



Contemporary business strategies and learning models in the agrifood industry

AgriFood Skills Australia

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nous group

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Acronyms

Acronym	Name	Acronym	Name
ABARES	Australian Bureau of Agricultural and Resource Economics	HA	Hassad Australia
ABS	Australian Bureau of Statistics	HACCP	Hazard Analysis and Critical Control Point
ACDA	Australian Council of Deans of Agriculture	IRTP	Industrial Transformation Research Program
AECL	Australian Egg Corporation Ltd	ISCs	Industry Skills Councils
AFGC	Australian Food and Grocery Council	MIS	Managed investment schemes
AFI	Australian Farm Institute	MLA	Meat and Livestock Australia
AMC	Agricultural Management Company	MOOCs	Massive open online courses
AMPC	Australian Meat Processor Corporation	NCDEA	National Centre for Dairy Education Australia
ARC	Australian Research Council	NCVER	National Centre for Vocational Education Research
AUD	Australian dollar	NESB.	Non-English Speaking Backgrounds
AWPA	Australian Workforce and Productivity Agency's	NEST	National Agribusiness Education, Skills and Labour Taskforce
CAGR	Compound Annual Growth Rate	NFF	National Farmers Federation
CAMAC	Corporations and Markets Advisory Committee	OEMs	Original Equipment Manufacturers
CFA	Collaborative Farming Australia	PICSE	Primary Industry Centre for Science Education
CoP	Communities of practice	PIEF	Primary Industries Education Foundation
CRDC	Cotton Research and Development Corporation	PIMC	Primary Industries Ministerial Council
CRCs	Cooperative Research Centres	RAI	Regional Australia Institute
CSEF	Crowd-sourced equity funding	R&D	Research and Development
CSIRO	Commonwealth Scientific and Industrial Research Organisation	RD&E	Research, Development and Extension
CSP	Commonwealth Supported Place	RDCs	Research and Development Corporations
DEPI	Department of Environment and Primary Industries	ROI	Return on Investment
DIISRTE	Department of Industry, Innovation, Science, Research and Tertiary Education	RTO	Registered Training Organisation
DPC	Drivers of Land Management Practice Change in Australian Agriculture	S&OP	Sales and Operational Planning
EGFC	East Gippsland Food Cluster	SMAs	Statutory Marketing Authorities
ESKi	Employment Starter Kit	SMEs	Small to Medium Enterprises
EVAO	Estimated Value of Agricultural Operations	TFP	Total factor productivity
FIAL	Food Innovation Australia Ltd	UNE	University of New England
GPS	Global Positioning Systems	USD	US dollar
GRDC	Grains Research & Development Corporation	VET	Vocational Education and Training

Contents

Executive Summary	3
1 The agrifood industry is becoming more polarised	9
2 Changing market dynamics and higher costs have eroded profitability	19
3 More businesses are actively seeking growth through alternatives to bank debt	33
4 Businesses are dealing with increasing complexity and risk	45
5 Consumer demand for differentiated products is increasing	50
6 Social media has created new ways to engage with consumers.....	53
7 The future agrifood workforce will be smaller and more skilled	58
8 Knowledge generation and innovation in in agriculture is multi-faceted and complex	63
9 Access to knowledge and innovation is easier for larger food processing companies	74
10 Demand for formal learning will remain low but new channels are emerging.....	81
11 Agrifood still lacks clear cross-industry coordination of workforce development.....	96
Bibliography	97
Appendix A Stakeholders consulted	111
Appendix B Selected sub-sector analysis.....	113
Appendix C Emerging agricultural technologies.....	118
Appendix D Occupation employment forecasts	120
Appendix E ARC funded food processing research	122
Appendix F VET reforms in Australian states and territories	124

Executive Summary

Scope of this report

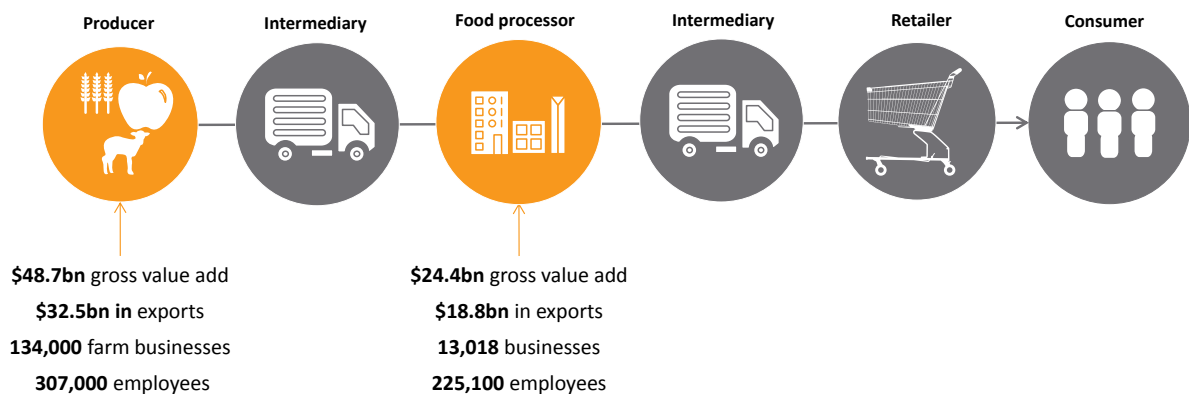
AgriFood Skills Australia engaged Nous Group (Nous) to undertake two research tasks that align with AgriFood Skills Australia mission to help the agrifood industry better meet its future education, training and skills development requirements.

These two research tasks which were identified in AgriFood Skills Australia's 2014 Environmental Scan are:

1. Analyse changing business models and structures across the agrifood supply chain and evaluate the implications for work organisation, workforce composition and job roles
2. Scope current knowledge transfer models within the agrifood industry - including formal, non-formal and informal types of learning

The scope of this research is confined to two key stages in the agrifood value chain - agricultural producers and food processors - shown in Figure 1.

Figure 1: In-scope elements of the agrifood value chain (NFF, 2012; Department of Industry, 2013)



This report was informed by an extensive literature review and consultations with businesses, government staff and academics working in the agrifood industry (see Appendix A for a full list of stakeholders).

To guide the collection of evidence and analysis, the two research tasks were broken down into five lines of enquiry:

1. How are current business models and structures changing across the agrifood industry?
2. What are the characteristics of the current knowledge transfer models in the agrifood industry?
3. What are the impacts of changing business models on demand for education, training and skills development?
4. How should current knowledge transfer models evolve to better align with changing business models and structures?
5. What are the key implications for policy-makers?

Key findings

The key findings of this report research are summarised below.

1. Any analysis of changing business models and structures needs to begin by acknowledging the profound structural changes that have occurred in the agrifood industry over the past three decades as Australia has made the transition from a low to high cost exporter in the face of declining terms of trade and total factor productivity.
2. While it is important to recognise that the impacts of these changes do not apply uniformly across all sectors, the key developments over this period can be summarised as:
 - a. The increasing segmentation of the agriculture sector with the consolidation of many farm businesses, and a growing gap between low and high performing farms, characterised broadly as:
 - i. Stability in what is described as the 'amenity' farm segment among part-time farmers who value the amenity or lifestyle benefits that come with farm ownership
 - ii. Flux within the 'aspirational' segment as farmers either adjust out of farming or attempt to make the big leap into the 'productive' segment
 - iii. Ongoing growth in the 'productive' and 'corporate' segments which will continue to play a significant role in the increasing size and productivity of Australian farms.
 - b. The intensifying financial pressure on food processors due to rising costs, increasing import competition and changing market dynamics where:
 - i. Capital expenditure is increasingly directed at 'staying in business' rather than growing or investing in new capabilities (even for global conglomerates)
 - ii. SMEs - who account for 98% of the 22,000 businesses in the sector - are being squeezed out (without the scale or management expertise to meet the demands of major supermarket retailers).
 - c. The emergence of only two viable strategies – niche production of differentiated products or large scale volume production – with businesses in the 'middle ground' under ever increasing pressure.
3. In addition to these longer-term structural changes, over the last decade or so five key trends have emerged that have had significant implications for business models and structures in the agrifood industry. These are:
 - a. The **ongoing erosion of profitability** for producers and processors as a result of greater market power among major retailers and high input costs
 - i. Supplying supermarkets is now beyond the realm of the average business with the introduction of closed loop supply chains, and the increase in price discounting and private labels
 - ii. Businesses that do supply supermarkets need a wide range of marketing and technical skills to meet their stringent requirements, especially with the growth of 'informal' regulation
 - iii. Meanwhile, niche producers and processors are targeting alternative channels (independent retailers, farmers markets, online) with sophisticated marketing, branding and sales skills.
 - b. More businesses are **actively seeking alternatives to bank debt** to grow their business through corporate-style models of business ownership and management or new sources of finance
 - i. Overseas direct equity investment in agriculture is increasing (albeit off a low base) with interest from international pension funds, sovereign wealth funds and multinationals

- ii. However, businesses need to meet minimum requirements (scale, governance, financial performance), and have the management capabilities (and access to advice) to succeed here
 - iii. To achieve scale, traditional lease and share farming models are gaining popularity (albeit modestly), as well as ‘corporate style’ collaborative farming models – each with particular knowledge requirements
 - iv. New forms of finance such as crowd-funding may present growth opportunities for some businesses.
- c. The **increasing levels of risk and complexity** associated with greater climate volatility, the emergence of new types of technology, and reforms to water markets and statutory marketing authorities
 - i. The technology-driven trend of increasing production and processing complexity, sophistication and automation will require a more highly skilled but smaller workforce
 - ii. Broadly speaking, new technologies require workers with higher language, literacy, and numeracy skills, while highly specialised skills are required for some proprietary technologies
 - iii. High level risk management skills are required to manage climate volatility, particularly for more complex production systems where a poorly managed adaptation can be very costly
 - iv. The 2002-07 drought diminished the financial capacity of many farmers to absorb and manage the risks associated with greater business complexity.
- d. Increasing consumer **demand for highly differentiated products** with specific attributes and characteristics
 - i. Consumer demand for products perceived to have social responsibility or nutritional value is increasing e.g. organic produce, free range eggs, nitrate free milk, hormone free beef
 - ii. Many opportunities for highly differentiated products have been captured by niche processors, although larger processors are likely to increase their market share, often through acquisition
 - iii. Key capabilities required for capturing price premiums associated with these types of products include market research and development, branding and effective use of social media.
- e. The **rapid growth of social media** and the emergence of new and low-cost ways for agrifood businesses to engage with prospective consumers, clients and partners
 - i. Online channels are now critical to successful marketing, and a significant leveller for niche food processors who can bypass traditional channels and communicate directly to customers
 - ii. Online co-creation for product, service and strategy development is being used successfully by major businesses like Kraft and Unilever, but is also a credible option for niche players
 - iii. Social media can also threaten licence to operate if not managed well – most businesses and industry groups do not have sophisticated social media and crisis management strategies.
- 4. These longer term and more recent trends, and the business models and structures associated with them, will have profound implications for the future agrifood workforce
 - a. Australia’s future agrifood workforce is likely to be smaller and more skilled, with strong growth in the proportion of professionals and technicians
 - b. Knowledge needs will be profoundly different: more advanced production techniques, leadership, management, mentoring, risk management, and the capability to translate R&D into products

- c. In some instances, businesses will need to up-skill their existing workforce. For other new and emerging capabilities, the industry will need to attract and grow an entirely new cohort of technicians and para-professionals that have yet to leave school
 - d. Larger and more sophisticated businesses (and some niche entrepreneurs) will continue to have the resources and capabilities to access new types of knowledge and practices with minimal government support
 - e. In agriculture, the challenge for policy makers will be to help those mid-size farm businesses with serious aspirations for growth make the 'leap' into the top bracket of productive enterprises
 - f. Young farmers are best placed to make this leap, given they tend to be: attracted to larger farms, better educated and connected, more receptive to new technologies, and more open to risk.
5. In the agriculture sector, the knowledge and innovation system that support these changes has also been undergoing substantial structural changes, partly in response to the trends described above
- a. The National Primary Industries R,D & E Framework is working to increase collaboration, specialisation and critical mass in the nation's substantial but fragmented research capabilities
 - b. Meanwhile, while extension models have become more sophisticated (more 'demand pull'), public sector investment has fallen dramatically as state governments have wound back their programs
 - c. These have been replaced by a wide range of increasingly sophisticated alternatives: consulting services, value chain intermediaries, RDCs, industry groups, and farmer driven research groups
 - d. The need for new approaches to verify, translate, package and curate knowledge given the volume of information that is now available via the internet.
6. In the food processing sector, much of the research and innovation is undertaken by larger companies, typically 'in house', although there are initiatives to broaden research collaboration in the sector
- a. The structure of the food processing sector means the role for government is smaller, with a small number of public research institutes working with a handful of food processing companies
 - b. However, there is concern that financially stretched SMEs are failing to invest in R&D and/or collaborate effectively with research partners, to source technologies they need to advance
 - c. New types of R&D hubs/networks e.g. Food Innovation Australia and the CSIRO Food Innovation Centre are improving industry access to publicly funded research and innovation
 - d. There are opportunities for researchers in these hubs to develop better connect with VET students (particularly those already employed in agrifood) to raise the profile of new innovations.
7. Demand for formal education and training has typically been low given industry preferences for easier to access, more relevant informal learning modes, but there are moves to try and correct this
- a. The number of higher education graduates, and VET enrolments and completions, have been falling steadily (and won't be helped by VET reforms that 'commodify' training certifications)
 - b. Many factors stymie demand including: the challenges of delivering into regional areas, industry scepticism about the ROI of formal training, and a low regard for the career opportunities in the sector
 - c. The willingness of employers to invest in workforce development will be tested by the increasing expectation that they contribute to government-subsidised programs e.g. the Industry Skills Fund There are opportunities to make formal education and training more relevant – skill sets, a new generation of agrifood courses, massive open online courses – but it is too early to gauge likelihood of success.

8. There is a need for greater cross industry direction setting and decision making related to skills and workforce development, with a specific focus on the following key challenges
 - a. Attract a new generation of motivated, skilled and smart workers that are not deterred by traditional and unrealistic notions of what it is like to work in the agrifood industry
 - b. Support enterprises in the 'aspirational' segment of farmers and small scale processors of successful niche products that want to make a major productive leap
 - c. Embed world-class business management capabilities in formal and non-formal learning channels across the industry
 - d. Reconceive the role and relevance of VET in light of recent market reforms and the ongoing need for more skilled agrifood employees
 - e. Support industry associations to work with their members on workforce development
 - f. Create employers of choice across the industry that value and invest in their employee's development
 - g. Reconceive the role of government in quality assuring, translating, and disseminating knowledge in the new digital era.

Report outline

These key findings, and the supporting evidence and analysis, are described in much more detail in the sections below. The structure of the report is as follows:

- **Section 1** provides the 'setting' for an analysis of recent trends in the agrifood industry by first describing how several decades of structural adjustment have been shaping the agriculture and food processing sectors
- **Sections 2 to 6** then describe the five most significant trends that have emerged over the last decade or so, providing examples of new business models and strategies that have arisen in response to these trends. Where helpful, the knowledge and skills implications for agrifood businesses are summarised
- **Section 7** summarises the key implications of these trends for the knowledge and workforce requirements of the agrifood industry
- **Sections 8 and 9** describes how the 'informal' research and innovation system that supports the agriculture and food processing sectors is evolving in response to these changes, summarising the key considerations for policy-makers of new developments in research and innovation.
- **Section 10** repeats the analysis of the previous two sections for the formal education and training system that supports the agrifood industry (including the policy considerations associated with new developments)
- **Section 11** concludes by outlining the opportunity for a coordinating body to champion skills and workforce development for the agrifood industry, listing the key challenges that should be the initial focus for such an organisation.

The relationship between these sections and the lines of enquiry outlined above is described below.

Table 1: Lines of enquiry and Relevant report sections

Line of enquiry	Relevant sections
1. How are current business models and structures changing across the agrifood sector?	<ul style="list-style-type: none"> • Section 1 (longer-term trends) • Sections 2- 6 (five most significant recent trends)
2. What are the characteristics of the current knowledge transfer models in the agrifood sector?	<ul style="list-style-type: none"> • Sections 8-9 – informal and non-formal learning models • Section 10 – formal learning models
3. What are the impacts of changing business models on demand for education, training and skills development?	<ul style="list-style-type: none"> • Section 7 (summary) • Sections 2- 6 (specific implications for knowledge and skills)
4. How should current knowledge transfer models evolve to better align with changing business models and structures?	<ul style="list-style-type: none"> • Sections 8-10 (analysis of new developments and gaps)
5. What are the key implications for policy-makers?	<ul style="list-style-type: none"> • Sections 8-10 (specific policy considerations) • Section 11 (challenges for a coordinating body)

1 The agrifood industry is becoming more polarised

The last three decades have been a period of significant change and ongoing adjustment across the agrifood industry as Australia has transitioned from a low to high cost exporter and terms of trade and total factor productivity (TFP) growth have both declined. The resulting structural adjustment has seen the gap between high and low performing businesses widen across the agrifood industry – particularly within the agriculture sector. The growing levels of complexity within the industry’s broader operating environment have also seen agrifood enterprises employing a wider array of strategies and business models and seeking the knowledge required to make these strategies successful through a more diverse range of channels.

The following five sections of this report will explore some of the key trends that have been re-shaping agrifood industry over the past decade and will continue to influence the types of strategies and business models employed by producers and processors for the foreseeable future. These trends include:

1. The **ongoing erosion of profitability** for producers and processors as a result of greater market power among major retailers and high input costs.
2. More businesses **actively seeking alternatives to bank debt** to grow their business through corporate-style models of business ownership and management or new sources of finance.
3. The **increasing levels of risk and complexity** associated with greater climactic volatility, the emergence of new types of technology, and reforms to water markets and statutory marketing authorities.
4. Increasing consumer **demand for highly differentiated products** with specific attributes and characteristics.
5. The **rapid growth of social media** and the emergence of new and low-cost ways for agrifood business to engage with prospective consumers, clients and partners.

Before exploring the nature and impact of these five trends, it is important to first understand the cumulative impact of several decades of structural adjustment in both the agriculture and food processing sectors.

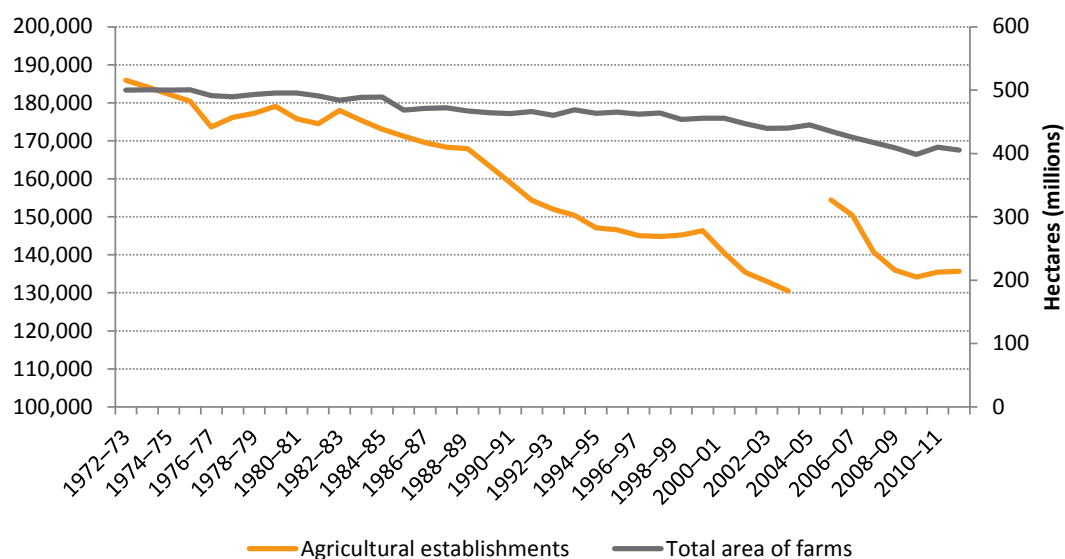
1.1 Consolidation and bifurcation is accelerating within agriculture

There are increasingly fewer farms

Between 1982 and 2013, consolidation within the agricultural sector saw the average farm size increase 13 per cent from 2,720 to 3,077 hectares and the overall number of farms reduce by more than a quarter from 178,000 to 128,917 (ABS, 2013). Figure 2 below illustrates that the number of farm businesses has decreased more rapidly than the area of land devoted to agricultural production, which implies a trend towards larger and amalgamated farms (Productivity Commission, 2014).

This pattern of consolidation does not apply uniformly across all industries. The shift towards larger farms has been most evident in the cotton, grains and pig farming industries. The decline in overall farm numbers has been greatest within the pig farming industry. Other industries experiencing significant declines in farm numbers over the past three decades include eggs, sheep and dairy. Industries that have gone against the trend of declining farm numbers include cotton, grapes, nurseries, poultry and beef cattle (Productivity Commission, 2005).

Figure 2: Number of agricultural enterprises and total area of farms (ABARES, 2013b)¹



Structural adjustment will continue to drive productivity growth

It is important to recognise that the trend towards fewer, larger broadacre and dairy farms in Australia combined with output growth at both the industry levels and for farms on average, suggests that farm exits and entries have made a significant contribution to productivity growth. A recent Australian Bureau of Agricultural and Resource Economics (ABARES) paper argues that, “over time, changes in industry structure and resource reallocation between exiting and entering farms have been an important source of productivity growth in the broadacre and dairy industries” (Gray, et al., 2014).

