training forms Appendix 5.8

It should be noted however that a relatively new European Economic Union Directive (June 2004) has mandated an outline for meat inspector training courses through out the European Economic Union (See Appendix 5.10). This new course descriptor will require changes to be made to the existing Certificate in the UK.

Students wishing to gain employment with the MHS also have to successfully undertake an examination set by the Royal Institute of Public Health.

An interesting report into comparative meat inspection training in Europe was finalized in 2003 and it makes comparisons of the meat inspection training delivered in a wide range of countries and regulatory environments (see Appendix 5.11).

Similarities with Australia
- delivered by a wide range of accredited providers
- formal qualifications with national accreditation
- documented competencies with training and assessment subject to external audit
- significant involvement of the regulatory authority in the development of the course content.

Differences between England and Australia
- formal arrangements are in place for on-the-job training and assessment
- involvement of a Professional Institute in the accreditation process.
- alignment of the meat inspection course with a multi-national standard.

Things to learn from England and possible improvements that can be made to the Australian system
- provision of formal arrangements for on-the-job training and assessment at dedicated sites where plant facilities and inspection site layout makes them appropriate
- the alignment of our meat inspection courses with international standards to maximize training credibility and utilization of international training resources.

Table 5.5: Rating of the England system against the Australian context[51]

Best Practice rating against Australian requirements	Delivery of meat inspection training	Assessment of meat inspection competencies	Materials for training and assessment	Curriculum for meat inspection training	Professional development opportunities for meat inspectors and trainers
Rating 1-5 5 most applicable 1 least applicable	4	4	N/A	TBA	3

Quality Assurance training
The Universities, Polytechnics and other accredited training providers deliver a wide range of QA courses including HACCP, auditing, sampling, meat industry trainers training and internal audit training to its own staff. FSA has not mandated any particular HACCP or QA training.

In addition industry is able to access graduates from a large number of Universities graduating food scientists and technologists to manage and run their QA programs.

5.1.6 Denmark

Regulatory environment
The Danish Agricultural Council - Food Safety is the regulatory body for both domestic and export meat processing works in Denmark.

Meat Inspection training
The national meat inspection competencies were developed in conjunction with the regulator and industry. The training is delivered by the Danish Meat Trade School (see Appendix 5.12). The course which is a nationally accredited is delivered and assessed through a combination of on and off campus activities by veterinarians employed by the Trade School.

The Meat Inspection certificate course requires an industry placement where the student is trained in the practical components of inspection and disposition. The off-the-job component is delivered on the Trade School campus. The on campus component provides comprehensive training in anatomy, physiology and animal diseases.

It should be noted however that a relatively new European Economic Union Directive (June 2004) has mandated an outline for meat inspector training courses through out the European Economic Union. This new course descriptor will require changes to be made to the existing Certificate in the UK.

Students wishing to gain employment with the MHS also have to successfully undertake an examination set by the Royal Institute of Public Health.

Similarities with Australia
- formal qualifications with national accreditation
- documented competencies with training and assessment subject to external audit
- significant involvement of the regulatory authority in the development of the course content.

Differences between Denmark and Australia
- one training provider delivering the course
- practical facilities for the delivery of the training are of a very high standard

[51] Refer to Appendix 5.1 for full detail of this table.

- formal arrangements are in place for on-the-job training and assessment.

Danish meat research centre

Things to learn from Denmark and possible improvements that can be made to the Australian system

- provision of formal arrangements for on-the-job training and assessment at dedicated sites where plant facilities and inspection site layout makes them appropriate
- the alignment of our meat inspection courses with international standards to maximize training credibility and utilization of international training resources.

Table 5.6: Rating of the Danish system against the Australian context[52]

Best Practice rating against Australian requirements	Delivery of meat inspection training	Assessment of meat inspection competencies	Materials for training and assessment	Curriculum for meat inspection training	Professional development opportunities for meat inspectors and trainers
Rating 1-5 5 most applicable 1 least applicable	4	4	N/A	TBA	3

Quality Assurance training

The Universities and the Danish Meat Trade school deliver a wide range of QA courses including HACCP, auditing, sampling, meat industry trainers training and internal audit training.

In addition industry is able to access graduates from a large number of Universities graduating food scientists and technologists to manage and run their QA programs.

5.2 Recommendations

Based on the observations made of training practices overseas, the following recommendations are made with a view to improve the meat inspection and quality assurance training programs in Australia with a view to:

- improving the quality and relevance of the training courses developed
- improving the training materials utilized in these courses
- improving the reliability of the assessment process employed in these courses
- increase the intra and international standing of the Australian Meat Industry's National Training Package
- improve the credibility of the Australian training system with overseas reviewers.

[52] Refer to Appendix 5.1 for full detail of this table.

Recommendation 5.1
That industry should seek to obtain a clear and unambiguous endorsement from AQIS and the State Meat Authorities of:

- the Meat Safety and Quality Assurance qualifications in the National Training Package
- the delivery modes for the delivery of these courses
- the assessment methods used to assess competency in these courses
- the training and assessment materials utilised.

This endorsement will ensure:

- that meat industry regulatory authorities have a full and comprehensive understanding of the course content as well as the training and assessment processes employed in their delivery
- that only current and technically correct materials are used by trainers and assessors in Australia
- a greater uniformity of course delivery through out the country.

Recommendation 5.2
That the meat industry should ensure that a formalized, mandated and documented system for the on-the-job training of meat inspection trainees is implemented. Such a system should stipulate:

- a minimum the number of hours of on-the-job practice (under supervision)
- the nature of the training to be delivered in terms of tasks and competencies.

This system is almost universally present in the overseas systems and will enhance the work readiness of the trainees when they finish their course.

Recommendation 5.3
That the industry should seek to implement a system of on-the-job assessment for meat inspection students that requires the participation of regulatory staff in the formal assessment process. Again this is present in the US, Canada, NZ and Ireland and will greatly increase the confidence of the regulator in the work readiness of graduating trainees.

Recommendation 5.4
That MINTRAC should formally map the Australian Meat Inspection and QA Units against international standards such as the standardized European Economic Union meat inspector curriculum and HACCP Alliance courses in the USA. Such mapping will allow Australia to demonstrate that our training is in line with that provided in other major meat processing countries.

6 Technology transfer and building industry innovation capacity

Dr Lewe Atkinson

The Australian "Research and Development Corporation (RDC) model" for supporting R&D and disseminating results to the red meat industry

The Australian RDC model is seen as world's best practice for supporting R&D and disseminating the results. The key elements of the model are:

- an independent board charged with taking a strategic approach to rural R&D
- a rational and integrated approach to R&D priority-setting
- strong involvement of industry throughout the whole process
- the broad scope of rural research activities for funding
- a strong focus on outcomes, and
- a dual accountability to both industry and the Australian Parliament.

Meat & Livestock Australia Ltd (MLA) is an industry-owned company and operates "an industry owned company version" of the RDC model for the Australian Red Meat industry. The strength of this model lies in the industry leadership which has been created through a collective commitment to research and development and the adoption of research results. This strength has been further enhanced by MLA as an "industry owned company" primarily due to the fact that both marketing and R&D services are delivered by MLA staff within the context of a "whole-of industry" focus.

Strategic plans are prepared by MLA in consultation with peak councils and other industry leaders through the Red Meat Advisory Council (RMAC). The Meat Industry Strategic Plan (MISP) "More For Less" sets out objectives and priorities for a five-year-period, and outlines the strategies which will be adopted to meet those objectives. In response to this, MLA generates its Industry Programs Plan (IPP) on an annual basis which maps out how it will achieve these objectives, as well as, providing annual KPI measures to demonstrate progress toward achieving these shared outcomes.

The government provides MLA with regular statements outlining its national research priority areas against which MLA reports annually via a dedicated forum held for government officers located in Canberra each year.

The R&D managed by MLA is funded on the basis of the Australian government matching dollar for dollar industry R&D levies and private funds, with the available government contribution being up to a maximum of 0.5% of the red meat industry's gross value of production. This matching contribution is intended to provide an incentive for industry and individual enterprises to increase its R&D funding and to become more involved in R&D priority-setting and the adoption of outcomes. It also recognises that activities funded by MLA generate a mix of public and private benefits.

What is technology transfer and industry innovation capacity? The concepts of technology transfer and industry innovation capacity are both component activities within a broader "knowledge diffusion" model.[53]

[53] Howard, 2005 – *The emerging business of knowledge transfer – Creating value from intellectual products and services – A report of a study commissioned by the Department of Education, Science, and Training* – John Howard March 2005 - © Commonwealth of Australia 2005.

The knowledge diffusion model is based on the idea that knowledge, once created, should be widely disseminated (**technology transfer**) and action taken to ensure that potential users have the capacity to adopt and use it (**industry innovation capacity**).

Typical strategies employed within this model are directed towards creating new industrially applicable knowledge and encouraging widespread (collective) adoption through education, extension, and training, as well as creating standards relating to production and distribution, with a view to building productivity and industry competitiveness and ensuring sustainability in natural resource use.

The model also reflects a view that the true innovators are the users of knowledge, not the creators.

The sort of "knowledge products" that would be evident when this model is functioning efficiently and effectively within a meat processing industry context are profiled in the following table (adapted from Howard, 2005).

Product category	Focus
Academic publishing	Production, marketing, distribution, and sale of books, papers, electronic materials through academic presses.
"Industry-ready" graduates	Creating a pool of young people possessing the knowledge and skills capable of development application within an industry context.
Industry-targeted teaching	Accredited courses, qualifications, and certifications from programs that have been tailored to meet the needs of industry in terms of professional development and career advancement.
Contract research and consultancy	Project-based research, advisory, and consultancy services as required to resolve industry issues.
Interchange of staff between universities/institutes and industry	For capacity building and technology transfer particularly in complex science and engineering areas.
Scholarly research publication	Publication in peer reviewed journals is important for scientific credibility of R&D.
Creation of IP rights	Ensures freedom to operate for industry.
Incubation of key innovation suppliers to industry	Facilitated technology transfer through targeted Small to Medium Enterprises (SMEs) within the "innovation supply chain".

Key elements of knowledge diffusion strategies and programs (Howard, 2005)

There are four main elements of knowledge diffusion strategies:

1. **Communication**: creation of awareness of the benefits of adopting new business practices, processes and procedures, and seeking behavioural change.
2. **Capacity building**: building knowledge, skills, and capabilities of organisations and businesses to adopt, apply, and use new technologies, through training, education and other forms of learning experiences.
3. **Introduction of standards relating to process and product quality and performance**: science-based standards provide industry performance benchmarks and create a target for process and product improvement and for enhancing client and customer confidence regarding product safety, integrity and health.
4. **Support for commercialisation of new technologies**: where a new business model is seen as the most appropriate method to promote adoption of the uses of a technology.

Therefore, sample output indicators for efficient and effective knowledge diffusion strategies would include evidence of the following:

- communication activities
- capacity-building activities
- technology transfer and education activities,
- standard setting activities
- technology adoption based on new business models, and
- industry output data.

Where does MINTRAC fit within the MLA "knowledge diffusion" model?

The MINTRAC training framework is thought to be a critical mechanism for facilitating technology transfer and innovation capacity within the Australian meat processing sector. It has "hard wired" the pathways for technology transfer at all levels of the meat processing sector.

Technology transfer and innovation uptake have been defined for the purposes of this study tour as being the implementation and application of the outcomes of meat industry research, the advances in technology across the industry, and the requirements of regulatory authorities, particularly in supporting market access in a global trading environment.

It is thought that the MINTRAC framework supports technology transfer and the creation of industry innovation capability in three key ways:

1 The learning units are developed based on research and technology developments in the industry, as well as, the current best practice internationally.
2 Providing an avenue for exposure of on-plant decision makers to R&D outcomes in a form that is useful and applicable.
3 Providing a platform or starting point for further enhancement of these outcomes in on-plant situations.

The areas of greatest interest at enterprise level in terms of appropriability of these R&D outcomes, are as follows:

- OH & S
- environment
- eating quality, and
- food safety.

The technology transfer model used by MLA is based on a classic "action research" industry adoption cycle (**RIKDA**):

- **R**esearch
- **I**nformation
- **K**nowledge
- **D**ecision
- **A**ction.

Whereby, industry adoptors make **D**ecisions about a commitment to adopt only after **R**esearch outputs have been converted into **I**nformation which will form the basis of the following **K**nowledge, where -

- There is a match between their local/customer requirements and the available technology options.

- There is confidence that a technology and/or product design is capable of meeting local/customer performance requirements.
- A technology and/or product is determined to be operable within local/customer cost, schedule and quality targets.

Therefore, the adoption decision is the point at which a business can define the performance of a technology and/or product (what it will do and how), its cost, and its "price point", in terms of local constraints and customer market opportunities. From this point forward an enterprise begins to make large investments in human capital, facilities and materials. This investment increases steadily as the product and/or technology approaches final commissioning, which also includes a business commitment (and risk) to commission the product.

The MINTRAC Framework and associated activities provides a key conduit for the conversion of **I**nformation created as the output of MLA R&D activities into **K**nowledge that can inform decision making at local plant level.

Evaluation template
An evaluation template was developed to assist with the benchmarking of the Australian technology transfer and innovation capacity building system against those of the countries that the study team visited.

Countries that appeared to be enjoying the benefit of best practice "knowledge diffusion" outcomes appear to do so as a consequence of having an outcomes focused approach to meat process operations and associated training activities.

This outcomes focus is typically manifested as having a clear understanding of customer needs and expectations in the context of their ability to meet these expectations and with an acceptable profit margin. The key strategic training initiatives in these countries that have been observed at both industry and enterprise levels have typically had a focus on enhancing the ability to meet customer needs through best practice supply chain management.

The template defines the criteria for what is considered to be the optimum knowledge diffusion system for the Australian meat processing sector as level 5, and then describes the four lower levels as graduated levels of achievement.

In undertaking the benchmarking exercise, the meat industry technology transfer and innovation capacity building systems of the six countries visited were considered against this 'ideal' template of Australian criteria. It is recognised that the values, contexts, and systems of other countries are quite different to those of Australia (see Section 2 "Situational Snap-Shots" for each country), and that there should be no expectation that all countries should achieve, or even aspire to reach the 'Level 5' that is described for the Australian system.

However, the template does serve to highlight strengths of other countries in some of the areas which could be of value if transferred to the Australian system, and from these strengths it is possible to draw recommendations for improvements to the Australian system.

A weighting value has also been attached to the criteria within the template. It is stressed that the evaluation of other countries has been undertaken against the Australian context, and that the percentage weighting is simply for comparison to the Australian system. It is in no way intended to be a ranking of the effectiveness of the systems of the other countries, since the contexts and structures of training and meat industry requirements are so different from country to country.

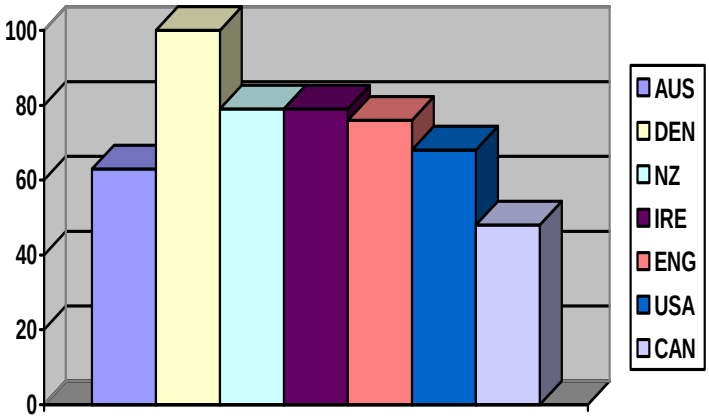


Table 6.1: comparative strengths of visited countries when considered against the Australian context

For Australia, evidence of a technology transfer and innovation capacity building system that is functioning efficiently and effectively within a meat processing industry context is detailed in the table below.

Knowledge product category	Evidence
Academic publishing	Significant effort by "world leading" research groups at University of Tasmania (Food Safety), University of New England and Murdoch University (Eating Quality). Also relevant publications produced by academics associated with CRCs; Beef Quality, Sheep, and Waste Management & Pollution Control.
"Industry-ready" graduates	Very limited supply of University Graduates to the industry via various Agriculture and Rural Studies programs. Only focus on the meat processing sector has been through MINTRAC via the Diploma program which was originally established at Victoria University of Technology.
Industry-targeted teaching	Massey University in NZ has been providing targeted industry training to senior/middle management. The University of New England has had a focus on meat quality which is an example of Industry-Targeted Teaching, but with limited focus on the meat processing sector.
Contract research and consultancy	Former CSIRO staff, now FSA, ProAnd, Meat Eng, Alliance, Ausmeat, MINTRAC, New Zealand-based consultants, and other industry specialists.
Interchange of staff between universities/institutes and industry	Not a lot of evidence of this.
Scholarly research publication	Limited and mainly via relevant CRC's, Murdoch & UNE (Eating Quality), and UTas and UQ (Food Safety)
Creation of IP rights	MLA and FSA are most active in this area.
Incubation of key innovation suppliers to industry	Past track record with technology specific licensee SMEs, such as; Macpro, SFK/FEA, AMT, E-nose, ADT, etc. Most recent effort with Millers Mechanical, MAR, and Scott Automation.

Table 6.2: Australian Technology Transfer & Industry Innovation Capacity

Best practice level of maturity	Facilitated technology transfer Framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
5	Mechanisms are effective & efficient. Impact of mechanisms and technologies is evaluated. Benefit is acknowledged by target end users. Funding is dedicated to technology transfer.	Alignment of proactive planning processes. Industry innovation strategies are integrated & synchronised. Portfolio-based approach to optimised R&D investment. Key stakeholders are engaged & aligned.	Funding dedicated for systematic review and evaluation. Innovation culture exists. Commitment to adoption. Key learnings embedded in future strategy.	Dedicated market/customer focus. Supply chain integration. Customer specifications & industry standards are integrated into day-to-day operations. Innovation outcome aligned to customer needs.	Sufficient funds secured for effective delivery of industry innovation capacity. Innovation supplier development is an integral part of industry strategy. Staff exchange and strategy integration between universities or institutes and industry. Full range of accredited courses, qualifications, and certifications for industry learning and development and career advancement.
4	Continuous improvement of mechanisms for technology transfer. Decision making based on measures of technology transfer. End users “pull-through” outcomes of technology transfer. Annual allocation of funds available for technology transfer	Shared proactive planning processes. Integrated industry innovation strategy. Portfolio-based R&D investment process. Key stakeholders aligned.	Ad hoc systematic review and evaluation processes. Limited evidence of the existence of an innovation culture. Adoption is specifically funded. Reflective learning processes included in the strategic planning processes.	Integration of market/customer focus. Engagement of supply chain partners. Documentation of customer specifications & industry standards. Integration with customer innovation strategy.	Annual allocation of funds available for building industry innovation capacity. Alignment of innovation suppliers to industry strategy. Formalised relationships between universities or institutes and industry. Formalised provision of accredited courses, qualifications, and certifications for industry

3	Optimum mechanisms for technology transfer understood. Ad hoc measurement of technology transfer. General awareness of the outcomes of technology transfer. Limited funds available for technology transfer.	Proactive planning processes. Industry innovation strategy exits. Formalised R&D investment process. Key stakeholders engaged and understood.	Value of review and evaluation processes recognised. Early signs of innovation culture emerging. Adoption is valued. Formalised processes for reflective learning.	Understanding of market/customer focus. Understanding of supply chain partners. Accommodation of customer specifications and industry standards. Engagement with customer innovation strategy.	Formalised processes for accessing funds available for building industry innovation capacity. Organisation of innovation supplier capability. Limited networking between universities or institutes and industry through U/G and Grad programs. Limited number of accredited courses, qualifications, and certifications for industry.
2	Ad hoc mechanisms for technology transfer. Limited measures of technology transfer. Limited awareness of the outcomes of technology transfer. Ad hoc funds available for technology transfer.	Reactive planning processes. Limited awareness of industry strategic priorities. Ad hoc R&D investment process. Key stakeholders identified.	Review and evaluation understood. Benefits of an innovation culture understood. Adoption is understood. Limited evidence of reflective learning.	Awareness of market/customer focus. Awareness of supply chain integration. Awareness of customer specifications & industry standards. Awareness of customer innovation strategy.	Ad hoc funds available for building industry innovation capacity. Ad hoc engagement of innovation suppliers. Ad hoc relationship between universities or institutes and industry. Ad hoc accredited courses, qualifications, and certifications for industry.
1	No mechanisms for technology transfer. No measures of technology transfer. No awareness of the outcomes of technology transfer. No funds available for technology transfer.	No planning processes. No industry innovation strategy. No formalised R&D investment process. No recognition of key stakeholders.	No systematic review and evaluation processes. No evidence of an innovation culture. No commitment to adoption. No evidence of reflective learning.	No market/customer focus. No supply chain integration. No recognition of customer specifications & industry standards. No alignment with customer innovation strategy.	No funds available for building industry innovation capacity. No innovation suppliers available. No relationship between universities or institutes and industry. No accredited courses, qualifications, and certifications for industry
Impact Weighting	**4/20**	**3/20**	**4/20**	**4/20**	**5/20**
63%	**12**	**12**	**12**	**12**	**15**

Note: shading indicates assessment of Australia's current position.

6.1 Summary of Findings

6.1.1 New Zealand

The New Zealand technology transfer and innovation capacity building system has some very close parallels to the Australian system over the past 20 – 30 years. Indeed, many of the major process innovations coming out of the NZ industry during that time have also been widely adopted by the Australian processing sector. This is particularly true in sheep processing with respect to "inverted dressing", and also in beef processing with the advent of "hot boning". The MIRINZ low temperature rendering system (MLTRS) and the companion "Flo-dry" technology has also been adopted by a significant number of integrated meat processor/renderers in Australia.

At the core of this "industry innovation culture" was The Meat Industry Research Institute of New Zealand (MIRINZ) Inc. This was a "membership-based" society formed in 1955 and funded on the basis of a partnership between Government, meat processing companies, and producers under the auspices of the NZ Meat Board – with the Government and industry providing roughly equal contributions.

A key distinguishing feature of the New Zealand technology transfer and innovation capacity building system has been the close cooperation with meat processing companies which has played a major role in converting scientific information into technology that can be used in processing plants. Their various contributions include working alongside MIRINZ staff, allocating space and manpower to test ideas, identifying problems that need research solutions, as well as, providing the funds to support MIRINZ. An important spill-over effect of this close cooperation has been the consequent creation of innovation capacity within the meat companies themselves.

MIRINZ at its peak in the 1980's had an annual budget of about $NZ10 million and employed about 100 technical staff. It was a stand alone commercial research institute and found it necessary to find new sources of finance, including research for overseas clients and no longer restricting its interests to sheep and beef alone.

Early achievements of the institute included Accelerated Conditioning Aging of lamb carcases for export to the UK which lead to a significant improvement in eating quality and consequent maintenance of ongoing market access to the EU. This period was also when the initial work commenced on the world's first "inverted dressing" system which went on to set the global standard for sheep processing. Other world class technologies such as MLTRS were also being conceived by workers at MIRINZ during this time. A key feature of the MIRINZ approach to technology development was the creation of very intimate relationships with industry steering groups very early in the life of a new project (i.e. Technical Advisory Groups). This group also included prospective commercialisers of the technology. This provided the research team with very practical advice on the application of the concepts in a real commercial environment which had significant impact on the subsequent successful commercialisation and industry wide adoption of these technologies. In addition, the research team also contained a mix of skills. Some of the team members had a very theoretical perspective on the project, whereas other team members were of a very practical "hands-on" bent. Indeed, many times these more "hands-on" team members were contracted by the ultimate equipment commercialisers to assist in commissioning many of the early installations.

The "membership-based" funding model also spawned a technical information service called Meat Industry Rapid Information And Delivery (MIRIAD). This service was provided by MIRINZ technical staff based on their particular expertise-base. The service was delivered in two ways. The first was in the form of a telephone-based "trouble-shooting" and problem solving service, whereby the MIRINZ staff members would provide technical advice and support for up to four

hours. After which if further support was required then a consultancy contract could be negotiated. The other way that service was provided was via the MIRINZ librarian who would search databases and provide abstracting services for MIRINZ members.