The ABARES paper also notes that, “future productivity growth depends on whether scarce resources, including farm land, labour, irrigation water and other capital, can move freely between farms to higher value uses” and that “resource reallocation—whether through structural adjustment or, more generally, resources moving between farms—is an important productivity driver at an industry level” (Gray, et al., 2014).

ABARES argues that it is therefore important for governments to promote productivity growth by “ensuring policy settings do not impede ‘normal’ structural adjustment within agriculture, including exits by inefficient farm businesses”. Historically in Australia, government policies associated with selected programs like drought and rural assistance “have tended to hamper, rather than facilitate, structural adjustment” (Gray, et al., 2014).

¹ Farm numbers across all years are not directly comparable in this analysis. Until 1985-86, farms with an Estimated Value of Agricultural Operations (EVAO) of \$2500 or more were included in records of agricultural establishments. In 1986-87, the EVAO threshold was raised to \$20 000, and in 1991-92, was raised to \$22 500, before being reduced to \$5000 in 1993-94. Further, from its 2005-06 agricultural census onwards, the ABS has used a register of agricultural establishments maintained by the Australian Taxation Office, whereas it previously used its own register. This change is represented by a series break in the graph above.

The gap between high and low performing farms is increasing

The last two decades have also seen a greater bifurcation in performance between high and low performing farms in Australia. Figure 3 illustrates that the gap between top and bottom performing broadacre farms – as defined by cash income – increased through the 1990s followed by a period of stability before once again increasing in the three years ending 2011–12. ABARES data indicates that while the bottom 25 per cent of broadacre farms have struggled to generate positive farm cash incomes over the past 20 years, the top 25 per cent of farms generated cash incomes exceeding \$200,000 (in real terms) in 13 of the 20 years preceding 2011 (ABARES, 2013d).

The characteristics of the top 25 per cent of broadacre farms include:

- **Higher rates of return** – The top 25 per cent of farms recorded average rates of return of 5.9 per cent a year – much higher than the average annual rate of return of 1.1 per cent a year for all broadacre farms over the three years ending 2011–12.
- **Disproportionately large share of production** – The top performing farms accounted for 53 per cent of the gross value of broadacre farm production over the three years ending 2011–12 compared with just 9 per cent for the bottom 25 per cent.
- **Greater levels of investment** – Top performing farms accounted for 65 per cent of net capital additions compared with 8 per cent for the bottom 25 per cent of farms – over the three years ending 2011–12.
- **Found among all locations** – Top performing farms are found in most regions of Australia despite the impacts of seasonal events and price changes across different part of the country (ABARES, 2013d).

Revenue growth is occurring primarily among ‘productive’ and ‘corporate’ farming segments

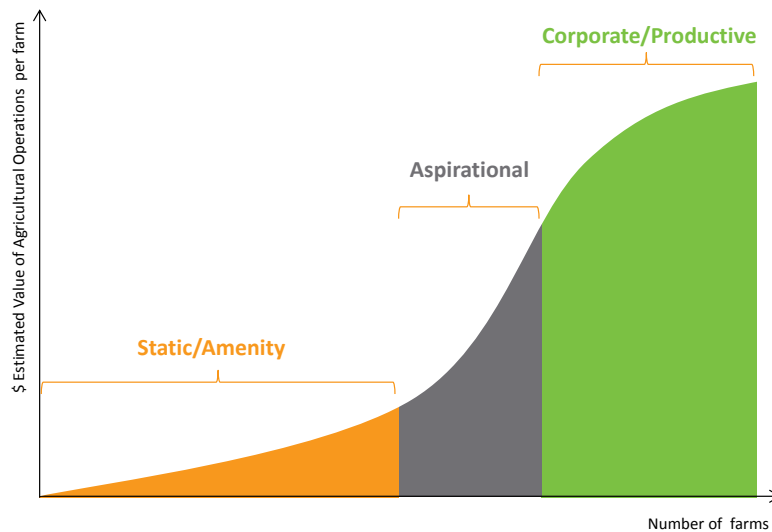
The patterns of consolidation and bifurcation over the past several decades has seen the emergence of a more diverse range of farming enterprises that can be segmented according to multiple dimensions such as size, financial performance, ownership structure and farmer aspirations.

Building on the work of Neil Barr in Victoria (Barr, 2008), the Australia farming landscape can be categorised into the five distinct segments listed below (DPI, 2012). The specific characteristics of these segments are outlined in more detail in Table 2 on page 13.

1. **Amenity** – Smaller farms typically located in peri-urban areas operated part-time for lifestyle reasons.
2. **Static** – Medium farms that are focused primarily on day-to-day operations with no or moderate growth ambitions that may range from financially stressed to comfortable and content.
3. **Aspirational** – Family farmers making adequate returns on capital looking to grow their farm income.
4. **Productive** – Sophisticated large scale family farms run by professional farmers.
5. **Corporate** – Large scale farms with external (non-family) equity and/or a board of management with external directors.

The approximate proportion and difference in output as measured by Estimated Value of Agricultural Output (EVAO) across these five segments are illustrated in Figure 3 below.

Figure 3: Farm segments – High level distribution (DPI, 2012)



Using the above segmentation, the agricultural sector is currently characterised by the following trends:

- **Stability in the 'amenity' farm segment** among part-time famers who value the amenity or lifestyle benefits that come with farm ownership. These smaller size farming ventures provide rich social capital to regional areas and are a counter to the aggregation of traditional mid-sized farms (RAI, 2014).
- **Flux within the 'aspirational' segment** as farmers either adjust out of farming or attempt to make the big leap into the 'productive' segment.
- **Ongoing growth in the 'productive' and 'corporate' segments** which will continue to play a significant role in the increasing size and productivity of Australian farms.

In looking at the current prevalence of corporate farms, it is important to highlight the lack of consensus about how they are defined (using either ownership or revenue metrics).² There is agreement though that corporate farms are proportionally few in number but extremely significant in terms of the share value of production output (McKinna, 2010).

It is also important to note that despite increased corporatisation within the sector, variants of the family farming model - which currently account for approximately for 98 per cent of all farming establishments - will continue to dominate the agricultural landscape in Australia for the foreseeable future. Family farming models have several characteristics which can provide greater resilience and flexibility relative to some corporate farming models. These can include high levels of farmer motivation, multi-generational and localised knowledge and skills, and lower overhead costs (McKinna, 2010; Keogh, 2013e).

It is important to recognise that challenges differ by sector

It must be noted that the macro trends of adjustment and consolidation outlined above are not applicable across all sub-sectors with agriculture. Appendix B.1 highlights some of the key trends and challenges across a selection of sub-sectors.

² For the purposes of this discussion, corporate farms are defined as businesses where there is an entity other than, or in addition to, a family or individual that owns and operates the business.

Table 2: Farm type segments

	Amenity	Static	Aspirational	Productive	Corporate
Description	Smaller farms typically located in peri-urban areas that are operated part-time for life style reasons.	Medium farms with no or moderate growth ambitions that may range from financially stressed to comfortable and content.	Aspirational family farmers making adequate returns on capital that are looking to grow their farm income.	Sophisticated large scale family farms run by professional farmers.	Large scale farms with external (non-family) equity and/or a board of management with external directors.
Avg. turnover*	\$40,000	\$80,000	\$150,000	\$550,000	\$4,400,000
Ownership structures	<ul style="list-style-type: none"> • Sole proprietor • Partnerships 	<ul style="list-style-type: none"> • Family farm • Family farm partnerships 	<ul style="list-style-type: none"> • Family farm • Family farm partnerships • Multigenerational family partnerships • Leasing • Share farming 	<ul style="list-style-type: none"> • Family farms • Multigenerational family partnerships • Multigenerational company and trust structures • Leasing • Share farming 	<ul style="list-style-type: none"> • External domestic or foreign ownership • Listed venture • Managed investment scheme (MIS) • Family equity partnership
Funding sources	<ul style="list-style-type: none"> • Off-farm income 	<ul style="list-style-type: none"> • Off-farm income 	<ul style="list-style-type: none"> • Banks • Pastoral finance companies 	<ul style="list-style-type: none"> • Banks • Pastoral finance companies 	<ul style="list-style-type: none"> • Direct equity investor (superannuation or private equity fund) • External owner • Banks • Pastoral finance companies
Proportion of total enterprises*	32%	20%	20%	25%	2%
Predominant areas of involvement	Beef/sheep	Beef/sheep, cropping	Cropping, beef/sheep, dairy, horticulture	Cropping, beef/sheep, dairy, horticulture, forestry	Dairy, horticulture, mixed farming, beef/sheep, cropping

* Estimates only

Adapted from: (McKinna, 2010; Wilkinson, et al., 2011; SPP, 2008)

1.2 Food processors are under increasing financial pressure

The performance of businesses in the food processing sector can be viewed through the lens of the three segments outlined in Table 3 below. All three segments in the sector – bar a relatively small number of successful niche processors – are currently under significant financial pressure. This is due to changing market dynamics within the Australian food retail sector, increasing costs and rising imports from overseas food processors. The first two of these trends are explored in detail in Sections 2.1 and 0 of this report.

Table 3: Food processing sector segments (McKinna, 2012b)

	Niche processors	SMEs	Global conglomerates ³
Status	<i>Thriving in the specialty, gourmet channel.</i>	<i>Threatened species – many are in receivership.</i>	<i>Australian strategies of many multinationals under review</i>
Overview	<ul style="list-style-type: none"> Typically started by 1-2 individuals Growth often limited by availability of capital 	<ul style="list-style-type: none"> Often regionally-focused Usually outgrow family ownership 	<ul style="list-style-type: none"> Global production footprint Well-capitalised Able to invest to exploit the growth in Asian markets
Revenue	< \$10m	\$10 - \$300m	>\$300m
Ownership	Privately owned	Family or privately owned	Multi-nationals listed on overseas stock exchanges or private family companies.
Products	Highly specialised product ranges	Narrow product ranges	Diverse category mix
Brand	Emerging brand awareness	Weak to moderate brand strength	Global super brands

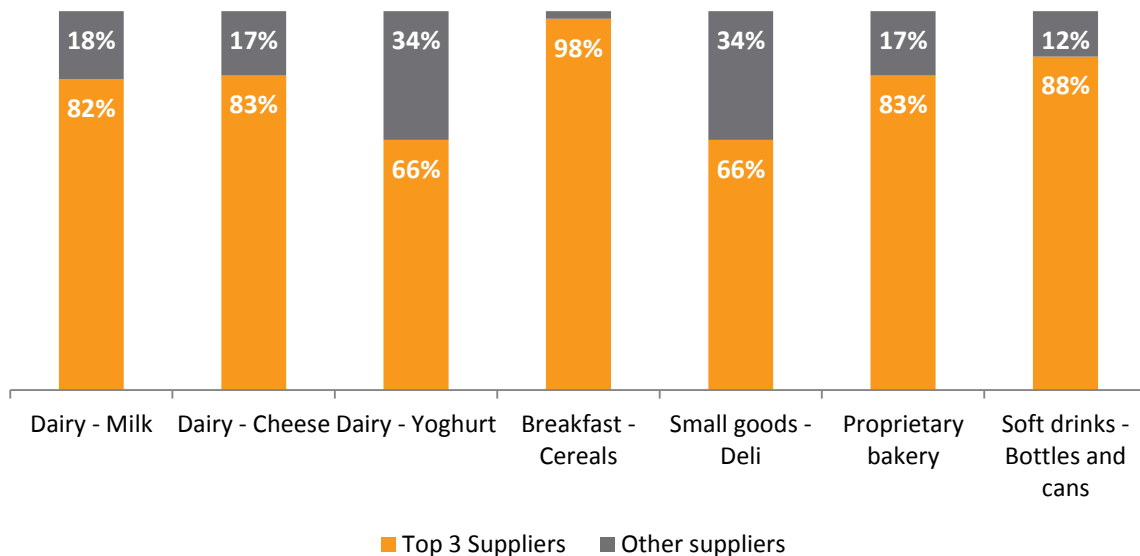
Larger companies account for the bulk of domestic consumption in supermarkets

Companies in the global conglomerate segment of the food processing sector account for the large majority of goods consumed domestically through supermarket channels. Figure 4 below illustrates that the largest three processors within nine major food processing categories account for between 66 and 98 per cent of the sales of branded products in that category (Woolworths Limited, 2014).

As a result of the high levels of dominance by global conglomerate across major food categories, the opportunities for SMEs and niche producers to grow the market share of their branded products in these categories will always be inherently limited.

³ All bar two of the top 20 food processing companies in Australia are multinationals with global headquarters outside Australia.

Figure 4: Supplier share of supermarket sales across nine major categories (branded products only)
(Woolworths Limited, 2014)



Uncompetitive SMEs are being squeezed out of the market

Small to Medium Enterprises (SMEs) – which comprise 98 per cent of the 22,000 business in the Australian food and beverage sector – are the segment currently under the greatest financial pressures. Many SMEs are family owned businesses that have grown opportunistically rather than strategically. They often do not possess the scale or management expertise to meet the demands of the major supermarket retailers who generally demand minimum sale thresholds, year-round supply capability, high quality and safety standards supported by sophisticated IT systems, sophisticated marketing support and above all, attractive trading terms. Many SMEs also lack the agility and marketing capabilities of the emerging generation of niche food processors.

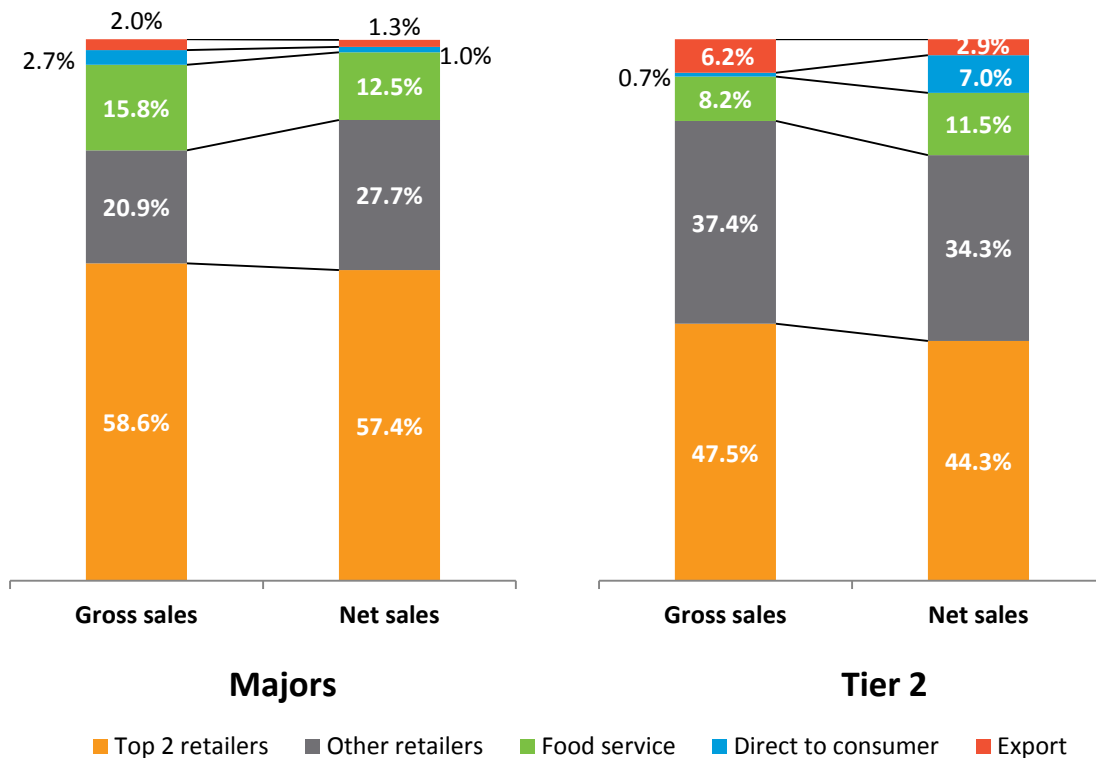
Global conglomerates in the food processing sector are also under pressure

Relative to SMEs, global conglomerates in the food processing sector are more reliant on the big two supermarket chains for sales. As a result, their levels of trade spend on discounts and promotional allowances are higher and they are also more vulnerable to deep discounting by supermarkets and growing competition from private label brands. The greater exposure of the large food processing to supermarkets in their gross sales is shown Figure 5 below. Figure 5 also illustrates that smaller ('Tier 2') businesses have a more balanced channel breakdown and a greater increased presence in channels that have lower share of trade spend (as reflected in the difference between gross and net sales).

The challenging market conditions that global conglomerates operating in Australia have faced over the last ten years have also limited their ability to invest in long term growth. The Managing Director of US-owned Simplot's local operations recently explained the challenges faced by many food multinationals operating in Australia:

In Australia we are constantly bidding for our capital from our international parent against the other businesses that they have in other parts of the world. And because most of that capital is coming from reinvestment, our profit performance is the major criteria on which we get our brownie points when we go and ask for money. So if you look at the last few years, it's been a pretty poor scene here in Australia with the non-tradables cost just climbing and, really, quite a cap on the pricing and the available profits within the supply chain in Australia (The Australian, 2014).

Figure 5: Gross and net sales mix by participant group (FY13) (AFGC, 2014b)

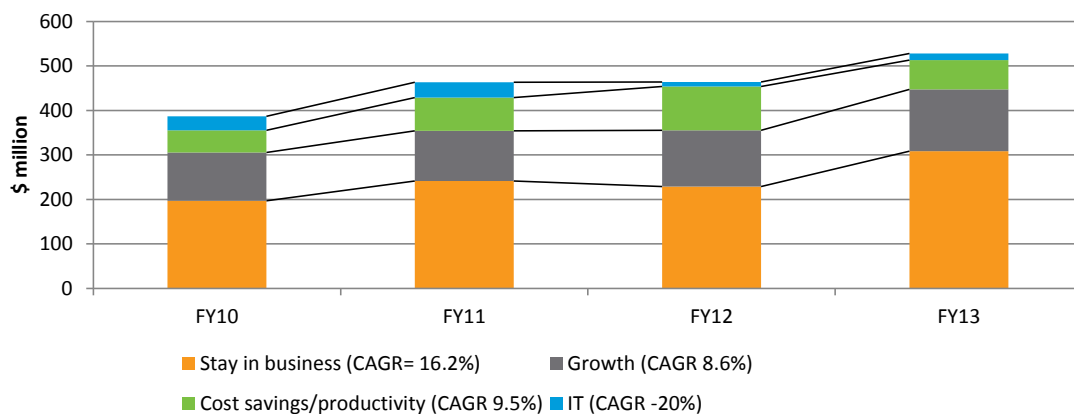


Note: The respondents to the AFGC survey classified as 'majors' were the eight businesses with FY13 revenues over \$1bn and greater than employees 1,000. The remaining eight participants were classified as 'tier-2'.

Businesses are increasingly focused on just surviving

As a result of declining profit margins across the sector, food processors have increasingly focused their capital expenditure on just staying in business – rather than growing or investing in new capabilities. Data from a recent Australian Food and Grocery Council (AFGC) survey found that between 2010 and 2013 the Compound Annual Growth Rate (CAGR) of capital expenditure directed towards 'staying in business' (i.e. maintain existing assets and their value) grew at a rate of 16.2 per cent (Figure 6).

Figure 6: Purpose of capital expenditure among food and grocery manufacturing companies with production facilities in Australia (n=15) (AFGC, 2014b)



Scale is needed to survive

Given the relatively small size of Australia's domestic market and the costs associated with servicing export markets, means that opportunities for food processing companies to grow significantly are primarily limited to the acquisition of their peers. In their 2012 report, the Government funded Food Processing Industry Strategy Group suggests that, "without a significant increase in the domestic or export markets, further consolidation of the sector is the only means of getting scale". Their report also notes that increased scale through consolidation does come with costs. Industry feedback from research conducted by PwC into businesses in the food oils and flour milling sub-sectors found that consolidation keeps overheads such as head office costs down, and can allow for economies of a scale in sourcing and producing products. Benefits from these economies of scale can be dissipated though through higher distribution costs which can be associated with consolidation (DIISRTE, 2012).

Opportunities and challenges differ by sub-sector

It is important to recognise that the historical performance and future challenges and opportunities vary across the food processing sector. Appendix B.2 highlights some of the high-level trends and challenges across major food processing sub-sectors.

1.3 Successful businesses are responding in two ways

In light of heightening competitive pressures and ongoing adjustment and consolidation across the agrifood industry, businesses face two fundamentally different types of strategies if they are to be successful going forwards. These are to become either a small scale producer or processor of niche products, or a large scale volume producer or processor. These strategies are explained in more detail in Figure 7 on page 18.

In light of the declining number of medium-sized farms in the static and aspirational segments and the decline in more traditional food processing SMEs, the 'middle ground' strategy – that of producing non-differentiated mainstream goods without a clear cost advantage – is looking increasingly less viable.

Those producers and processors that are in this 'middle ground' will ultimately face the difficult decision to either pivot their business towards producing more differentiated niche products or to invest in growing sufficiently to compete in larger markets.

It should be noted that that the bulk of the value generated by successful businesses in the agrifood industry going forwards will be through the large scale volume producers and processors. While the importance of niche producers and processors will continue to increase, their contribution to the overall competitiveness and profitability of Australian agrifood is likely to remain limited (RAI, 2014).

Figure 7: The three main strategic positions for businesses in the agrifood industry

	Niche producer	Middle ground	Volume producer
Summary	Farmers or food processing business - typically small in size – that have successfully captured price premiums through the producing highly differentiated products for specific customer segments or markets	Small to medium farms or food processing SMEs no longer able to compete on price who lack the capital and capabilities required to service major domestic and overseas markets or develop new ways of value-adding. They may be take-over targets.	Corporate or large productive family farms and large national or multinational food processing companies that have invested in the capabilities and infrastructure required to meet the needs of supermarkets and corporate overseas markets.
Output share *	5%	15%	80%
Sources of advantage	<ul style="list-style-type: none"> Differentiated products Provenance Novel marketing approaches Alternate sales channels Elevated importance of brand 	<ul style="list-style-type: none"> Limited 	<ul style="list-style-type: none"> Scale efficiencies Quality and safety Consistency Capacity to invest in R&D
Key challenges	<ul style="list-style-type: none"> Growth Access to capital Maintaining unique product characteristics and/or production techniques Compliance with informal regulation Developing new sales channels Finding a buyer (eventually) 	<ul style="list-style-type: none"> Achieving scale Seek additional capital required to remain in business Sell up to a larger competitor 	<ul style="list-style-type: none"> Achieving ongoing productivity gains Maintaining a safe and reliable supply of products Access to labour and capital Compliance with informal regulations Maintaining social license
Knowledge acquisition	<ul style="list-style-type: none"> Professional networks Higher education Mentoring Supply chain partners 	<ul style="list-style-type: none"> Advisors/consultants Extension programs RDCs TAFE Print media 	<ul style="list-style-type: none"> Advisors/consultants Professional networks National and global experts Online Research groups Higher education Internal programs

*High level estimate

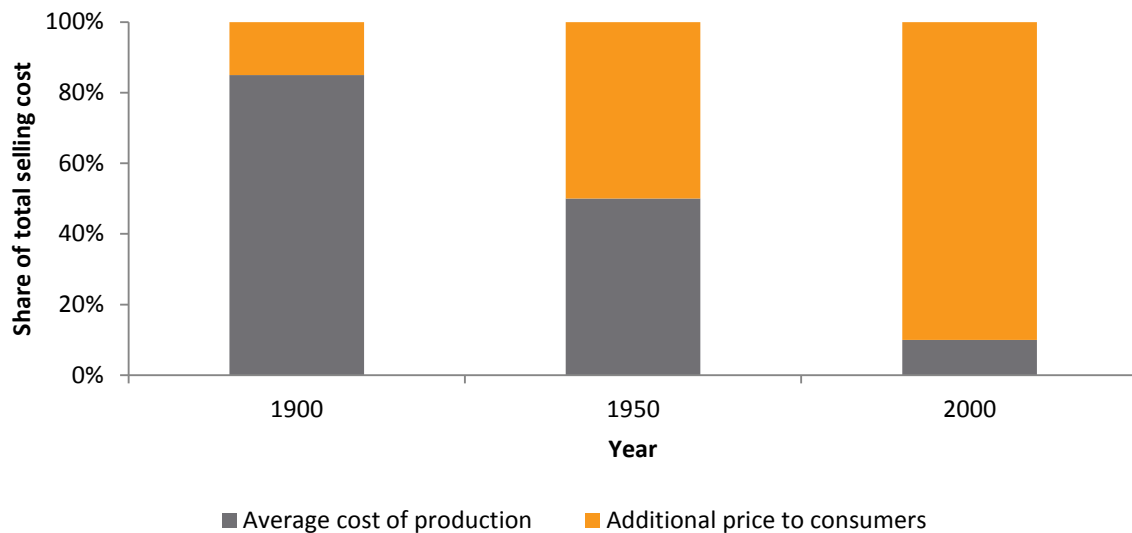
2 Changing market dynamics and higher costs have eroded profitability

2.1 The transfer of value from pre-farm gate has accelerated

Value in the agrifood industry is now largely created post-farm gate

Over the past 100 years, the proportion of the value of the final product that farmers have received has steadily decreased – as shown in Figure 8.

Figure 8: Value creation in the agrifood industry (Commonwealth of Australia, 2014b)



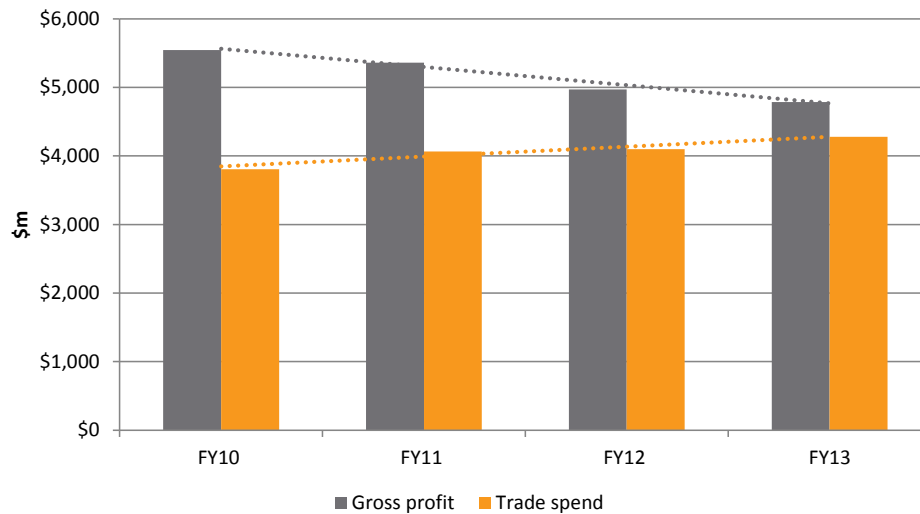
Note: Graph represents a general trend, which also applies to agricultural production.

The share of value for producers and processors has rapidly decreased

The past ten years has seen a dramatic transfer of value from producers and processors to consumers, supermarkets and corporate food service companies. An indication of this shift is the relative financial performance of the food and grocery manufacturing industry and the supermarket industry. The former declined by 0.1 per cent Compounded Annual Growth Rate (CAGR) between FY08 and FY12. Within a similar period of time - FY08 to FY13 – supermarkets grew by 4.7 per cent CAGR (AFGC, 2014b).

A recent AFGC survey of found that the profitability of the survey participants fell over the last four years – with gross margins reducing from 41.0 per cent in FY10 to 38.5 per cent in FY13. Over the same period of time the trade spend – the sum of trading discounts and promotional allowances – increased against a backdrop of flat-lining sales results. Figure 9 below shows the increase in trade spend and decrease in gross profit for the past three FYs among respondents to the AFGC survey.

Figure 9: Gross profit and trade spend of survey respondents (n=16) (AFGC, 2014b)



The market power of major supermarkets retailers and corporate food services has increased

The past ten years have seen a step change in the corporate strategies of the two big supermarkets. The catalyst for this change can be largely attributed to the takeover of Coles by Wesfarmers in 2007 and the subsequent appointment of a new management team at Coles in 2009. Over the last five years, the new management at Coles have embarked on an aggressive business restructuring to arrest Coles' declining market share. Key strategies have included widespread store refurbishments, aggressive price discounting, and initiatives to improve supply chain efficiencies.

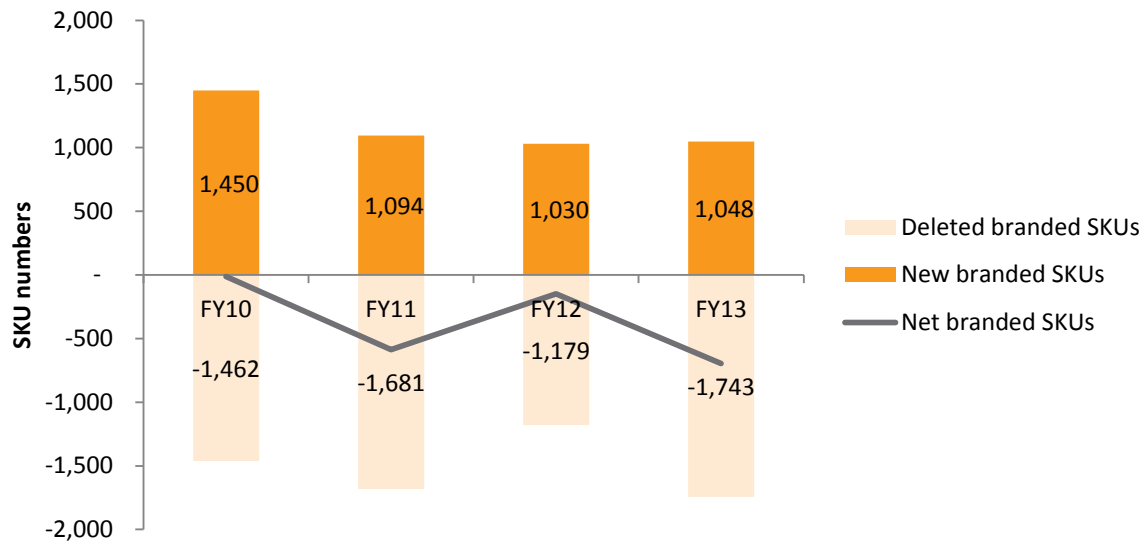
In response to Coles' successful efforts to arrest its declining market share, Woolworths has emulated many of strategies adopted by its major rival. These included Coles' ubiquitous "Down Down" campaign - which Woolworths responded to in 2011 with its own "Knockdown" campaign and its loss-leading discounting of key staples such as milk and bread.⁴

The current private label market share has also grown dramatically over the past ten years. Recent research by Nielsen found that private label products now account for one in every five supermarket dollars spent in Australia, a close to doubling of the same figure in 2006.

As a result of these pricing pressures, the growth of private label market share and ongoing range rationalisations on supermarket shelves, proprietary brand owners are having to discount to protect market share and shelf-space. As a result of these pressures, many second tier brands are disappearing from the market. It is also getting harder for processors to get products into the market, with supermarkets requiring promotional support and significant investment in branding and marketing for packaged goods prior to their initial listing. The cumulative effects of increased price competition, private label share and market entry costs have resulted in an overall net decrease in branded Stock Keeping Units (SKUs) over the past four years – as illustrated in Figure 10 below.

⁴ Coles launched own brand 2L bottles of milk for \$2 and own brand bread loaves for \$1 in 2011 – a move that was immediately copied by Woolworths.

Figure 10: Volume of SKUs produced by food and grocery manufacturing companies with production facilities in Australia (n=16) (AFGC, 2014a)



The current challenging conditions for food processors working with the two big supermarkets were highlighted in Nielsen’s recent Retail Barometer report. Fifty-three of the processors surveyed by Nielsen in 2013 for the report believed that conditions had deteriorated in the past year. Processors identified their biggest concerns as pressure on trading terms, an inability to pass on price increases and the increasing cost of serving major retailers. Forty-two per cent of processors said that their volume had grown but only 34 per cent saw profit growth and 22 per cent had profits fall during the survey period (Ferguson, 2013). The Agricultural Competitiveness Green Paper also acknowledges that the “uneven level of market power through the supply chain [is] seen as a major cause for lower returns to farmers” (Commonwealth of Australia, 2014b).

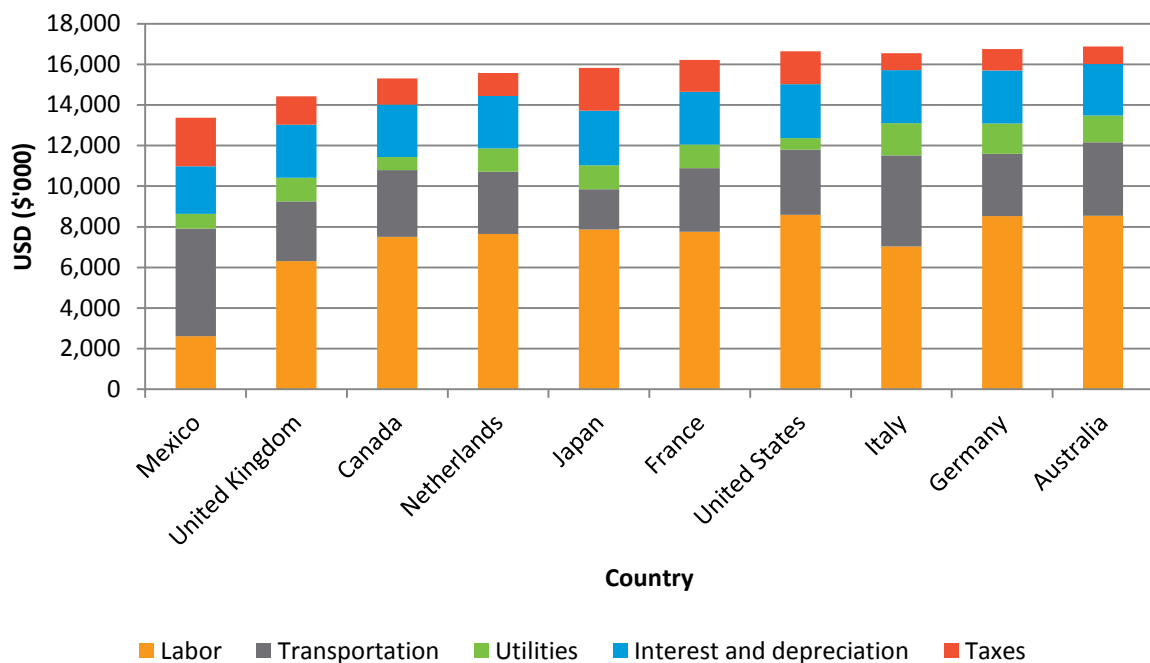
Evidence suggests that the market power of the two big supermarkets in particular may be plateauing with an increasing public backlash against supermarkets practices with suppliers and the Australian Competition & Consumer Commission’s decision in October 2014 to launched legal action against Coles related to alleged unconscionable conduct against five suppliers. The recent ACCC action indicates a broader trend towards regulators intervening more frequently and actively in this segment of the market.

2.2 Costs for agrifood businesses continue to rise

Input costs in food processors are high relative to other countries

The cost of doing business in the Australian agrifood industry is high. Commonly cited cost pressures from businesses in the sector include labour, transportation, utilities, and rent. Recent analysis by KPMG found that costs in Australia's food processing sector are higher than all comparable mature countries from North America, Europe, and Asia Pacific that included in their benchmarking study – as illustrated in Figure 11 below (KPMG, 2014).

Figure 11: Ten year average annual location sensitive costs within agrifood industries (KPMG, 2014)



An increase in informal regulation through private standards has also increased costs

Over ten years the level of agrifood industry has seen a significant increase in the volume and scope of private standards developed and applied by supermarkets, food services companies and major restaurant chains. These standards can cover anything from aesthetic such as size, colour and shape, to logistical issues around production, packaging, and handling of food products to food safety requirements, or 'credence' claims such as those relating to fair trade and animal welfare. The standards which relate to food safety are often now more stringent than public standards set by government bodies dealing with food safety (Richards, et al., 2013).

The costs associated with applying these standards – which typically are not harmonised – and of undertaking third party auditing are borne by processors. Farmers have also been required to invest in specialised equipment and technology to fulfil the requirements of buyers and their systems of compliance. One local food regulator recently observed that:

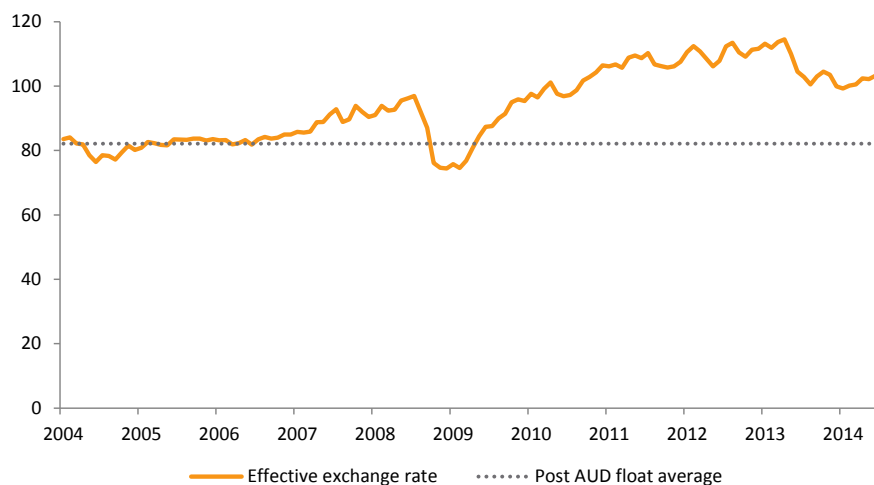
There's very significant market shifts with the supermarkets. The two big supermarket chains [Woolworths and Coles], but also the independent chains have, in the past 10 years increased their demands for food safety and quality, their demands for Hazard Analysis and Critical Control Point (HACCP) systems, pushed back the costs of production, and the costs of inappropriate production,

such as recall costs, back through their systems, so that the processors are bearing more and more of those costs (Richards, et al., 2013).

The value of the Australian dollar has risen dramatically post Global Financial Crisis

The rapid rise of the Australian dollar (AUD) over the past decade has challenged Australian agrifood businesses across the value chain. In 2011, the AUD/US dollar (USD) exchange rate was more than fifty per cent above the average exchange rate for the period since the dollar was floated – as shown in Figure 12 below. This was the result of a series of factors including capital investment in the Australian resource sector, high commodity prices and investors seeking stability during the Global Financial Crisis (and later, the European sovereign debt crisis) (Garton, et al., 2012).

Figure 12: Effective real exchange rate over the past ten years (Bank for International Settlements, 2014)



The high dollar saw Australia's international competitiveness, on which more than \$50 billion in agrifood exports depend, decline heavily (Department of Industry, 2013) (AFGC, 2013). Australia, a high cost processor (with some of the highest labour and utility costs of all mature manufacturing economies) suffered a significant decrease in export demand. Processors revenues and margins dropped, which in turn restricted their ability to invest in innovation to achieve productivity growth. This exacerbated difficulties for farmers who were already suffering from low yields due to the ongoing drought (Potard, 2014). In the domestic market, international competitors took advantage of the high value of the dollar to increase exports to Australia. Imports from global exporters (especially of processed foods) increased its share of total food and grocery turnover and in 2009 Australia became a net importer of processed foods and has stayed so in subsequent years.

2.3 The big two supermarkets have re-shaped supply chains

In an effort to reduce their costs and increase the predictability of supply, the two big supermarkets fundamentally re-shaped the nature of domestic agrifood supply chains over the past ten years. The impact of these changes on business models across the sector are explored below.

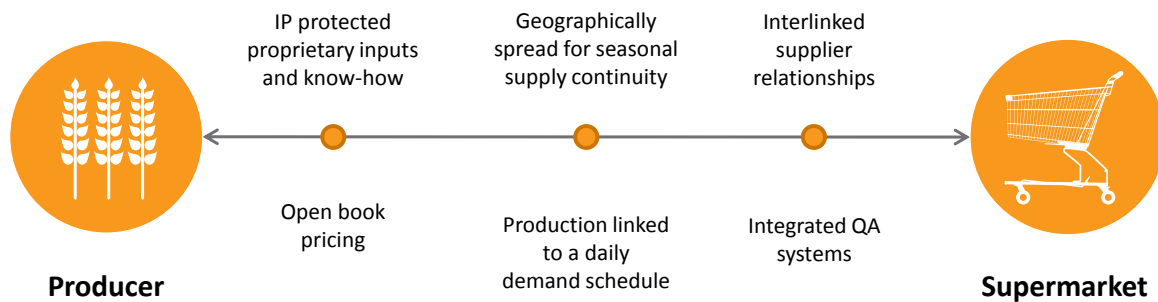
'Closed loop' supply chains are now the dominant model

Coles and Woolworths have led a movement towards new types of 'closed loop' supply chains which are based upon strategic links between partners. They are managed centrally by supermarkets or by a

supply chain 'category captain' or fulfilment manager on their behalf. An example of these new types of 'category captains' is the Costa Group, which is profiled in Case study 1 on page 25.

While 'closed loop' supply chains share some characteristics with more traditionally vertically integrated supply chains, the hybrid ownership models they employ are fundamentally different. The common features of the types of 'closed loop' supply chains employed by the two big supermarkets are shown in Figure 13 below.

Figure 13: Key features of a closed-loop supply chain (McKinna, 2010)



While some elements of 'closed loop' supply chains can be beneficial for processors – such as the open book pricing model⁵ (which can make it easier to manage seasonal risk and relationships with supply chain partners) – supermarkets often use their bargaining power to negotiate highly favourable trading terms. These trading terms with the supermarkets are typically around 12 to 20 per cent of the wholesale selling price, which is comprised of a combination of settlement discounts, volume deals and rebates. Other costs for suppliers associated with more sophisticated 'closed loop' supply chain arrangements include:

- Minimum threshold quantities and penalties for suppliers as a result of 'out of stock' occasions
- Significant investment in inventory management systems and quality assurance systems and skilled staff to operate them
- Investment in logistics technology such as compliant bar-coding, labelling, scanning devices, updated product codes, etc. (McKinna, 2010).