Despite MIRINZ achieving significant success and notoriety the support of its meat processor membership base began to wane in the late 1980's and by 1989 the Meat Industry Association of New Zealand (MIA) was required to provide funding from collective industry funds to sustain operations. This shifted the funding mix to be an equal split between membership subscriptions, MIA, and Government. Then in 1990 PPCS a large cooperative company lead a move by meat processors to withdraw their financial support for MIRINZ entirely.

The imminent collapse of MIRINZ was prevented by the intervention of both the NZ Meat Board and the NZ government and producers. This partnership brought about the formation of the Meat Research and Development Corporation (MRDC). For the next 10 years MIRINZ was still able to operate based on funds provided by MRDC and the Australian Meat Research Corporation (MRC) on a project-by-project basis, as well as, a royalty stream of approximately $NZ100,000 - $NZ200,000 per year coming from the sale of the inverted dressing system and MLTRS. MIRINZ staff also supplemented this income by undertaking a significant amount of contract work for Australian meat processors which focused on issues such as; establishment of hot boning protocols, chiller/plate freezer design and optimisation, energy modelling and management, etc.

The mid-1990's saw the emergence of Industrial Research Limited (IRL) to become a key provider of research services to MRDC and then subsequently Meat & Wool New Zealand (MWNZ), particularly in the area of process automation and robotics. MIRINZ struggled to compete with IRL for available research funds both in New Zealand and Australia. By 1999, IRL had gained the ascendency in this area and MIRINZ had begun to move into "wind-up" mode. Agresearch took over operation of the research facilities that MIRINZ had occupied. MIRINZ was then offered for sale by MWNZ and Agresearch purchased it with the intention of internalising all viable activities and then simply maintaining MIRINZ as a "brand name" for marketing purposes.

The two NZ crown research agencies; Agresearch and IRL are now the only two organisations providing R&D services to the NZ meat industry. Most of the process automation and robotic development work is now being undertaken by private companies under contract direct to the larger meat processing companies. Any work now funded by MWNZ is purely on a contestable contract basis. Agresearch now also plans to wind down the long running MIRIAD service because of a lack of support from subscribers. But it will maintain a core capability in key areas of "market failure" R&D, these being; eating quality, microbiological shelf life, food hygiene and safety, value added product development, and process automation to supplement labour supply.

All future R&D activity at Agresearch will be based on the vision and framework for the future called 2020 Science. 2020 Science contains Five Big Ideas which have been deemed critical to the pastoral sector and biotechnology industries. The basic notion of the strategy is to increase agricultural outputs whilst reducing resource input at the same time.

A note of caution: There is some concern in New Zealand that the withdrawal of the traditional industry support for R&D will ultimately result in a decrease in the capacity of the meat processing sector to continue to innovate. But the counter view to this would suggest that the current balance between the respective capacities for private and socialised innovation is about right for the prevailing social and economic context in New Zealand.

Evidence of "knowledge products" that are derived from a technology transfer and innovation capacity building system that is functioning efficiently and effectively within a New Zealand meat processing industry context is detailed in the table below.

Knowledge product category	Evidence
Academic publishing	Significant past evidence of publishing through MIRINZ industry publications, as well as, Massey University academics working in the meat industry.
"Industry-ready" graduates	Massey University has been providing graduates to the industry for many years.
Industry-targeted teaching	Massey University has been providing targeted industry training to senior/middle management. Also NZITO and Assure have been providing accredited training at inspector and operator levels.
Contract research and consultancy	Former MIRINZ staff, now Agresearch, and ProAnd are all very active.
Interchange of staff between universities/institutes and industry	Not a lot of evidence of this.
Scholarly research publication	Massey University academics and their students working in the meat industry.
Creation of IP rights	Agresearch, IRL, & MWNZ are very strong in this area.
Incubation of key innovation suppliers to industry	Past track record with Millers Mechanical, and SRV. But only limited effort in this area in recent times.

What are the strengths of the New Zealand system, when compared to the Australian system?

Table 6.3: New Zealand Technology Transfer & Industry Innovation Capacity[54]

Facilitated technology transfer framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
1	5	5	5	4

6.1.2 United States of America

Size does matter. The USA is the world's biggest economy and the world's premier consumer market. In the US, the customer is king.

US meat processors are very focused on customer needs within their own domestic markets. Fitness-of-product-for-purpose is their mantra for the definition of quality (e.g. meeting shelf life requirements at retail). The fact that the US exports any meat at all is simply the result of the scale of the industry and the ability of savvy international meat traders to accumulate particular beef product items in sufficient quantity to ensure sustainable supply relationships with key North Asian customers. No other country has the ability to compete with US exports in the same unique combination of prices, perceived quality, and quantity of specific cuts. Furthermore, the customer perception of the quality of US product is even further enhanced by their respect for the unique

[54] Refer Table 6.2 for full detail

USDA grade certification system which has become the defacto global standard for beef eating quality.

But US meat processors are presented with a paradox in a “free market economy”. This is the result of the democratic power of both the cattle producer and consumer lobbies who have forced both a legislated meat grading and a food safety system onto the processing sector. The economic rationale for the independent third party imposition of the meat grading system is that these grades provide the market with a more efficient price/value discovery process for both the buyers and sellers of beef. This is probably true in a domestic market the size of the USA. The legislation of food safety systems is clearly driven by the domestic consumer lobby which is also specific to the USA.

It is fair thing to say that the US meat processing industry does not appear to have an “export culture” and this is mainly due to its strong domestic market and the fact that the major US processors (Swift & Co., Tyson, Cargill) are already multi-national organisations with globally oriented supply chains into which their off-shore assets can place specific products to meet local/regional market requirements.

However, the recent closure of the Japanese market to US beef has still cost the industry $US1.4 billion per year and has lead to review and update of compliance systems in some 80 plants intending to continue to export to this market. This enhanced focus on compliance with importing country requirements will eventually lead to the emergence of an “export culture” within the US domestic supply chains.

Managing capacity, i.e. raising utilisation rates, and adding value are the new mantras of the industry.

The scale of the US processing industry and the national “innovation system” that is supported by public funds allows the local meat industry access to a technology transfer and innovation capability system which uses sheer size to make up for any perceived failing in effectiveness and efficiency. This technology transfer and innovation capability building system is composed of a number of entities, each with interdependences with each other and other various segments of the processing industry.

These include:

- the United States Department of Agriculture (USDA) – Agricultural Research Service (ARS) which undertakes industry specific R&D, and depending on the technical nature of the innovation, industry adoption is then facilitated by either the USDA – Agricultural Marketing Service (AMS) or the USDA – Food Safety Inspection Service (FSIS). The USDA – Animal and Plant Health Inspection Service (APHIS) will also facilitate industry adoption of innovations, particularly in areas relating to animal health and welfare.
- the National Cattleman’s Beef Association (NCBA) also incorporates the Cattlemen’s Beef Board (CBB) which is one of this country’s major “checkoff” boards – promoting the best interests of beef producers through research, education, advertising, and promotional activities. In this role, CBB disperses $US45 - $50 million each year. Therefore, it has a major fiduciary responsibility to ensure that the projects it funds are conducted effectively on behalf of U.S. beef producers.
- there are also a variety of “membership-based” industry organisations such as; National Meat Association (NMA), American Meat Institute (AMI Foundation), American Association of Meat Processors (AAMP) and North American Meat Processors Association (NAMPA), all of which provide technical services to particular segments of the meat processing industry, including; the small to medium meat packers on the West Coast, the top 25 meat

processors companies, the major value adding/food companies, and the small meat processor/retailers, respectively, and

- finally there is the American Meat Science Association (AMSA) which was formed 50 years ago, with its first "reciprocal meat conference" held in 1948. It was formally incorporated in 1964 and provides a unique forum for all interests in the meat industry – commercial, academic, government, and consumer – to come together in a reasoned, scientifically-based atmosphere and address the needs of the processing and marketing segments of industry, the consuming public, its own members, and others in the biological and nutritional sciences. AMSA hosts a processing technology conference with the NMA on an annual basis. This organisation also provides a collaborative opportunity for the main universities that provide both graduate students and research services to the industry, typically through Faculty members that are dedicated to meat science, biological and nutritional sciences (e.g. Georgia Tech, KSU, CSU, Texas A&M, Cal Poly SU, U of Cal. Davis, Pen State, Uni of Nebraska, OSU, etc.).

The service delivery model for most of these organisations is primarily web based. But, these Universities also have core extension and outreach obligations that are regionalised and largely funded from state and federal government sources (see below).

USDA

Agricultural Research Service

Major bricks and mortar commitments to meat animal research; at Clay Center (e.g. U.S. Meat Animal Research Center - MARC), and at Beltsville Agricultural Research Center (BARC). The core project at BARC is the Bovine Functional Genomics initiative, whereas the primary objectives of the Meats Research Unit at Clay Centre are:

- to reduce the risk of foodborne illness associated with the consumption of red meat, to respond to the research needs of the Food Safety and Inspection Service of the USDA
- to increase efficiency of lean meat production, and
- to improve eating quality of meat.

The food safety research addresses the microbial status of the meat from slaughter to table using both molecular and standard microbiological techniques. Unique methods are developed and validated for sampling carcasses and trim, and for isolating and identifying pathogens that may be present. Molecular techniques are used to track contamination to its source, in order to discover additional hurdles that will decrease the transfer of pathogens to the carcass. Factors that affect the survival and recovery of pathogens in stored and cooked meat products, as well as on refrigerated beef carcasses, are examined. Special emphasis is placed on improving intervention strategies and developing new, directed strategies designed to decrease pathogen contamination of red meat without adversely affecting meat quality. All of the information acquired will be integrated into forms usable by the meat industry as part of HACCP plans.

The meat quality research is directed toward identifying key steps in the regulation of muscle protein breakdown during growth and during postmortem storage. Special emphasis is placed on the identification of areas of the genome that regulate carcass composition and meat quality, the development of methodologies to classify carcasses based on tenderness and lean meat yield, the effect of breed on carcass composition and meat quality, and the development of intervention technologies to optimize meat tenderness.

The process for setting research priorities for ARS is highly iterative and based on consultative strategy generation in conjunction with annual evaluation and peer review all of which is anchored to an annual technical conference. This annual research meeting allows for input by the end-user agency operatives in the field, as well as, an opportunity for the administration to expose future

policy and strategy for feedback and refinement. The technical content of the work presented is peer reviewed at a detailed level during specific breakout sessions. The USDA Cooperative Research And Development Agreement (CRADA) funding mechanism allows for researchers outside the ARS to bid and gain funding for projects that are aligned with the ARS R&D strategy.

Agricultural Marketing Service

AMS is currently working with FSIS to implement the 12 point corrective action plan for SRM removal and disposal in the 80 plants who wish to export to Japan. This includes training for inspectors on the obligations of meeting importing country requirements – establishing an "export culture".

In addition, since 1923 AMS has operated the Meat Grading and Certification Branch which has served the livestock and meat industry by providing grading and certification services for beef, lamb, pork, veal, and calf. These services, provided by request on a fee-for-service basis, facilitate the orderly marketing of meats and meat products, thus benefiting livestock producers, feeders, processors, and consumers.

Under the meat grading service, quality and/or yield grades (determined according to written standards) are applied to beef, lamb, pork, veal, and calf carcasses. Meat retailers and wholesalers and members of the hotel and restaurant industry use USDA grades as a value guideline and a marketing tool. Quality grades also are helpful to consumers in determining meat palatability.

Under the certification service, meat and meat products are officially accepted according to detailed specification requirements. This service ensures that volume meat product purchasers--such as Federal, State, and local agencies--receive products that comply with specifications and contractual requirements. Many hospitals, schools, State institutions, the Department of Defence, and USDA itself (in the National School Lunch Program) use this service to secure uniform, high-quality, nutritionally-sound products.

The AMS also has a Student Career Experience Program (SCEP) which makes student trainee positions available for meat graders and market news reporters. Meat Graders perform grading and certification services in facilities where beef, lamb, veal, and calves are slaughtered, chilled, stored, and processed. Market News Reporters collect, analyze, and disseminate market information for livestock, meat, wool, grain by covering direct sales, auctions, and terminal markets.

Students in the SCEP can gain invaluable career experience while earning money for their education. Students receive hands-on training while in the SCEP. After graduation, students who have completed the SCEP do not have to compete with others to obtain full-time employment as a meat grader or market news reporter. In addition, they may be eligible to receive reimbursement for tuition, books, and incidental educational-related expenses.

FSIS – Technical Service Center (TSC)

The TSC serves as the FSIS's center for technical assistance, advice, and guidance regarding the implementation of national policies, programs, systems, and procedures including implementation of the farm-to-table food safety strategy within a HACCP framework. The TSC also assists in the implementation of this strategy and serves as the feedback mechanism relating to changes and refinements in existing systems and procedures.

The role of the TSC is to assist decision making by providing all parties with the standards and other technical information needed to understand, implement, apply, and enforce regulatory requirements. Key tools used to deliver these services are the web and a telephone call centre located in Nebraska.

Case Study – USDA, FSIS and AQIS

"The Poison Chalice is half full"

In 1987, USDA decided to advance all of its "slaughter inspectors" through to "process inspectors". This transition was successfully achieved by a variety of training/assessment options which included; recognition of previous degree-based outcomes, recognition of prior learning equivalent to 30 units of relevant University degree study, etc.

Then in 1989, AQIS saw an opportunity to achieve a number of its own business outcomes through the implementation of a similar program with its own meat inspection staff and initiated a Food Technology Training Program with 450 of its meat inspection staff.

This program was conceived by AQIS then headed by Dr Gardener Murray and the program was coordinated by Clive Richardson. It was the most ambitious and well resourced training initiative every undertaken by AQIS and the student cohorts achieved very high completion (i.e. >85%) and pass rates (i.e. >90%). By the end of 1995, AQIS had created a new cadre of Food Technology qualified meat inspectors, each with an enhanced understanding of the principles and implementation of HACCP systems. However, the Australian food industry had only limited demand for export certification of processed foods so the career path for this group was limited. At the same time, the meat industry was demanding further reductions in inspection costs. The upshot was that this group of inspectors was made redundant by AQIS – "*the poison chalice*".

The USDA "Mega Regs" were implemented in 1995 – 96 in response to the "Jack-in-the-box" incident. As a consequence, Australian meat exporters who were US listed began facing the demands of development and implementation of HACCP systems to comply with the heightened requirements of the "Mega Regs". This group of ex-AQIS meat inspectors was quickly absorbed by the Australian industry in various QA roles in order to meet these regulatory requirements (i.e. approximately 150 are now employed by meat processing companies in various QA management, production, and training roles).

In hindsight, this initiative has been the most successful AQIS/meat industry collaboration ever undertaken. What was thought to be the "*poison chalice*" of the certificates and Advanced Diploma of Food Technology and then the subsequent redundancy, has actually lead to the rapid infusion of Diploma and certificate qualified Food Technologists into the Australian Red Meat industry. This has been an excellent outcome for all parties concerned:

- for AQIS and the meat industry in terms of effective and efficient market access maintenance,
- for individual meat processing enterprises in terms of being able to recruit from a pool of appropriately skilled individuals at the right time to meet a significant change in their business needs, and
- For the individual meat inspectors in terms of having the opportunity to up-skill on-the-job, and then make the transition into new and sustainable QA management roles within individual meat processing enterprises.

"The poison chalice was indeed half full"

Membership-based industry organisations

NAMPA

The North American Meat Processors Association is a non-profit industry organization, now in its seventh decade. The members are meat processing companies and associates who share a continuing commitment to provide their customers with safe, reliable and consistent meat, poultry, seafood, game and other products.
The Association, founded in 1942, is a member-driven organization with member companies both large and small throughout the United States, Canada and other parts of the world.

NAMPA serves the business and professional needs of its members through a variety of services, including; educational programs, meetings and seminars.

The organization is best known by its acronym, NAMPA, and is universally recognized for its world-renowned publication, The Meat Buyers Guide, now in its 38th year of publication.

NMA

The National Meat Association provides a practical problem solving service to members - mainly located on the west coast. The NMA also has a limited issues management role - particularly for the smaller end of the industry.

The NMA team can be relied on for one-on-one assistance. Whether removing regulatory roadblocks, finding consulting experts, suggesting new market options or alerting members to new challenges

The NMA Scholarship Foundation encourages undergraduate students to pursue a degree in the Animal, Meat and Food Sciences. Since its inception in 1995, the foundation has granted tens of thousands of dollars in scholarships to exceptional undergraduate students. The goal of the Foundation is to raise $1 million to create a self-perpetuating endowment that will fund scholarships well into the 21st Century. The earnings should provide more than 25 annual scholarships to Animal, Meat or Food Sciences undergraduate students.

AMI

The American Meat Institute is an essential part of the meat and poultry industry representing a broad spectrum of firms, from large, multi-national companies to small and family-owned businesses. AMI **Packer Processor** members cover 95 percent of the nation's beef, pork, lamb and veal products and 70 percent of the nation's turkey products. **Supplier** members sell spices, equipment, services and ingredients; anything needed by the industry to produce safe and wholesome product.

Key services provided;

- access to legislative and regulatory expertise and experience of AMI staff,
- real-rime news reporting through meatAMI.com, and
- 24/7 crisis management assistance.

AAM

The American Association of Meat Processors (AAMP), is North America's largest meat trade organization. Membership includes more than 1,700 medium-sized and smaller meat, poultry and food businesses: slaughterers, packers, processors, wholesalers, in-home food service business, retailers, deli and catering operators, and industry suppliers. AAMP members are from the U.S., Canadian provinces and several foreign countries.

NCBA

The beef industry created the R&D ranch concept to jump-start new product development and improve the market price for undervalued beef and veal primals. Beef industry profits currently come from less than one-third of the total beef carcass, principally from ground beef and steaks. The undervalued two-thirds can be a "cash cow" for the beef industry. Through new product development, this two-thirds can be used to create products that offer consumers new conveniences, different flavors and a better eating experience. Producers also benefit from more value for their cattle

The New Products and Culinary Center effort is dedicated to increasing the value of the chuck and round and providing time-starved consumers with convenient new beef and veal products. It serves as a catalyst for beef and veal product innovation in four key areas, with the R&D Ranch® being the driving force of innovation for the beef industry:

- **R & D Ranch ® :** The place where new beef and veal concepts are born, and the lynchpin of the beef industry's total new products effort
- **Beef & Veal Culinary Center:** Ensures today's new beef and veal products meet consumer expectations through product and packaging evaluation, recipe development and testing, nutrition analysis, and more
- **New Product Resources:** Helps branded partners build success with consumers through market data, research and insights.

The industry's new products efforts are led by the R&D Ranch team, which is comprised of a variety of experts with more than 100 years of combined new product experience including meat and food scientists, operations experts, marketers, chefs and culinary professionals who have worked in the meat packing, processing, packaged goods, foodservice and retail industries. Since 1998, the team has participated in the launch of more than 100 new product concepts and is working on several additional concepts for the coming years.

The R&D Ranch team helps industry partners identify and develop new beef and veal products that will complement and grow their businesses. The team can show industry partners how to transform the chuck and round (which traditionally have been underutilized and more challenging to work with) into a great eating experience. They also use market knowledge and research to help partners develop products consumers want, from the flavor to the package. Finally, the team helps coordinate sales and marketing efforts – from cooking instructions and recipes to promotions and public relations – to contribute to market success. They have developed many new product concepts, making formulations available to processors and manufacturers, and in many cases have helped manufacturers turn their own ideas into successes.

AMSA

Member services:

- direct, personal contact at AMSA meetings with meat scientists from academia, industry, and government
- opportunity to attend various exclusive short courses on meat science subjects and an invitation to attend the International Congress of Meat Science and Technology (ICoMST)
- dissemination of scientific information at joint programs with American Association of Meat Processors, American Meat Institute, National Cattlemen's Beef Association, National Pork Board, and National Meat Association

- opportunity to become involved in the programs that shape your career by participating on committees to determine the structure of meetings and industry programs.

AMSA collaborates with NMA Education Committee on developing and promoting the NMA Scholarship Foundation which encourages undergraduate students to pursue a degree in the Animal, Meat and Food Sciences. In doing so, it undertakes a number of "outreach" activities with partner universities:

- student placement programs
- carcase judging for eating quality
- internships & technical tours
- building the industry profile as a career opportunity for graduate students.

University Sector

In the United States it is evident that the universities take a far-reaching and proactive role in the delivery of education and training programs to the meat industry. The Study Tour team visited both Texas A&M University (TAMU) and Nebraska University and found the following features:

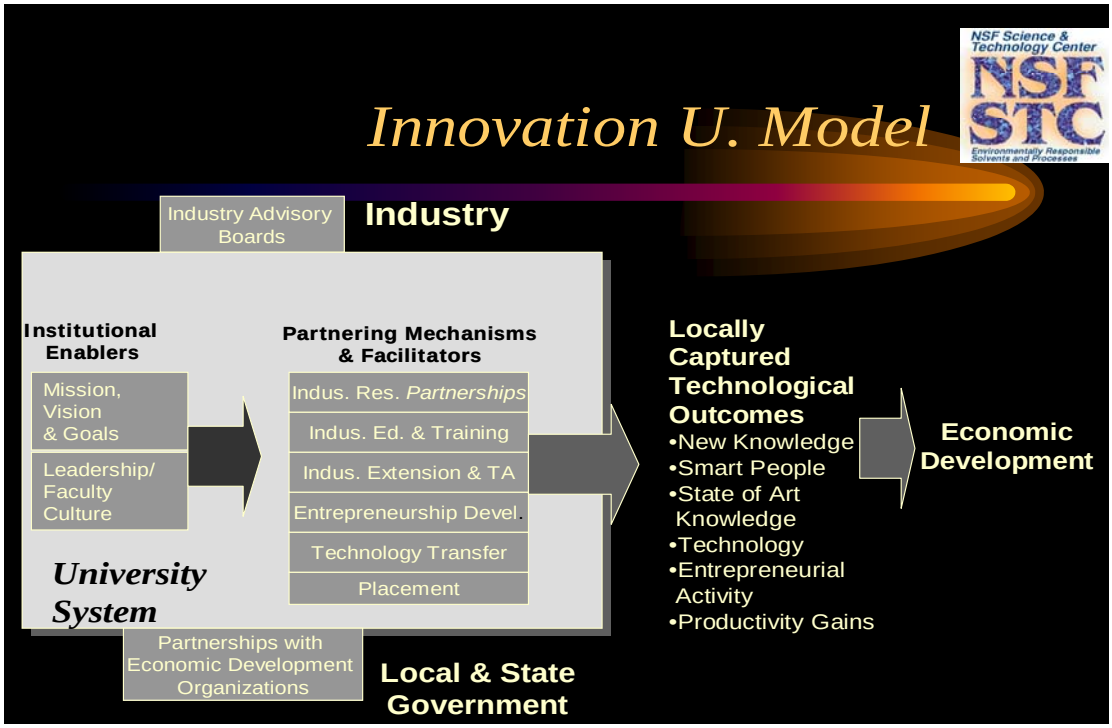
- well structured outreach programs which ensured availability of on hand technical and research expertise to meat industry companies and individuals
- a close relationship between research and education programs which provided timely and targeted training across the supply chain
- an increasing preference by companies to seek out and employ graduates in meat processing plants (For example, TAMU produces about 800 graduates per year. Of these 30% go directly to industry, 30% government)
- programs which regularly bring together practitioners from across the supply chain and which result in a far greater awareness of producer to customer relationships than is evident in Australia
- a range of meat-specific undergraduate qualifications which were producing high calibre graduates to the meat industry
- high participation rates in competitions such as meat judging programs which created interest in the meat industry and were often a source of potential recruits.

Of particular interest was the unique role that US "land grant" universities play in extension and outreach (i.e. technology transfer and building industry innovation capability). This model is somewhat unique to the US because higher education is funded by state governments, so they are always focused on how these institutions can benefit their local economies.

The "new land grant university model" which is regarded as best-in-class is called the "Innovation U Model" where "World-class" universities are also robust partners with industry, as well as being a player in regional innovation.

TAMU has been assessed against this model which is featured below.[55]

[55] Tornatzky, Waugaman and Gray, 2004 - http://www.southern.org/pubs/innovationU/default.asp



Indeed, when the activities of the twelve-member TAMU Meat Science faculty was assessed during the visit there was clear evidence that all the core elements of the model where functioning efficiently and effectively within a Texas meat industry context;

- Industry Research Partnering,
- Technology Transfer,
- Entrepreneurial Orientation,
- Extension,
- Industry-Responsive Training and Education,
- Student Placement Services,
- Formal Partnering with State Government,
- Formal Partnering with Industry,
- Mission and Vision, and
- Culture and Leadership.

The Innovation U model would be an excellent concept to explore for technology transfer and building industry innovation capability for the Australian meat industry. Although, in terms of reproducibility, the first issue to be determined would be the significance of the fact that higher education in Australia is federally funded, rather than state based.

Another feature of the TAMU model was the “meat industry enquiry services and outreach activity” obligations of the university faculty staff. The industry interaction typically involved activities such as;

- workshop/conferences
- web-based publishing
- trouble shooting on-plant problems over the phone
- small student research projects
- consulting
- newsletters.

Given the level of industry specialization of the skills and technical competencies required to deliver these sorts of services, as well as, the increasing pervasiveness of knowledge services through the internet, it is now feasible for MLA to consider facilitating access by Australian meat processors and research providers to globally sourced knowledge services. For example, these services could be drawn from a combination of US, NZ, and Australian sources of expertise, depending on the fit between the nature of the problem and skills required resolve the issue.

Evidence of "knowledge products" that are derived from a technology transfer and innovation capacity building system that is functioning efficiently and effectively within a US meat processing industry context is detailed in the table below.

Knowledge product category	**Evidence**
Academic publishing	Significant past evidence of publishing through the USDA-ARS Meat Research Unit at Clay centre as well as a wide variety of University-based academics working in the meat industry.
"Industry-ready" graduates	"Land Grant" universities have been providing graduates to the industry for many years. The industry has provided significant support through scholarship programs at these universities. Indeed, the NMA has an "education committee" focused on his issue.
Industry-targeted teaching	"Land Grant" universities have been providing targeted industry training to senior/middle management. Also USDA has been providing training to all of its staff. The creation of the HACCP Alliance based at TAMU was specifically focused on providing HACCP training for the meat industry.
Contract research and consultancy	Mainly delivered by university-based academics with close relationships with the industry. Often coordinated by industry associations at an all-of-industry level.
Interchange of staff between universities/institutes and industry	Some very famous examples of this (e.g. Russel Cross), but more frequent interchange occurs between universities and USDA. Indeed, USDA funds a number of faculty positions at specific universities.
Scholarly research publication	AMSA & academics and their students working in the meat industry.
Creation of IP rights	Does not seem to be a major issue in the US. Probably because so much of the work is funded either by USDA or through "check-off" funds. The rest of the R&D seems to occur "in-house" so "trade secret & know-how" seems to the main way that IP is protected.
Incubation of key innovation suppliers to industry	There are some very significant technology companies that develop and supply equipment and hygiene systems to meat processors but this technology is primarily related to value added products. There is evidence of a commercialistion/incubation mechanism whereby a major meat company may partner with a smaller technology provider to develop a specific technology with a view to allowing R&D costs to be recovered as a percentage of on-going sales to other companies after an exclusivity period (e.g. RMS Grading System, Frigoscandia Steam cabinet, etc). With the exception of SFK Systems for pork processing, there is no other evidence of automation/robotics companies that provide their own products to the industry. Most of this automation work is funded and directed by USDA ARS and typically focused on automation of inspection services delivered by AMS and FSIS. This work is usually contracted out to University based research centers, but not commercialised, rather it will be rolled out as part of the service provided by USDA.

Table 6.4. US Technology Transfer & Industry Innovation Capacity[56]

Facilitated technology transfer Framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
3	4	3	3	4

6.1.3 Canada

The Canadian meat processing industry was traditionally characterised as being a commodity oriented manufacturing meat business that was highly dependent on the USA as an export market for disposal of 75% of its product at a floor price set by the US domestic market.

The major US processors Tyson and Cargill, are both major players in Canada and hence in terms of high quality export product there is also strong interrelationship between Canadian imports to the US and US exports to Japan.

The key factors that are currently slowing the rate of recovery in the Canadian industry post-BSE include;

- a very tight labour market due to the resources boom which is having the effect of limiting processing capacity
- over supply of Over Thirty Month animals
- a lack of a shared industry innovation strategy due to provincial parochialism
- many years of relatively limited customer focus due to assumed market access security to the US, and
- a lack of a pre-existing integrated value adding capacity within Canada.

There are a number of organisations that are now emerging at a national level in an effort to integrate a variety of regional efforts to work toward recovery of the Canadian beef industry.

The Canadian Cattlemen's Association (CCA)

Established in 1932, the Canadian Cattlemen's Association is the only national association representing the interests of Canada's 90,000 beef producers. The Canadian Cattlemen's Association provides the leadership and unity necessary to speak as one voice for the beef industry. This includes assisting in its development, adaptation to new ideas and technologies, and in its prosperity.

The Canadian Cattlemen's Association is involved in a wide range of issues that are of concern to Canadian beef producers. These include; trade, animal health, environment and animal care, fiscal and monetary policy, and grading/inspection; to name just a few. In addition, the Canadian Cattlemen's Association works closely with other sectors of the agriculture and food industries on matters of mutual concern.

[56] Refer Table 6.2 for full detail

Sunterra Meats packing plant, Canada

National Check-off
The collection of a one dollar per head National Check-off fee on cattle is just commencing in some parts of Canada (cattle producing provinces of Alberta and BC)- it ensures funding for promotion, export development and research.

The National Check-off is directed towards two goals:

- increasing sales of beef (domestic and export), and
- finding better and more efficient methods of producing beef and beef cattle.

Increased sales of beef will be achieved through product promotion and development and expansion of new and existing markets. The Beef Information Centre (BIC) and the Canada Beef Export Federation (CBEF) administer the funds on behalf of the Government through a contractual agreement.

Better and more efficient ways of producing beef and beef cattle will be developed through research. The Beef Cattle Research Council (BCRC) administer the funds on behalf of the Government through a contractual agreement. It is also tasked with ensuring research is well coordinated throughout the country and is guided by sound industry priorities.

The National Beef industry Development Fund

The National Beef Industry Development Fund (NBIDF) is a $C9.25 million dollar investment of the Governments of Canada, British Columbia and Alberta, managed and directed by a by an industry/government committee for the purpose of promoting and enhancing the competitiveness of the beef industry in Canada through funding research and/or development programs. The fund commenced in March of 2002 and sunsets in March of 2006.

The fund committee held an industry consultation meeting to assist in the identification of the strategic direction for the Fund. The meeting brought together stakeholders from all sectors of the industry to review and discuss development priorities for the Canadian beef cattle industry. The workshop was facilitated in a manner that identified the past successes of development funding but also allowed ideas and suggestions to emerge that were not necessarily reliant on current industry practices.

The workshop identified and recommended the following industry development priorities to the fund committee:

Overall Objective:

A customer driven industry committed to 100% customer satisfaction.

Funding Priorities:

- expand markets and increase market security
- lever and enhance Canadian beef image to facilitate product differentiation
- develop integrated food safety and foreign animal disease (FAD) strategies
- add/optimize value to beef and beef cattle products branded products, new products
- beef quality and consistency
- facilitate improved knowledge and technology transfer
- improve co-operation, co-ordination and information sharing and transfer between levels and sectors.

As a result of these meetings, the following four development areas were identified as forming the strategic direction of the fund:

- expand market share and security
- increase product value
- improve alignment of the supply chain
- invest in knowledge and education (through innovation and adaptation).

An industry-driven CRC-type entity has since been formed in 2003 based on a partnership between; Alberta – Agriculture, Food, and Rural Development, the University of Alberta, and the Alberta Research Council. This clearly is a very provincial initiative with the following goal; to create an Alberta meat industry that is globally competitive, sustainable, profitable, and growing.

The framework of the initiative is based on the Australian CRC model and is called the "Institute for Food and Agricultural Sciences, Alberta: Value-Added Meat Program – *beyond the box*". The program has established five themes based on preliminary research into consumer preferences.

1. **Enhanced skills and research capacity**: includes technical and university training to produce trained and educated personnel who will enable expansion of the meat industry and undertake meat science research.
2. **Value tracking (traceback)**: preserves identity from production to consumption and provides the means to verify meat products' attributes.
3. **Maximising carcass value**: creates opportunities related to new and innovative meat products and processes. Four areas of focus are:
    - **value added fresh meat research**
    - **value added cooked meats**
    - **synchronising live animal production systems to develop new fresh and cooked products**
    - **improved use of poultry dark meat and protein from spent light and heavy fowl.**
4. **Bioactive animal lipids**: this emerging area of research has the potential to create new bioactive lipid enriched meat, functional foods, natural health products and ingredients, which will enhance the value of meat and meat products and attract future investment.
5. **Assuring the microbiological quality and safety of value added meats.**

Lacombe Research Centre and the Beaverlodge Research Farm

The Lacombe Research Centre, a research centre of Agriculture and Agri-Food Canada, is located in the town of Lacombe in central Alberta between the two large cities of Edmonton and

Calgary, approximately 23 km north of Red Deer. The centre is linked with the Beaverlodge Research Farm, which is located 40 km west of the city of Grande Prairie in northwest Alberta.

The Lacombe Research Centre contributes to the study of food safety, red meat quality, carcass grading, cereal breeding and forage/beef research on a global scale.

The Lacombe Research Centre conducts research on the ante- and post-mortem factors that influence red meat:

- yield
- quality
- safety
- preservation.

Lacombe also manages a research program in apiculture. With its affiliated sites and research partners, the Centre develops integrated, sustainable crop and animal production systems and crop varieties for the short-season environments of the Parkland vegetation zone and northwestern Canada.

Lacombe Research Centre and the Beaverlodge Research Farm Research Areas

Meat Research

- Carcass composition and meat quality
- Meat safety and spoilage
- Meat palatability
- Meat molecular genetics
- Meat spoilage and shelf life
- Yield and grading
- Live animal management and meat quality

This research capability underpins the grading and hygiene inspection services delivered by the Canadian Government through the relevant independent agencies.

The irony of the Canadian situation is that it seems that it has taken the BSE event in 2003 to surface many of the underlying issues that would have eventually impeded the continued growth and global competitiveness of the Canadian beef industry.

Evidence of “knowledge products” that are derived from a technology transfer and innovation capacity building system that is functioning efficiently and effectively within a Canadian meat processing industry context is detailed in the table below.

Knowledge product category	Evidence
Academic publishing	Limited evidence of past work coming from the Universities of Alberta (UoA) and Guelph (UoG - Ontario)
“Industry-ready” graduates	Seem to be mainly derived from Olds College ex – 5 month meat processing program. Also a limited number of graduates from UoA and UoG.
Industry-targeted teaching	See above.
Contract research and consultancy	No evidence.
Interchange of staff between universities/institutes and industry	Limited numbers ex-Olds College program.
Scholarly research publication	Limited evidence from Universities, but Agriculture Canada does have a very strong track record in food safety. This is probably

	driven by the desire to maintain market access to the US.
Creation of IP rights	No evidence.
Incubation of key innovation suppliers to industry	No evidence.

Table 6.5 Canadian Technology Transfer & Industry Innovation Capacity[57]

Facilitated technology transfer Framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
2	2	1	3	3

6.1.4 England

The British meat industry is one of proud tradition (e.g. Smithfield Markets). It has a formalised three tiered structure and is the product of a craft-based industry which has slowly evolved and adapted to environmental change over many centuries.

The three tiered industry structure breaks down in the following way:

1. large companies which are primarily dedicated to provide case-ready product to the major supermarket chains (i.e. 35% of all meat product produced), as well as, limited capacity for value added manufacturing for food service (i.e. 10% of all meat product produced)
2. the middle tier of SME's who are more focused on meat wholesaling and trading, rather than manufacturing consumer products
3. the small processors/butchers focused on local communities and villages.

It is the second tier that appears to struggling the most with the changing environment. Despite the fact that they are still only focused on local markets, they are still expected to comply with same EU requirements as specified for export under the new regulations introduced in January 2006.

This and other segments of the industry are now faced with these new pressures brought about by the emergence of a number of new social and economic drivers, including:

- a rising consumer advocacy lobby as a consequence of recent food safety scares
- limited labour supply due to sustained economic growth
- consumer expectation of convenience leading to a requirement for increasingly sophisticated in meat processing operations
- current Common Agricultural Policy reforms over the next 10 years which will result in further reductions in local red meat production leading to the increasing consumer demand being satisfied by even more imported product
- significant concentration of channels to market as global supermarket supply chains become more pervasive, and
- further harmonisation of national standards with the requisite conditions of participation as an exporter within the new EU market.

All of these emergent industry drivers are conspiring to generate an enormous amount of pressure on the traditional structures and systems that had adequately served the UK meat industry for at least the past 100 years. Although it does appear that the industry has adapted significantly over the past 10 years.

[57] Refer Table 6.2 for full detail

The traditional nature of the meat industry is not only constrained to the processing sector, but also extends to the industry organisations and providers of technical and research services to the industry.

There is one major membership-based industry organisation serving the sector.

British Meat Processing Association (BMPA)
The BMPA was formed to assist the British meat industry to adapt and rationalise to meet the changing demands of the market place and the consumer. It was the result of an amalgamation of the British Meat Federation and the British Meat Manufacturer's Association which believed that it was logical and timely to create a trade association to represent more effectively the interests of their members throughout the chain, provide a better and broader information service with stronger representation to government and its agencies, and to welcome new members with similar interests in an inclusive association of meat interests.

Benefits of Membership

Information
BMPA provides up to the minute information on key issues affecting the fresh meat and meat manufacturing sectors.

Website Service
BMPA provides confidential Members' only briefings, consultation information, news articles and useful links to other websites.

Specialist knowledge
BMPA provides specialist knowledge, interpretation and advice on:

- national and EU legislation governing fresh meat and meat manufacturing
- enforcement issues
- technical issues, including labelling legislation, meat plant hygiene, HACCP and microbiological testing, animal by-products, reserved descriptions, compositional standards, quality assurance and training, animal welfare, packaging and transport.

Interaction and Liaison
BMPA provides the opportunity for members to discuss issues against a neutral and non competitive background and provides direct links to other trade bodies representing the food chain as a whole.

Representation to government and its agencies
BMPA consults and represents members' views to Government through:

- participation in BMPA meetings and reaction to Government consultations through documentary responses; committees, issue led working groups, and annual conference
- membership of industry/government liaison groups
- effective links with officials in government departments
- regular correspondence and dialogue with government Ministers
- a network of Members of Parliament.

Representation to the European Commission and Parliament
BMPA represents members' interests in Brussels through CLITRAVI, the European meat products trade association, and UECBV, the trade association representing fresh meat processors. BMPA provides:

- an excellent knowledge and understanding of EU legislation procedures
- direct access to decision makers in the European Commission
- the opportunity to influence legislation at the drafting stage
- the opportunity to influence Members of the European Parliament.

There is one major statutory organisation serving the sector.

Meat & Livestock Commission
The Meat and Livestock Commission's (MLC) role is to:

- work with the British meat and livestock industry (cattle, sheep and pigs) to improve its efficiency and competitive position;
- to maintain and stimulate markets for British meat at home and abroad, while taking into account the needs of consumers.

MLC was set up under the 1967 Agriculture Act. It is a Non Departmental Public Body, funded through the collection of levies on sheep, pigs and cattle slaughtered for human consumption or exported live. This is supplemented by EU and Government grants and from money earned from its own commercial operations.
Over recent years the MLC has created a new federal structure. The responsibility for the setting and delivering of strategy for the deployment of levy income has been devolved to four bodies:
British Pig Executive (BPEX)
English Beef and Lamb Executive (EBLEX)
Hybu Cig Cymru/Meat Promotion Wales (HCC)
Quality Meat Scotland (QMS).

Policy is directed by 11 MLC Commissioners appointed by Defra, Scottish Executive and Welsh Assembly.

A fundamental review of all levy bodies was announced during March 2005. MLC is confident that the benefits and value of its work will stand up to scrutiny and it is welcoming the opportunity that this review presents to revisit, and possibly update, the 38-year-old legislation that defines our statutory functions.

MLC – Commercial Activities and Industry Consulting services
The commercial operations are managed separately within MLC, and employ some 350 staff. They provide professional consulting advice, logistics and inspection services to the meat and livestock industry on a commercial basis. All costs are fully accounted for and any profits are returned to the MLC for the benefit of the industry. Over the last five years MLC commercial services contributed more than £4 million, after tax, to supplement MLC levy income.

MLC – Industry Consulting (IC) has been involved in consultancy work in the meat and livestock industry since 1980, providing services for individual companies, regional agencies and local and national government in Great Britain and overseas countries. It undertakes projects in its own right and works in partnership with others.

IC specialises in putting together consultancy teams for individual projects drawing upon the depth of expertise within the MLC as a whole and that of a close network of specialist IC Associates. In this way it is able to handle almost any type of consulting requirement within the domestic and international meat and livestock industry. Areas of expertise include

- **Economic -** evaluation and analysis;
- **Strategic** - evaluation and planning;

- **Company -** performance assessment, benchmarking, business planning; operational costing analysis and business assessment;
- **Engineering** - livestock handling systems; livestock markets; meat plant assessment and design for new and upgraded slaughtering and meat processing facilities; waste disposal; electronic data capture and control systems; engineering project management:
- **Marketing -** market and customer analysis and development;
- **Supply chain -** value chain analysis and development; quality assurance; training for meat plant operations; database of meat companies.
- **Project planning and evaluation**,
- **Sourcing project funds**.

By working closely with other parts of MLC, the Red Meat Industry Forum and the devolved bodies, IC can provide expertise for projects in many other areas than the above e.g. **the provision of livestock production/breeding advice; the provision of livestock and meat inspection and assessment services; HACCP, traceability and ICT systems for the meat and livestock industry; and training.**

Red Meat Industry Forum (RMIF)
The Department of Trade and Industry has partnered with the Meat & Livestock Commission to create the RMIF which targets SMEs with the intent of providing tools and building capacity to undertake plant-based continuous improvement programs. The notion is that this middle tier needs to see how the introduction of more process analysis and rigour will lead to immediate cost savings, as well as, sustaining competitive advantage in the longer term. Despite the fact that this work is co-funded by the DEFRA through MLC, these SMEs are still reluctant to engage in this program.

There are also two highly distinguished technical services companies providing “membership-based” services to the sector.

Campden & Chorleywood Food Research Association
CCFRA Group is the UK's largest independent membership-based organisation carrying out research and development for the food and drinks industry worldwide. It is committed to providing industry with the research, technical and advisory services needed to ensure product safety and quality, process efficiency and product and process innovation.

The R&D programme reflects needs identified by industrial members and provides a constantly renewable knowledge base for technology transfer. A continuous programme of investment ensures leading-edge processing and analytical facilities for research and contract work. CCFRA maintains close working relationships with industry through frequent meetings with its twelve technical advisory panels and associated industrial working parties.

Contract R&D is also carried out on behalf of UK government departments, levy boards, industrial consortia and the European Union. Consultancy work is done under Aid-funded programmes for countries with a developing market economy.

Facilities include three fully equipped food processing halls, product and process development facilities, a substantial, leading-edge sensory analysis suite, and extensive research and analytical laboratories covering microbiology, hygiene, chemistry, biochemistry and microscopy.

Purpose built training centres and dedicated information services are central to CCFRA´s pivotal role in technology transfer. A substantial and growing training programme forms the basis of worldwide in-house training for industry tailored to specific company requirements. Best-practice

guidelines with industrial input and endorsement provide practical knowledge, and newsletters, alerting bulletins and seminars address current issues.

Leatherhead Food Research Association
Leatherhead Food International is a global and independent provider of food information, market intelligence and technical and food research services. They provide consultancy services varying from large scale Government research, through individually tailored client information projects, to nutritional, sensory and consumer studies.

They have over 1,000 members internationally, who we support daily with the whole range of our food expertise, and with our regular training programmes.

Founded in 1919, Leatherhead Food International (LFI) has been focused on meeting the changing needs of the UK and global food industry for over 85 years – a proud and privileged heritage that has allowed it to develop as an independent, market driven, client-focused organisation.

The LFI regulatory advisory service covers 140 countries and is available in 12 different languages. Its market intelligence and technical abstracting capabilities are second to none. The library resources are unrivalled in the private sector - over 17,000 books and 650 monthly journals form part of this vital asset - not to mention a technical and regulatory help desk that handles over 10,000 enquiries a year.

In addition, LFI can safely steer a product through all the steps from inception through to launch; checking consumer and sensory awareness, food quality and safety, legislation and packaging, along the way. Reality-checking of the brand proposition and joint benchmarking analysis of each different stage are vital components of this comprehensive service.

Other LFI activities include the provision of large-scale public and private funded research and analytical projects for the FSA, EU and Department of Health; a complete suite of consumer and sensory services, running topical conferences and comprehensive training programmes, and providing tailored on-line information packages.

Of particular interest to Australia was the Cranfield Fellowship in Manufacturing Management. This is a specialist executive program targeted at future leaders of the red meat industry across Europe. It is to be provided by Cranfield University and supported by: University of Cambridge – Institute for Manufacturing, and The Danish Meat Trade College. It is a three part programme, including a self directed learning/preparation phase, a nine month “foundation phase”, followed by a six month “project phase”. The learning outcomes will include:

- knowledge of business and manufacturing strategy development.
- expertise in the principles of manufacturing operations.
- practical understanding of the latest leadership and influencing techniques.
- understanding and experience of production operations in the red meat industry.

This sounds like a very interesting initiative with possible application in the Australian context. But it is understood that the course is yet to be delivered due to a lack of enrolments. It is expected that the course will be run as soon as sufficient enrollments are confirmed.

Evidence of "knowledge products" that are derived from a technology transfer and innovation capacity building system that is functioning efficiently and effectively within a British meat processing industry context is detailed in the table below.

Knowledge product category	Evidence
Academic publishing	No public domain evidence here. Except where this has been undertaken as part of membership services provided by CCFRA or LFI. In addition, the EU Framework Funding Programmes have produced a significant amount published work targeted at capability building within EU member states.
"Industry-ready" graduates	No evidence here. Except where Food Technologists find their way into the meat industry as QA managers.
Industry-targeted teaching	No evidence here at a tertiary level.
Contract research and consultancy	MLC, RMIF, CCFRA, and LFI are all very strong & active here.
Interchange of staff between universities/institutes and industry	No evidence of this.
Scholarly research publication	No evidence of this.
Creation of IP rights	No evidence of this.
Incubation of key innovation suppliers to industry	No evidence of this.

Table 6.6 British Technology Transfer & Industry Innovation Capacity[58]

Facilitated technology transfer Framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
4	4	4	3	4

6.1.5 Ireland

The Irish meat industry has always had an export focus with nine out of every ten cattle being destined for export markets. Beef makes up about 70% of total meat exports.

The story is the same for sheep and pigs, which make up 20% and 10% of export production, respectively. The destination for this product is split between the UK and the rest of the EU (i.e. 70%:30%).

The Irish industry is also relatively unique in that there is no foreign ownership, but it does have major interests in the UK, primarily through Anglo Irish Meat Processors Ltd, Dawn Meats, and Dungannon Meats which all supply major supermarket chains with case ready product.

The key challenges that lie ahead for the industry include:

- establishment and maintenance of all-of-supply chain traceability and QA systems
- responding to shifting trade policy which will lead to a reduction in on-farm subsidies, new regulatory directives and liberalisation of access to EU markets
- responding to consumer demand for convenience through value-added ready-to-eat products, and

[58] Refer Table 6.2 for full detail

- integration with global supermarket supply chains by meeting their need to pass value adding activities back up the supply chain.

The National Food Center (Teagasc)
Teagasc provides integrated research, advisory and training services for the agriculture and food industry in Ireland.

They are a semi-government organisation established under legislation enacted by the Irish government. The 11 member Board is appointed by the Minister for Agriculture and Food and has representatives from the farming organisations, the food industry, the universities, the Department of Agriculture and Food and Teagasc staff.

They are a client-based organisation and operate in partnership with all sectors of the agriculture and food industry and with rural development agencies. They have developed close alliances with research, advisory and training agencies throughout the world and are continuously seeking to expand our international contacts.

Around 75% of Teagasc's yearly budget comes from the Irish exchequer and EU funding with the balance generated from earned income. Some 40% of the budget is devoted to research with the remainder split half and half between advisory and training services

Teagasc has a highly integrated research and technology transfer infrastructure and employs over 1,500 staff at over 100 locations throughout Ireland.

- Research services are provided by 200 research scientists and 300 research technicians at nine dedicated centres.
- There are 550 advisors and regional specialists located at regional, county and local offices.
- The eight colleges and local training/research centres are staffed by college lecturers, technicians and education officers.