Almost all 'closed loop' supply chains for commodity lines now bypass historical intermediaries such as central markets, with produce going directly from farms to stores. For example, fruit and vegetables are now packed into returnable totes which are the same containers from which the shopper selects the produce. In the meat category, supermarkets have moved to a case ready system where they buy store cattle from breeders, have them finished on feedlots, slaughtered, boned and packed into portion cuts, weighed, priced and delivered to shops on a demand basis. A handful of large case-ready facilities are responsible for servicing the supermarkets' requirements (McKinna, 2010).

The growth in closed-loop supply chains and the evolving expectation of the big two supermarkets has also led to a growth in new types of supply chain intermediaries that work with businesses wishing to build new relationships with the major retailers. An example of this includes RANGEme – an online service that connects agrifood producers and processors with major retailers which is profiled in Case study 2 on page 26.

⁵ Under this model suppliers paid at cost for produce plus an agreed margin.

Supplying supermarkets now requires critical mass and smaller players are being squeezed out

The net effect of 'closed loop' supply chains and the increase in price discounting and private standards discussed on page 22, is that **directly supplying supermarkets is now beyond the realm of the average producer or processor**. As the Director of Industry Affairs at the Australian Food and Grocery Council (AFGC) recently noted:

It has never been harder to build, sustain and grow a successful food and grocery business than it is today. Traditional supplier-retailer relationships continue to be tense, with considerable influence applied by retailers to a broad range of key areas such as delivery requirements, packaging specifications, transport and stock management (AFGC, 2013).

Smaller to medium producers or processors that no longer have the volume, working capital or administrative resources to supply the major supermarkets are forced to sell through other channels such as central markets or intermediaries (such as agents and merchants).

Case study 1: Costa Group SA

Costa Group SA – Supply chain fulfilment manager

Costa Group is Australia's largest processor, marketer and exporter of fruit and vegetables, providing leading logistics and supply chain capabilities to major retailers.

While many major retailers including the large supermarkets are pursuing closed-loop supply chains, Costa Group remains one of the few vertically integrated businesses in horticulture. In recent years, it has reduced its number of horticulture categories to those in which it judged itself to be the strongest and where the greatest market opportunities existed. Today, its core produce categories include avocados, bananas, berries, tomatoes, grapes, citrus and mushrooms.

According to Richie Roberts, the South Australian Divisional Manager of Citrus at Costa Group, closed loops supply chains provide a level of credibility and quality control that other producers cannot guarantee through only partnerships and agreements. According to Richie, vertically integrated businesses that grow, pack and market their own horticulture are better able to identify supply chain efficiencies and increase the volume of produce into major market segments.

Today, Costa Group has more than 40 farming, wholesale market and distribution operations nationally – equating to over 4,000ha of farmed land and 20ha of protected glasshouse production.

According to Richie Roberts, the focus of Costa Group, at least in horticulture is as much on supplying major retailers as it is in international markets, particularly Asia. To cater to consumer demands abroad, Costa Group uses advanced machinery. For example, it is careful to measure the brix level (the sugar content) of its citrus exports, particularly to sugar-sensitive markets such as Japan.

Costa Group is a highly geographically diversified business, with farms throughout the country to reduce extreme climate risk but also to ensure year-round supply of its produce. For example, Costa Group's table grapes are grown in Queensland and the north and south of New South Wales, ensuring it can deliver on the demanding supply scheduled required by the major supermarkets.

For mid-tier managers, Costa Group has a specially designed in-house professional development program called 'Costa Manager' in which participants learn about team and people management and develop the 'soft' skills required at their level. While a formal qualification is preferred to reach this level, there is recognition in horticulture that experience in the sector is often as valuable as a formal qualification.

The rest of Costa Group's workforce is made up of highly skilled employees and contractors and low skilled casual workers. In South Australia, Costa Group is a major employer of unskilled labour, recruiting up to 1000 casual workers to pick and pack citrus fruits during peak seasonal periods.

The pack houses in which these casual employees work are usually large enough to justify automated efficiencies. As a result, there are a small group of highly technical Costa Group employees and select specialist contractors that Costa Group can call upon should there be specific technical issues.

Case study 2: RANGEme

RANGEme – connecting niche processors to major retailers

Launched in March 2014, RANGEme is a 'direct lead generation' business, allowing processors to 'pitch' their products to time-scarce category buyers at major retailers.

RANGEme Founder and CEO, Nicky Jackson, a former marketing executive with Kellogg's, Uncle Toby's, Good Man Fielder and Pepsi, developed the idea for RANGEme following first-hand difficulties in attracting the attention of major buyers to stock her baby skincare range.

In its initial exploration phase, Jackson undertook an extensive market research exercise to confirm both the demand and supply for what would eventually become RANGEme. The research confirmed there was a significant disconnect between category buyers and processors. Small processors were finding it exceedingly difficult to gain the attention of retail buyers, and when they did, were often unaware of what retailers are looking for. "Often, small and medium businesses can spend large amounts of time and resources looking to secure a buyer for their products," Jackson says. Meanwhile, major retailers are increasingly looking to stock locally produced, healthy, functional foods – but find it frustrating that the large majority of small processors often do not present all the right information.

"Suppliers might have fantastic ideas and products but commercially there is a bit of a disconnect," she said. Similarly, while buyers are time poor, "they don't want to miss out on new and innovative ideas either". As such, RANGEme has been developed in conjunction with buyers to get the pitch right the first time. As it is today, RANGEme streamlines the supplier-buyer connection by allowing suppliers to upload their products and information. Category buyers, confident that the correct information will be presented, select processors with whom they would like to explore partnership opportunities.

To date, buyers using the service include major retailers such as Coles, Toys R Us and leading retail chemists. However, sellers registered with RANGEme are many and varied. According to Jackson, buyers will vary from small, new processors seeking to develop their first retail offering to large international processors seeking to enter the Australian market through a major retailer.

The success of RANGEme is in part due to the push by major retailers to shorten their supply chain through direct links with partners (removing the brokers or agents that have traditionally linked the various segments of the supply chain). This is driven by the continued fragmentation of the agrifood industry in recent years. In particular, the rise of healthy 'preventative' food offerings has seen the emergence of small-to-medium sized processors with premium products. Consumers now have a wider variety of produce from which to select and increasingly, are choosing these premium, niche brands over large scale processors.

In less than a year, RANGEme has grown to include over 30 national retailer groups that buy products for more than 6000 retail sites. Its greatest challenge and opportunity going forward is growing the number of suppliers using the service, to help them communicate directly with buyers in a cost-efficient, effective and straightforward process.

Knowledge and skills implications: Supplying supermarkets, foodservices companies and major restaurant chains

As discussed above, the evolution of domestic supply chains – particularly the growth of informal regulation – has imposed a raft of new knowledge and skill requirements on agrifood enterprises supplying supermarkets, foodservices companies or major restaurant chains.

For managers of food processing companies, the following capabilities are now critical success factors in order for business to meet the requirements of supermarkets and their third party auditors:

Marketing and sales

- brand development
- product development
- packaging
- category management
- supply and demand management (i.e. Sales and Operational Planning (S&OP))
- business management
- business planning
- risk management
- negotiation and communication skills.

Technical skills

- developing and managing seamless HACCP plans and systems
- transport and logistics
- sustainability and measurement of carbon footprint
- OH&S.

It should be noted that third party auditors typically require detailed documentation as proof of compliance, much of which needs to be signed by formally qualified staff.

For frontline production staff in food processing businesses, key skills requirements now include compliance with OH&S requirements and how to use the types of electronically controlled equipment that are now used to comply with new quality, safety and integrity standards.

For farm businesses, the advent of integrated supply chains, higher levels of supermarket-led regulation and a greater focus on traceability has increased the imperative to be trained in processes and systems that impact from their point of the supply chain, all the way through, including (McKinna, 2013a):

- supply and demand and logistics management
- HACCP accreditation and auditing
- compliance accreditation
- chemical handling
- general food safety
- product quality assurance
- OH&S.

The major supermarkets have developed formal training programs to better serve the needs of their suppliers over the past five years. For examples, in 2011 Coles partnered with Advancing Food Safety – a Registered Training Organisation (RTO) – to develop and deliver three qualifications (a Certificate and Diploma in Quality Assurance and an Advanced Diploma in Quality Management) for employees of Coles' suppliers.

2.4 Businesses are outsourcing non-core activities

With the ever-increasing need to seek efficiencies as a result of declining profitability, many agrifood businesses are out-sourcing what they view as non-core competencies to external parties. Functions that are commonly out-sourced include logistics, manufacturing and marketing. Increasingly, food processors are also contracting out parts of their production process which cannot be economically done in-house (e.g. slicing vegetables or manufacturing products with small production runs).

A 2010 survey of 500 food processing businesses in Queensland focused on contract manufacturing found that 19 per cent of businesses reported contracting out and 28 per cent contracting in. Business growth and product expansion were the most commonly cited reasons for engaging in contract manufacturing at 83 and 69 per cent respectively (Queensland Government, 2013).

The rate of outsourcing varies across industries and within them, the size and nature of a business. While small businesses may see outsourcing as an effective method of remaining competitive with larger businesses (without the need for significant capital outlay – which they may not possess), larger businesses may also see it as a good overall approach to cost reduction (Queensland Government, 2013).

Within agriculture, out-sourcing rates differ across industries. For example, an analysis of farmers in Western Australia found that wheat farmers are much more likely to outsource cropping tasks as the production stages in cropping tend to be short, infrequent and require relatively few complex and distinct tasks (Rose & Kingwell, 2009).

It is worth noting that Australia lacks an integrated facility akin to the Food Bowl in Auckland (see Case study 3 below) where food processors can outsource multiple parts of their operations related to product development, testing and production.

The trend towards out-sourcing is particularly common among younger agrifood entrepreneurs

An extreme manifestation of the trend towards outsourcing non-core competencies are those businesses that focus solely on product development and branding. These businesses typically manufacture niche products with associated price premiums that allow them to out-source the majority of their operations. Examples of this business model include the iced tea Nexba and Yummia – a ready-to-eat bircher muesli tub. Both companies directly employ very limited numbers of staff.

Anecdotal evidence suggests that this business model is particularly popular among the younger generation of food and beverage entrepreneurs. In the words of Drew Bilbe, one of Nexba's co-founders, "We want to focus on the fun stuff – selling the brand and our passion – driving new product development" (Bailey, 2014).

The growth in online, direct-to-consumer sales channels is giving younger and socially media savvy entrepreneurs a route to market outside of the supermarket channel. Often the following of these entrepreneurs builds to a point where they are approached by supermarkets with an offer to supply them. At this point, these entrepreneurs typically require access to additional capital to expand, and will either bring in an investor or sell out.

Case study 3: Auckland's Food Bowl

Food Bowl – Purpose built facility for processors to develop and out-source new products

Te Ipu Kai (or the 'Food Bowl') is a facility based near Auckland Airport that opened in 2011. The Food Bowl is designed to enable food manufacturers to develop and test new products for trial marketing and eventual commercialisation, specifically for the fast moving consumer goods market. Users of facility have 24/7 access to six processing halls that are food safe and export accredited in most major overseas markets as well support from product developers, certification agencies, business development experts.

According to Tony Nowell, chairman of New Zealand Food Innovation Auckland and operators of the centre, the Food Bowl is designed to address the "wide gap between those companies who want to commercialise products and the resources available to enable that commercialisation".

Since opening, the Food Bowl has also been used by Australian companies. These include organic coffee processors Di Bella Coffee who plan to use the Food Bowl facilities to develop their new Espresso Kick + Latte energy drink which requires high-temperature pasteurisation – a production technique that only large milk and beverage companies possess in Australia. The founder of Di Bella Coffee, Phillip Di Bella, notes that the Food Bowl is "very low risk" and that "there's nothing like this in Australia."



Sources: (Morgan, 2013; Goh, 2011; Food Innovation Network, 2014)

Knowledge and skills implications - Outsourcing non-core activities

The recent Queensland Government survey on contract manufacturing found that many businesses do not take adequate steps to protect themselves against legal disputes over quality of products and services, or ownership of Intellectual Property. Of concern was that that over half of businesses surveyed operated on verbal agreements, with only 31 per cent having agreements drawn up by external legal experts. A common source of conflict is when there is no clear understanding of liability of parties when transporting product, which can arise when there is:

- breakdown of refrigerated transport
- failure to handle and deliver products correctly at point of dispatch or delivery
- divergence between actual and expected delivery time frames (Queensland Government, 2013).

It is also becoming more important for businesses to clearly understand their legal liabilities and responsibilities and managing the risk associated with outsourcing. For example, under chain of responsibility regulations, a company that uses a trucking contractor can be held accountable if there is an accident if it can be proven that it put pressure on the contractor to meet a time schedule. Similarly, a business using a contract labour firm are responsible for OH&S and visa compliance for migrant workers – something that many stakeholders are not aware of.

2.5 Producers and processors are pursuing alternate channels

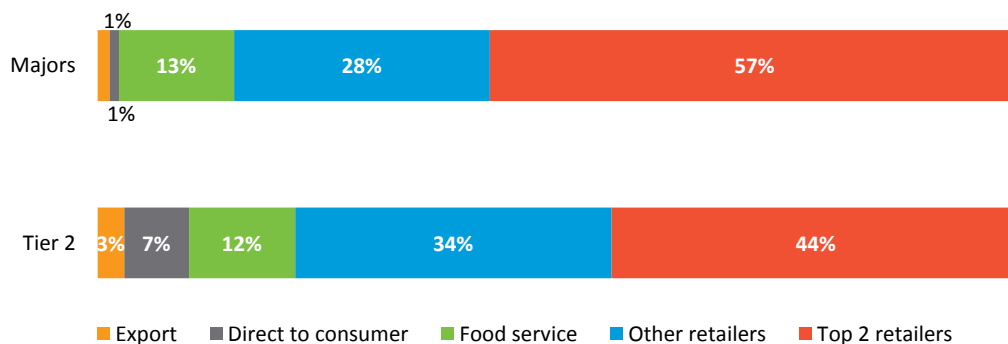
Smaller processor and processors are pro-actively targeting non-supermarket channels

Many small and niche producers and processors are proactively targeting non-supermarket channels such as independent retailers, farmers' markets and farm gate sales, or on-line (McKinna, 2010). Success in these alternate channels is usually contingent on developing more sophisticated marketing, branding and sales skills.

The importance of alternate channels for niche and SME ('Tier 2') food processors is illustrated by the relatively high contribution that sales through the direct to customer channel made to the net sales revenue of respondents to AFGC's recent survey (see Figure 14 below). Although it is still small with only 3.9% of total food and grocery sales in FY2013, sales through the direct to customer channel also experienced the largest percentage growth among respondents to the AFGC survey - with a CAGR 13.3 per cent over the past four years (AFGC, 2014b).

One example of a producer pursuing innovative alternate sales channels is Mackays, Australia's largest banana grower. Mackays trialled selling their bananas through two vending machines. Following the initial success of these machines they recently established vending machines that dispenses a range of in-season fruit and vegetable snacks known as the 'FruitBar' (ABC, 2013).

Figure 14: Net sales⁶ by channels for respondents to AFGC survey (n=16) (AFGC, 2014b)



Farmers' markets are growing in popularity

In recent years, farmers' markets have grown so rapidly in popularity that they are now considered a significant channel in their own right. Many of the 150 farmers' markets in Australia are professionally run and managed. Farmers' markets currently account for seven per cent of fresh food sales in Australia but this figure is rapidly growing. Compared to central markets, farmers' markets are perceived to be of fresher and higher quality due to the direct connection with processors and processor. Processors and processor are often able to sell their products at farmers' markets at a premium (or at a minimum, more than would be paid by wholesalers). Farmers' markets have worked well for *Green Eggs*, a Victorian egg farm, who sell the bulk of its product through a highly coordinated farmers' market network (and restaurant channels) and in doing so, avoiding major retailers all together (McKinna, 2010).

⁶ Net sales are gross sales less trade spend on trading discounts and promotional allowances.

Sales through online channels are likely to grow

Supermarkets are one of the few retail industries remaining in Australia that have not been profoundly disrupted by e-commerce. Over the next five to ten years this is likely to change – particularly with the suspected entry of Amazon’s online grocery platform (see Case study 4) into Australia (Langley, 2014a).

The online platforms of the two major supermarkets are still relatively modest and viewed as complementary, rather than supplementary, sales channels. In 2011, Coles reported that their online sales were equivalent to just five stores (Foo, 2011). More recent data indicates that strong growth in the Coles Online channel following a recent relaunch, with the volume of new customers increasing by 48 per cent and visitors up by more than 70 per cent in FY14 (Wesfarmers, 2014).

The success of Aussie Farmers Direct – which was established in 2005 and has been the fastest growing franchise business in Australia for the for past three years – illustrates the growth potential in the online sales beyond the channels offered by the major retailers (Hemphill, 2014). Under the franchise model adopted by Aussie Farmers Direct, each of the 226 franchisees is allocated a geographic area with set boundaries and delivery days.

Online marketing is also becoming a profitable extension to cellar door sales for boutique wineries, where they can maintain customers and relationships after cellar door visits through databases or wine clubs (McKinna, 2010). Niche processors are likely to benefit from a significant shift towards online grocery shopping. With greater shelf space flexibility, online platforms would afford boutique processors a space in which to offer their produce without the requirements often made by major retailers.

Case study 4: AmazonFresh

AmazonFresh – The online giant that may enter the local market

AmazonFresh is the online grocery service of Amazon.com, was Initially set up as a pilot in Seattle in 2007, AmazonFresh now provides a same day grocery delivery service in Los Angeles, San Francisco and San Diego. In the five years since its inception, AmazonFresh has become a dominant player in the online grocery market with an estimated \$15.4 billion of sales in 2013. A recent study indicated that 40% of e-grocery shoppers preferred AmazonFresh over other online grocery retailers. It’s reported ambitions for 2014 include the expansion into another twenty urban areas in 2014, including some cities outside the United States.



If AmazonFresh were to enter the Australian market it may possess significant competitive advantages over the major supermarkets and existing smaller local online services. These potential advantages include cheap labour, low taxes, highly innovative supply chains and a recognised and trusted brand name. Furthermore, it would leverage its leading e-commerce capability to deliver an as yet unparalleled online grocery shopping experience for Australian consumers, an extensive virtual shelf-space capacity and flexibility not seen in the two big supermarket’s current online offerings.

The potential impacts of AmazonFresh’s launch in Australia are many and significant. These include, but are not limited to:

- The disruption of ‘bricks and mortar’ supermarket businesses as consumer preferences shift to online grocery shopping.
- Grocery retailers, online and physical could move into operating twenty-four hours a day, seven days a week to better suit the shift in modern retail. Over time, this could lead to significant change across the supply chain with shorter lead times and smaller batches as businesses improved their forecasting from improved data and analytics. Businesses will also require new marketing techniques to actively manage share of screen.
- Greater opportunities for niche processors and businesses. AmazonFresh could be a highly profitable alternative distribution channel for farmers. Boutique suppliers in Southern California have experienced great success with AmazonFresh, with some independent suppliers selling their whole store’s products online (Luna, 2014). The same could apply to small scale producer and processors who have yet to engage with the major supermarkets.
- Greater flexibility for new or existing agrifood businesses that wish to conduct product testing in selected regions.

Sources: (Rabobank, 2014b; Housel, 2014).

2.6 Some farmers are pursuing on-farm value adding

In light of increased price competition domestically and in overseas markets for agricultural commodity products, some farmers are more actively pursuing on-farm value adding strategies with a view to capturing some of the price premiums associated with certain niche products.

Stakeholders interviewed for this report cited a wide diversity of farm value-adding business strategies currently pursued by farmers. These included dairy farmers producing boutique cheeses, cotton farmers looking at new ways to do ginning, beef processors selling their own brand meats through butchers, almond farmers milling specialist meal for macaroons, chick pea and lentil farmers manufacturing premium private label branded organic vegetarian burger patties.

There is currently very limited evidence about the growth and relative financial performance of new on-farm value adding business strategies. Anecdotal evidence suggests that many high-performing farmers have successfully pursued these types of diversification strategies. Given the ever-increasing competition from overseas food processors, the challenge for Australian farmers going forwards is to move beyond first stage value-add production and to stay focused on genuinely niche products.

Another income diversification strategy that selected farmers continue to pursue is agritourism. While agritourism as a strategy is not new, an increased focus from selected consumers on provenance and understanding how food is produced have increased agritourism opportunities for some farmers. The importance of agritourism as a source of income diversification varies amongst businesses. A 2010 Commonwealth survey of primarily family run agritourism and food tourism businesses in regional areas around Australia found that 21 per cent of respondents earned over 90 per cent of their income from agritourism (Ecker, et al., 2010). Anecdotal evidence suggests that agritourism is more actively pursued by farmers within the amenity segment, due to the proximity of most amenity farms to urban areas and surrounding regional tourism infrastructure such as hotel accommodation.

Knowledge and skills implications: On-farm value adding

For many farmers, effectively capturing the price premiums associated with post farm-gate production of niche products requires an entirely new set of skills and capabilities. These skills and capabilities include market research and development, evaluating the best channels to market, branding, effective use of social media, identifying and understanding new processing methods and technologies, food safety and labelling and building relationships with new supply chain partners. Farmers that sell products on-site also require skills related to customer service and developing effective agritourism strategies.

In July 2014 the Rural Industries Research and Development Corporation (RIRDC) launched the www.farmdiversity.com.au website which allows farmers to investigate almost 100 options for diversifying their enterprise – which include food processing.

3 More businesses are actively seeking growth through alternatives to bank debt

Over the past ten years, different types of ownership and management models and new sources of finance have opened up alternatives to more traditional forms of financing for agrifood businesses seeking to grow and expand. The uptake of these new models and sources of finance across the industry are explored below.

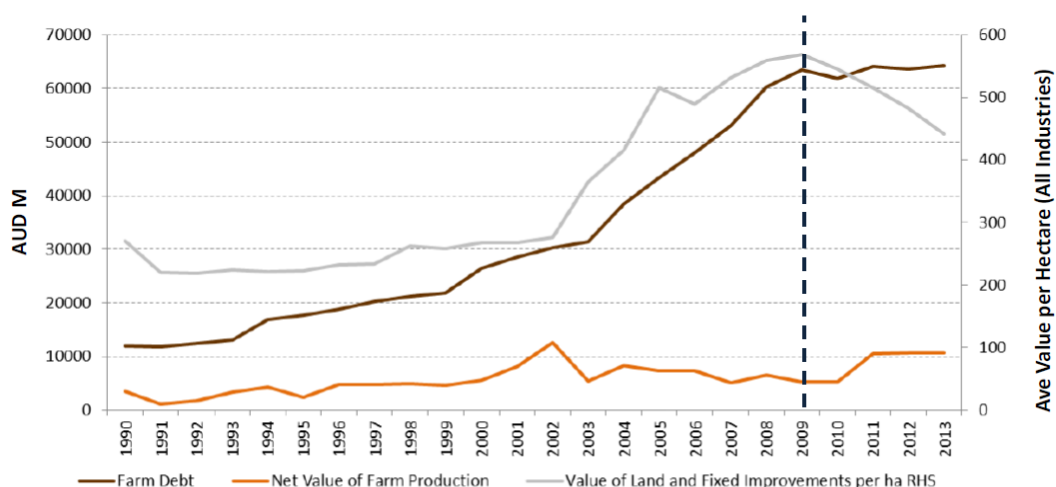
The Agricultural Competitiveness Green Paper argues that “identifying new ownership and management structures or alternative financing models is central to attracting more investment from both domestic and international sources of capital”. However, a fundamental challenge that must be addressed first is providing farmers with a “greater understanding of the different models that are available” so that they can “make more informed decisions about the best model for their circumstances” (Commonwealth of Australia, 2014b). Another challenge for farmers is to effectively identify and manage the range of business consultants, paraprofessionals and specialist contractors that farmers are increasingly reliant upon as they implement and manage more complex business structures and ownership models (AWPA, 2013b).

Australian agriculture has historically been funded by bank debt

Australian farm businesses are largely funded by debt financing, with funding being relatively cheap and accessible for established businesses over the past 15 years or so (Tomlinson, 2014). For most family farms, the sources of capital for investment are limited to the funds available to the family, the farm returns that are generated (including earnings retained in Farm Management Deposits) and borrowings (mainly from banks) (Commonwealth of Australia, 2014a).

Australian farm debt levels grew rapidly from the early 2000s onwards – largely as a result of the 2002 - 07 drought – as shown in Figure 15. Farm decisions to increase debt levels were usually made for one of two reasons: to remain in business (in response to the 2002-07 drought and declining terms of trade) or to increase productivity through expansion and/or investment in technology (and a demonstrated willingness to borrow with rising land values and lower interest rates).

Figure 15: Total farm debt, land value and net value of farm production 1990-2013 (Baker, 2014)



Though farm debt levels have declined in the past two years, the real level of farm debt per hectare of the average Australian broadacre farm is still twice the level it was twenty years ago (Craw, 2014). Increased debt levels have been exacerbated by changing bank policies in relation to farm debt levels (e.g. requiring higher than normal deposits) but also the general desire amongst Australian farms to reduce debt to a more manageable level following multiple droughts and input price fluctuations since the early 2000s.

Australia has historically lacked alternatives to debt financing

Compared to international counterparts such as Brazil and New Zealand, there are relatively few alternatives to debt in Australian agriculture. For example, in the United States, it has been estimated that non-owner-operating investors, such as institutional investment funds, owned around 29 per cent of farm land in 2007.

This is significantly less common in Australia where farm business assets are considered to be less easily converted into cash or to experience more volatile cash flows (Commonwealth of Australia, 2014a). As such, the domestic equity market has traditionally been limited by the liquidity bias of domestic superannuation funds and the lack of avenues for retail ‘mum and dad’ investors to invest in agrifood. As a result, the domestic superannuation industry invests only two percent of their \$1.7 trillion investment pool into the agrifood class (McKinna, 2014)

Access to capital is a barrier for smaller food processors

Access to finance is the most commonly cited barrier to expansion (especially to overseas markets) of Australian food processors. For example, in 2011, a survey of 92 food processing companies conducted by PwC found that the cost of business expansion was one of the major inhibitors in increasing investment – with 44 survey respondents nominated the cost of expansion as an inhibitor to increasing investment in their business.

The Government’s Food Processing Industry Strategy Group found that the issue of access to finance is particularly acute amongst SME food processors who face limited options to fund investment decisions compared to larger businesses. SMEs typically fund growth through debt or internal finance (such as retained earnings and contributions of capital by the owner). About two-thirds of lending to small businesses is through commercial bills and other loans with variable interest rates. Conversely, larger firms are typically able to access equity markets to finance growth. External equity finance in the form of venture capital is generally unavailable to SMEs without strong growth prospects. This includes both venture capital funds and individual private investors such as angel investors (DIISRTE, 2012).

3.1 Corporate farming is becoming increasingly common

The last ten years has seen a growth in the prevalence of corporate farming models. For the purposes of this discussion, corporate farms are defined as businesses where there is an entity other than, or in addition to, a family or individual that owns and operates the business.

As highlighted in Section 1.1 on page 12 of this report, there is a lack of consensus about how they are defined (using either ownership or revenue metrics) or data that indicates the relative proportion of corporate farms across Australia. It is generally agreed though that corporate farms are proportionally few in number (roughly two per cent of all farming enterprises) but extremely significant in terms of the share value of production output.

The four most common variants of corporate farming in Australia are outlined in Table 4 below. The model that has seen the highest growth in popularity in Australia is direct equity investment.

Table 4: Common corporate farming model (McKinna, 2010) (Tomlinson, 2014) (The Australian, 2014)

Model	Overview	Current trends
1. Direct equity	An equity investor, such as a superannuation scheme or a private equity fund, invests in corporate farming operations either directly or as a partnership.	Increasing in popularity but primarily among with large farm businesses –still not very common.
2. Listed venture	Agricultural companies listed on the stock exchange.	Contracting in number after PrimeAg was wound up in late 2013 and the majority of its assets sold to US pension fund TIAA-CREF. Listed agriculture companies in Australia and internationally are likely to remain a very small proportion of overall listed enterprises.
3. Managed investment schemes (MIS)	A variety of structures based on collective investment in a common enterprise.	Decreasing in popularity after the scandals associated the collapse in 2009 of Timbercorp and Great Southern – the two of the biggest listed MIS companies in Australia - as well as the ATO ruling in 2007 that impacted horticulture.
4. Equity partnership	A joint venture between related or non-related individuals who have come together to pool their capital and possibly skills to enable the partners to obtain revenue and growth from their investment.	Yet to gain the same levels of popularity as in New Zealand despite several predictions over the past five years to the contrary.

Levels of overseas direct equity investment in agriculture are increasing – albeit from a small base

Traditionally, domestic equity investment has been limited by the bias of domestic superannuation funds towards liquid assets and short-term returns and the lack of avenues for retail ‘mum and dad’ investors to invest in agrifood. As a result, the domestic superannuation industry invests only two per cent of their \$1.7 trillion investment pool into the agrifood class (McKinna, 2014). Recently, these same funds are recognising the favourable return on agricultural land (relative to market) and the ‘nation building’ potential of investment in agricultural and the value in investing in assets that traditionally do not correlate with market movement (Vidler, 2014). Interest levels from Australian superannuation funds in agricultural assets still remain low though relative to international funds (Tomlinson, 2014).

Several recent high-profile investments suggest that international pension funds, sovereign wealth funds and multinational companies are all showing greater levels in Australian agriculture. The most recent example is the \$3 billion fund that was established in September through a joint venture between China’s Agricultural Investment Fund and the Yuhu group which will focus on investments in infant milk formula, beef, lamb and seafood (McAloon, 2014). Another investment vehicle that is likely to gain traction in Australia are the new food and agriculture real estate investment trusts (REITs) listed in Singapore that are raising between US\$500 million and 1 billion in funding (The Australian, 2014).

These growing levels of interest can be attributed to Australia’s competitive pre-farm gate production costs, low political risk, strong reputation for food quality and safety and proximity to key Asian markets. Another, often unspoken, motive for foreign investors – particularly government-controlled sovereign funds – relates to enhancing food security for that country.

The growth in overseas investment is also due to the global trend for institutions to increase their allocation to alternative asset classes, of which agriculture is increasingly being considered as a part of this type of portfolio. In 2013, global institutional investment in commodities, as a sub-set of alternative investment, was expected to grow from US\$39.2 billion in 2009 to US\$124 billion (BDO Australia, 2013).

The ownership and management models of direct equity investors vary

The model favoured by international pension funds is to invest in Australian agriculture through a manager or a responsible entity (RE) which buys/leases, operates and manages farms on their behalf rather than directly owning and managing the property in their own right. This is partially because of superannuation investment rules and partly because they seek to have an ‘arm’s length’ relationship with accountability and an exit course (McKinna, 2010). This model is used most commonly by US pension funds such as Westchester (see Case study 5 below).

Another common model used by domestic and international investors like Warrakirri and Hassad Australia (see Case study 6 below) is to invest in land either through freehold or leasehold that is typically adjacent or close by so that economies of scale through aggregation can be achieved. The option to lease land – on a short or long term basis – is usually employed to assess the value of the land. Investors that employ this model typically contract back the management of their assets to the prior owners (Foss, 2011).

Case study 5: Westchester

Westchester: Buy and lease-back through specialist agricultural asset management firm

Westchester is a US-based specialist agricultural asset management firm. The Teachers Insurance and Annuity Association of America has a controlling interest in Westchester, which runs the International Agricultural Investors fund. Westchester’s Australian investments occur through the locally listed IAI Australia Fund II which is managed by a team of 12 staff based in Wagga Wagga. It is estimated that Westchester has invested up to \$900m in agriculture across Australia. Westchester’s passive investment model relies on buying and then leasing the properties back to the former owners or more commonly to farmers or farming management companies looking to expand their operations. Under the Westchester model, a fixed rental rate and term are agreed under a formal lessee/lessor arrangement. This arrangement represents a significant saving for many farmers given that they are no longer making interest repayments on bank debt. Anecdotal evidence indicates that some farmers who have sold their land to Westchester have been able to dramatically increase the size of their farming operations after unlocking the value of their land. There are some suggestions that farmers under the Westchester model have experienced difficulties in accessing bank financing for working capital given that they are no longer able to offer their land as security. Some farmers have overcome this issue by successfully seeking working capital from large input supplier.

Sources: (Foss, 2011; Thompson, 2014; Whitley, 2012)

Case study 6: Hassad Australia

Hassad Australia: Direct ownership and management of geographically dispersed assets

Hassad Australia (HA) was established in 2009 as an investment vehicle for the Qatar Investment Authority (QIA). Over the past five years HA has invested \$425m in grain and sheep meat production across five states. HA pursues a strategy of geographic diversification of different asset types. Hassad also seeks scale efficiencies through the acquisition of adjacent or nearby assets. To date, Hassad has created 14 aggregations through the acquisition of more than 40 properties across an area of approximately 250,000 hectares. Each of HA’s aggregations are overseen by a property manager who in turn report regional operations managers. Some of the functions that are centralised within HA’s head office in Sydney include livestock marketing and exports, finance, Human Resources, OH&S and legal counsel. HA recognises that capturing economies of scale remains a major challenge for corporate agriculture. In the company’s submission to the Australian Government’s Agricultural Competitiveness Issues Paper, HA noted that “Scale economies have eluded a number of large corporate investments over the years often due to cumbersome management structures, unwieldy governance and too much centralisation”.

Sources: (Hassad Australia, 2014; England, 2013; Heard, 2012)

Direct equity is likely to remain focused on a small cohort of large and high performing businesses

Large scale international investors typically impose minimum requirements around scale, governance and financial performance when investing in Australian agricultural enterprises. The average size of overseas investments therefore rules out the majority of enterprises in Australia as potential recipients of international capital. According to ex-Macquarie executive Tim Hornibrook, “the family farmer, for the most part, is not structured to accept external capital as the deal sizes are too small, and they don’t have the governance or the reporting in place” (The Australian, 2014).

Even when businesses do meet the majority of international investors’ requirements, many deals still fall through. Danny Thomas, the Asia regional director for the global commercial real estate firm CBRE, suggests that, “the challenge for farmers is to get themselves investment ready. They need to make sure they appoint good advisers and understand what the capital is looking for – get themselves ready to receive the inbound capital” (The Australian, 2014). At a minimum, this typically requires farmers to have a clear business plan and robust data related to their historical and likely future financial performance.

According to David Williams, the managing director of corporate Finance Advisory firm Kidder Williams, growth in international investment in Australian agriculture is currently being stymied by a lack of depth in farm management capabilities which he describes as a “gaping wound”. Williams notes that, “investors are pointing out the lack of management in some key sectors of the economy” and that Chinese investors are not willing to “pay up” to hire advisers to assist with finalising investment transactions (Kitney, 2014).

If farm enterprises are successful in attracting overseas investment, there are still challenges to be overcome in ensuring that the investment is a success. These challenges include managing cultural differences related to communication and relationship building, educating investors about local agricultural conditions and cycles, managing any disconnects that may arise between cash flow based valuations and the underlying value of land, overcoming reluctance to assign value to capital appreciation over operating returns. Challenges specific to pension fund investors include managing the line between direct and passive investment which can become blurred (Hooper, 2014).

Equity partnerships remain attractive but are not likely to grow

Despite a concerted push over the last five years by firms like Harvest Capital Partners and the potential for it to be used in succession planning, the equity partnership model has not reached the same levels of popularity as New Zealand where there are estimated to be over 1,000 non-family equity partnerships - primarily within dairy, but also in the sheep and beef, cropping and viticulture industries (ANZ, 2014). Case study 7 below provides an overview of how equity partnership models are applied in practice in New Zealand.

One of the major reasons why equity partnerships have not been adopted in Australia to the same degree as New Zealand is the lack of liquidity in the farm land leasing market. Farm land in New Zealand does not attract capital gains tax when it is sold, and this means that stakeholders of farm businesses, involved in land ownership, can buy-in and sell-out of equity partnerships more easily than their Australian peers (Tomlinson, 2014).

Rabobank Australia’s group executive of country banking, Peter Knoblanche, remains cautious about the future growth of equity partnerships and highlights the challenges associated with getting interested parties – particularly those across multiple generations – “onto the same page with their perspectives about the strategy”. Agricultural Management Company (AMC) chief executive and managing director Charlie Blomfield also notes the effort required to ensure the “alignment of interests and professional management systems required to operate the businesses at the level expected by investors [and that]

there is much work to be done educating both sides of the equation about the stakeholder's core business, processes and strategies" (Luke, 2013).

Case study 7: Equity partnerships in New Zealand

Equity partnerships in New Zealand

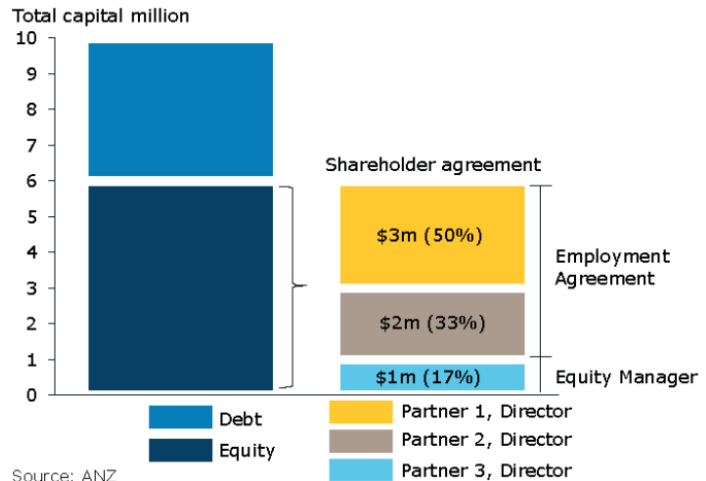
Equity partnerships are a joint venture between a few individuals who pool their capital to invest in a business venture. There are typically less than ten shareholders in 10 and may be any one or more of individuals, partnerships, trusts, or other companies. The equity partnership owns the land, plant and any stock, and employs a manager to run day-to-day activities. Often one of the partners is employed as the farm manager, or more commonly referred to as an equity manager. Limited liability companies are the most common form of ownership structures. Other structures include trusts and limited partnerships. Under the limited liability company model shares are issued to each member according to the amount of capital

each investor provides. An indicative example of a simple model of an equity partnership set up under a company structure to purchase a 200 hectare dairy farm is shown to the right.

Some of the benefits that equity partnerships can provide include:

- Opportunities for farmers to pool capital to overcome high capital requirements and in some cases low cash rates of return (i.e. sheep & beef)
- Additional opportunities for farmers to invest in a new sector and/or region
- Faster growth opportunities through greater scale
- Greater diversification of risk
- Opportunities for newcomers to the industry to establish a stake in a farm business
- Finance from external investors that are not interested in direct farm ownership.

ANZ New Zealand have identified several critical success factors in an equity partnership which include: having a robust, achievable strategy for value creation; ensuring all the appropriate due diligence has been completed; having good relationships, common objectives and motivations between shareholders; having an appropriate business structure; ensuring there are robust business processes and systems in place; clear communication with regular meetings; and agreed procedures for entry/exit of shareholders, as well as for resolving any disputes.



Source: (ANZ, 2014)

3.2 Family farms are also becoming more sophisticated

Traditional models of share farming and lease farming are increasing in popularity

Anecdotal evidence suggests that the relatively high cost of land and the perpetual quest for scale efficiencies are gradually increasing the popularity of more traditional models of land leasing. New variants of collaborative farming models that adopt practices common to corporate farms are also becoming more popular.

Lease farming

Lease farming (also known as tenant farming) has been used in Australia since the second half of the twentieth century. The leasing model is considered to be a relatively safe avenue for young people to gain experience and enter into farming and for more experienced farmers to increase efficiencies of scale without the expense of purchasing more land (Parliament of Victoria, 2012).

A farm lease is a contract between a tenant and a landowner which allows the tenant or 'lessee' to rent land from the owner or 'lessor' for a fixed period of time. The leasing of land can occur on a short-term basis (i.e. one year) or a longer period. Annual leasing is common in the cropping sector which requires long rotations (e.g. potatoes which typically work on a one in five year cycle). Under this type of arrangement, there is usually on an annual fee and 'makegood' basis whereby the tenant replants the field into pasture at their cost. Under longer-term lease arrangements, the tenant typically negotiates a rate for three or more years, usually on a rolling basis. Most of the land that is leased in lease farming arrangements is owned by ex-family farmers or their widows or absent children (McKinna, 2010).

A 2012 Victorian Parliament inquiry looking at the attraction and retention of young farmers highlighted some of the contemporary models of lease farming that are emerging in the state. The inquiry noted work being done by Murray Goulburn Co-operative with state government support to develop and promote innovative leasing models. Patten Bridge from Murray Goulburn Co-operative cited one example of a new type of leasing model that involved a "the lessee funding the building of the new dairy on the farm and taking the capital expense of funding that dairy on the basis of a 10-year agreement" (Parliament of Victoria, 2012).

Anecdotal evidence from the recent Victorian Parliament inquiry found that "leasing seems to be becoming increasingly common across Victoria", and that "leasing is more common in Western Australia than in Victoria" (Parliament of Victoria, 2012). Long-term leasing is also likely to become more common though, as the current generation of farmers approach retirement and many ex-farmers make their land available for commercial use by another party while remaining living on their property (McKinna, 2010). It should be noted that lease farming is not likely to grow in popularity in areas where land may be over-valued due to pressures from amenity farming or property development, given that leases are based on the return to capital of the market price of land.

Knowledge and skills implications: Lease farming

In educational material on leasing models designed for their members, Dairy Australia highlights several key ingredients common to successful leasing arrangements. These include: mutual respect and trust between both parties; a written document which clearly states the expectations of each party; a realistic individual budget developed by the lessee; contingency plans for covering the repairs and maintenance expectations by the lessor; and the lessee avoiding 'narrow attitudes' and not making ongoing investments in their farm. On the latter point, Dairy Australia note that, "in most cases where a lessee has grown assets in a lease situation, they have left the farm in a far better state than when they leased it – but they spent money in areas that made money for both parties" (Dairy Australia, 2014b).

The leasing model imposes a fixed financial commitment on lessees for the duration of the lease which can sometimes prove problematic – particularly in instances where commodity prices fall dramatically. The Victorian parliamentary inquiry therefore noted the need for young farmers to be well informed about the positives and negatives of leasing and the importance of carry out due financial diligence (Parliament of Victoria, 2012).

A final note of caution on the skills and knowledge implications of lease farming models relate to the risks of short-term leases. In the Victorian parliamentary inquiry, Nic Gowans from the Victorian Department of Primary Industries' Ballarat office cautioned that if agriculture becomes dominated by short-term leasing, knowledge of the land and the instincts that farmers gain from working an area over time is likely to be lost.