The Food Training and Technical Services Department at the Ashdown food research center is a leading supplier of training and technical advice to the food processing and retail sector in food safety and quality systems, food innovation and new product development. This training and advice is provided to assist food businesses in meeting their legal requirements, customer requirements, and to facilitate industry best practice.

The key drivers for change in the Irish meat industry include:

- **food safety**: Traceability, on farm assurance, and new EU requirements
- **trade policy**: Liberalisation of the Common Agricultural Policy
- **convenience**: Driving companies toward further value adding
- **global retailing**: Focus on case ready for supermarkets.

The notion of technology transfer and evaluation of the industry benefit from research is built into the “firm measure” which is the Food Institutional Research measure used as the basis for ongoing EU 6th Framework funding support for the National Development Plan 2000-2006.

Ashtown National Food Centre, Ireland

Evidence of "knowledge products" that are derived from a technology transfer and innovation capacity building system that is functioning efficiently and effectively within an Irish meat processing industry context is detailed in the table below.

Knowledge product category	Evidence
Academic publishing	No evidence of this. Except where work has been funded through the EU Framework Program.
"Industry-ready" graduates	No evidence of this.
Industry-targeted teaching	No evidence of this at tertiary level.
Contract research and consultancy	Seems to be largely delivered through Teagasc.
Interchange of staff between universities/institutes and industry	No evidence of this.
Scholarly research publication	Limited evidence of this and then typically through the EU Framework Program.
Creation of IP rights	No evidence of this.
Incubation of key innovation suppliers to industry	No evidence of this.

Table 6.7 Irish Technology Transfer & Industry Innovation Capacity[59]

Facilitated technology transfer Framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
4	5	3	4	4

Denmark

The Danish economy is a shining example of what can be achieved by "socialised capitalism" in a global economy. The cornerstone of this system for the agricultural sector of the economy is co-operative structure. These co-operatives are owned by the Danish farmers. The formation and existence of co-operatives is based on some general principles;

- democratic member governance; one man, one vote
- voluntary and open membership

[59] Refer Table 6.2 for full detail

- right and obligation to supply products
- profits belong to the members and are distributed among them in proportion to their turnover with the co-operative.

The Danish co-operatives are today among some of Denmark's largest enterprises. They have reached this position on account of co-operation among farmers, and during the past few years a number of mergers have contributed to this development. The Danish co-operatives are even the largest of their kind in Europe within the dairy and slaughterhouse sectors. The benefit to Danish pig farmers from the economies of scale and vertical integration of Danish Crown is manifested in the fact that they receive approximately 40% of the consumer spend on pork products at retail.

The Danish government clearly values the impact of agricultural exports on its economy. Exports of agricultural products is increasing and now represent 13% of total export value and, of this total; beef, veal, and pork represent about 22%. In view of this, the Danish government supports the Danish Agricultural Council which is a trade organisation whose object is to attend to joint tasks and business interests on behalf of agricultural and food organisations and co-operatives.

This work covers the entire supply chain from "farm gate to dinner plate" – from the food producer to the sale undertaken by the co-operative.

The task of securing optimal conditions for the trade is performed among other things by;

- promoting the interest in agriculture, horticulture, aquaculture, and the food industry
- strengthening the competitiveness and reputation of the sector
- representing the sector in joint matters in relation to the government, the Danish Parliament, the public authorities, other commercial enterprises in Denmark and abroad
- attending to and promoting the joint interests of co-operatives in the fields of trade policy, competition and co-operative interests.

The following meat industry organisations are members of the Danish Agricultural Council; Danish Crown A.m.b.A, Tican A.m.b.A., Danish Bacon & Meat Council, and the Danish Livestock & Meat Board.

The Danish meat processing industry is dominated by one major player – **Danish Crown A.m.b.A**. It is an international food group with production and sales of fresh pork and beef, primarily under the parent company. The Group's subsidiaries operate extensive production and sales of other food products. Today Danish Crown is the world's second largest pig slaughtering operation (after Smithfield in USA), the world's largest meat exporter, and is the 8th largest meat company in the world. It is a co-operative company with a mission to supply products that meet consumer requirements for differentiated quality and thus ensure our owners the highest possible price for raw materials. The company vision is to be the leading meat company in the EU by being competitive in international markets which will ensure that Danish pork and beef producers have a significant and profitable position in global markets. Over the past 30 years it has systematically consolidated processing capacity across Denmark and now owns 90% and 59% of pork and beef processing capacity, respectively. Danish Crown is now solely responsible for producing 2% of the global volume of pork production.

About 85% of all meat produced in Denmark is exported. Major market destinations include; UK/Germany 60% and Japan/USA 12%.

The Danish meat industry is facing some key challenges in the future, these include; decreasing supply of local labour, further exposure of the domestic economy to trade with other EU member

nations, live export of Danish piglets to competitor EU nations, and increasing environmental and animal welfare constraints on local production and processing.

The **Danish Bacon & Meat Council** (DBMC) is the industry organisation for two co-operative slaughter companies; Danish Crown and Tican. The main objectives of the organisation are to safeguard and promote the interests of pig producers and the whole of the pork and bacon industry. DBMC has three main areas of responsibility:

1. **R&D:** projects that cover all areas from primary production through to slaughter and processing. Key areas are breeding, feeding, housing systems, animal welfare, the environment, food safety, meat quality and automation.
2. **Promotion & Information Services:** the member companies co-operate through DBMC to promote sales of Danish pork and bacon in both Europe and overseas markets. Information and PR activities are directed at pig farmers, slaughterhouses, meat processing companies, consumers, the media, the authorities and opinion formers.
3. **Advisory Services, Disease Prevention & Management:** DBMC deal with a wide range of issues on behalf of their pig producers, abattoirs and processing companies, including health management, disease prevention, meat inspection, legal affairs and market support.

Danish Crown has also taken up a “first-mover” position in development and commercialisation of process automation technology through its previous ownership of SFK Systems/Danfotech. SFK Systems is a world-leading supplier of high technology production systems and equipment for the meat industry, primarily for pig slaughterhouses. Furthermore, the company has a specialized trading department for accessories to the food industry. The company has departments in both Kolding and Aalborg and has a turnover of approx. DKK 550 million with customers primarily in Western and Eastern Europe, North and South America and in China and Japan. SFK Systems A/S has approx. 330 employees.

The recent transfer of an 80% majority of the shares of SFK Systems to LD Equity makes it possible to strengthen the ongoing development of SFK Systems as an independent and strongly focused global niche company. The agreement with LD Equity is a natural step in Danish Crown’s focus on own core business as a slaughtering and meat processing company. As a minority shareholder Danish Crown will aim at continuing and strengthening the technological development in SFK Systems and thus strengthening the company’s position as a global supplier of high technological production systems and equipment to pig slaughterhouses and meat processing.

The Danish meat industry, particularly in pork, is generally recognised as being a world leader. This is largely due to the fact that it has always been export focused which has meant that it has always had to satisfy the needs of relatively sophisticated export customers rather than simply meet the needs of its own domestic market. Denmark is not only a leader in terms of product quality and price, but also in “world’s first” processing technology that underpins its competitive advantage buy establishing “best practice” in the minds of its customers.

Indeed, it intends to maintain its competitive position by supplying process automation technology and consulting services to the rest of the world through DMRI Consult which is the consulting arm of the Danish Meat Research Institute (DMRI). The rationale for this strategy is that by doing so it is in the best position to stay at the cutting edge of technology and thereby maintain its world leadership position in pork processing and export sales.

The other driving force is that the DMRI is internationally renowned for its results. Owned and financed by the meat industry through the DBMC, its research and development programme covers almost all areas of meat production, from pig transport and slaughtering technology, to processing and refrigeration methods, quality management and environmental protection. Recent work has focused on the automation of slaughtering, cutting and boning processes. The DMRI works closely with the two slaughterhouse companies, universities and other research establishments all over the world and carries out these consultancy and advisory services at home and abroad. These services represent about 45% of the income to the institute and focus on the following areas;

- plant and process design
- operations management
- environmental management
- EU accession issues.

Institute staff often work extended periods with particular companies to train operators, technicians and supervisors on new technology – and the Study Tour team saw examples of this at the Danish Crown plant at Horsens. This commitment to technology transfer was acknowledged in the 2005 Annual report as follows; "The supervisors at the slaughterhouse are occupied by many other tasks, not least the production figure. Therefore it makes sense to hire an outside person, who can maintain an overview and concentrate on the proper commissioning of each machine".

At the Higher Education level, most students undertake a generic Food Science undergraduate degree and then move to a meat specialisation as part of a master's degree through the University of Copenhagen. DMRI supports a basic research funding programme. It was initiated in 2000 because the meat industry wished to improve the innovation in its own research and development activities. The programme requires a close cooperation with universities and research institutions. In each funding round that is offered annually co-financing is provided for 4 – 8 projects that may focus on any area of the supply chain. These focus areas have included food safety, and food quality – diet and nutrition. DMRI also co-finances PhD programs at a number of Danish graduate schools which target the education and training of Danish researchers. These graduate schools are listed as follows:

- FOOD – the Veterinary and Agricultural University and The Danish Technical University,
- CISP – the Danish Technical University, the University of Copenhagen and the IT University),
- BIOP (the Danish Technical University and the Riso National Laboratory), and
- ITMAN (the Danish Technical University)

Evidence of "knowledge products" that are derived from a technology transfer and innovation capacity building system that is functioning efficiently and effectively within a Danish meat processing industry context is detailed in the table below.

Knowledge product category	**Evidence**
Academic publishing	Limited evidence of University based publishing, but now increasing due to investment in the Basic Research Funding Programme.
"Industry-ready" graduates	The Danish meat trades school provides significant numbers of trade qualified graduates, but most graduates are employed by DMRI/SFK Systems rather than meat processing companies.
Industry-targeted teaching	World class Danish Meat Trades School
Contract research and consultancy	World Class DMRI Consult
Interchange of staff between universities/institutes and industry	Beginning through the Basic Research Funding Programme which commenced in 2000.

Scholarly research publication	Increasing evidence through the Basic Research Funding Programme.
Creation of IP rights	DMRI and SFK Systems have been very strong in this area over the past 20 years.
Incubation of key innovation suppliers to industry	SFK Systems has now evolved toward ownership by VC company LD Equity.

Table 6.8 Danish Technology Transfer & Industry Innovation Capacity[60]

Facilitated technology transfer Framework	Strategic planning & consultation processes	Communication & reflective evaluation of impact/benefit with target adoptors	Integration of customer & consumer needs into industry standards	Access to sufficient resource base for building industry innovation capacity
5	5	5	5	5

6.2 Recommendations

Technology Transfer

Recommendation 6.1
It is recommended that MINTRAC, in consultation with MLA, investigate the feasibility of introducing a dedicated meat science degree with at least one University in Australia.

Recommendation 6.2
It is recommended that MLA consider facilitating 24/7 access to a global source of meat industry specific knowledge services. Target users would be; Australian meat processors, on-plant regulatory staff, and selected Australian research providers.

Recommendation 6.3
It is recommended that MLA reviews the current level of DMRI resource commitment to on-site prototype commissioning of process automation projects. This review may be able establish the necessary level of commitment to project management and training resources that would be a "best practice" benchmark for the successful site-based roll-out of meat process automation technologies.

Building Industry Innovation Capacity

Recommendation 6.4
It is recommended that the industry significantly increase investment in the current initiatives that target the building of innovation capacity within individual meat processing companies (e.g. Plant Initiated Projects program).

Recommendation 6.5
It is recommended that the industry significantly increase its support for the closer engagement of meat processing companies in site-based R&D projects. An important spill-over effect of this cooperation is the consequent creation of innovation capacity within these meat companies themselves (e.g. Plant Initiated Projects program).

[60] Refer Table 6.2 for full detail

Recommendation 6.6
It is recommended that MLA and MINTRAC ensure that the Cranfield Fellowship in Manufacturing Management for the Red Meat Industry is reviewed during the development of an industry plan for Executive Leadership activities in the Australian industry.

Recommendation 6.7
It is recommended that MLA encourage a significant increase in Australia's involvement in the AMSA "reciprocal meat conference" through key Australian meat researchers (e.g. initial focus would be directed toward sponsoring staff &/or student exchange programs).

Recommendation 6.8
It is recommended that MLA increase the level of engagement between USDA – ARS and Australian research groups (e.g. initial focus would be directed toward sponsoring staff and/or student exchange programs).

Recommendation 6.9
It is recommended that MLA re-engages with the EU Framework Program with a view to using the EU outputs as part of the planning for future R&D, as well as, identifying opportunities for future collaboration (e.g. initial focus would be directed toward sponsoring staff &/or student exchange programs).

Recommendation 6.10
It is recommended that MLA and MINTRAC explore a partnership with DMRI to co-finance PhD programs at a number of Danish graduate schools which could target the education and training of Australian researchers (e.g. initial focus would be directed toward sponsoring staff &/or student exchange programs).

7 Appendices

7.1 International Study Tour – Itinerary

Date	Visit	Contact
Sunday 26th February	Travel	
Monday 27th February	NZITO offices	Carl Ammon General Manager NZITO
	Mainland Meats	
	AgResearch/MRINZ presentation	
	Hosted dinner with NZ ITO	
Tuesday 28th February	Meat Inspection Services; Asure NZ	
	Ruakura visit	
	Team meal	
Wednesday 1 March	Travel New Zealand – Sydney – San Francisco Dinner with Graeme Goodsir and Jane Anderson	Graeme Goodsir
Thursday 2nd March	National Meat Association – 60th annual convention	Etta Reyes NMA – Conference organiser
	10 min pres to NMA Workplace Issues Committee; then meet with Joe Harris, SMA, Kerri Harris, IHA Alchemy Training reps,FSI	Rosemary Mucklow NMA – Conference organiser
Friday 3rd March	NMA conference	
	visit to Superior Farms, Dixon	Shane McKenzie
Saturday 4th March	Travel to Texas	
	Drive to College Station	
Sunday 5th March	Texas A&M University; Rosenthal Meat Science Centre	Wesley Osburn
	Drive back to Dallas	
Monday 6th March	Travel Texas to Lincoln – JS and JK	
	Travel Texas to Omaha – CR, LA, KE	
	University of Nebraska - JS and JK	Dr Dennis Burson Chris Caulkins
	USDA Technical centre, Omaha - CR, KE, LA	Dr Barbara Masters
	Team meal	
Tuesday 7th March	Team meeting	
	Travel Lincoln to Alberta	
	Team meal with Brad McLeod	Brad Mcleod
Wednesday 8th March	Breakfast at Olds College MINTRAC & Olds College presentations Discussion groups Lunch Olds College tour Tour; Sunterra Meats; Innisfail Meat Packers Supper hosted by Olds College – Flames restaurant	Brad McLeod Program Coordinator

Thursday 9th March	*Meet with Canadian meat workers union;*	*UFCW Calgary Office*
	Tour SAIT	
	Travel to London (overnight)	
Friday 10th March	*Meat Training Council – meeting at Butcher's Hall*	*David Grailey CEO, Meat Industry Training Council*
	Host evening meal – the Farmer's Club	
Saturday 11th March	*Travel to Dublin*	
	TEAGSC National Food Centre	*Pat Daley National Food Centre*
	hosted meal with TEAGSC representatives	
Sunday 12th March	*Travel to Copenhagen*	
Monday 13th March	*Danish Meat College – abattoir* *Meet Kirsten Bach Larsen, educational manager* *Tour of training facilities – Karen*	*Karen Wahlgreen International Project Manager*
	Danish Meat Research Institute	*Claus Fertin (CEO)*
	Team meal with Malcolm Harvey	*Malcolm Harvey*
Tuesday 14th March	*Travel to Horsens* *Danish Crown Plant – Horsens* *Return to Copenhagen*	*Soeren Tinggaard*
Wednesday 15th March	*Travel to Bangkok (day/night)*	
Thursday 16th March	*Travel to Sydney*	

7.2 Appendix 2 – Sites / people visited

New Zealand

New Zealand Industry Training Organisation (NZITO)

NZITO is an incorporated society and registered charitable trust controlled by a board of directors appointed by Fonterra Co-op and Meat Industry Association. Operational policy is steered by dairy and meat sector advisory groups made up of HR, training and employee representatives. Staff operate from a single national centre serving the entire country in close liaison with company personnel.

Industry coverage includes:

- Dairy product collection and distributions, dairy manufacturing, technical services, supply chain, sales
- Meat processing, export and local, small goods, further processing, fellmongery processing, supply chain, sales
- Leather manufacturing
- Steel manufacture, BHP and Fletcher Steel - as an agent
- Occupational Health and Safety standards body.

Services encompass:

- Training needs analysis
- Training plan development
- Arranging training delivery
- Review of programming effectiveness
- Brokerage of providers
- Allocation of government funding grants
- Award of national qualifications
- Records management
- Trainee redeployment
- Development of training standards
- Development of course curriculum
- Self paced, CBT and on line resource
- Video production
- Industry careers resources
- OSH database on accident statistics
- Client website with programmes, providers, links, documentation, resources and e-learning.

Training programmes include:

Dairy manufacture, meat processing, food processing, food safety and RMP, laboratory, road transport, quality management, line management, team building, call centres, distribution (stores) and warehousing, sales and service, energy and chemical plant operations, OSH, auditing, trades (engineering and electrical), waste treatment, environment management, diploma courses in dairy, meat, and business, and a masters program in dairy science and technology.

Mainland Meats

Fonterra Co-operative Group Ltd is a leading multinational dairy company, owned by 11,600 New Zealand dairy farmers. It is the world's largest exporter of dairy products, exporting 95 percent of production.

Fonterra's global supply chain encompasses shareholders' farms in New Zealand through to customers and consumers in 140 countries. Collecting over 13 billion litres of milk a year, it manufactures and markets over 2 million tonnes of dairy products annually, making it the world's leader in large-scale milk procurement, processing and management.

Fonterra Brands include some of the world's best-known dairy brands, including Anchor, Anlene, Anmum, Tip Top, Fresh 'n Fruity and Mainland.

Mainland Products Ltd (MPL) is a highly successful FMCG (fast moving consumer goods) company based in New Zealand. There are 5 categories within the Mainland group: Beverages, Cheese & Butter, Fresh Foods, Meats & Convenience Foods, and Export.

Mainland Products Ltd employs about 2,200 staff, and has in excess of 2,200 different end product variants. Products include milk, cream, UHT milk, flavoured milk, cream, fruit beverages, butter, cheese (cheddar, processed and specialty), yoghurt, cultured foods, processed meats, and frozen convenience foods.

Greenlea Premier Meats Pty Ltd

Greenlea Premier meats is a privately owned and operated company which has grown rapidly since operations began in 1993. It is a young and energetic company that has become a major player in the New Zealand Beef Industry.

Greenlea is located within the highest concentration of cattle in the Southern Hemisphere and thus being based in the Waikato region, has enabled it to maintain a year round supply of beef.

AgResearch

The AgResearch mission is to apply the depth of experience and expertise it has in every aspect of pastoral farming and also in biotechnology to continue to build substantial competitive advantage throughout the value chain.

The company applies its expertise in biosciences and genetics to improve productivity and market success from forage to the supermarket shelf. The outputs of those endeavours directly benefit farmers, agribusiness and those involved in the food and health sectors.

The company is also directly involved in innovation through subsidiaries such as AgVax and Grasslanz, but AgResearch exists to create wealth for New Zealand by helping the pastoral and biotechnology sectors. It also transfers intellectual property to New Zealand farmers and businesses for their benefit and that of New Zealanders and the New Zealand economy generally.

Asure

Asure's mission is to help its customers deliver consumer confidence by providing simple and efficient solutions to complex food safety issues. It is national organisation with approximately 860 employees at 90 sites throughout New Zealand. The core business is Meat Inspection, but the company also provide a range of products and services to a variety of Food Industries. Asure works closely with the New Zealand Ministry of Agriculture and Forestry, based on the State Owned Enterprise (SOE) model.

Asure also offers the following products and services:

- plate to plough products and services
- laboratory analysis services
- exotic disease and pest response.

New Zealand Food Safety Authority

The New Zealand Food Safety Authority administers legislation covering food for sale on the New Zealand market, primary processing of animal products and official assurances related to their export, exports of plant products and the controls surrounding registration and use of agricultural compounds and veterinary medicines. NZFSA is the New Zealand controlling authority for imports and exports of food and food-related products.

United States of America

National Meat Association

NMA's Standing Committees meet biannually, during the Annual Convention and then at the Summer Conference. They may also meet upon call of the Committee Chairmen. All Committee Chairmen are also members of the Long Range Strategic Planning Committee.

All Committee meetings, excepting the Strategic Planning Committee and Executive Committee and including the Board of Directors, are open to all members. Prospective committee members should contact the appropriate Committee Chairman for more information.

NMA's Information Services

NMA's information services are superb, providing the industry with a weekly newsletter, an award-winning website, educational seminars, and conventions packed with the best and the brightest.
The association's main communications tool is its weekly newsletter, Lean Trimmings. Academics, government officials, reporters and consumers, as well as members, rely on Lean Trimmings to provide them accurate, timely information.

Advocacy

National Meat Association has been advocating the interests of the meat industry since 1946. The association is internationally known and respected as a champion of its members and the meat industry at large.

The association is always at work in Washington and across the nation, making sure that regulations are fairly implemented, and information is distributed.
National Meat Association assists its members to meet the consuming public's expectation for safe food produced in a competitive market environment.

Alchemy Training Systems

Alchemy Training Systems creates and sells innovative, interactive computer-based training solutions that help our customers increase profitability, productivity and regulatory compliance by effectively training entry-level workers. Their innovative SISTEM™ products (Standard Industry Skills Training and Education Media) create a complete solution for companies seeking to train entry level or other difficult-to-train workers. One or many employees can participate in 10 to 15 minute, highly engaging, interactive, multimedia training sessions that teach critical skills for worker success. SISTEM™ products may be purchased as complete turnkey solutions for a company's training needs or in its component parts to meet the specific training requirements of smaller companies, government or social service agencies.

Food Safety and Inspection Service (FSIS)
The Food Safety and Inspection Service (FSIS) is the public health agency in the U.S. Department of Agriculture responsible for ensuring that the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labelled and packaged.

Numerous offices make up the Food Safety and Inspection Service, each playing a key role in protecting America's food supply.

Graeme Goodsir
Graeme is an independent meat industry consultant, an Australian, who has lived and worked in the US for over 20 years. Graeme has been the main source of advice and 'door opening' for our team in the US, and has also sent regular updates on the US meat industry. He writes regularly for an electronic magazine called *Lean Trimmings*,
http://www.nmaonline.org/html/lean_trimmings.htm

Superior Farms
Superior Farms is a recognized leader in the production of top quality lamb, marketing premium lamb products since 1963. Superior offers lean, high quality lambs originating from feedlots in Hermiston, OR, and Lovelock, NV. Superior sources lambs from the Western and Mountain states. Declining domestic numbers require Superior Farms to purchase lambs from all regions of the United States, in addition to relying on Australia as a source of supply. Lamb buyers located in the various regions allow Superior Farms to consistently provide a succulent lamb that is tender and full flavored, on a year-round basis.

Superior has established leadership in the production and marketing of value-added boxed lamb. In 1970, it was one of the first meat packing companies in the United States to successfully vacuum package lamb. Superior expanded their production to include block-ready and tray-ready lamb in the 80's, and case-ready lamb in the early 90's. Superior's packaging technology has been expanded to include veal and the evolutionary process continues with the development of marinated and roasted lamb cuts.

Superior offers a variety of cuts, from fabricated primals to portion items. Ground lamb, seasoned and marinated roasts, flavor enhanced products, and fully-cooked lamb continue to expand its extensive product list.

Meat Science Section, Department of Animal Science, Texas A&M University
Mission
The mission of the Meat Science Section is to conduct programs in teaching, research and extension that deal with the animal, food and nutrition sciences related to meat and meat products.
Research areas
Animal Science
- evaluation of livestock as related to their carcass merit
- carcass composition and grading
- genetic regulation of muscle and adipose tissue differentiation and composition
- instrument grading of livestock and carcasses
- value-based marketing.

Food Science and Technology
- palatability of meat and meat products
- packaging and shelf-life for retail and export markets
- new-product development
- new process technologies

- cookery procedures
- food safety and hazard assessment
- mechanisms and control of quality deteriorations in meat and meat products
- biochemical factors related to food safety and nutritive value.