Share farming

Variants of the share farming model have been used in Australian agriculture since the early twentieth century – predominantly in the cropping and dairy sectors. Share farming typically involves a business partnership between two entities whereby one party provides the land and infrastructure and the other the labour and operating equipment. Profits between the partners are shared according to a pre-determined agreement. Within the dairy sector, a common model involves one partner providing land and infrastructure (dairy, irrigation, feed storage, etc.) and the other the cows and labour (McKinna, 2010).

The limited data that is available suggests that the incidents of farmers using the share farming model is increasing. Data from Dairy Australia shows that the proportion of Australian dairy farmers increased from 15% in 2009/10 to 18% of farms in 2012/13 (Dairy Australia, 2013a) (Dairy Australia, 2010).

More sophisticated corporate style models of collaborative farming are emerging

More sophisticated variants of the traditional share farming models are starting to emerge with joint venture farm enterprises like Bulla Burra in South Australia and DB Group in NSW (see

Case study 8 below). Elements of these new collaborative farming models can include the pooling of joint venture partner resources, the creation of a new business with an independent board in which the partners are shareholders, the leasing of partners' land assets to this company, the sale and lease back of heavy farming machinery, and collective specialisation in crop rotation.

In 2007, the owner of Bulla Burra, John Gladigau, established a private consulting company - Collaborative Farming Australia (CFA) – to support farmers to form collaborative farming ventures. Levels of interest in this model of farming have far exceeded the ability of CFA to provide support. According to Gladigau, they have also had to dissuade some farmers from pursuing the model as they did not possess the types of culture and attitudes such as a “being able look outside the square and collaborate effectively with others” that are fundamental to the success of these new models.

Case study 8: DB Group

DB Group – Corporate style collaborative farming in Southern NSW

DB Group is a group of businesses located in Southern New South Wales. Formed in 2008, it is the result of a merger between four family-run farming businesses. Rather than pursue a debt-financed farm growth model, DB Group operates as a simple limited trust, whereby each family retains the land they own in their individual names, but lease the land to DB Group who provide either fixed or variable income streams. This approach provides land access certainty through formal legal arrangements. DB Group itself owns everything but the land, including machinery and livestock and employs the labour responsible for growing and marketing the crops. To maximise the returns from the machinery and personnel they manage and reduce operational risk, DB Group also grows and markets crops on leased land and operated an off-farm retail stock feed and saddlery.



The alternate structure of DB group arose from five tumultuous years for broadacre farming including challenging seasons, significant increases in input costs and the pending deregulation of the wheat market. This need for change was heightened by the impending generational shift of farm ownership and managing. “All around we have seen families leaving farms and it has not necessarily been the drought – it’s the fact they haven’t been able to successfully work through succession planning so that everyone’s goals are met” described Matthew Dart, co-owner of DB Group, third generation farmer and former agribusiness consultant with Westpac and Rabobank.

Dart, with the assistance of professional advisory firms, reviewed his family’s businesses and realised his farming operations needed to scale up and retain their own intellectual property - to reduce the burden of rising fixed costs and achieve greater efficiencies. However, continuing to use debt finance would only increase the financial stress felt during poor seasons, perpetuating the cycle of farming debt. Friends of Dart and his wife, David and Alison Burcham also had the same problem and together, the Darts and the Burchams decided to develop the shared business model which became DB Group. In 2014, an additional family, the Coopers was added to the business, thus demonstrating its flexibility.

According to Dart, one of the greatest challenges in setting up DB Group was convincing banks to provide the debt financing to purchase machinery and livestock. Banks discouraged the separation of farm land ownership and management, seeing the prospect of doing so as far too risky. DB Group switched to a major retail bank, and was only able to gain their full support after Dart’s father had provided his farmer’s security and DB Group had proven itself through a succession of profitable years. According to Dart, this ‘was an exception rather than the rule’, and identifies his background in agribusiness banking as a key factor in successfully gaining the support of DB Group’s bank.

Today, DB Group farms approximately 10,000 hectares of crop for its owners, around 4,000 to 5,000 hectares of crop for others and 4,000-5,000 ewes as a part of its core business. Dart sees many opportunities for the business going forward. However, the DB Group maintains a Board structure an Advisory committee which together ensures DB Group remains strategic in its business decisions.

3.3 New sources of finance are emerging

There are several cases in Australia of businesses successfully utilising crowd funding

The internet has facilitated the development of the crowd-sourced equity funding (CSEF) as a potential alternative to traditional bank debt funding for Australian agrifood enterprises. Several countries, including the United Kingdom and New Zealand, have recently implemented CSEF regulatory regimes.

In May 2014, the Corporations and Markets Advisory Committee (CAMAC) released a Government commissioned report on crowd-sourced equity funding. The CAMAC report found that the current law makes it difficult for companies in Australia to use CSEF to raise crucial initial 'seed' or early stage capital to help innovative start-ups and other small enterprises develop. CAMAC recommended an alternative regulatory framework be developed which could boost competitiveness and innovation by increasing the funding options available to entrepreneurs (CAMAC, 2014). Under the Government's new Industry Innovation and Competitiveness Agenda, the Assistant Treasurer is currently consulting on the regulatory framework to facilitate CSEF (Department of Prime Minister and Cabinet, 2014).

Once a new regulatory framework has been approved by Government, there will likely be new types of CSEF opportunities for agrifood entrepreneurs in Australia in light of the expansion plans of AgFunder – the first agrifood CSEF platform based in the US (see Case study 9 below). A note of caution is important in assessing the potential growth of CSEF opportunities in Australia. Dr Paul Kelly, the managing director of venture capital firm OneVentures, suggests that CSEF is a "very recent phenomenon" and "little is known about what is a successful crowdfunding equity strategy" and therefore "retail investors should approach this very cautiously". He also argues that a paucity of later stage venture capital funding – rather than seed funding – is the greatest challenge for Australian start-ups who "are generally having to look elsewhere for larger capital investments and as they succeed and they grow, they are forced to go offshore in many occasions" (White, 2014). In their submission to the CAMAC review the ASX also noted that CSEF "has focused to date on raising small amounts of capital motivated more by philanthropic rationales than by prospective financial gains" and that "it is not clear how many potential issuers may be attracted to using crowd sourced finance" (ASX, 2014).

A variant of the crowd funding model that does not involve any equity stakes is already well established in Australia. Under this model, businesses use online platforms like Indiegogo, Pozible, and iPledge to seek donations or 'pledges' from 'supporters' who receive in-kind rewards – such as produce, merchandise or experiences (see Case study 10 below). These rewards are proportional to the monetary value of the pledge that supporters make.

Case study 9: AgFunder

AgFunder: The world's first crowd-sourced equity funding platform for agrifoods

AgFunder, the first dedicated crowd-sourced equity funding focused on investments in the agrifood was launched in the US in September 2013 by CEO and founder Rob Leclerc, a former partner at SeedRock Capital Group, a venture capital firm focused on natural resources and agriculture.

AgFunder offers both debt financing and equity offerings for individual and institutional investors. AgFunder is initially focused on funding smaller opportunities that range between US\$500,000 to \$1.5 million. The geographic scope of AgFunder has been limited to US and Canada based opportunities, although the business has plans to offer investments in Australia and South America. Going forward, Leclerc believes that the companies that are most likely to get funded through AgFunder are 'sexy' start-ups – like aerial drones and robotics – or those with an overt social mission.

The first opportunity launched in February of this year by AgFunder was to raise US\$400,000 for OnFarm, a Californian company whose software integrates data from multiple sources as real-time soil moisture, image and weather data. Prior to the offer being closed, AgFunder raised \$800,000 – double the initial target.

Companies that have raised funding through AgFunder since February include:

- Kuli Kuli (\$355,000) – A Californian company which manufactures gluten-free nutrition bars containing the 'superfood' moringa which they source from women's growing cooperatives in West Africa
- aWhere (\$7,000,000) – A Colorado-based software and analytics company that provides provide real-time, hyper-local agronomic or agro-meteorological data to subscribers
- Tree Global (\$400,000) – An international tree nursery service company based in Ontario
- TerViva (\$1,200,000) – A Californian company developing a new class of agriculture crops that can be grown on sub-prime agriculture land with far fewer inputs than crops such as corn and soybeans.

The AgFunder business model is based on FundersClub – the world's first online venture capital firm. AgFunder sources its own investments and then creates a dedicated investment fund for each company, into which it can then syndicate investors. AgFunder conducts due diligence before companies are listed on the platform. For the deals that it sources, AgFunder takes a 20 per cent carried interest, or a share of the profits once the principal is returned to the investors.

As AgFunder scales up, Leclerc hopes to work with accelerators – venture funds and angel investors who are able to develop deals locally – and then use its technology platform to syndicate their investment. These accelerators would be listed on the AgFunder platform as sponsors or managers of the investment, and AgFunder would then syndicate investors into the vehicle that they manage. With this model, AgFunder would vet the investors, and then the investors would run due diligence on the investments.

Sources: (Gould, 2013; Gillam, 2014; AgFunder, 2014)

Case study 10: Jonai Farms

Jonai Farms – Crowd funding pioneers

The Jonas family established Jonai Farms - a free-range rare breed pig farm – outside Daylesford in Victoria in 2011. In 2013 they become the first farmers to successfully crowd fund an on-farm infrastructure investment.

In mid-2013 they raised \$27,570 – using the Australian website Pozible – to build a licensed boning room and retail butcher's shop on their farm. Their first Pozible campaign reached its initial target of \$21,450 on day 19 of the 40-day campaign. The Jonas' provided Jonai Farms calendars and a total of 400kg of meat to their 166 supporters – in gifts that were proportional to the size of their pledge. Approximately 30 of their supporters from this campaign also attended Jonai Farms on-farm Salami Day mid last year.

Establishing an on-farm butchery has given the Jonas "full control over the quality, reliability, and finances of our supply chain, and it's allowed us to respond individually to our community's desires". It has also enabled them to "ensure all our products are preservative and nitrate free, and enabled us to develop a line of 'single-estate sausages' made entirely from things grown here on the farm, including all our own herbs and garlic".

Their most recent campaign which ended in June 2014 raised \$33,265 (of a target of \$30,000) to build temperature and humidity-controlled curing room for making artisanal smallgoods like prosciutto and salami, and a commercial kitchen for producing cooked charcuterie such as pâté de tête and rillettes.

Sources: (Jonas, 2013; Jonas, 2014)

4 Businesses are dealing with increasing complexity and risk

The operating environment for businesses in the agrifood industry is becoming ever more complex. This complexity stems from the adoption of new technologies, reforms to the water market, increased climatic volatility, and government reforms of statutory marketing arrangements.

It is becoming increasingly important for businesses in the agrifood industry to effectively manage these complexities by employing effective risk management strategies and choosing the right business models. It is also important to recognise that the 2002-07 drought diminished the financial capacity of many farmers to absorb and manage the risks associated with greater business complexity.

4.1 New technologies will continue to profoundly impact business practices in agrifood

The wave of digital agriculture is gaining traction

Spatial and information technologies have been responsible for a number of important innovations in agriculture, and particularly cropping, including:

- The use of Global Positioning Systems (GPS) for more precise control of heavy machinery to reduce soil compaction and ensure the most efficient application of inputs
- The use of remote sensing, combined with sensors fitted to harvesters, for site-specific crop and weed management strategies e.g. variable rate technology and decision support systems (McKinna, 2010).

The next wave of digital technologies, and particularly the convergence of sensors and robotics, is likely to have profound impacts for the management of food production systems.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the University of New England have recently set up the Kirby Smart Farm in Armidale to demonstrate the potential of sensors and supporting services. They describe how a series of sensors are used to monitor soil moisture, temperature and livestock, together creating an information stream to support flexible decision making for pasture and livestock management. Local wireless networks allow the fixed and mobile sensors to send a continuous stream of data to a remote cloud-based computing and analytic service that is supported by a baseline arm database comprising of numerous spatially-enabled 'information layers' (Griffith, et al., 2013).

Meanwhile, robots armed with sensors that can crawl through paddocks, identifying and treating individual plants, are already under development. The Queensland University of Technology, for example, is developing agricultural robots that feature (Perez, 2014):

- Cheap sensors to obtain high accuracy in robot localisation and navigation.
- Cameras to detect and avoid obstacles (potentially removing the need for expensive radar and laser range sensors).
- Cameras for weed detection and classification that can be used to control variable rate technology in herbicide application (and ultimately study weed population dynamics).

- Operating speeds of 5 to 10km/h, which could enable novel, alternative, weed destruction methods e.g. based on mechanical methods, microwave technology, thermal and solarisation.

These types of robots are likely to become more attractive as the limits are reached in terms of the size of farm machinery. Widespread deployment of sensor-enabled robots is probably a decade away, although leading farmers are already pointing the way to the future. For example, Zespri – New Zealand’s largest exporter of kiwifruit – now uses drones to undertake crop inspections, and to guide the application of treatments.

Policy Horizons Canada recently identified key emerging technologies likely to shape the future of agriculture. These technologies are outlined in Appendix C along with the year that each technology is projected to become mainstream (defined as when start up and venture capitalists widely invest in these technologies).

The full productivity gains of biotechnology remain untapped

In the Commonwealth Government’s Agricultural Competitiveness Green Paper, the potential for genetically modified crops to better equip cropping systems to withstand drought, frost and other climate challenges was cited as a significant opportunity for Australian agriculture going forward (Commonwealth of Australia, 2014a).

Agricultural biotechnology involves the improvement of plants, animals and microorganisms’ properties through an improved understanding of their DNA. Biotechnology is widely viewed as having an important role to play in dealing with emerging challenges, ranging from climate change to pressure on global food supplies. Specifically, agricultural biotechnologies, such as genetically modified crops, have the potential to transform agricultural productivity by delivering increased yields and lowering input costs. They can also improve environmental outcomes by reducing the need for inputs such as herbicides and water (Commonwealth of Australia, 2014a).

Genetically modified crop production in Australia is highly regulated. Currently, canola and cotton are the most commonly produced genetically modified food crops produced in Australia, but a variety of other genetically modified foods can be imported and used as an ingredient in packaged foods. However, field trials of pineapple, papayas, wheat, barley and sugarcane are underway in Australia. These products have been modified for insect resistance, herbicide tolerance, colour, oil production, sugar composition, flowering and fruit development (Pazzano, 2012).

There is additional potential for biotechnology to enable agricultural systems to be adapted to produce pharmaceuticals and products with industrial applications, thus expanding the markets in which farmers can operate (Commonwealth of Australia, 2014a)

Food processing technologies are continually evolving

The food processing sector has been relatively fast to adopt new processing and packaging technologies either to reduce cost or to differentiate their product. Examples of new and emerging processing technologies include: high pressure processing; microwave technology; ultrasonics; thermal processing; pulsed electric fields; sensory analysis and nano-technology. New packaging technologies include modified atmosphere and smart barrier films, and biodegradable materials (McKinna, 2013a).

The potential impacts of new technologies will continue to be profound

While it is difficult to anticipate how new technologies associated with digital agriculture and biotechnology will transform the agrifood industry, the impact is likely to continue to be profound. At a macro level, the adoption of new technologies in the sector will increase production, processing efficiency and quality and heighten the need for a smaller – but more highly skilled – workforce.

In the short-term within agriculture, the amount of information available to support decision making combined with the capacity of individual ‘treatment’ of plants and animals, should result in step changes in the capacity to produce to specification at lower cost (particularly for more intensive production systems like dairy and horticulture).

A recent research project conducted by CSIRO and the University of New England anticipated that:

- Sensor data and related digital services will be integrated into vertical supply chains to create efficiencies and innovation in processing, distribution and marketing
- Agribusiness companies will increasingly focus on using digital services to optimise supply chains and complement their traditional focus on physical products and processes
- Biosecurity and food safety initiatives will increasingly use agricultural sensor data for early detection and monitoring of incidents
- The development of tools and methodologies for biomass and carbon accounting that can be used for farm operations as well as emerging carbon markets (Griffith, et al., 2013).

Knowledge and skills implications: Achieving higher productivity through technology

The technology-driven trend of production and processing complexity, sophistication and automation will require a smaller, but more highly skilled agrifood workforce that is engaged in less labour intensive activities.

At a fundamental level, the effective operation of new technologies requires workers to have higher language, literacy, numeracy and digital literacy levels – an issue that needs to be addressed first at a school level. Skills and knowledge requirements are also becoming more specialised and fragmented with the emergence of proprietary technologies associated with specific industries, companies or technology manufacturers. In some cases, new technologies are highly sophisticated with user-friendly interfaces, making them intuitive to use, while others require considerable upskilling of workers and changes to training products (AWPA, 2013b).

Stakeholders consulted by AWPA for the food and beverage workforce study indicate a level of frustration with the generally slow uptake of new technologies in the sector. This tardiness was attributed to a number of factors which included, "poor perception of relevance, attitudes towards risk, likelihood of return on investment, observable outcomes, and complexity and integration into existing systems" (AWPA, 2013b).

4.2 Effective water trading is now key to risk management

The recent experience in Australia with low water allocations and changes in water trading regulations have meant that the use and allocation of water now plays a critical role in farm management and decision-making. A key turning point in the sector was when many processors began to purchase temporary water to supplement the reduced availability of permanent water. Many irrigators in particular then adapted their farming methods to take advantage of the additional flexibility the restructured water market has given them.

Some farmers are engaged in profitable water trading strategies

The escalating price of permanent and temporary entitlements and the declining allocation of permanent water entitlements are providing new water trading strategies for some farmers. As a result of these new dynamics in the market, four quite distinct but opposing strategies have evolved:

1. **Transition to temporary water** – Water entitlement holders sell their permanent water and buy temporary water on an ‘as needs’ basis.
2. **Opportunistic sales during good years** – The owners of permanent water entitlements opportunistically make the decision to sell off water onto the temporary market, depending on seasonal conditions. Under this scenario, if the seasonal conditions are favourable and water is plentiful, they plant a crop. In years where seasons do not look favourable and water is scarce and more expensive, they sell their water and put the proceeds straight to their bottom line. This strategy only applies to annual crops as permanent horticulture needs water to survive. Anecdotal evidence suggests that this strategy has become highly profitable for some businesses.
3. **Buy and lease** – Investors such as superannuation funds buy permanent water and lease it out on a three to five year basis. Underpinning this strategy is an expectation that water will increase in value over time.
4. **Dairy** – Farmers sell their water either temporarily or permanently and buy in feed – a strategy that only applies in dairy (McKinna, 2010).

Knowledge and skills implications: Managing water trading

The ability to use water inputs flexibly, such as through water trading, is a key risk management capability for farmers (Commonwealth of Australia, 2014a). The effective management of water is akin to complexity of managing a share portfolio. Farmers are required to navigate a range of complex decisions on a regular basis related to selling permanent water and buying back temporary water, irrigating pasture or buying in feed, planting a crop or selling water.

4.3 Increasing climatic volatility is changing farming practices

There is a general consensus that climatic volatility is increasing. Projections of future climate change for Australia involve changes to a range of climate variables including average temperatures, precipitation and sea level. As a result of these changes, projections also indicate that the frequency and intensity of extreme weather events will change (Productivity Commission, 2012). The Bureau of Meteorology and CSIRO have predicted that droughts are likely to become more frequent and severe in parts of Australia (Commonwealth of Australia, 2014b).

Within agriculture, climate change will affect the yields and quality of agricultural outputs. Farmers have already responded to changing weather patterns by adopting new risk management and production practices such as modifying crop planting times, crop types (e.g. the opportunistic planting of summer or winter crops) (Productivity Commission, 2012).

Managing climatic volatility is particularly challenging for more complex production systems. Changing practices and technologies always carries risk for farmers as they ‘perturb’ the farming system. This risk is enhanced if farmers need to adapt production systems in response to changes in climate (e.g. moving from perennial to annual pasture systems to reduce evapotranspiration losses in drier years - a slow, difficult and expensive transition). If implementation is poorly executed (which is more likely when dealing with complex systems and sophisticated technologies) farmers risk losing a lot of money.

4.4 Marketing has become more complex with the phasing out of statutory marketing authorities

Single-desk marketing arrangements, either at state or federal level, whereby a statutory authority had compulsory acquisition, marketing and price setting rights, have been gradually phased out in agriculture since the 1980s. Statutory marketing arrangements are ongoing in some industries, namely rice and potatoes (Gray, et al., 2014).

The Productivity Commission argued that the ways in which many of these domestic marketing schemes were implemented reduced incentives to improve productivity by differentiating production. Compulsory statutory marketing arrangements in particular prevented farmers from searching out new markets that would yield more than average returns (Productivity Commission, 2000). Furthermore, the restrictions introduced by Statutory Marketing Authorities (SMAs) reduced incentives to innovate by improving quality or finding new ways of marketing, as farmers were prevented from choosing how, when, at what price and to whom they sold (NFF, 1998).

The phasing out of statutory marketing authorities has meant that farmers transitioned from providing their produce to a single desk authority to being responsible for the sale of their own produce. The deregulation of SMAs has provided opportunities for farmers to develop new products and find new markets that yield more than average returns, which has improved productivity growth through higher value products. The reforms have also allowed buyers to seek specialised producers and processors without being constrained by SMA regulations (Gray, et al., 2014).

The deregulation of SMAs has favoured sophisticated, large farms that have been able to manage the additional complexity. Conversely, many farmers who had previously relied on good agronomy or animal husbandry realised they needed to adapt to new open-market dynamics by acquiring business management skills with which they are unfamiliar (McKinna, 2010).

5 Consumer demand for differentiated products is increasing

The increasing volume of information available online coupled with an overall growth in Australians' standards of living have resulted in increased consumer demand for food products that are perceived to have social responsibility or nutritional value – such as organic produce, free range eggs, nitrate free milk, or hormone free beef. Consumers also now expect products to have multiple characteristics - often simultaneously – for example nutritious, value for money, ethical, and tasty.

It is also important to recognise the symbiotic relationship between supermarket marketing campaigns and consumer preferences and concerns. In many instances the initial demand from consumers for new differentiated products has been driven in the first instance by supermarkets. An example of this is the recent Coles-led marketing campaign to sell hormone free beef. In some instances, Government has demonstrated a willingness to 'nudge' consumers to make better dieting decisions through standards and regulation.

To date, many of the growth opportunities associated with types of highly differentiated food products have been captured by niche processors – at least in the initial stage of new market development. It is expected that large-scale processors will continue to increase their share of production in these markets in coming years – often through the acquisition of successful small scale niche processors. A common pattern has emerged whereby large food processing companies leave the investment and risk associated with developing markets for new types of products to smaller niche processors. If a product is successful, these larger companies then pay the premium to acquire the smaller businesses and the market for their product.

'Preventative health' diets are becoming more common

One manifestation of evolving consumer demands is the increased prevalence and speedier adoption of 'preventative health' diets and the growing market for premium products associated with these diets – such as such as gluten free pasta or lactose free milk. High-profile nutritionist Dr Rosemary Stanton notes that that people who come from a higher socio-economic background are more likely to declare themselves gluten-free because they can afford the more expensive foods that come with adopting the diet⁷ (Whyte, 2013).

The market for functional foods is growing rapidly

Functional foods are considered to be any food or food component that may provide demonstrated physiological benefits or reduce the risk of chronic diseases, above and beyond basic nutritional functions (CSIRO, 2004). Examples include chia seeds and algae. The global functional food industry increased 150% between 2003 and 2010 with a CAGR of 14% (Nutrition Outlook, 2011).

Changes in consumers' diet, lifestyles, awareness, and interest in their own health and well-being are factors creating a demand-pull for products with the potential to deliver beneficial health outcomes. Supply-push factors are also evident. Expanding scientific knowledge and technological capability, particularly ingredient exploration and development, has led to increased product innovation (Leatherhead, 2011).

⁷ A recent analysis by The Age newspaper supported this assertion by finding that Medicare data shows that the highest rates of the diagnosis of coeliac disease (a condition that affects less than one per cent of the population) in the country are in Melbourne's eastern suburbs, including two of the city's wealthiest suburbs - Toorak and Richmond.

However, it is warned that the proliferation of functional food businesses will only lead to future market growth if substantiated with independent research findings as to their products' nutritional benefits. Australia's relatively high levels of disposable income, strong reputation in food quality and safety and investment in food research and development indicates that domestic supply and demand of functional foods has significant room for growth. However, consumers demand proof, as substantiated by independent scientific research, that a functional food will deliver the benefits promised (Leatherhead, 2011).

Publicly funded campaigns around healthy eating will become more common

The overwhelming trend towards healthful habits such as better diet and nutrition is attributable to increased consumer awareness as well as increased focus on preventative health through diet and nutrition. This latter factor has seen the governments play a more proactive role in discouraging the consumption of energy-dense, nutrient-poor food and drinks and promoting consumption of fruit and vegetables, low fat dairy whole grains and lean meat and fish (University of Wollongong, 2013). This has resulted in the 2013 revision of the Australian Dietary Guidelines, an authoritative source of dietary information used by health professionals, policy makers and educators in Australia.

More recently, the 2014 Australian and New Zealand Ministerial Forum on Food Regulation Forum comprising Commonwealth, state, territory and New Zealand Ministers agreed that a Health Star Rating system would be voluntarily implemented over the coming five years. Such a system would give packaged food and drinks a rating out of five to reflect their nutritional 'value' as determined by the 'Health Star Rating calculator' with the expectation that higher ratings would 'nudge' consumers to make better dietary choices. Already, major retailers, Woolworths and Sanitarium have committed to adopting the new system (Bainbridge, 2014).

Consumers are more concerned about the environmental impact of food production

One important trend has been the mainstream incorporation of values that were once seen as the domain of the 'environmental movement'. As a result, consumers are increasingly conscious of the 'bads' associated with bio-science influenced, industrial food production. Supermarkets in Australia and other developed nations have responded to consumers' increased desire for 'greening' through the creation of retailer-led private standards, certification, accreditation, eco-labelling, and branding systems (Smith, et al., 2010). As discussed on page 23 above, these private standards impose additional costs on producers and processors.

Provenance is becoming more valued

Another trend associated with rising incomes and increased access to information through the internet is the growing interest among Australian consumers about where food is produced. This has been driven in part by a desire by some consumers to reduce the 'food miles' associated with their eating habits as well as a preference by some consumers to support local agrifood businesses. Increasing numbers of consumers – particularly those with higher disposable incomes – are willing to pay premium prices for local products. Subsequently, businesses are following consumer demand by stocking and using more locally produced products. It is also worth noting that the increased value placed on food provenance is closely linked to the increasing popularity of farmers' markets around the country and growth in farmers selling directly to restaurants.

Knowledge and skills implications: Production of highly differentiated products

The ability to successfully capture the price premiums associated with differentiated products depends on several key capabilities. These include: market research, market development, branding and the effective use of social media. For business processing products with very specific characteristics and attributes, additional skills requirements are typically associated with food safety and quality assurance, raw food material storage and handling methods, investigating nutritional characteristics of products before, during and after processing, and microbiological sampling and testing (AWPA, 2013). For livestock processors that emphasise the provenance or ethical attributes of their products, key skills include building relationships with supply chain partners to ensure that animal welfare practices are consistent across the value supply chain and managing low-stress animal handling.

Maintaining a social license to operate is increasingly important

The increased demands and activism from Australian consumers around issues such as animal welfare, sustainable sourcing, and the use of GM products, pesticides and antibiotics has meant that businesses in the agrifood industry now need to make sure that they confirm with societal expectations and maintain their 'social license' to operate.

Many agrifood businesses are frustrated that these societal expectations and norms around food and food production are constantly evolving and not always well-informed. In their submission to the Australian Government's National Food Plan green paper, the Australian Centre for Food Integrity echoed these frustrations:

Agriculture and food production continually risk their Social License and freedom to operate due to the lack of factual information independently available to the media, consumers, policy makers and other influential commentators. There is no process in place to build consumer trust in our ever-changing food system (Australian Centre for Food Integrity, 2012).

Knowledge and skills implications: Maintaining a social license to operate

Historically, farmers have had a mixed record in responding to public criticism of their farming practices. In his recent review of agricultural education, Jim Pratley states that a common response by farmers is to "attack the attacker, using science alone to justify current practices". Pratley notes that type of approach "is ineffective in building stakeholder trust and support, and it tends to increase suspicion and scepticism about the industry being worthy of public trust" (Pratley, 2013).

Rather than defending the 'right to farm', a more productive approach for primary industries to maintain their social license is to pro-actively lead community attitudes in establishing the terms of agriculture's social licence to operate (Williams & Martin, 2011). This approach requires strong leadership, savvy communication and marketing and voluntary accountability among processors. It also requires a willingness to accept criticism even when it might seem unfair or incorrect which may result in short term pain in search of the long term gain. A more pro-active and positive approach recognises that both primary industries and community attitudes and standards need to evolve in parallel (Pratley, 2013).

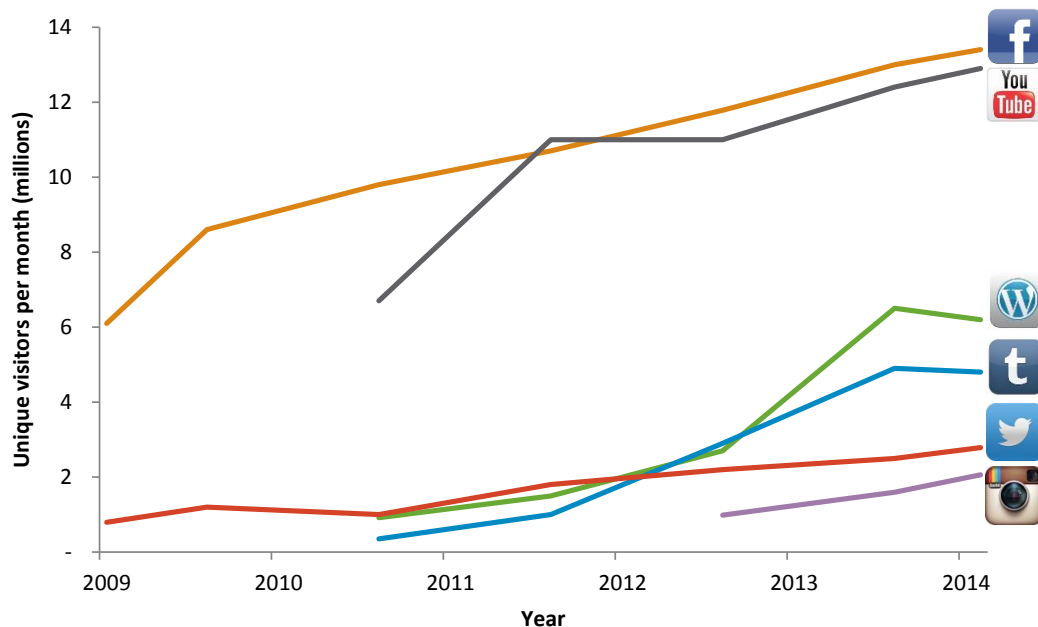
A key skill for those in the sector that want to take a more pro-active approach to maintain their social license will be the effective use of social media and crisis management (see page 57 for a further discussion of this).

6 Social media has created new ways to engage with consumers

Access to information has accelerated through social media and the internet

The last ten years have seen massive changes in how Australians use social media and the internet to interact with brands and consume products online. Recent research by Nielsen found that the majority of Australians (82 per cent) now spend an average of 23.3 hours online each week, from just an average of 6.7 hours spent online by 73 per cent of Australians ten years previously. Nielsen's research also found that seven in ten Australians actively use social media, a major behavioural shift since 2003 when less than one in ten online consumers engaged in any online social networking activities (Nielsen, 2013). The rise in Australian users of key social media platforms over the past five year is shown in Figure 16 below.

Figure 16: Australian visitors to social media platforms (Social Media News, 2014)



Online channels are now critical to successful marketing strategies

With the advent of social media, consumers have an unprecedented capacity to connect – not only with businesses, but also with each other. Consumers can instantly and publicly evaluate their experiences with goods and services online and engage directly with companies through online chat features. Consumers are also increasingly able to shape the nature of their purchases by, for example, designing goods over the internet.

The advent of online marketing and the growth of 'big data' which tracks individual consumption patterns and preferences, has also made it significantly easier and cheaper for agrifood companies to tailor their marketing directly to individual customers. A reflection of the increased importance of online channels is that online advertising now accounts for 27 per cent of total ad spend across Australian companies – an eight-fold increase from 2003 (Nielsen, 2013).

The advent of social media has been significant leveller for niche food processors who can access the same free online platforms as large scale processors. Social media has allowed processors to bypass traditional communication channels and instead communicate directly with customers (see Case study 11 on page 55 for an example of this). Many niche processors now use social media and online platforms to rapidly test, develop and launch products. In contrast, large processors are often encumbered by the hierarchical processes that preclude it from swiftly taking products to market (e.g. new products would require national product launches as accompanied by a multi-media marketing campaign).

Online co-creation is becoming more common

Online co-creation is the practice of produce, service and strategy development that is executed by consumers, staff and stakeholders together in online collaborative spaces. Major businesses such as Kraft and Unilever have utilised online co-creation with great success. In 2013, Unilever announced a formal partnership with 'eYeka', the world's biggest co-creation community. eYeka's network of 250,000 creators worked across Unilever's brands (such as Cornetto and Lipton) to accelerate the creation of their marketing and communication campaign (eYeka, 2013). In contrast, Kraft used online co-creation to develop an entire product line. Using the 'Communispace' platform, Kraft provided a product concept with a very short competitive 'go-to-market' window. Together, Kraft created a line of 48 'South Beach Diet' branded products that generated \$100 million in the six months following its launch (Communispace, n.d.).

Though both these examples are global food and beverage conglomerates, it is important to note that these platforms are also highly accessible for niche processors. Unlike traditional approaches, online co-creation does not require significant capital investment in research and development, which is a distinct competitive advantage of large corporate processors. Furthermore, crowd sourcing of product ideas has the distinct benefit of generating consumer buy-in and decreasing product launch risk.

Case study 11: Madame Flavour

Madame Flavour – Premium herbal tea with a personal touch

Madame Flavour is a Victorian based manufacturer of boutique teas. The company was founded in 2007 by Corinne Noyes, a former marketing executive with Simplot Australia whose experience included creating and branding Leggo's Stir Thru Sauces and the Talking Italian campaign.

After conducting market research, Noyes identified a niche for leaf teas with a feminine focus. Given that women are the large majority of specialty tea consumers, the bulk of specialty teas and many of the existing major brands such as Lipton, Twinings, and Dilmah still had at that time “colonial, male branding”.

An early breakthrough for the company came after Noyes contacted Woolworths' tea and coffee buyer to make a very quick pitch. “From the beginning I planned for Madame Flavour to be on the shelves of supermarkets. Coming from a marketing background I knew what it took to get there too. You must have a product that's genuinely unique and a good marketing plan to show people will want to buy it, and that you're going to make consumers aware of your product. I also wanted to build a business of a certain scale as it's what I knew [from my background].” As such, from the outset, Noyes understood that to achieve the efficient scale required to supply major supermarkets, Madame Flavour needed specialist expertise across the supply chain. Therefore, while Noyes and her team personally develop the tea blends; production, warehousing and transport for Madame Flavour are outsourced. A key challenge at the beginning was securing sufficient finance. The business began with only a small amount of savings which grew through “borrowing little bits here and there, convincing the banks, mortgaging everything we owned.”

From the beginning Noyes intended to give Madame Flavour a personal touch and provide a level of interaction with customers that is unusual for a supermarket brand. “Every packet of tea has a letter inside from Madame Flavour to our customer – or Kindred Spirit. To date we've received about 20,000 letters in response to this alone, often addressed to 'Madame' herself. There's something exciting and reassuring about directly connecting with the story of the food you're consuming.”

Madame Flavour also actively uses social media to promote the brand and interact with customers, even receiving help with the French and German translations for their packaging after putting out a request to the brand's followers on social media. “I am always amazed at how generous our customers are, and at how much they enjoy being involved,” she said.

After securing distribution with Woolworths and Coles, Noyes has actively tried to diversify Madame Flavour through supply to hotels, cafes and airlines. Food service channels are the fastest growing part of the business, and according to Noyes, represent a significant opportunity going forward.

Noyes has identified “going to supermarkets without scale” and “managing growth carefully” as the key set of challenges going forward. She notes that, “Getting ranged is one thing, but staying ranged requires a level of sales, marketing and advertising. We are now competing with some of the world's largest multi-nationals, the challenges are around how to do that as a team of just seven”. Noyes recognises that multinational corporations entering the tea market have significant advantages – including economies of scale, leading production and logistics capabilities - but believes the ability of niche providers such as Madame Flavour to innovate fast and develop genuine relationships with their consumers to be a key strength.



Farmers are also using social media to promote their businesses

The use of social media for business purposes is also increasing within the agriculture sector. Research from 2013 found that 76 per cent of farmers in the United States between the ages of 18 and 35 use social media to share knowledge, connect with consumers and promote their business (Rabobank, 2013). Anecdotal evidence suggests social media use among younger farmers in Australia is reaching similar levels. An increasingly common strategy for many dairy-farmers is to use Facebook and Twitter to attract readers to their blogs.

Louise Stock – a communications coordinator for DairySA which is leading a campaign to increase social media usage – notes that the majority of DairySA’s members use Facebook and other programs socially, but that only a smaller proportion use it for business purposes. She can see the potential benefits of social media in promoting and selling a farming business and in countering negative perceptions of rural life, "you can get true information out there about what farming is about – a farmer’s love of the land and their animals and their passion for farming” (Anderson, 2014). Sam Livingstone from the virtual farming community AgChatOz notes that social media can be used to highlight provenance characteristics, such as letting consumers know “that the beef [they] are buying as a consumer has been raised on grass”, or to promote alternate sales channels such as “letting consumers know which farmers’ market you are going to be at on the weekend so that they can purchase your produce.” (Rabobank, 2013)

Louise Stock notes the importance of farmers using social media to engage in dialogue, "listening to what others are saying, and responding, is just as important as pushing information out when it comes to social media (Anderson, 2014).

Case study 12: Bulla Burra

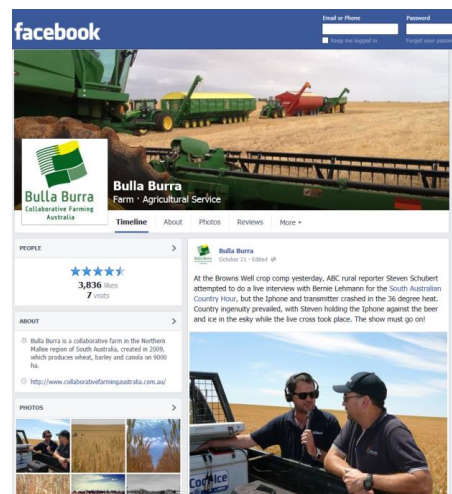
Bulla Burra – Multiple uses for social media

Bulla Burra is a farm in the Northern Mallee region of South Australia which was created in 2009 using a collaborative farming approach (see page 40). The page now has over 3,800 likes – with the most common group of followers being young people aged 18-24 years old.

In mid-2013, Bulla Burra established a Facebook to promote Bulla Burra’s work and operating philosophy. According to John Gladigau, Bulla Burra’s Executive Director, their Facebook page has provided a wide range of opportunities for them to connect with people in Australia and overseas. According to Gladigau, “whenever we post something on Facebook we get people making comments from all around the world – we are constantly being challenged by people as to why we do what we do – it has created a lot of discussion and we have learned a lot. We have also had a lot of overseas farmers on study tours come visit as a result of the page”.

On a practical level the page has enabled them to get feedback on certain farming practices (e.g. pest control), sell their old equipment, and recruit skilled staff from around the world during harvest time.

Gladigau says that the page plays an important role in counter negative stereotypes by portraying positive stories of farm life. “Farmers can be their own worst enemies – we have responsibility how we present ourselves publicly and we need to present our work as professional, accountable, and efficient”.



The power of social media can also adversely impact the sector

It is important to recognise that social media can have positive and adverse impacts on businesses in the agrifood industry. When an issue emerges that causes the general public to question the social license of farmers (see page 52), the power of social media can rapidly impact the industry in question if the crisis is not managed effectively. The majority of businesses and industry groups in the sector currently lack effective social media and crisis management skills.

An example of the potentially adverse impacts of a poorly managed media crises is the scandal that enveloped the live cattle export industry in 2011 after a story about live exports to Indonesia was aired on the ABC's Four Corners program. Largely as a result of the broadcast and a subsequent social media campaign supported by Animals Australia and GetUp, the Government suspended live cattle exports to Indonesia shortly after afterwards (Keogh, 2013d). A more recent example includes the social media campaign in 2013 against the use of sow stalls in piggeries that led Coles to announce it would only sell 'sow stall free' pork (ABC, 2014).

Knowledge and skills implications: Using social media effectively

Developing an effective social media presence requires a range of skills that include basic marketing and communications, how to identify and engage effectively with target audiences. Other key elements include a social media strategy with clear objectives (e.g. awareness, leads, sales, community building, sharing knowledge) that align with business goals and provide a clear rationale for which social media channels a business will utilise. Maintaining an effective social media presence requires a business to generate unique and interesting content on a regular basis and ensure consistency in content and messaging across all channels.

The key elements for a business or industry to effectively manage a social media related crisis include being prepared by having plans or protocols in place, responding in a timely fashion, directly acknowledging and engaging with the issues, maintaining consistent messaging, and providing a pro-active strategy to deal with the particular issues

7 The future agrifood workforce will be smaller and more skilled

Australia's future agrifood workforce will be more skilled and smaller in size relative to the industry's current workforce (AgriFood Skills Australia, 2014a). This shift represents the ongoing adjustment and consolidation patterns discussed in Section 1 of this report as well as the increasingly more sophisticated and complex business needs of agrifood enterprises outlined in sections 2 to 6 of this report.

Modelling suggests that employment within the agrifood industry will continue to contract

The Australian Workforce and Productivity Agency's (AWPA) 2013 study of the food and beverage workforce included four scenarios for Australian agrifood over the period until in 2025 as a basis for modelling the sector's workforce needs. These scenarios are outlined below:

1. **Long Boom** – the high demand for resources traded with China and other countries continues. Industries challenged by the high terms of trade undertake structural adjustment. This results in a scenario of sustained prosperity and a restructured economy.
2. **Smart Recovery** – the challenges facing Europe and the United States affect financial markets. This means low growth for Australia to 2014–15. Growth then improves and Australia benefits from industry and government strategies to implement a knowledge economy.
3. **Terms of Trade Shock** – resource prices fall mainly due to increased supply from other countries, the Australian dollar falls and we move to a broader-based economy.
4. **Ring of Fire** – a risky world with multiple economic and environmental shocks resulting in ongoing lower growth.