Nutrition

- cholesterol, fat and fatty acid composition of meat and meat products
- iron nutritional values of meat products
- modifying fatty acids in livestock and meat products
- impact of dietary fat on cholesterol homeostasis in animal models.

University of Nebraska - Animal Science Department

The Department of Animal Science is located at the University of Nebraska - Lincoln. Lincoln, the Star City, is the capital of Nebraska, located in the eastern part of the state, just 60 miles west of Omaha and the Missouri River. The Department of Animal Science is located on East Campus in a design award-winning facility that encompasses extensive animal teaching and research rooms, including a 475-seat arena, and state-of-the art classrooms and laboratories. The Univerity's discipline-based 40 faculty members continue to receive university, national and international awards for excellence in teaching, research and extension. A highly ranked undergraduate program gives students top priority. Faculty members interact with scientists and industry leaders throughout the U.S. and around the world. UNL animal science faculty, staff, graduate students and collaborators have great positive impact on animal agriculture in Nebraska and beyond through dynamic networks of discovery and education, increased product value and improved sustainability.

Areas of Interest

Species:

- Beef Cattle
- Dairy Cattle
- Horses
- Poultry
- Sheep
- Swine.

Discipline:

- Breeding & Genetics
- Meat Science
- Non-Ruminant Nutrition
- Physiology
- Ruminant Nutrition.

USDA Technical Services Centre

The TSC serves as the Agency's center for technical assistance, advice, and guidance regarding the implementation of national policies, programs, systems, and procedures including implementation of the farm-to-table food safety strategy within a HACCP framework. The TSC also assists in the implementation of this strategy and serves as the feedback mechanism relating to changes and refinements in existing systems and procedures.

TSC Mission Statement The role of the TSC is to assist decision making by providing all parties with the standards and other technical information needed to understand, implement, apply, and enforce regulatory requirements.

Interactive Knowledge Exchange (IKE) IKE is a tool available to all Field Operations employees. Through the use of fictional scenarios, IKE allows employees to review FSIS requirements, and hopefully, to correlate with his or her work-group and supervisor regarding the application of those requirements.

Humane Interactive Knowledge Exchange (HIKE) HIKE is the newest education and correlation tool from TSC. Like IKE, the HIKE uses fictional scenarios to help employees improve their knowledge and understanding of humane handling and slaughter laws, regulations, directives and notices.

TSC Questions and Answers The TSC Questions and Answers page contains answers to various questions received by the Technical Service Center from inspection personnel, industry, and other interested parties, many of which pertain to recent FSIS policy issuances.

SRM Guidance Material FSIS provides assistance to inspection program personnel in performing their verification activities as outlined in the interim final rule issued to amend 9 CFR 310.22(a)(3) of its regulations for the removal, segregation, and disposition of specified risk materials (SRMs).

Canada

Olds College

Olds College's 19-week Meat Processing certificate program is the only one of its kind in Canada and attracts students from a large variety of regions. Students choose this innovative program because it focuses on practical, hands-on training in an industry-like environment. As a student in the Meat Processing program, you will train on state-of-the-art equipment and enjoy a learn-by-doing environment.

The Olds College Meat Processing program provides students with skills in sanitation, food safety, slaughter, meat cutting and value-added processed meats and sausages. All of these skills are in great demand in current job markets. This 19-week certificate program is offered twice a year beginning in September and February. The broad range of skills, techniques and training you receive will enable students to reach professional levels in meat cutting, trimming, boning, breaking, wrapping, sausage-making and curing. In addition, students also gain an in-depth understanding of sanitation, food safety, and an introductory course on HACCP (Hazard Analysis Critical Control Point). Students gain added employment opportunities as they develop skills in slaughter techniques such as skinning, eviscerating and carcass preparation of beef, pork and lamb. As an added benefit, they also learn merchandising by actually working the retail counter in the College's own meat outlet.

Sunterra Meat Market

Sunterra is a Calgary based, family owned organization. The Price family (principal owners of Sunterra) have been committed to excellence in agriculture for over 40 years.

In 1970, the Price family pioneered a concept never before seen in Canada. Starting a company called PIC (Pig Improvement Canada) in Acme, Alberta, the family purchased breeding hogs from the program founders in Britain. The PIC program looks to breed a superior hog that is leaner (and healthier) but does not sacrifice meat flavor. Years of research into breeding and genetics and high standards of farm management have resulted in quality pork products today.

The Price family is also heavily involved in beef production and has applied the same exacting standards to this operation. Beef and pork products with the "Sunterra Farms" label come from their own farms and are the highest quality meats.

In 1989, Trochu Meat Processors (a meat processing plant located in Trochu, Alberta) was purchased so that the group would have total control over its beef and pork products, as well as the opportunity to make processed products like ham, bacon and sausage. In 2002, full ownership of Canada West (a meat processing plant in Innisfail, Alberta) gave similar control over lamb and veal products.

The exceptional quality of the beef and pork products was lost in the conventional retail system. The Sunterra Market retail concept was developed to complete the production cycle and deliver quality meats direct from farms to consumers' tables. The first Sunterra Market location opened in Calgary in 1990. With its opening it gave the group total control over all the factors of meat production and distribution (feeding, breeding, nutrition, processing, packaging, transportation and retailing). Sunterra Market has expanded to seven market locations in Alberta.

The United Food and Commercial Workers Union (**UFCW)**

United Food and Commercial Workers Local 401

- they are the major UFCW Local union in Alberta
- their purpose is to improve the working lives of their members and all workers and we have been doing so for over fifty years.
- UFCW are the largest private sector local union in the province.
- while known for representing employees in the food processing and retail sector, UFCW are much more diverse than that. Whether you work in a convention centre or a funeral home, a rental car agency or an office, you can be a 'commercial' worker.
- UFCW are a democratic not for profit organization, affiliated with civic labour councils, the Alberta Federation of Labour and the Canadian Labour Congress.
- their leaders are elected from and by the membership they represent.
- UFCW have offices in Edmonton, Calgary and Lethbridge, but travel to provide direct service to their members province wide.

Scholarships

The **United Food & Commercial Workers, Local 401** is committed to further education and assisting the membership in accessing quality education. UFCW organisation recognizes that the cost of education continues to skyrocket which makes it difficult for working people or their children to access post-secondary education. Keeping all of this in mind, the UFCW has a number of scholarship programs which address these needs. UFCW encourages members or family members to visit each section listed for more details on each of the scholarships offered.

Ranchers Beef

Ranchers Beef is a Canadian owned and operated meat processing facility that is operating in the heart of Cattle country. It is a newly created, vertically integrated beef company involved in all levels of the beef value chain. As a limited partnership, Rancher’s Beef is comprised of approximately 50 unit holders involved in all levels of the beef industry. The company is in the process of constructing a new state-of-the-art beef processing facility near Calgary, Alberta.

Innisfail Meat Packers

Innisfail Meat Packers is a small meat processing, packing and retail outlet near Calgary.

Northern Alberta Institute of Technology

The Northern Alberta Institute of Technology is a leader in technical training and applied education designed to meet the demands of Alberta's industries. NAIT graduates provide the skilled workforce required to support today's global, knowledge-based economy.

NAIT confers certificates, diplomas, and applied degrees. The Institute offers some 250 programs, including 34 apprenticeship offerings, and over 1,200 continuing education courses.

NAIT has over 17,500 full-time and apprenticeship students, and more than 50,000 continuing education registrations. Over 40 per cent of students entering full-time NAIT programs have previous post secondary education.

Southern Alberta Institute of Technology

SAIT, known world-wide for its quality technical education and hands-on training has more than 70 applied degree, diploma and certificate programs. SAIT also have over 2,300 continuing education courses and provides first class training for more than 65,000 learners, beginning and enhancing their careers, each year.

SAIT's Meat Retail Cutting program is a one-year certificate program. Students are required to complete two practicums**.**
The retail meat cutter works in a large, complex and demanding industry. In addition to being experts in meat cutting, people in this field must be knowledgeable about receiving, storage and sanitation practices, the inspection and grading of meats, meat nutritive values, practical business applications such as costing, pricing and inventory control. The employment outlook is particularly good for students who are aggressive and interested in advancement into meat management positions.

Beef Information Centre

The Beef information Centre (BIC) is a national organisation formed in 1973 by Canadian Beef producers. BIC's mandate is to increase consumer demand for beef.

The Beef Information Centre (BIC) is the Beef Market Development division of the Canadian Cattlemen's Association. BIC uses an integrated approach, focusing programs on five key areas – improving the quality & consistency of beef; increasing beef's convenience; expanding the use and value of all cuts; improving food safety; and improving consumers' perceptions about beef's healthfulness and wholesomeness.
To enhance the effectiveness of its efforts, BIC channels its market development programs to target those "gatekeepers" – retailers, processors, foodservice distributors and operators, health professionals and media – who have the most impact on how beef is merchandised, marketed and portrayed to the consumer.

Mick Price - University of Alberta

Mick Price's program of studies includes growth and development of meat producing farm livestock and wildlife species. It also deals with factors (environmental and genetic) influencing body composition, and particularly the amount and distribution of bone, muscle and fat in meat animals. More recently he has become interested in catch-up (compensatory) growth and its effects on subsequent body composition and reproductive performance in livestock, particularly cattle. This has important practical applications in early weaning, grass finishing and winter management of beef cows. Other interests include behaviour and management of entire males for meat production, and the identification and measurement of carcass and meat quality factors and their role in commercial grading.

England

Meat Training Council

The Meat Training Council is the independent voice of training and education in meat and poultry sector - from the farm gate to the customer. We provide a number of services, including:

- training advice and consultancy
- design and publication of training materials
- development and accreditation of meat vocational qualifications
- careers information.

The Meat Training Council works with:

- meat and poultry companies including SMEs and shops
- other trades bodies, including trades associations
- colleges and training centres
- Learning Skills Councils, LECs, Business Links etc.
- careers services and schools.

Meat Industry Qualifications

National Vocational Qualifications (NVQs - SVQs in Scotland) are available for all meat and poultry functions at every occupational level. They are often assessed in-company by nationally qualified personnel.

For would-be technician, supervisory and management staff, HNDs in meat technology are available and there is an MSc in meat science. There are also higher-level S/NVQs.

The right attitude can be just as important as qualifications. All applicants should have a commitment to the industry and enjoy hard work, which is at times physically demanding. Good communication skills, manual dexterity and some numeracy are often necessary.

Red Meat Industry Forum

RMIF's aim is to help everybody involved in the red meat supply chain to adapt their businesses to all the inevitable challenges ahead, particularly post CAP reform and in the face of growing globalisation. Their work shows that significant savings are possible as well as opportunities to add value to British produce.

The RMIF is determined to help the British red meat industry recapture - and maintain - a leading position in the market place.

The RMIF believes that the spotlight must fall on red meat businesses in their entirety, not just on individual producers, in order to enable whole supply chains to achieve world-class status - and to provide an outstanding example of efficiency and quality with continuous business improvement

Crucial to achieving these industry-wide benefits is the inclusion of the entire supply chain.

Cranfield University

Richard Clayton, from Cranfield University, is developing an upper level meat management program in collaboration with Danish Meat College.

ABP (Anglo Beef Processors)

ABP's mission statement is to be the preferred partner of multiple retailers, manufacturers and caterers for the supply of fresh and frozen meat and meat products.

With an annual turnover in excess of £319m, Anglo Beef Processors is the UK's leading meat processor, employing over 1500 colleagues at 13 plants nationwide.

As the leading supplier of beef and lamb products to the large retail outlets, ABP's continued commitment to quality has benefited from an extensive investment programme during the last 3 years.
With investments in plant, producer groups, processing technology, packaging machinery, training programmes and new product development, ABP is ensuring it continues to meet the needs and demands of today's consumer and retains its position at the forefront of the industry.

Ireland

Teagasc – Ashtown National Food Centre, Ireland

Teagasc provides integrated research, advisory and training services for the agriculture and food industry in Ireland.

It is a semi-state organisation established under legislation enacted by the Irish government. The 11 member Board is appointed by the Minister for Agriculture and Food and has representatives from the farming organisations, the food industry, the universities, the Department of Agriculture and Food and Teagasc staff.

Teagasc are a client-based organisation and operate in partnership with all sectors of the agriculture and food industry and with rural development agencies. They have developed close alliances with research, advisory and training agencies throughout the world and are continuously seeking to expand our international contacts.

Around 75% of Teagasc's yearly budget comes from the Irish exchequer and EU funding with the balance generated from earned income. Some 40% of the budget is devoted to research with the remainder split half and half between advisory and training services

Teagasc employs over 1,500 staff at over 100 locations throughout Ireland.

- Research services are provided by 200 research scientists and 300 research technicians at nine dedicated centres
- There are 550 advisors and regional specialists located at regional, county and local offices
- The eight colleges and local training/research centres are staffed by college lecturers, technicians and education officers.

FAS

FÁS is Ireland's national training and employment authority. FAS aims to promote a more competitive and inclusive knowledge-based economy, in collaboration with its stakeholders, by enhancing the skills and capabilities of individuals and enterprises.

FAS' meat training programmes have been developed to take account of best international practice and is suitable for both new entrants to the sector and for existing workers who wish to acquire certification under the system of Accreditation of Prior Learning (APL).

The program aims to equip trainees with the skills and knowledge which will enable them to carry out their jobs to the highest international standards of best practice for workers in the Industrial

Meat Sector. Particular emphasis has been placed on food safety and quality and the standards will reflect the growing health concerns of the consumer and the economic demands of the sector.

Denmark

Danish Meat College

Background

The Danish Meat Trade College is an independent Education and Training Centre, founded in 1964 by the Danish slaughterhouses, who considered human resource development in the meat industry to be of paramount importance for the future expansion of the sector. Today, The Danish Meat Trade College has developed into a modern educational institution, covering education and training at the following levels:

- Vocational education and training
- Technical education
- Continuing training.

Activities

As a modern service minded educational institution, the College services the entire Danish food manufacturing industry and especially the meat industry. The Danish Meat Trade College develops, plans and implements relevant training activities for the Danish food manufacturing industry and approximately 5,000 students, of these 500 students from abroad, are educated and trained annually. The training is conducted at the College's facilities or as in-service training locally.

Approximately 300 teachers and supporting staff are employed at the College, of this approximately 125 specialist teachers with very different technical educational background, supplemented with a pedagogical education. A large number of the specialist teachers have extensive experience in international training and education activities through international projects of the College.

Danish Meat Research Institute

In short:

- established in 1954
- owned by the Danish pig producers via the Danish Bacon and Meat Council (DANSKE SLAGTERIER)
- 148 employees including 87 scientific staff, 27 technicians and 20 laboratory technicians
- 93 patent applications since1992. Since 1995, DMRI have received 67 patents, this places them in the top10 totally and in top 5 in DK patents among Danish companies
- 448 publications since 1992
- partner in more than 30 publicly supported projects the last ten years.

Mission

- worldwide leading knowledge centre within meat and slaughter technology
- attractive partner nationally and internationally
- the Danish meat industry link to national and international research and development.

Competences

The research activities are within the strategic core areas:

- product quality
- product safety

- automation
- external environment.

DMRI Consult offers solutions in:

- process design
- animal welfare
- production management
- water and energy savings

Service to the meat industry's companies includes development and maintenance of the data systems of the industry, library function and patent surveillance.

Danish Crown Pork Processing Plant, Horsens, Denmark

Danish Crown broke ground on the construction of a new pork processing plant at Horsens, Denmark, in August 2002. The construction and installation work was completed in late 2004. The facility was inaugurated in May 2005 and is believed to be the largest pork processing facility in the world.

The plant was originally commissioned as part of a modernisation and consolidation process by Danish Crown. The company now intends to close the slaughtering lines at several of its other plants, including the existing Horsens plant and the facilities at Lemvig, Struer and Hjorring (closed in May 2005) and transfer their work to the new plant.

The investment for the new plant was DKK2 billion ($270 million, €250 million). The site covers 37ha and the plant has a total floor space of 78,000m². The plant currently (2005) employs 1,360 people and processes 78,000 hogs per week.

7.3 Appendix 3 - Researchers

John Salter

General Manager Human Resources,
the Teys Group of Companies
Team Leader

Mr John Salter has overall responsibility for the industry delegation, ensuring the smooth and efficient management of the tour and the team members are seen both internationally and within Australia as effective ambassadors of the Australian Meat Industry.

John will lead the formal presentations and meetings throughout the tour. He will also guide the development and preparation of the final report and facilitate and deliver post-report presentations with the assistance of the team.

Background
John has an extensive 30 year career in Human Resources and Industrial Relations within the construction manufacturing, welfare and hospitality sectors. This includes 18 years within the meat processing industry with both the employer association and two major corporations. He has been located for various periods in the capital cities of three states, Brisbane, Adelaide and Sydney.

John's current portfolio with the Teys Group includes responsibility for all matters associated with staff learning. He was heavily involved in the formation of the industry training body (MINTRAC) during the early 1990's.

John is currently the chairperson of the industry Human Resources and Occupational Health and Safety Committees.

Qualifications
Chartered Member AHRI
Member Industrial Relations Society of Australia

Personal information
John is married with two teenage children and lives in the eastern suburbs of Brisbane, Queensland.

He has a lifetime of involvement in competitive sport both at a playing and administration level and represented Queensland at a senior level in Rugby League during a professional playing career which ran from 1974 to 1981.

These days he enjoys organising, coaching and watching junior sport and playing golf.

Jenny Kroonstuiver

Chief Executive Officer – National Meat Industry Training Advisory Council (MINTRAC)

Study Team research role

Ms Jenny Kroonstuiver's role is to prepare an overview of the education/training structure of each country visited, including funding arrangements and systems for quality control of training. She will research the structure and nature of meat industry training for each country and investigate the strategic approaches to providing training for the next generation of meat workers. Specific information will be sought in relation to meat industry participation rates and data collection strategies. She will also seek to describe the impact of emerging global supermarket supply chains on future training needs and to identify the extent of regulatory and customer interest in training records at audit.

Background

Jenny worked as a secondary school teacher in the rural and remote areas of Australia for fourteen years, before moving into the Australian vocational education and training system. She spent the next thirteen years in various lecturing and management roles in the vocational sector of Curtin University - a role which involved working across the vocational and higher education sectors and project management responsibility for projects such as new areas of

delivery, including agriculture, mining, flexible learning, quality assurance, e-learning and writing and accreditation of new courses.

Jenny joined MINTRAC as the Chief Executive Officer in early 2004, and since then has undertaken project management responsibility for areas such as scholarships, review of the national qualifications, e-learning and workforce retention projects.

Qualifications

Bachelor of Education (Hons), University of Western Australia,
Master of Education, Murdoch University
Diploma of Frontline Management
Cert. IV in Workplace Training

Personal information

Jenny grew up on a large sheep station in Western Australia, and has lived and worked in most states of Australia. Aged 51, she has four adult children, all of whom live in different locations across Australia. She has a long-standing association with the Royal Flying Doctor Service of Australia, as both councillor and fundraiser, and was recently awarded life membership.

Clive Richardson

Senior Project Officer for the National Meat Industry Training Council (MINTRAC)

Study Team research role

Mr Clive Richardson's role will be to prepare an overview of the regulatory environment of each country visited and to identify strategies used for incorporation of regulatory requirements into training arrangements. This will include investigating current public health concerns and priorities such as BSE, Avian Influenza and the response of regulatory authorities, other concerns and priorities such as animal welfare, waste management, OH&S etc, and the mandated and industry initiated responses to these concerns. He will then review the role and nature of the training component incorporated into these responses, including the means of communication between industry and the regulator, technical and statistical information made available to industry by the regulatory authority, and training that has been mandated and/or recommended to industry by the regulator for domestic processors and importing countries.

Clive will identify accredited and in-house training programs for regulatory personnel in each country, and the joint training programs for industry and regulatory personnel.

Background

Clive's background of diverse experiences includes five years farming sheep and cattle and ten years of adult education with Trade and Armed Forces personnel.

He worked for five years with Australian Quarantine and Inspection Service (AQIS) as the national technical training manager and a further two years managing AQIS' industry training division. He has also spent considerable time overseas, including three years emergency response with experience in Rwanda, Kenya, Tanzania, Zaire, Kosovo, Jordan/Iraq and the tsunami in Indonesia.

His past ten years as a senior Project Officer with MINTRAC have involved training program development and industry extension work.

Qualifications

Bachelor of Economics
Diploma of Education
Cert IV Training and Assessment
AQIS Auditor
Certificate in Wool Classing

Personal information

Clive is 53 years old, married, with 2 adult sons. He currently lives on a small sheep farm 30 mins out of the national capital (Canberra). Clive's hobbies including breeding and training horses, bushwalking, canoeing, and white water rafting.

Kath Evans

Secretary of the Australasian Meat Industry Employees Union (Newcastle and Northern Branch)

Study Team Research role

Ms Kath Evans will undertake research into training delivery including researching the meat training system in each country; identifying areas of delivery expertise and excellence; and identifying examples of industry commitment to, and support for both enterprise-based and systemic training.

During the study tour her research responsibilities include describing models of training delivery used in each country visited, as well as the
structural and funding arrangements, and systems for apprenticeships and traineeships or their in-country equivalent.

Kath will also explore the role of training in recruitment and career planning including linkages with schools, technical colleges and universities. She will identify a range of Best Practice examples in training delivery.

Background

Kath commenced employment with the Australasian Meat Industry Employees Union in Newcastle as a Research and Claims Officer. Her role included training and development, industrial relations and advocacy, occupational health and safety and workers compensation, Australian Qualification

Framework and competency based classification structures, and participation at board level on industry skills councils at state and national level. Kath was the inaugural Chair of the National Meat Industry Training Advisory Council (MINTRAC) and is currently Director of MINTRAC and Agri-Food Industry Skills Council. She is also President of Newcastle Trades Hall Council, a provincial council of trade unions.

Qualifications

Graduate Diploma Health Science (Rehabilitation Counselling)
Currently enrolled Diploma of OH&S Train the Trainer
Union Authorised Officer Training Program

Personal Information

Kath and her husband Warren have a collective of five children and seven grandchildren. She resides in Newcastle and is an avid fan of the local Newcastle Knights Rugby League Team and is a Director of Panthers Rugby League Club. She enjoys an active life with her family and friends.

Lewe Atkinson

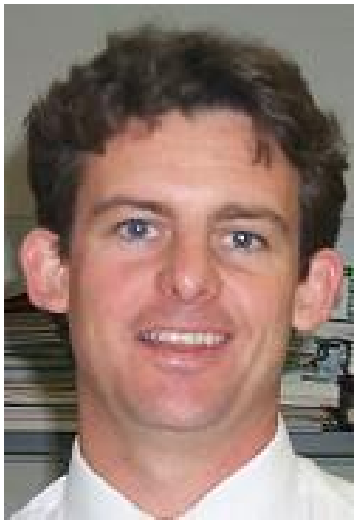
Manager, Innovation Adoption Strategy
Meat and Livestock Australia (MLA) Ltd.

Study Team Research role

Dr Lewe Atkinson's role during the tour will be to prepare an overview of the meat research environment of each country visited. He will explore the roles and relationships between peak bodies and regulatory structures, and the funding arrangements underpinning and driving meat research. A key task will be to identify strategies used for incorporation of research outcomes into training arrangements.
Lewe will also investigate the response to international issues such as BSE, avian flu, new technologies etc and how these become part of the regulatory and training arrangements.

Background

Lewe has 19 years experience in food manufacturing and meat product research & development. After 4 years experience as operations and research with Unilever, he became Research and Information Services Manager for Australian Meat Technology Pty Ltd, a meat industry consulting company. He then joined Meat and Livestock Australia Ltd, where he has held several positions over the past 8 years. He currently provides an executive business service to R&D program managers within MLA that supports them in forward visioning, strategic planning, change management, and outcome delivery for their programs mainly oriented toward the off-farm sectors of the supply chain.



A core element of his current responsibilities is the development of a company-wide framework for evaluation and communication of the value of research and innovation. This project seeks to show how investment in innovation can add value to a wide variety of key stakeholder groups, including; Government as an investor, the industry as investors and target adoptors, and the community as the ultimate beneficiary of benefits flowing from the adoption of R&D outcomes.

Qualifications

B.Sc. (Health & Biological Sciences)
Deakin University.
Masters of Business Administration &
Ph.D (Chem Eng)
University of Queensland.
Member of the Institute of Chemical Engineers in Australia (MIChemE)
Accredited Member of the National Speakers Association of Australia

Personal Information

On turning 40 recently, Lewe re-affirmed his personal life goals as:

- mastering a musical instrument.
- becoming a Black Belt.
- jumping out of an aircraft.
- becoming a competent horseman..

7.4 Appendix 4 - New Zealand[61]

Education is increasingly international in character, driven by trends which include the ICT revolution, employment markets transcending national borders, and a geographically mobile population of students, teaching staff and researchers.

Central Agencies and Providers: A Devolved System

New Zealand education has moved from a quite centralised structure to one in which individual schools and tertiary institutions have considerable responsibility for their own governance and management, working within the framework of guidelines, requirements and funding arrangements set by central government and administered through its agencies.
Separate education agencies have national responsibilities for qualifications and quality assurance

Administrative authority for most education service provision is devolved away from central government to the educational institutions which are governed (in the public sector) by individual Boards or Councils, members of which are elected or appointed.

The Tertiary Education Commission's (TEC) (www.tec.govt.nz) key role is to oversee implementation of the Tertiary Education Strategy and associated set of priorities. TEC takes an active role in facilitating collaboration and cooperation in the tertiary education system, and a greater system connectedness to wider New Zealand businesses, communities, iwi (tribes) and enterprises.

It is also responsible for funding all post-compulsory education and training offered by universities, polytechnics, colleges of education, wananga (public tertiary institutions that provide programmes with an emphasis on Maori tradition and customs), private training establishments, foundation education agencies, industry training organisations and adult and community education providers.
Education in New Zealand

The New Zealand education system is based on several guiding principles including: culturally appropriate early childhood services; primary and secondary education that is free for New Zealand citizens and permanent residents; equitable and affordable access to tertiary education; and quality assured and portable education qualifications.

The provision of flexible pathways for study is also an important feature - for example students are not streamed or channeled through particular types of school from which future study options are determined.

Although there is diversity in the forms of institutions through which education is provided, national policies and quality assurance provide continuity and consistency across the system.

Tertiary Education

The term `tertiary education' in New Zealand is used to describe all aspects of post-school education and training. There are currently 36 public tertiary education institutions, including eight universities, twenty-one institutes of technology and polytechnics, four colleges of education, three wananga (Maori tertiary education institutions). There are also 46 industry training organisations, and approximately 895 private training establishments, which include private English language schools, registered by the New Zealand Qualifications Authority.

[61] This information is taken from the New Zealand Ministry of Education website:
http://www.minedu.govt.nz/index.cfm?layout=document&documentid=7481&data=l

Technical and Vocational Education is mainly offered at institutes of technology, polytechnics, private training establishments and in the workplace. However, some programmes are also available in secondary schools, wananga, government training establishments, one college of education and several universities.

Higher, or Degree-level Education is mainly offered at universities, but some degree programmes are also available at institutes of technology, polytechnics, wananga and colleges of education, and at some private training establishments.

Industry Training Organisations are bodies that represent particular industry sectors. Industry Training Organisations develop and maintain national unit (skill) standards and qualifications for their sector. They also facilitate on-job training and contract training providers to offer off-job training and courses

Qualifications
Within New Zealand, education formal qualifications are offered from Year II in the school system and from certificate up to doctorate level in the tertiary system. *The New Zealand Qualifications Authority (NZQA)* (www.nzqa.govt.nz) maintains an overview of qualifications in school and tertiary education and training. NZQA has developed the *New Zealand Register of Quality Assured Qualifications (the "Register")*, established to provide a means to clearly identify all quality assured qualifications in New Zealand. The Register has ten levels and is composed of qualifications that are registered in accordance with an agreed set of title definitions. It provides a comprehensive list of all quality assured qualifications and benchmarking of New Zealand qualifications internationally. The Register is available on the Internet at www.nzqa.govt.nz.

Quality Assurance of Tertiary Education

Quality assurance of tertiary education in New Zealand focuses on the quality of learning outcomes recognised through qualifications as a whole, and also on the systems and processes that support quality delivery by providers.

Only those tertiary qualifications and providers that are quality assured by a quality approval body are eligible for Government financial assistance. Quality assurance bodies decide whether providers and qualification developers meet appropriate standards.

7.5 Appendix 5 -United States of America[62]

School education:

The length of primary education varies from four to seven years. Secondary education occurs in grades 7-12, depending upon the laws and policies of states and local school districts. There is no national structure, curriculum or governing law; all laws and policies are set and enforced by the 50 state governments and the over 14,000 local school districts. All states and school districts have set the secondary school graduation level as the completion of 12th grade, and the common name for the secondary graduation qualification is the High School Diploma.

Vocational and academic/college preparatory or honors/Regents diplomas usually have additional set curricular requirements and/or standards which aspiring graduates must meet or exceed. In addition, the majority of US secondary school districts and private schools permit students to participate in the Advanced Placement (AP) programme of the College Board. This programme allows qualified students to take college level introductory courses in selected subjects taught by certified faculty.

[62] This information is taken from the European Education Directory EuroEducation.net website: http://www.euroeducation.net/prof/usa.htm

Higher education:

Higher education in the U.S. is also called postsecondary education. It is not divided into different sectors (university, non-university, etc.) as are some other national systems and it is a diverse and autonomous community of publicly and privately supported institutions. Current data indicate that there are some 2,819 institutions offering a Bachelor's or higher degree; 2,657 institutions offering at least an associate's degree but less than a bachelor's degree; and 4,927 institutions offering shorter non-degree programmes of less than two years duration. Institutions are classified in the following categories:

- *Research Universities* (I and II): Comprehensive doctorate-granting institutions that operate extensive theoretical and applied research programmes in a wide variety of disciplines;
- *Doctorate-Granting Universities* (I and II): Institutions offering comprehensive studies in a wide variety of disciplines but which do not award the Doctorate in as many fields as do research universities;
- *Master's (Comprehensive) Universities And Colleges* (I and II): Institutions offering academic and professional programmes at the Bachelor's and Master's degree levels, and first-professional degrees, but which do not award the research Doctorate;
- *Baccalaureate (Liberal Arts) Colleges* (I and II): Institutions offering academic and professional programmes at the Bachelor's degree level, but not higher degrees;
- *Associate of Arts Colleges:* Institutions offering academic and professional or occupational studies at the Associate Degree level, including public community colleges and public and private junior colleges;
- *Professional Schools and Other Specialized Institutions*: Institutions that offer instruction in only one or a few related subjects, either professional or academic, and thus are not comprehensive enough to fit into other classifications. The degree level ranges from the associate degree through the research Doctorate (eg. Independent schools of medicine, engineering, dentistry, and law; schools for the visual and performing arts; theological seminaries, etc.)
- *Postsecondary Vocational and Technical Schools*: Institutions offering short, non-degree training programmes of less than two years duration, leading to Certificates or Diplomas in occupational specialities.

The federal government has no jurisdiction or authority over the recognition of educational institutions, members of the academic professions, programmes or curricula, or degrees or other qualifications. Nearly all U.S. postsecondary institutions are licensed, or chartered, by a state or municipal government to operate under the ownership of either a government (if public) or a private corporation (if independent), and may be for-profit or not-for-profit enterprises. Religious institutions are considered independent, or private. Quality assurance is achieved via state requirements, voluntary accreditation, and the reputation of institutions and among their academic peers and employers of graduates. Accreditation is a self-regulating process of quality control engaged in by the U.S. postsecondary education community to ensure minimum standards of academic capability, administrative competence, and to promote mutual recognition of qualifications within the system.

Non-university level:

There is no distinction between "university level" and "non-university level" higher education. The level of studies is delineated by the level of qualification offered in a specific programme rather than by type of institution offering it.

University level studies:

- University level first stage**:** Associate Degree, Bachelor degree, Advanced Certificate, 1st professional degree:

- University level second stage**:** Master's Degree, Post-Master's Degree, Diploma or Certificate:
- University level third stage**:** Research Doctorate:

Higher education training in industry
This is considered a specific form of continuing professional education and is referred to as employer-sponsored training. Programmes are offered by employers or through contract by postsecondary institution, professional association, union or consulting organization. Education or training may be provided at work site or elsewhere. Continuing professional education or training ranges in length and depth from short courses intended to refresh or introduce new skills up to full degree programmes. Credit for work completed in such programmes may be recognized and accepted by regular higher education authorities through policies developed by institutions.

7.6 Appendix 6 - Canada[63]

In Canada, education is the responsibility of the ten provinces and three territories. While educational structures and institutions across the country are similar in many ways, they have been developed by each jurisdiction to respond to the particular circumstances, geographical situation, and historical and cultural heritage of the population they serve.
Elementary and secondary education

Public education is provided free to all Canadian citizens and permanent residents until the end of secondary school—normally at age 18. The ages for compulsory schooling vary from one jurisdiction to another; generally, schooling is required from age 6 or 7 as of a certain date as specified in jurisdictional legislation to age 16.

A great variety of programs—vocational (job training) as well as academic—is offered at the secondary level. Some jurisdictions offer dual credit courses that simultaneously give students both high school and postsecondary credits.

Postsecondary education
Once secondary school has been successfully completed, students may apply to a college career program or to a university. Traditionally, enrolment in trade-vocational programs, such as apprenticeship or other programs geared towards preparation for employment in an occupation or trade, did not require graduation from secondary school. However, requirements are evolving so that more and more programs, especially in trades dealing with advanced technology or having implications for public safety, are now requiring high school graduation.

Apprenticeship training involves a contract between an apprentice and an employer, registered with the jurisdiction, in which the employer provides the apprentice with training and experience for a trade. Programs vary in length from two to five years, depending on the trade. Registered apprenticeship combines on-the-job experience with four- to eight-week periods of in-class training each year of the program. In most jurisdictions the in-class portion is usually taken at a postsecondary institution during the apprenticeship training. However, in Quebec, the in-class training is taken prior to beginning an apprenticeship program.

Currently there are approximately 170 registered trades in Canada, each with specific standards and training requirements as set down by each jurisdiction. In some of these 170 registered trades, apprenticeship certification is compulsory for entry into and practice of the trade, while in others, although it indicates the level of competence a holder has, apprenticeship certification is voluntary and one can practise the trade without it. In 45 of the 170 registered trades, the

[63] This information is taken from the European Education Directory EuroEducation.net website: http://www.euroeducation.net/prof/canada.htm

provinces have agreed on interprovincial standards. In these 45 trades, candidates who achieve a standard agreed upon among the provinces qualify for the interprovincial Red Seal and are allowed to work anywhere in Canada without further training or examination.

Postsecondary education is available in both government-supported and private institutions, some of which award degrees.

Universities typically offer four-year undergraduate programs leading to Bachelor's degrees. Advanced degrees include Master's degrees and Doctoral degrees. Not all universities offer advanced degrees, particularly at the Doctoral level. In addition to universities, university colleges are recognized degree-granting institutions that offer three- to four-year bachelor's programs. Both universities and university colleges also offer programs leading to diplomas and certificates, but the primary emphasis is on degree programs. Additionally, a number of jurisdictions have begun to give limited degree-granting authority to community colleges. These institutions still offer diploma and certificate programs. The degree programs offered by these institutions are either two-year associate degrees or three- to four-year applied degrees in a particular area of speciality of the institution.

The systems of public non-degree-granting institutions in Canada for the most part were created by provincial and territorial governments in the 1960s to provide labour market preparation programs as alternatives to the more theoretically oriented programs of universities. Depending on the province or territory, they are called colleges, regional colleges, centres, colleges of applied arts and technology, community colleges, institutes, schools, or, in Quebec, collèges d'enseignement général et professionnel (CEGEPs).

Public non-degree-granting institutions offer vocationally oriented programs in a wide range of semi-professional and technical fields, leading to diplomas and certificates and, in the case of Quebec, to diplomas and attestations.

Several college systems offer university transfer programs—typically the first two years of a university undergraduate program, usually in cooperation with a university, at which the remainder of the program would be completed.

The source of funds at the postsecondary level will depend on the nature of the institution. For universities and public non-degree granting institutions, public funding comes either directly from the federal (mostly for sponsored research) or provincial/ territorial (mostly in the form of operating and capital grants) governments. Private funding for those institutions is made up of tuition and other fees, donations (including bequests), investment, and non-government grants and contracts. Private non-degreegranting institutions receive very little or no public funding, except indirectly through support to students; funding for these private institutions comes mostly from tuition fees.

7.7 Appendix 7 - United Kingdom[64]

School education:

Primary education may take the form of combined junior and infant schools and therefore lasts for six years or a first stage covering infant schools (two years) and a second stage covering junior schools (four years). Secondary education covers schooling from the age of eleven to the minimum school leaving age of sixteen. Pupils follow a common curriculum leading to the GCSE which has replaced the General Certificate of Education Ordinary Level. At some schools, pupils may stay on at a school sixth form for a further two years when they sit for the General Certificate

[64] This information is taken from the European Education Directory EuroEducation.net website: http://www.euroeducation.net/prof/ukco.htm

of Education Advanced Level (GCE A Levels) or the General Certificate of Education Advanced Supplementary examinations (GCE AS examinations), or vocational courses leading usually to General National Vocational Qualifications (GNVQs). Further education colleges also offer these courses.

Higher education:

Higher education is provided by three main types of institutions: universities, colleges and institutions of higher education and art and music colleges. All universities are autonomous institutions, particularly in matters relating to courses. They are empowered by a Royal Charter or an Act of Parliament. As a result of the Further and Higher Education Act of 1992, the binary line separating universities and polytechnics was abolished and polytechnics were given university status (i.e., the right to award their own degrees) and took university titles. The Council for National Academic Awards was abolished, leaving most institutions to confer their own degrees. Higher Education Funding Councils were created for England, Scotland and Wales, replacing the Universities Funding Council and the Polytechnics and Colleges Funding Council.

Non-university level post-secondary studies (technical/vocational type):

Non-university level post-secondary technical education is provided by technical colleges, colleges of further and higher education and accredited independent colleges which offer a large number of vocational courses leading to a professional qualification. The Business and Technology Education Council offers many vocational courses leading to the BTEC First Diploma (one year, full-time) or to the BTEC National Diploma (two to three years, full-time). A Higher National Diploma is conferred after three years' study by the Business and Technology Education Council. As regards professional education, the professions have laid down their own professional qualifications (some thirty major professional bodies exist).

University level studies:

- University level first stage**:** Undergraduate stage - this stage lasts for three or four years and leads to the award of a Bachelor's Degree in Arts, Science or other fields (Technology, Law, Engineering, etc.). In some Scottish universities the first degree is a Master's Degree. The Bachelor's Degree is conferred as a Pass Degree or an Honours Degree where studies are more specialized. The Bachelor's Honours Degree is classified as a First Class Honours, a Second Class Honours or a Third Class Honours.
- University level second stage: A Master's Degree is conferred after one or two years' study following upon the Bachelor's Degree.
- University level third stage: Master of Philosophy, Doctor of Philosophy:
- University level fourth stage: Higher Doctorate.

Higher education training in industry:

There are sandwich courses in which an undergraduate course is incorporated with periods of industrial training. The duration of study for an Honours Degree is four years. Admission conditions vary enormously and courses are offered only in universities which were formerly colleges of advanced technology.

7.8 Appendix 8 - Ireland[65]

School education:
Primary education lasts for eight years. Secondary school lasts for five to six years. It is divided into a three- to four-year junior secondary cycle, followed by a two-year senior secondary school cycle leading to the award of the Leaving Certificate. Vocational secondary schools offer two-year courses leading to the Leaving Certificate Vocational Programme and the Leaving Certificate Applied.

Higher education:
Higher education in Ireland is offered by universities and institutes of specialized higher education. Universities are financed for the most part by the State in the form of annual grants-in-aid and non-recurrent grants for capital expenditure, in a proportion of the order of 90%, as well as by student fees, endowments, and private donations. Each college has its own governing body and exercises full control over its finances. Colleges are composed of faculties and departments.

Non-university level post-secondary studies (technical/vocational type):
Higher technical and vocational education is offered by Institutes of Technology (formerly Regional Technical Colleges) and specialized colleges. They offer two-year Certificate, three-year Diploma and four-year Degree programmes in the applied fields of Engineering, Science and Business Studies, as well as some postgraduate courses.

University level studies:
University level first stage**:** Bachelor's Degree
University level second stage**:** Master's Degree
University level third stage**:** Doctorate.

Administration & co-ordination: Responsible authorities

- Department of Education and Science (An Roinn Oideachais & Eolaíochta)
- Higher Education Authority (HEA) (An tÚdarás Um Ard-Oideachas)

Role of governing body: responsible for the founding of universities and tertiary level institutions and their development to meet the needs of the community.

7.9 Appendix 9 - Denmark[66]

School education:
Basic education comprises primary and lower secondary education and lasts for nine or ten years (the 10th year is optional). Upon completion of Class 9 or 10 of the Folkeskole pupils may go on to upper secondary school. The 3-year Gymnasium programme is the traditional general upper secondary programme. General upper secondary school and the more vocationally-oriented programmes "Højere Handelseksamen" (HHX) or "Højere Teknisk Eksamen" (HTX) qualify students for higher education. HHX and HTX also prepare for employment in trade and industry - usually in training positions. Vocational programmes are mainly Erhvervsuddabbelse (Vocational Education and Training, VET) and prepare directly for specific jobs within the different branches of trade. In addition, most programmes qualify students for direct admission to one or more short-cycle professional higher education programmes. Approximately 30-50% of the time is spent at school and 50-70% is spent as a trainee or apprentice in a business enterprise. Parallel with the vocational education and training programmes, there are a number of other programmes: the basic social and health education programmes (SOSU) and agricultural, forestry, home

[65] This information is taken from the European Education Directory EuroEducation.net website: http://www.euroeducation.net/prof/irco.htm
[66] This information is taken from the European Education Directory EuroEducation.net website: http://www.euroeducation.net/prof/denmarco.htm

economics and maritime programmes. Education is largely the responsibility of the Ministry of Education. It shares control of the Gymnasium and Højere Forberedelseseksamen (HF) with the country councils and school or course boards. It is responsible for setting up the framework for curricula at primary and secondary education level. However, the contents of the courses are established by the schools (with their boards) and finalised by the teachers with their pupils. Vocational education and training is controlled by the Ministry of Education with the social partners as important parties.

Higher education:
Higher education comprises a university sector and a college sector, i.e. the professionally-oriented higher education sector. The university sector includes 11 universities, 5 of which are multi-faculty universities. The other 6 are specialized in Engineering, Education, Veterinary Medicine, Agriculture, Pharmacy or Business Studies. The university sector offers courses at three levels: Bachelor's Degree (normally 3 years of study), the Candidatus Degree (i.e. Master's Degree, normally 2 years following upon the Bachelor's Degree) and the Ph.D. Degree (normally 3 years' study after the Candidatus Degree). The universities also award the traditional higher Doctoral Degree (dr. phil., dr. scient etc) after a minimum of 5-8 years' individual and original research.

The college sector comprises more than 150 specialized institutions of higher education offering professionally-oriented programmes, either short-cycle (2 years) or medium-cycle (3 to 4 years). Colleges offering medium-cycle higher education have started merging into more comprehensive Centres for Higher Education (Centre for Videregående Uddannelse (CVU)). Vocational colleges have formed Vocational Academies (Erhvervsakademier) as a framework for regional cooperation. The Ministry of Science, Technology and Innovation is responsible for university education except for certain higher education programmes which come under the Ministry of Cultural Affairs (e.g. Architecture, Music, Fine Arts, and Librarianship). The Ministry of Education is responsible for short- and medium-cycle education. The legislation covers the aims and framework of education, funding and in some cases curricula, examinations and staffing. Higher education institutions are publicly financed and State-regulated.

The quality of higher education is ensured by ministerial approval of new programmes and institutions, external examiners and an evaluation system. Although they have institutional autonomy, institutions must follow general regulations concerning teacher qualifications, award structures, study programmes and quality assurance. While private institutions can operate without any approval, they must abide by an accreditation procedure to make their students eligible for state study grants.

7.10 Appendix 10 Mainland Products (Meat Division) Case study

prepared by Kath Evans

Career Development
I interviewed an employee of Mainland Products to obtain a practical example of how access to training and development has encouraged a worker to strive towards her vision of becoming a Plant Manager in the future. I have chosen to use the name Kristina for confidentiality purposes.

Kristina began work at Mainland Meat as a packer in the early 1980s. Training occurred on-the-job using the buddy system. Kristina only stayed with the company for a short period owing to family commitments.

Kristina recommenced employment with the company in the mid 1990's. Training was still conducted utlising the buddy system, however she noticed a more stringent focus on hygiene. Training also included 'how and why' things were done. She progressed through the tasks performing more complex tasks, keen to learn more skills.

Kristina was promoted to a Lead Hand position and embraced the new challenge diligently. She wanted to learn more about how and why things were being done.

At this time the company was developing Standard Operating Procedures (SOP's). Kristina was approached to assist in the process of the development stage and was very keen to help. SOPs were developed, trialed and rolled out across the work sections. Accredited training and assessment was introduced into the company.

Kristina attended courses to assist her in this process as she had developed a thirst for knowledge and the company was keen to provide the opportunity. Kristina attended the Level 3 Line Management Course. The New Zealand Industry Training Organisation (NZITO) facilitated this process. Kristina then attended the Level 4 Management Course and found this course to be in depth and more challenging and loved it!

She has been encouraged by the company to develop her skills and knowledge and through training she has felt more confident in her role. She believes that training has provided her with the communication skills that have enabled her to assist workers in their endeavours to achieve high standards of skills and knowledge.

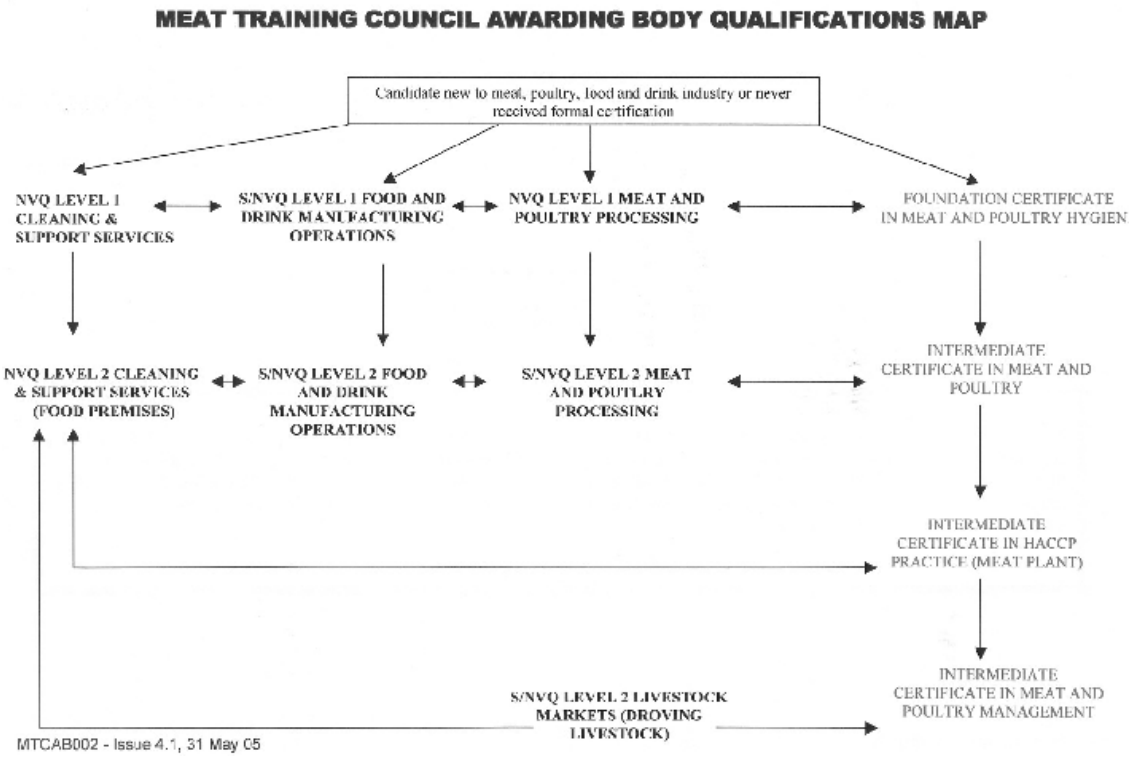
Kristina acknowledged the support of the company and hopes one day to become a Manager. Good luck Kristina and I am sure that you will be successful in whatever comes your way.

7.11 Appendix 11 Examples of recruitment and retention incentive strategies in USA

Employee Stock Ownership Program
The longer an employee remains with the company the higher the payout upon retirement. Share price is evaluated each year by an independent evaluator.
There is no compulsory superannuation scheme, and this scheme introduces a long-term benefit upon retirement similar to that of superannuation.

Recruitment Incentive
An incentive is paid to an existing employee who introduces a new recruit who obtains employment with the company.
A further incentive payment is paid to that existing employee upon successful retention of the new employment within a set time frame.

7.12 Appendix 12 England: Meat Training Council awarding body Qualifications map



7.13 Appendix 13 – Food / Meat Inspection Training

Assessment Matrix

Best Practice rating against Australian requirements	***Delivery of meat inspection training***	***Assessment of meat inspection competencies***	***Materials for training and assessment***	***Curriculum for meat inspection training***	***Professional development opportunities for meat inspectors and trainers***
1	*Training is :* *delivered by peers on an ad hoc basis and driven by operational*	*Assessment is:* *conducted by peers or immediate superiors on an ad hoc basis*	*Materials:* *vary from site to site are used on an ad hoc basis by both assessors and trainers.*	*Curriculum is:* *developed in consultation with regulator/ educators and industry*	*Little or no professional development with ad hoc training delivered by peers or immediate superiors.*
2	*Training is:* *structured and delivered by peers*	*Assessment is:* *structured and conducted by peers or immediate superiors*	*Materials are:* *available nationally*	*Curriculum is:* *competency based developed in consultation* *with regulator/ educators and industry* *nationally consistent and recognised*	*Professional development is:* *ad hoc and in response to a specific crisis* *dealing with regulatory and technical issues*
3	*Training is:* *structured and delivered by accredited instructors/trainers*	*Assessment is:* *structured and conducted by accredited assessors*	*Materials are:* *nationally consistent, approved by industry /regulators and* *developed specifically for the national meat inspection course*	*Curriculum is:* *part of a national qualifications system,* *competency based, developed in consultation with regulator/ educators and industry,* *nationally consistent and recognised*	*Meat Inspectors and MI trainers have access to professional development:* *planned as well as in response to a specific crisis* *dealing with regulatory and technical issues* *mandated for meat inspectors undertaking specific duties*
4	*Training is:*	*Assessment:*	*Materials are:*	*Curriculum/course structure is:*	*Meat Inspectors and MI trainers have access to*

	structured and delivered by accredited trainers. *supported by adequate training materials.* *significant off-the-job component.*	*is structured and conducted by accredited assessors.* *is supported by adequate uniform nation assessment tools* *involves a significant theory component*	*nationally consistent approved by industry /regulators* *developed specifically for the national meat inspection course* *r* *eviewed regularly and capable of easy updating*	*part of a national qualifications system* *competency based* *developed in consultation with regulator/ educators and industry* *nationally consistent and recognised* *regularly reviewed*	*professional development:* *planned as well as in response to a specific crisis* *dealing with regulatory and technical issues* *available on a regional basis encouraged or sponsored by the regulator* *mandated for meat inspectors undertaking specific duties*
5	*Training:* *is delivered by accredited trainers* *available in flexible delivery modes* *cost effective* *delivered with adequate access to on-the-job practice* *available to staff wishing to advance their career* *subject to quality audit*.	*Assessment:* *is made on the basis of competency rather than course attendance or time served* *accepted by regulatory agencies as being indicative of workplace skills* *process reviewed by the regulator* *conducted by trained and accredited assessors* *structured and documented contains evidence of on-the-job competency as well as theory* *moderated across the nation subject to quality audits.*	*Materials are:* *nationally consistent developed specifically for the national meat inspection course.* *reviewed regularly and capable of easy updating approved by industry /regulators* *available to all training organisations* *suitable for flexible delivery* *Trainers & assessors are trained in the use of the materials.*	*Curriculum/course structure is:* *part of a national qualifications system* *competency based detailing the nature of competency required as well as the underpinning knowledge* *developed in consultation with regulator/ educators and industry* *nationally consistent and recognised* *regularly reviewed* *parallels the career of a meat inspector*	*Meat Inspectors and MI trainers have access to professional development:* *on a regular basis (at least yearly)* *planned as well as in response to a specific crisis* *dealing with regulatory and technical issues* *available on a regional or electronic basis* *be encouraged or sponsored by the regulator* *where possible enhance the formal qualifications of the inspector* *mandated for meat inspectors*

				articulates into further education or training *reflects industrial outcomes.*	*undertaking specific duties* *mandated for trainers to ensure currency*
Impact Weighting	***20%***	***30%***	***10%***	***30%***	***10%***

7.14 Appendix 14 – Assessment Matrix

QUALITY ASSURANCE TRAINING including courses covering HACCP, microbiological hazards and testing, auditing, QA data analysis, GMP, SOP and government legislation and regulation.

Best Practice rating against Australian requirements	***Delivery of quality assurance training***	***Assessment of quality assurance competencies***	***Materials for training and assessment***	***Curriculum for quality assurance training***	***Professional development opportunities for quality assurance managers and QA trainers***
5	*Training is :* *delivered by accredited trainers* *available in flexible delivery modes* *cost effective delivered with adequate access to on-the-job practice* *be available to staff employed by industry and regulators* *available to staff wishing to advance their career* *standardized content and format* *subject to quality audit*	*Assessment is :* *made on the basis of competency rather than course attendance or time served* *accepted by regulatory agencies as being indicative of workplace skills* *a process reviewed by the regulator* *conducted by trained and accredited assessors* *structured and documented* *contains evidence of on-the-job competency as well as theory* *moderated across the*	*Materials are:* *nationally consistent* *developed specifically for the national quality assurance course* *reviewed regularly and capable of easy updating* *approved by industry /regulators* *available to all training organizations* *suitable for flexible delivery* *Trainers & assessors are trained in the use of the materials*	*Curriculum/course structure is:* *part of a national qualifications system* *competency based detailing the nature of competency required as well as the underpinning knowledge* *developed in consultation with and sign off from regulators/ educators and industry* *nationally consistent and recognized* *regularly reviewed* *parallels the career of a quality assurance*	*Quality assurance managers and QA trainers have access to professional development:* *on a regular basis (at least yearly)* *that is planned as well as in response to a specific crisis* *dealing with regulatory and technical issues such as microbiology etc* *available on a regional or electronic basis* *encouraged or sponsored by the regulator and industry organizations* *delivered to both industry*

		nation *subject to quality audits*		*manager* *articulates into further education or training* *reflects industrial outcomes*	*and regulatory staff at the same time* *that should where possible enhance the formal qualifications of the QA Manager* *mandated for quality assurance managers undertaking specific duties* *mandated for trainers to ensure currency*
4	*Training :* *Is structured and delivered by accredited trainers* *Is supported by adequate training materials* *has a significant off-the-job component*	*Assessment :* *is structured and conducted by accredited assessors* *is supported by adequate uniform nation assessment tools* *involves a significant theory component*	*Materials are:* *nationally consistent* *approved by industry /regulators* *developed specifically for the national quality assurance course* *reviewed regularly and capable of easy updating*	*Curriculum/course structure is:* *part of a national qualifications system* *competency based* *developed in consultation with regulator/ educators and industry* *nationally consistent and recognized* *regularly reviewed*	*Quality assurance managers and MI trainers have access to professional development that is:* *planned as well as in response to a specific crisis* *dealing with regulatory and technical issues* *available on a regional basis* *encouraged or sponsored by the regulator* *mandated for quality assurance managers undertaking specific duties*

3	*Training is* *structured and delivered by accredited instructors/trainers*	*Assessment is structured and conducted by accredited assessors*	*Materials are:* *nationally consistent* *approved by industry /regulators* *developed specifically for the national quality assurance course*	*Curriculum is:* *part of a national qualifications system* *competency based* *developed in consultation with regulator/ educators and industry* *nationally consistent and recognised*	*Quality assurance managers and MI trainers have:* *access to professional development planned as well as in response to a specific crisis* *dealing with regulatory and technical issues* *mandated for quality assurance managers undertaking specific duties*
2	*Training is structured and delivered by peers*	*Assessment is structured and conducted by peers or immediate superiors*	*Materials are available nationally*	*Curriculum is:* *competency based* *developed in consultation with regulator/ educators and industry* *nationally consistent and recognised*	*Professional development is ad hoc and in response to a specific crisis dealing with regulatory and technical issues*
1	*Training is delivered by peers on an ad hoc basis and driven by operational*	*Assessment is not conducted and attendance is deemed evidence of competence*	*Materials vary from site to site and are used on an ad hoc basis by both assessors and trainers.*	*Curriculum is developed in consultation with regulator/ educators and industry*	*Little or no professional development with ad hoc training delivered by regulators or technical consultants on site*
Impact Weighting	***20%***	***20%***	***20%***	***20%***	***20%***

7.15 Appendix 15 NZ Meat Inspection Courses (Generic)[67]

All unit standards and qualifications registered as at (on the National Qualifications Framework may be accessed from the website.
To find a document, click on the associated classification (field, subfield or domain) or use Search Framework at right (click on 'options' to refine your search).

Qualifications
No qualifications currently registered at this level. Also check fields and sub-fields.

Unit Standards

Level 2		
13471	1 Credits	Demonstrate understanding of the law governing premises licensed or approved under the Meat Act 1981 (this unit standard is expiring and no longer for sale)
17378	2 Credits	Describe the function, operation and legislative basis of meat inspection services
13470	1 Credits	Describe the structure and function of meat inspection services operating under the Meat Act 1981 (this unit standard is expiring and no longer for sale)
Level 3		
13473	1 Credits	Demonstrate knowledge of post-mortem inspection hygiene requirements
13489	2 Credits	Explain how hygiene practices reduce the risk of product spoilage and food poisoning
13488	4 Credits	Take samples for laboratory analysis
13472	5 Credits	Use a hand knife to perform post-mortem inspections under provisions of the Animal Products Act 1999
Level 4		
13498	6 Credits	Demonstrate how disease processes affect the fitness for use of meat products and by-products
13499	8 Credits	Demonstrate knowledge of post-mortem meat inspection
13497	10 Credits	Demonstrate understanding of blood and lymph circulatory systems
13474	8 Credits	Describe and carry out generic ante-mortem inspection duties
Level 5		
13486	20 Credits	Approve applications for new buildings, alterations and additions to licensed premises
13485	50 Credits	Compliance check edible areas of premises licensed or approved under the Animal Products Act 1999
14899	50 Credits	Compliance check inedible areas of premises licensed or approved under the Animal Products Act 1999
Level 6		
13487	20 Credits	Certify products and byproducts processed in licensed and approved premises

Data as at 18 April 2006

[67] www.nzqa.govt.nz/for-business/ details

Meat Inspection Species Specific
All unit standards and qualifications registered on the National Qualifications Framework may be accessed here.

Qualifications - No qualifications currently registered at this level.

Level 3		
22046	4 Credits	Demonstrate knowledge of the Animal Products Act 1999 as it applies to poultry meat examination
22047	6 Credits	Demonstrate knowledge of the poultry industry as it applies to poultry meat examination
22048	8 Credits	Describe ante-mortem examination of poultry to be processed for human or animal consumption
Level 4		
13479	8 Credits	Complete ante-mortem inspection of bobby calves to be processed for human consumption
13476	8 Credits	Complete ante-mortem inspection of cattle to be processed for human consumption
13505	8 Credits	Complete ante-mortem inspection of emus and ostriches to be processed for human consumption
13480	8 Credits	Complete ante-mortem inspection of farmed deer to be processed for human consumption
13477	8 Credits	Complete ante-mortem inspection of horses to be processed for human consumption
13478	8 Credits	Complete ante-mortem inspection of pigs to be processed for human consumption
13475	8 Credits	Complete ante-mortem inspection of sheep and goats to be processed for human consumption
22049	12 Credits	Describe post-mortem examination of poultry to be processed for human or animal consumption
22050	6 Credits	Explain and apply monitoring, corrective action, and verification of poultry meat examination
13482	4 Credits	Inspect feral killed deer
13495	4 Credits	Inspect feral killed goats
13496	4 Credits	Inspect feral killed horses
13481	4 Credits	Inspect feral killed pigs
13483	4 Credits	Inspect feral killed rabbits and hares
13484	10 Credits	Inspect feral killed wallabies
13504	8 Credits	Inspect offal and carcasses of bobby calves
13501	40 Credits	Inspect offal and carcasses of cattle, beefaloes and buffaloes
13492	10 Credits	Inspect offal and carcasses of emus and ostriches
13490	40 Credits	Inspect offal and carcasses of farmed deer
13494	10 Credits	Inspect offal and carcasses of farmed rabbits
13502	40 Credits	Inspect offal and carcasses of horses
13503	40 Credits	Inspect offal and carcasses of pigs
13493	10 Credits	Inspect offal and carcasses of possums
13491	10 Credits	Inspect offal and carcasses of poultry
13500	40 Credits	Inspect offal and carcasses of sheep, lambs and goats
13510	4 Credits	Locate anatomical features of the carcass and offal of bobby calves in post-mortem inspection
13511	4 Credits	Locate anatomical features of the carcass and offal of farmed deer in post-mortem inspection
13507	4 Credits	Locate and identify anatomical features of the carcass and offal of cattle in post-mortem inspection
13508	4 Credits	Locate and identify anatomical features of the carcass and offal of horses in post-mortem inspection
13509	4 Credits	Locate and identify anatomical features of the carcass and offal of pigs in post-mortem inspection
13506	4 Credits	Locate and identify anatomical features of the carcass and offal of sheep, lambs and goats

Data as at 18 April 2006

7.16 Appendix 16 Key Public Health Occupations[68]

A science-based framework is critical in identifying and preventing food safety problems. The foundation of this framework is made up of key public health occupations within FSIS. These occupations, held by permanent full-time employees, include:

- Chemists
- Consumer Safety Inspectors
- Enforcement, Investigations, and Analysis Officers
- Epidemiologists
- Food Inspectors
- Food Technologists
- Import Surveillance Liaison Inspectors
- Microbiologists
- Program Investigators
- Public Health Veterinarians

Chemists
Chemists perform chemical analyses of increasing complexity to determine the levels of pesticides, drug and environmental pollutants, and biological residues. They interpret and evaluate the results of chemical analyses and compare the results to pertinent agency regulations to assure the safety of meat, poultry, and egg products. Chemists also assess equipment, standard operating procedures and established protocol and make recommendations for change or refinement. The analytical work performed by chemists at FSIS impact other laboratory and other agency personnel, regulated establishments, the industry, other agencies, and the general public.

Consumer Safety Inspectors
Consumer Safety Inspectors work in one or more privately owned meat, poultry and egg processing plants. They ensure the plant is operating within its written plans for Hazard Analysis and Critical Control Point (HACCP), sanitation and processing. In addition, they conduct regulatory oversight activities inside the plants in matters relating to other areas of consumer protection (e.g. misbranding).

Enforcement, Investigations, and Analysis Officers

Enforcement, Investigations, and Analysis Officers are primarily involved in conducting onsite assessments to verify that plant food safety systems are properly designed and functioning. They are also involved in applying administrative enforcement processes. They collect information pertaining to voluntary recalls of meat, poultry or egg products. Consumer Safety Officers also follow-up on consumer complaints. Enforcement, Investigations and Analysis Officers conduct investigations and analysis regarding administrative or civil enforcement matters pertaining to commercial establishments operating under a grant of Federal inspection. This includes collecting necessary information pertaining to recall activities, consumer complaints or other public health concerns.

Epidemiologists
Epidemiologists analyze and evaluate reported cases of illnesses possibly linked to meat, poultry, and egg products. They also investigate and study potential meat- and poultry-borne hazards. Epidemiologists also perform special epidemiological projects concerned with food hygiene, public health, and preventative medicine. This includes researching literature, keeping

[68] This information is located at www.fsis.usda.gov

abreast of advances in the field of epidemiology and assessing potential impacts on FSIS activities. The analysis, investigation, conclusions and recommendations of the epidemiologists at FSIS have an immediate impact on food hygiene programs that affect the public's health.

Food Inspectors
Food Inspectors are involved in the inspection of animals before and after slaughter. They are engaged in various activities in order to assess compliance with the Federal Meat Inspection Act, the Poultry Products Inspection Act and the Egg Products Inspection Act, as well as other applicable Federal laws and regulations. Food Inspectors perform ante-mortem and post-mortem inspection of cattle, swine, sheep, goats, chickens, turkeys, ducks, geese, rabbits and equine to assure that products are wholesome and fit for human consumption. Food Inspectors also perform inspection of further processed products and inspection of imported products at port of entry.

Food Technologists
Food Technologists are involved in professional work concerning the application of science and technology to food product research, development, improvement, evaluation, production, processing, preservation and packaging. Food Technologists perform various activities such as planning and executing complex studies; identifying and evaluating data sources; and coordinating projects involving analysis and evaluation. Food Technologists occupy positions at Headquarters, Center for Learning and the Technical Service Center.

Import Surveillance Liaison Inspectors
Import Surveillance Liaison Inspectors perform duties related to the surveillance of imported meat, poultry and egg products from the point at which they enter the United States, to the place where import inspection is conducted. Surveillance and liaison functions are performed at import facilities including areas such as the dock, loading areas, refrigeration and storage areas, at land entry points along the Canadian and Mexican borders, and at air terminals across the United States. Import Surveillance Liaison Inspectors also provide technical guidance and direction to import inspectors and industry representatives regarding import inspection methods, procedures and regulatory requirements.

Microbiologists
Microbiologists perform microbial analyses on official samples submitted by various agency field personnel located throughout the United States. These microbiologists perform a full range of microbial examinations of meat and poultry products and their ingredients to determine the presence, numbers and species of bacteria with particular emphasis on *Salmonella*, *Listeria*, *Staphylococcus*, *Clostridium*, *E. coli 0157:H7*, and other species important to public health. Microbiologists also perform various tasks associated with the adaptation and validation of methods and test systems used in field laboratories in the analysis of meat, meat products, poultry, poultry products, and egg products.

Program Investigators
Program Investigators are involved in administering, coordinating, supervising or performing inspectional, investigative, analytical, or advisory work to assure understanding of and compliance with the Federal Meat Inspection Act, the Poultry Products Inspection Act and the Egg Products Inspection Act, as well as other applicable Federal laws, regulations or mandatory guidelines. These positions are established primarily to ensure compliance of individuals or organisations with laws, rules, regulations, executive orders or other mandatory guidelines. Compliance is assessed by such means as inspections, investigations, and analysis or reports. Compliance may be obtained by methods such as persuasion, negotiation and technical assistance. Compliance may also require actions such as citation of violations, drafting of

complaints, and referral of cases for administrative or legal proceedings.

Public Health Veterinarians
FSIS Public Health Veterinarians (PHV) supervise food inspectors and consumer safety inspectors who ensure the plants meet requirements of the Pathogen Reduction and Hazard Analysis and Critical Control Point (HACCP) regulations. PHV are responsible for ensuring the humane slaughter of livestock. Public Health Veterinarians oversee the enforcement of federal meat and poultry inspection procedures at ante-mortem and throughout the entire establishment, including processing operations, transportation and distribution of meat, poultry and egg products to markets and retail stores. Public Health Veterinarians play an integral role throughout the public health process. They evaluate the design and implementation of food safety systems and are responsible for administering enforcement actions based on the statutes.

Not all FSIS PHV work in plants. Many work at headquarters or at other field office locations throughout the United States. In these positions, they evaluate agency programs to assess their effectiveness in ensuring the safety of meat, poultry and egg products and other challenging tasks that ultimately protect people from foodborne illnesses. Additionally, some FSIS PHV conduct epidemiological investigations based on reports of foodborne health hazards and disease outbreaks in collaboration with local health departments and the Centers for Disease Control and Prevention (CDC). Still other FSIS PHV assess State inspection programs and design new inspection systems and procedures

7.17 Appendix 17 Regulatory Essentials[69]

The implementation of HACCP and pathogen reduction programs represents one of the most significant changes in the regulation of the meat and poultry industry since the inspection program began in the early 1900's. These regulatory changes are so substantial that they also require retraining a large number of FSIS employees in the new policies and procedures. Much of the material used for training of Agency personnel also has applicability to state and local regulators in training their employees. Further, it is of interest to members of the meat and poultry industry in developing comprehensive training for their own personnel.

Food Safety Regulatory Essentials
FSIS is providing training to reinforce the understanding of how to perform food safety duties. The training - Food Safety Regulatory Essentials Training (FSRE) - is based on the recently issued FSIS Directive 5000.1, Revision 1, Verifying an Establishment's Food Safety System. The directive outlines the full range of inspection responsibilities in relation to the HACCP/Pathogen Reduction Regulation. In addition, it incorporates all recent Agency issuances (directives, notices) related to these topics.

Unlike the initial HACCP training, the FSRE training is tailored to an inspector's assignment. All persons receiving the training get the foundation training and customized training. The foundation training covers the Rules of Practice; Sanitation Performance Standards; and Sanitation Standard Operating Procedures. The customized training covers HACCP verification; Pathogen Reduction; and food safety sampling.

Inspectors assigned to establishments producing products in the 03B, C and J HACCP processing categories receive HACCP training focused on raw products. Inspectors in establishments producing products in the 03G, H and I HACCP processing categories receive HACCP training focused on not shelf stable, ready-to-eat and not ready-to-eat products. Inspectors at establishments producing products in the 03D, E and F HACCP processing categories receive HACCP training focused on shelf stable products.

[69] This information is located at www.fsis.usda.gov

7.18 Appendix 18 Achieving the Public Health Vision - an Update on FSIS Activities[70]

Remarks delivered by Dr. Garry McKee, Administrator, FSIS, before the Association of Food and Drug Officials Annual Educational Conference, June 18, 2003, Chicago, Ill.

Training and Education

(Slide 9) Now, that I've given you an example of what it means to "go beyond the book" with education, I'd like to focus next on a few priorities, which fit into the context of our pursuit of becoming a world-class public health agency. These are training and education, homeland security, and partnerships with states.

(Slide 10) First, for training and education: to achieve our vision, our workforce has to be equipped with the knowledge and technical expertise to operate within a public health framework. In order to protect public health, we are intent on enforcing HACCP, and we are holding industry, as well as ourselves, accountable for successfully operating under the HACCP model. This is why I feel very strongly about revamping FSIS' training and education program. We need to clear up any misconceptions and inconsistencies that our folks might have in operating within a HACCP environment.

(Slide 11) We have set five goals that will shape the future of our training and education program, and we have already made considerable progress in making effective long-term changes to protect public health. Let's go over each of these goals briefly.

First Goal

(Slide 12) The first goal is to orient the training in a way that moves us toward our goal of becoming a premier public health agency. To me, this goal is like laying a solid foundation and using the best materials when building a dream house. You wouldn't use second or third rate materials, or else the house would fall apart. Our workforce is the "foundation and building materials" of a model agency, and we can't afford not to take the training and education seriously.

When we first implemented HACCP, we structured our HACCP training in a "one size fits all" approach. However, over the years we have seen that this system did not provide the best return on our investment in time and money. It was not tailored to the environment in which the inspector worked.
To address this issue, we recently started the Food Safety Regulatory Essentials classes at the Training and Education Center in College Station, Texas. This training program is targeted to our inspectors who have HACCP duties, as well as to in-plant supervisors. The training is tailored to the inspector's job responsibilities.

For instance, all inspection personnel receive one week of sanitation training. Then they receive one-week of HACCP training for raw products and then one week of HACCP training for ready-to-eat products. This represents a total of three weeks of training up front. If an inspector only works in ready-to-eat establishments then he or she will only go through two weeks of training and skip the HACCP training for raw products.

[70] This information is located at www.fsis.usda.gov

Nearly 300 people have taken this training so far. We have had a significant amount of positive reception from it, and all training classes are fully booked. By the end of the fiscal year, our goal is to have 800 inspectors fully trained. We've made quite a bit of progress so far, and I can easily say that we're on target to meet this goal.

Second Goal

(Slide 13) The second goal is to take the training closer to the worksite. We are working on identifying regional locations for training, which, in bringing it closer to the frontlines, will reduce the amount of travel time and costs associated with moving our personnel to one central location.

In addition, we are getting our inspectors new computer systems – basically the Tanberg, a video teleconferencing system which runs off an email system. This will be easier, and it will provide us significant long-run cost savings. Also, this system will further facilitate distance learning.

Third Goal

(Slide 14) Our third goal is to have our training linked to credentials or degrees. We want our workforce to take training courses and be able to earn credits for them to apply toward a higher degree. We want to provide incentives for FSIS employees to pursue relevant associate, undergraduate, or graduates degrees.

Fourth Goal

(Slide 15) The fourth goal is to train entry-level employees before they enter their duty stations. Previously, our entry-level employees would start their jobs without receiving any training up front. That is not the case now. All new inspectors start off with the necessary training they need.

Fifth Goal

(Slide 16) The fifth goal is to work on making training a condition of employment. What we are trying to achieve here is that if an employee doesn't pass training, then he or she is essentially demonstrating an inability to perform successfully on-the-job. This all goes back to me saying before, that we need to hold ourselves accountable.

We already have a well-established and successful training program for our consumer safety officers, compliance officers and entry-level food inspectors (although we're in the process of reconfiguring the entry-level food inspector training program). Currently we are now updating our Veterinary Medical Officer training program, which includes an entry-level training program for recent veterinary school graduates. Then we'll focus on updating training programs for other job categories as well.

As with all changes and improvements to large processes and organizations, such as ours, they take time. However, we have made major strides in moving our training and education program forward, and will continue our progress.

Homeland Security

(Slide 17) Our next priority is homeland security, and we are focusing on preventing biological, chemical and radiological attacks on our food supply. We have developed a biosecurity training program that takes a unique approach because it presents topics that familiarise participants with techniques to prevent terrorist activities, rather than responding to an event. The training advocates a multi-dimensional team approach to homeland security – such as local, state, federal and private sector interaction – and reinforces reporting lines for suspicious activities.

This biosecurity training focuses on our field employees – one for the district office and the other for employees in the plant. Since we initiated this training, we have had five district training sessions where we invited our local partners within that district, such as State, FDA and APHIS representatives, as well as local first responders.
I know that we have had about 20 state representatives attend these district training sessions so far. Just out of curiosity, may I see a show of hands of those who have already attended this biosecurity training session?
(Slide 18) If you are interested in attending the training, or learning more about it, then contact Dr. Peachie Burlin at the Center for Learning at (979) 260-9562; extension 243; or by email at marjorie.burlin@fsis.usda.gov. I strongly encourage all AFDO members to take advantage of this opportunity, and if you have already attended this training, we also welcome your comments on how we can improve it further.

I have stressed to FSIS employees and other groups before that both government and industry share a tremendous responsibility to be in a state of “continual situational awareness.” This means that all plant employees and inspectors constantly need to look out for any abnormalities along the food production chain.
(Slide 19) Earlier this year, we added 20 new import surveillance liaison inspectors around the nation to augment the efforts of traditional FSIS inspectors assigned to 146 Import Houses. Where traditional USDA import inspectors examine each shipment and conduct reinspection activities, these new import surveillance liaison inspectors conduct a broader range of surveillance activities at each import facility, as well as extensive records review. These inspectors are also liaisons to improve the coordination with other agencies, such as the Department of Homeland Security, concerning the safety of imported food products.

(Slide 20) Two months ago, we signed a Memorandum of Agreement with the Public Health Service (PHS) that allows for the detailing of expanded numbers of PHS Commissioned Corps Officers to FSIS. Not only will these officers help us respond to foodborne disease outbreaks and prevent foodborne illness, but they will help us in our homeland security efforts as well. Since Commissioned Corps Officers are available 24 hours and seven days a week, this allows us greater flexibility to respond instantly during heightened security alerts or an actual threat to the food supply.

7.19 Appendix 19 Careers Profile for a Meat Inspector in Canada[71]

The Canadian government is very particular when it comes to ensuring our food safety. And there are people who make sure the food safety rules are taken seriously and upheld. Pat Boutillier is one of them.

As a food processing specialist inspector for the Canadian Food Inspection Agency (CFIA), Pat is one of 3,300 CFIA employees across Canada. They work as part of the "scientific, engineering and technical support group" that is responsible for inspecting food products. Pat inspects meat and meat products. She does this in federally registered establishments and storage facilities.

Pat knows how to tell if a system is effective and safe. But even if she thinks all is well, she follows a set of procedures to ensure compliance. "Recalls occur occasionally," she says. This is when products are removed from grocery shelves and returned to the manufacturer. It's up to inspectors like Pat to catch unsafe products at the source.

Recognizing priorities is important

Time is of the essence in Pat's day. She may set out for a regular inspection at a meat processing plant, but be called to another where there's a more urgent task. "Everything has priorities," she explains, referring to the decision-making involved in her job. She decides what to attend to depending on its established priority. Concerns at a slaughter facility take top priority, Pat says. "After the growers, it's the beginning of your food chain."

At work, Pat dresses to meet the facility's standards. She wears the appropriate attire-hairnet, hard hat and hearing protection. Each facility Pat inspects provides her with an office space. She spends approximately one hour a day doing the necessary paperwork. Though she's kept very busy, Pat generally works a seven-and-a-half-hour day.

Pat emphasizes the need for good communication skills. "You might have clients who may not want to hear what you have to say. You have to know the facts and be confident." Similarly, it's essential to have "an ability to remain calm in all situations."

Education and experience add up

After years of working in the food industry, Pat became a CFIA meat inspector in 1989. With her previous work experience and a farm background, Pat readily took to the work. "Animals, food and meat-they've always been a part of my life," she says. Pat has worked her way up to the government agency's fourth classification level in meat inspection.

In terms of education, inspectors require a minimum of a college diploma with specialisation in the technical sciences. In some circumstances, the CFIA will give preference to an applicant with a university degree. There's also "a lot of training, which you take as you go," Pat says. After 18 months of training, you take an exam. If you pass, you move up to the next level within the agency. From there, you can compete for other positions as they become open within the agency.

In order to conduct audits, inspectors must also have thorough knowledge of HAACP (Hazard Analysis Critical Control Point). This is a science-based program that is used to improve food safety in federally approved facilities, by identifying and preventing hazards that could

[71] This information is located at www.agriscience.ca/studentguide/e_profile12

contaminate food.

Although she has to know the legislation and the regulations, and how to explain it all to meat processors, Pat says that she enjoys the independence her position allows her. “You have to have the ability to work on your own,” she notes.

Modern procedures mean less heavy work

All newly hired meat inspectors begin their training as slaughter inspectors. Pat says of her early days on-the-job, “all of the inspection was hands-on.” Now high-speed processing equipment and related procedures mean there’s less heavy physical work. And Pat, now an experienced inspector, spends a lot less time on the slaughter floor.

Pat also has the experience to help employers plan new facilities or upgrades. She works with them from the blueprint stage through construction, to get them “on stream.” While Pat considers project management of this sort quite interesting, food safety is always uppermost in her mind. She says that she takes her responsibility to heart, “knowing I have a part in ensuring safe food for Canadians and their trade partners.”

Starting Salary: $30,000 per year

Salary After Five Years: Approximately $46,000 per year

Educational Requirement: College or University degree in Animal Health or Food Science, or equivalent

7.20 Appendix 20 - UK meat inspectors

The work
Meat inspectors, also known as meat hygiene inspectors, are responsible for checking and certifying meat under the current meat inspection and hygiene legislation. They may already have experience of working in the meat industry, perhaps in an abattoir or meat processing plant.

Meat hygiene inspectors may work for the Meat Hygiene Service in slaughterhouses, cutting plants and cold stores throughout the country. Other meat inspectors work with veterinary officials inspecting live animals, game or poultry for indications of health or disease, and are also involved in post mortem inspections.

As well as inspecting in detail meat or live animals, they check other areas such as: the hygienic operation of meat plants and equipment; the welfare of animals in slaughterhouses; meat transportation; and the disposal of unfit meat.

Meat inspectors are required to record the results of inspections in detail, including any recommendations or problem areas, and ensure that action points are dealt with quickly and efficiently.

Hours and Environment
Meat inspectors usually work a 37 to 40 hour week, Monday to Friday. Weekend and evening work may also be required, and overtime may be worked if a hygiene problem occurs.

- They wear protective clothing and use appropriate tools for inspection.
- They spend much of their time working indoors, where there might be machinery noises and distinctive smells, and temperatures may be cool.
- Meat inspectors are likely to have to travel between different locations.

Skills and Interests
To be a meat inspector you should:
- be knowledgeable about the meat industry
- be good at working with your hands
- pay great attention to safety and hygiene
- have good health and stamina
- be adaptable and flexible
- have good written and verbal communication skills
- have the ability to build effective working relationships with people at all levels
- be able to act calmly when dealing with difficult people or situations
- be able to record findings in a methodical and comprehensive manner.

Entry
To become a meat inspector, you need to hold the Royal Society for the Promotion of Health Certificate in Meat Inspection (or, where appropriate, the Certificate in Poultry Meat Inspection). This is a statutory qualification, involving at least 400 hours of training.

To be eligible for entry onto a Certificate in Meat Inspection course, you will need one of the following:
- five GCSEs(A-C)/S grades (1-3) including English and either science or maths
- Associateship of the Meat Training Council by examination (contact the Meat Training Council directly)

- submission of a 5,000-word project or dissertation on a science-related subject for the Royal Society''s approval.

There is no set upper age limit for becoming a meat inspector. If you have experience of working in the meat industry - perhaps as a meat process worker - you can apply for a place on a Certificate of Meat Inspection training course without the usual academic qualifications listed above.

Training
The college-based part of the Certificate in Meat Inspection training covers: anatomy and physiology; pathology and meat inspection; animal welfare; visit records; hygiene; and legislation. The remainder of the training is practical, taking place in slaughterhouses or other types of meat plant.

The examination comprises a foundation and a specialised paper, plus an oral and practical test.

You can obtain details of the colleges offering a Certificate of Meat Inspection training course from the Royal Society for the Promotion of Health.

Opportunities
There are only around 2,800 meat inspector jobs available in the UK.

The Meat Hygiene Service offers around 1,600 job opportunities in around 1,400 different plants in England, Scotland and Wales. The Meat Hygiene Service is an executive agency of the government regulatory body, the Food Standards Agency.

Other employers are large-scale manufacturing companies and supermarket chains.

There may be promotion opportunities for experienced meat inspectors, for example: supervising other meat inspectors; a management role within the company; or a regional supervisory or management position within the Meat Hygiene Service.

Annual Income
Figures are intended as a guideline only.

- Trainee meat inspectors with the Meat Hygiene Service start on £15,900 a year.
- Experienced meat inspectors earn from £19,500 to £24,000.
- Senior meat inspectors earn from £24,000 to £30,000.

7.21 Appendix 21 National Food Centre (Ashtown, near Dublin)[72]

Training
The Ashtown Food Research Centre is a leading supplier of training to the food processing and retail sector in food safety and quality systems, food innovation and new product development. Training is provided to assist food businesses in meeting legal requirements, customer requirements and industry best practice. The training services are accredited to the ISO9001:2000 quality management standard. In addition, The Ashtown Food Research Centre is a registered training centre for FAS, and FETAC certified training courses, and is a recognised training organisation by Enterprise Ireland and other national organisations.

The Ashtown Food Research Centre has developed and piloted training courses with a number of state and industry agencies over the years. Training courses are provided both publicly and privately (in-company). Some of the courses incorporate a practical on-the-job element to optimise the transfer of information and maximise application.
The Ashtown Food Research Centre client list includes food manufacturers, retailers and the major food regulatory bodies and industry support agencies.

Courses available

- BRC Awareness
- Certificate in Foundation Hygiene for Food Handlers (FETAC)
- Advanced Hygiene Management of Food Safety (FETAC)
- Advanced Hygiene Management of Food Safety E-Learning option (FETAC)
- HACCP in Food Safety (FETAC)
- Food Safety Auditing (FETAC)
- Trainer Skills in Food Safety and Hygiene (FETAC)
- Thermal Process Validation (FETAC)
- Microbiology for Non-Microbiologists (FETAC)
- Microbiological Sampling of Fresh Meat EC/2001/471 (FETAC)
- Microbiological Shelf-Live of Foods (FETAC)
- Labelling of Foodstuffs (FETAC)
- Food Law Update (Allergen Issues for the Food Industry)
- Food Legislation (FETAC)
- Technologies in Meat Manufacturing
- Certificate in Meat Hygiene

[72] Information located at www.hridir.org/.../teagasc_agriculture_and_food_development_authority/the_national_food_centre/index.
See also Appendix 1.2

7.22 Appendix 22 Official Journal of the European Union 25/6/2004 L226/107[73]

Official Auxiliaries

1. The competent authority may appoint as official auxiliaries only persons who have undergone training and passed a test in accordance with the following requirements.
2. The competent authority must make arrangements for such tests. To be eligible for these tests, candidates must prove that they have received:
   (a) at least 500 hours of theoretical training and at least 400 hours of practical training, covering the areas specified in paragraph 5; and
   (b) such additional training as is required to enable official auxiliaries to undertake their duties competently.
3. The practical training referred to in paragraph 2(a) is to take place in slaughterhouses and cutting plants, under the supervision of an official veterinarian, and on holdings and in other relevant establishments.
4. Training and tests are to concern principally red meat or poultrymeat. However, persons who undergo training for one of the two categories and passed the test need only undergo abridged training to pass the test for the other category. Training and test should cover wild game, farmed game and lagomorphs, where appropriate.
5. Training for official auxiliaries is to cover, and tests are to confirm knowledge of, the following subjects:
   (a) in relation to holdings:
   (b) theoretical part:

- familiarity with the farming industry organisation, production methods, international trade etc.
- good livestock husbandry practices
- basic knowledge of diseases, in particular zoonoses, viruses, bacteria, parasites etc.
- monitoring for disease, use of medicines and vaccines, residue testing
- hygiene and health inspection
- animal welfare on the farm and during transport
- environmental requirements in buildings, on farms and in general
- relevant laws, regulations and administrative provisions
- consumer concerns and quality control.

(ii) practical part:

- visits to holdings of different types and using different rearing methods
- visits to production establishments
- observation of the loading and unloading of animals
- laboratory demonstrations
- veterinary checks
- documentation

(b) in relation to slaughterhouses and cutting plants:
(i) theoretical part:

- familiarity with the meat industry organisation, production methods international trade and slaughter and cutting technology
- basic knowledge of hygiene and good hygienic practices, and in particular industrial hygiene, slaughter, cutting and storage hygiene, hygiene of work
- HACCP and the audit of HACCP-based procedures
- animal welfare on unloading after transport and at the slaughterhouse

[73] This information is located at http://Europa.eu.int/eir-lex/JOHtml.do?uri=OJ:L:2004:226:SOM:EN:HTML

- basic knowledge of the anatomy and physiology of slaughtered animals
- basic knowledge of the pathology of slaughtered animals
- basic knowledge of the pathological anatomy of slaughtered animals
- relevant knowledge concerning TSEs and other important zoonoses and zoonotic agents
- knowledge of methods and procedures for the slaughter, inspection
- preparation, wrapping, packaging and transport of fresh meat
- basic knowledge of microbiology
- ante-mortem inspection
- examination for trichinosis
- post-mortem inspection
- administrative tasks
- knowledge of the relevant laws, regulations and administrative provisions
- sampling procedure
- fraud aspects;

(ii) practical part:

- animal identification
- age checks
- inspection and assessment of slaughtered animals, L 226/106 EN Official Journal of the European Union 25.6.2004
- post-mortem inspection in a slaughterhouse
- examination for trichinosis
- identification of animal species by examination of typical parts of the animal
- identifying and commenting on parts of slaughtered animals in which changes have occurred
- hygiene control, including the audit of the good hygiene practices and the HACCP-based procedures
- recording the results of ante-mortem inspection
- sampling
- traceability of meat
- documentation.

6. Official auxiliaries are to maintain up-to-date knowledge and to keep abreast of new developments through regular continuing education activities and professional literature. The official auxiliary is, wherever possible, to undertake annual continuing education activities.
7. Persons already appointed as official auxiliaries must have adequate knowledge of the subjects mentioned in paragraph
8. Where necessary, they are to acquire this knowledge through continuing education activities. The competent authority is to make adequate provision in this regard.
9. However, when official auxiliaries carry out only sampling and analysis in connection with examinations for trichinosis, the competent authority need only ensure that they receive training appropriate to these tasks.

Section IV: Specific Requirements
Chapter I: Domestic Bovine Animals
A. Bovine Animals Under Six Weeks Old
Carcases and offal of bovine animals under six weeks old are to undergo the following post-mortem inspection procedures:

1. Visual inspection of the head and throat; incision and examination of the retropharyngeal lymph nodes (*Lnn retropharyngiales*); inspection of the mouth and fauces; palpation of the tongue; removal of the tonsils.

2. Visual inspection of the lungs, trachea and oesophagus; palpation of the lungs; incision and examination of the bronchial and mediastinal lymph nodes (*Lnn. bifucationes, eparteriales and mediastinales*). The trachea and the main branches of the bronchi must be opened lengthwise and the lungs must be incised in their posterior third, perpendicular to their main axes; these incisions are not necessary where the lungs are excluded from human consumption.

3. Visual inspection of the pericardium and heart, the latter being incised lengthwise so as to open the ventricles and cut through the interventricular septum.

4. Visual inspection of the diaphragm.

5. Visual inspection of the liver and the hepatic and pancreatic lymph nodes, (*Lnn portales*); palpation and, if necessary, incision of the liver and its lymph nodes.

6. Visual inspection of the gastro-intestinal tract, the mesentery, the gastric and mesenteric lymph nodes (*Lnn. gastrici, mesenterici, craniales* and *caudales*); palpation and, if necessary, incision of the gastric and mesenteric lymph nodes; 25.6.2004 EN Official Journal of the European Union L 226/107.

7. Visual inspection and, if necessary, palpation of the spleen;
L 226/108 EN Official Journal of the European Union 25.6.2004.

7.23 Appendix 23 Training of Auxiliaries

(Meat Hygiene Inspectors/Meat Technicians)
A Survey of Training in the 15 EUROPEAN ECONOMIC UNION Member States
Training of auxiliaries in EU member states (meat hygiene inspectors/meat technicians)

Executive Summary - December 2003

Part I - Recommendations

1. All fifteen EU Member States were written to and all replied and participated except for Greece.

2. In Continental Europe, a number of countries do not train or employ Auxiliaries for mainly historical, cultural and economic reasons; e.g. a tradition of full veterinary inspection, and/or a surplus of veterinary graduates, or too small an industry. These countries are Australia, Belgium, (Greece?), Italy and Luxembourg.

3. In other EU Member States, there is a varying amount of training in accordance with supply and demand and all the courses claim to meet the requirements of the current EU Directives. Provision of courses varies, firstly the short intensive type of theoretical course lasting only a few weeks, held at a Further Education College, with substantial veterinary involvement and backed up by practical experience, which is typified by Finland, and possibly Northern Ireland within the UK. The Irish Republic trains Technical Agricultural Officers who are employed for support duties, but not inspection. A number of larger countries have developed permanent training at centres of excellence, such as, the Danish Meat Training College at Roskilde, the French training centre at Corbas, Lyon, and in the Netherlands training is carried out by the Utrecht University Veterinary Faculty.

4. To some extent, there has been a lack of emphasis on Auxiliary training in recent years because of the EU requirement for full-time veterinary supervision.

5. Internal discussions about the future of training are taking place but there is a tendency to ‘wait and see’ what Brussels will require before making detailed plans and commitments.

6. A number of countries such as Denmark and Spain (Catalunya) have fairly advanced plans for extended courses, but are awaiting developments from the EU.

7. It has been convenient and cost-effective to attempt to supplement the Udall RCVS Trust Report on Veterinary Public Health Training as there is a degree of overlap between VPH and Auxiliary Training.

8. For that reason, other Scandinavian countries (as well as Denmark) and also Italy were visited and will be reported on. Visits and meetings were held in Denmark, Finland, France, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and the UK.

9. Some specific recommendations with regard to rationalisation and improvement of Auxiliary training in the UK will be made, listed separately.

10. Further specific recommendations with regard to VPH training in the UK and in European Economic Unionrope will be made and these will also be listed separately.

11. Specific recommendations with regard to the revision of the Veterinary Surgeons' Act, where it impacts on Veterinary Public Health, will also be listed separately.

12. A specific recommendation with regard to funding in Scotland will be made - see APPENDIX 'A'.

13. A specific recommendation with regard to both Veterinary and Medical Public Health service delivery will again be listed separately - see APPENDIX 'B'.

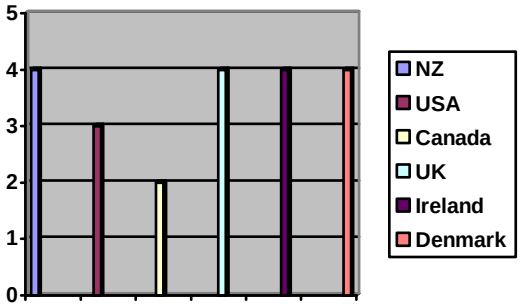
14. Comments will be made on the functional structure of the Meat Hygiene Service in Britain (UK Section - see APPENDIX 'C').

15. Comments will be made on the House of Commons Environment, Food and Rural Affairs Committee (EFRA Com.) report on the availability of and demand for farm animal veterinary services (APPENDIX 'D').

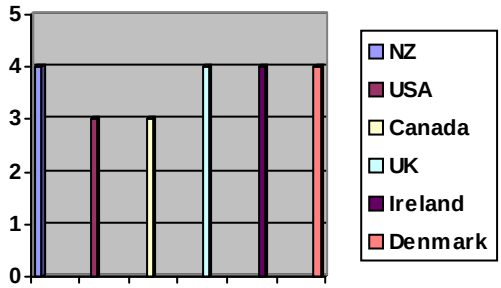
16. Comments will also be made on the DEFRA ministerial decision that the State Veterinary Service should leave core DEFRA and become a Next Steps executive agency (APPENDIX 'E').

7.24 Appendix 24 - Meat Inspection Training Rating

Delivery of Training

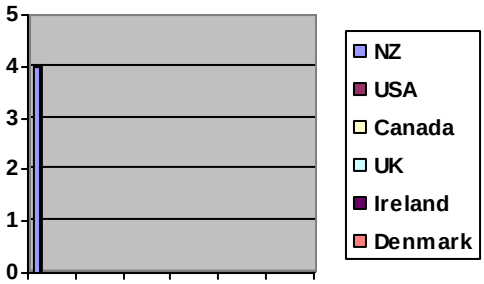


Assessment of Training



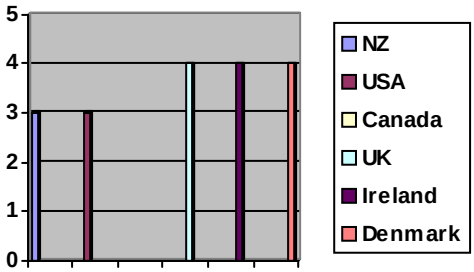
Note: At this time no country apart from NZ has made Assessment materials available.

Training Materials



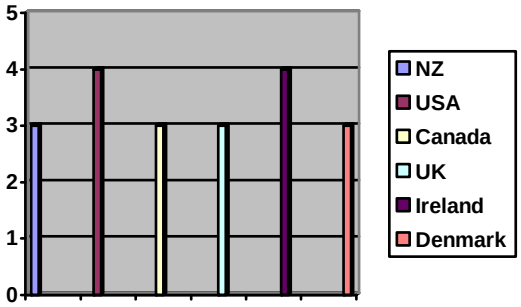
Note : At this time no country apart from NZ has made training materials available.

Curriculum

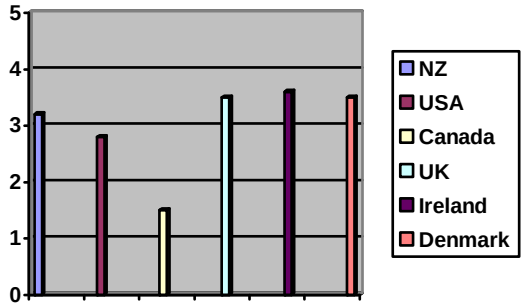


Note : At this time Canada and the USA have not made the detailed content of their training courses available

Professional Development Opportunities for Inspection Staff



Summary of the comparison of all aspects of meat inspection training



NB This comparison is done in terms of what can be learned to improve Australia's training in this area taking into account the regulatory and educational environment in Australia.