Within the ANZSIC Industry related to agriculture, employment levels were projected to decrease in the period to 2025 under three of the four scenarios – as shown in Table 5 below. Within the agriculture industry sub-division, the only industry groups expected to grow under all four scenarios were Poultry Farming and Other Crop Growing, which employed 13,600 and 11,500 people respectively in 2011.

Within the food and beverage manufacturing subdivision, AWPA projects falling employment levels under all scenarios with the exception of Ring of Fire – which likely reflects the protectionist trading assumptions within this particular scenario (AWPA, 2013b).

Table 5: Projected annual average change in employment levels by industry (AWPA, 2013b)

ANZSIC Industry	2011 employment levels ('000)	Long Boom	Smart Recovery	Terms of Trade Shock	Ring of Fire
Agriculture, forestry and fishing*	337.6	0.4%	-0.4%	-0.4%	-1.6%
Food, beverage and tobacco product manufacturing**	246.9	-1.4%	-1.3%	-0.9%	0.7%

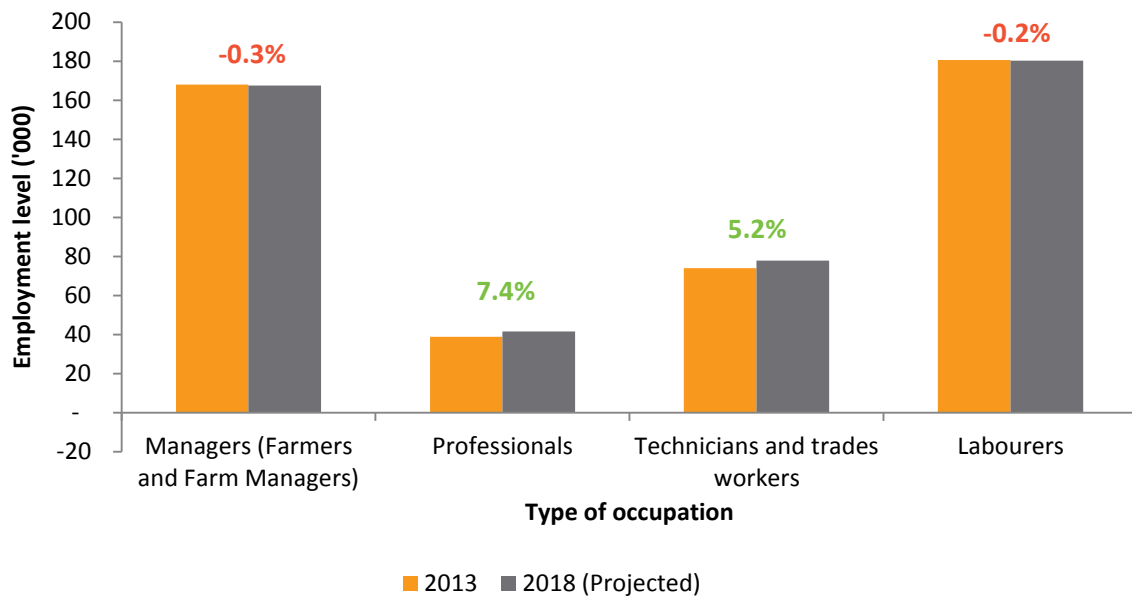
* Industry total excludes Forestry and Logging and Forestry Support Services industry subdivisions.

** Industry total excludes Cigarette and Tobacco Product Manufacturing industry subdivision.

Projections show a continuing trend towards employment in more skilled occupations

Current five-year employment forecasts by the Department of Employment also show a likely decrease in lower skilled workers in the agrifood industry over the next five years. Figure 17 below shows a contraction in agrifood industry occupations within the Labourer ANZSCO occupation group and strong growth in the Professionals and Technicians and trades workers groups. More detailed data related to individual occupation level forecasts can be found in Appendix D.

Figure 17: Projected employment levels across the agrifood industry by ANZSCO occupation (Department of Employment, 2014)



NOTE: In-scope agrifood industry occupations taken from AWPAs Food and beverage workforce study (AWPA, 2013b)

The knowledge needs of the future agrifood workforce will be profoundly different

If the agrifood industry is to fully exploit Australia's competitive advantages, it will require knowledge and skills in areas such as advanced production techniques, leadership, management, mentoring, risk management and the capability to translate research and development into successful new products (AWPA, 2013b). As the Australian Council of Deans of Agriculture argue in their submission to the Agricultural Competitiveness White Paper:

Agriculture has become a knowledge-intensive endeavour: most successful operators are not only qualified in traditional agricultural subjects, but they are also competent financial managers, have an ability to comply with complex legal regulations, are excellent communicators and negotiators, have a savvy understanding of domestic and international markets and are competent HR managers (ACDA, 2012).

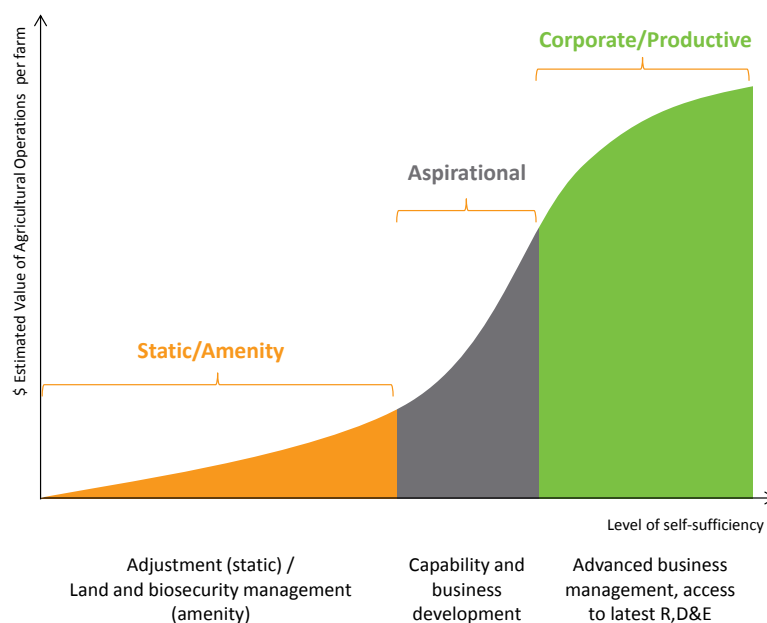
This transition to new and more complex knowledge and skill sets will fundamentally re-shape all layers of the current agrifood workforce. In some instances, businesses will need to up-skill their existing workforce. For other new and emerging capabilities, the industry will need to attract and grow an entirely new cohort of technicians and para-professionals that have yet to leave school. ***The industry's future therefore largely depends on its ability to understand what changes need to the skills base of its workforce and how to make that change.***

Larger and more successful businesses are better able to meet their future knowledge and workforce requirements independent of government

There is a strong correlation between the size and sophistication of an agrifood enterprise and its ability to successfully access and incorporate - with minimal government support - the types of knowledge and practices that agrifood enterprises need to continue growing.

Within the agriculture in particular, farms in the corporate/productive segment of the sector are much more likely to have the capability and resources to access the new types of knowledge required for them to maintain or enhance their productivity – as illustrated in Figure 18 below. Figure 18 also show how the knowledge needs of producers become more advanced and sophisticated in direct relation to their EVAO.

Figure 18: Typical knowledge requirements and levels of self-sufficiency by farm segment



Some of the new ways in which farmers in the corporate/productive segment are pro-actively accessing new knowledge include:

- Applying for scholarship and leadership programs such as the Nuffield scholarship and the Rural Leadership Foundation
- Organising private international study tours
- Facilitating study tours of Australia by international farmers and industry experts
- Establishing direct relationships with national and international researchers and research teams for early access to 'new knowledge'.

Unsurprisingly, these savvier and more innovative producers tend to share similar characteristics. Key determinants of farmer innovation include farm size and profitability and farmer education levels.

An ABARES survey of farmers found that more than 90 per cent of large family farm businesses in Australia – those with an annual turnover exceeding \$400,000 – had made innovative changes over the two years ending 2007-08 and more than 40 per cent made at least one change to a great extent. In contrast, only 77 per cent of small family farm businesses – those with an annual turnover of up to \$400,000 – made innovative changes and only an estimated 29 per cent made at least one change to a

great extent (Liao & Martin, 2009). The same ABARES study found that generally a higher proportion of farm owner managers who were educated at a post-secondary school level made innovative change compared with those farmers with secondary education or below (Liao & Martin, 2009).

At the larger end of the corporate/productive segment of agriculture, some of the large corporate farming businesses in Australia have started to develop their own internal workforce development strategies and initiatives. For example, Hassad Australia recently launched its Next Generation Leaders Program. This program offers four graduates from agricultural tertiary institutions the opportunity to rotate over a two-year placement through corporate and operational roles (Hassad Australia, 2014).

The ability to access knowledge and engage in workforce development independent of government is also higher among larger global conglomerates within the food processing sector. For example, companies like Mondelēz International and Simplot have their own Organisational Development teams that manage internal development programs for staff and graduates. In mid-2014 Mondelēz also launched the Master of Food and Packaging Innovation, a joint initiative between the University of Melbourne, Mondelēz International and the Victorian Government.

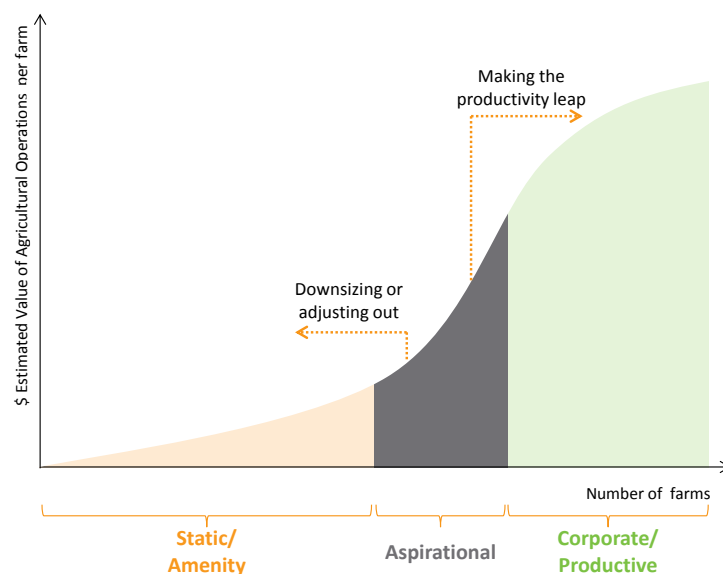
It is also important to note that many of the entrepreneurs that have started businesses in the niche processor segment are also highly self-sufficient. Anecdotal evidence suggests that some of the more successful founders of niche producing enterprises have previously held senior roles in large food processing companies or have come from other industries like banking and finance.

Effectively targeting enterprises that want to make a productive leap will be critical

As highlighted in the Agricultural Competitiveness Green Paper, lifting the performance of the middle 50 per cent of farms in Australia towards the levels achieved by the top 25 per cent will be a major challenge for policy makers going forwards. The Green Paper argues that successfully ensuring this transition “will be critical to attracting the capital and labour required to meet the market opportunities ahead while making sure family farms can stay as the cornerstone of Australian agriculture” (Commonwealth of Australia, 2014b).

Effectively supporting the middle 50 per cent of farms to grow will require careful targeting of those farmers in aspirational segment that want to make a major leap in productivity, rather than those that are slowly downsizing or adjusting out of the sector – as illustrated in Figure 19 below.

Figure 19: Long-term aspirations within the aspirational farmer segment



Younger farmers are well placed to make the productive leap

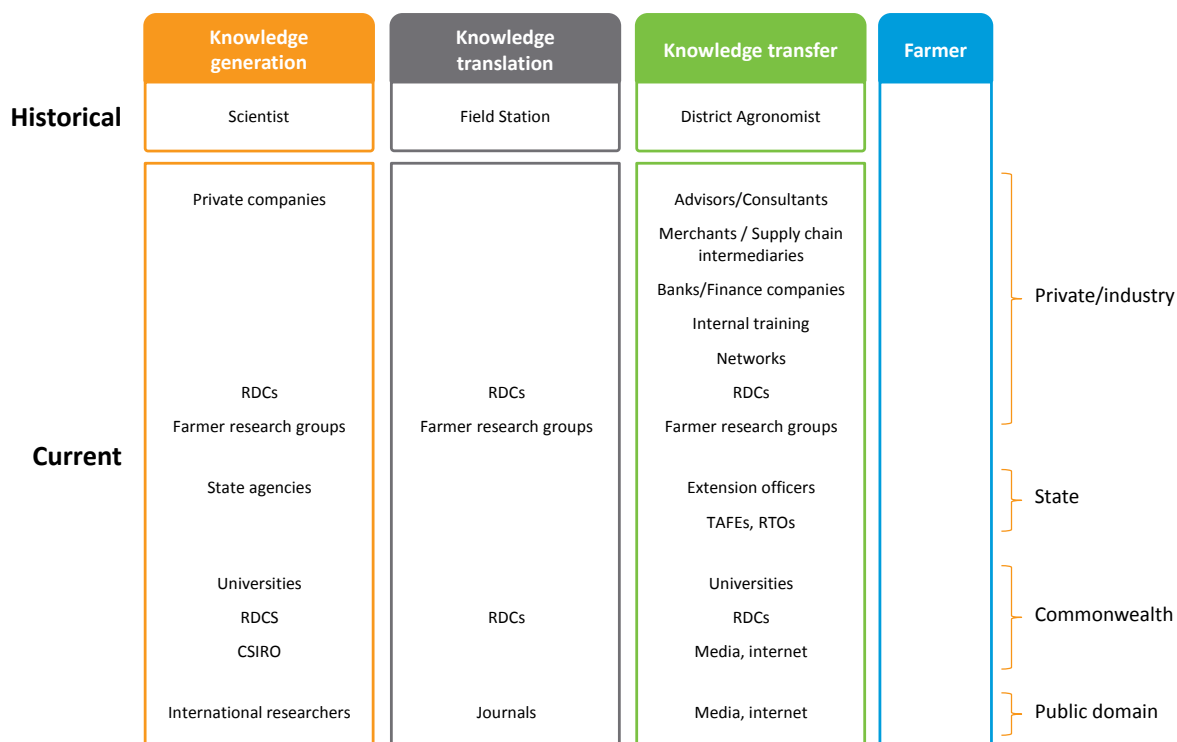
Anecdotal evidence suggests that the many members of the current generation of young farmers are well placed to make the productive leap required to increase agricultural productivity in an age of increasing complexity. Based on predominantly qualitative and anecdotal evidence, several generalisations can be made about the attitudes, preferences and ambitions of young farmers – all of which directly and indirectly shape how they access the knowledge and support required to run their businesses successfully. These characteristics include (Barr, 2014; UMR Research, 2012):

- **More attracted to larger and more successful farms** – limited available evidence suggests that younger farmers are more likely to be found on the larger farms that produce the bulk of Australia's agricultural output. In the case of inter-generational farming families, this is largely due to the fact that older farmers must continually invest in growth to counter the terms of trade decline to maintain the attractiveness of their farm to the next generation in their family (Barr, 2014). Perceptions of the risks and difficulties associated with farming as well as attractive and lucrative career options outside of farming mean that young people from farming families may not necessarily be interested in assuming responsibility for their family business.
- **Aspirations are set more broadly** – the aspirations of the next generation of farmers are being set by the expectations of their peers, rather than the income of their parents. These expectations are less geographically and industry-bound than in previous generations, as younger farmers are now starting their careers later after longer periods of pre-farming education and employment where they are able to mix with a wide range of peers.
- **Better educated** – increasingly, young people from farming families and backgrounds are pursuing tertiary qualifications in a diverse range of fields. Historically, studies would be in agricultural sciences and other agrifood related courses. However, increasingly, many young farmers are gaining formal qualifications in non-specialised courses such as economics, business or science. These farmers will sometimes pursue early careers in areas tangential to farming such as commodity trading or agribusiness banking, building a sophisticated understanding of business and markets which they apply once they return to farming later in their careers.
- **More receptive to new technology** – younger farmers have been raised in a society more globalised and connected than any of their predecessors. A New Zealand study of dairy farmers found that the most progressive dairy farmers are far more likely than older farmers to be interested in investing in new technology to help improve their farms' productivity. Similarly, they are more amenable to electronic channels of communication to share farm capability information
- **Better connected through non-traditional and informal networks** – young farmers tend to have multiple non-traditional networks which do not follow traditional physical boundaries. These farmers are generally technologically savvy, well-travelled and better networked into urbanite colleagues than older generations of farmers. This trend has seen an increase in the number of professional networking forums for young farmers in recent years (such as those organised by Future Farmers). These farmers tend to be more interested into learning from their peers than pursuing traditional policy advocacy networks.
- **More open to risk and growth** – the current generation of young farmers are less likely to have dependents than farmers of the same age in previous generations. This enables them to be both more mobile and to take greater risks in career risks.

8 Knowledge generation and innovation in in agriculture is multi-faceted and complex

The ways in which knowledge is generated, translated and transferred in the agriculture sector has profoundly altered over the last three decades. The historical government-dominated and more linear continuum of knowledge generation and transfer in agrifood– shown in Figure 20 below – has been replaced by a more diverse and multi-dimensional matrix model.

Figure 20: Actors in the agriculture knowledge and innovation system



This new model of knowledge generation and transfer in the agrifood industry differs from historical approaches in several profound ways:

- **Crowded** – The number of public, private and not-for-profit sector organisations with an interest in knowledge transfer has increased over time with a general shift from public to private funding sources. The internet has also dramatically increased the ability of businesses to access new sources of knowledge.
- **Fragmented** – The requirement for specialist knowledge associated with specific products, technologies and business processes has increased the volume and diversity of niche knowledge that is generated and transferred.
- **Faster** – the advent of new technologies has dramatically shorted the lead time for disseminating new knowledge after it is generated, which in turn has created new expectations about how quickly people expect to access new knowledge.

Several of the major trends that have influenced these changes in how knowledge is generated over the past two decades and transferred in the agrifood industry are explored below.

Public funding for agriculture research is declining – but from a relatively high base

Public sector support for agricultural research and development (R&D) has gradually decreased over the past several decades. In 1995, Australian and state government research agencies undertook 22 per cent and 53 per cent of agricultural R&D respectively. By 2009 these shares had declined to 16 per cent and 50 per cent respectively, with the share of publicly funded agricultural R&D provided by universities increasing from 14 per cent to 34 per cent (Australian Bureau of Statistics 2010) (ABARES, 2011).

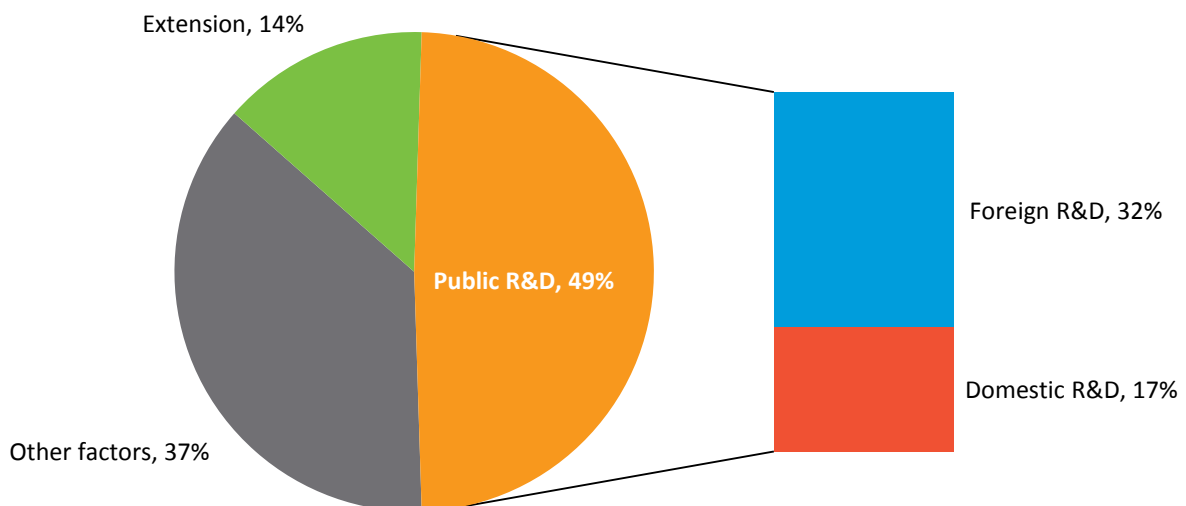
A number of bodies involved in agrifood Research, Development and Extension (RD&E) are funded through a mix of private and government sources. Key stakeholders include the 11 Cooperative Research Centres (CRCs), CSIRO, 14 Research and Development Corporations (RDCs) and Collaborative Research Networks (AWPA, 2013b).

Public research and development been a primary driver of productivity growth

Modelling by ABARES in 2011 confirmed the historical role of public R&D in driving productivity growth in agriculture. In their analysis of TFP growth between 1952–53 and 2006–07 – which averaged around 1.96 per cent a year – ABARES concluded that growth in public R&D knowledge stocks accounted for approximately half the broadacre TFP growth over this period. The same analysis found that extension knowledge stocks accounted for 17 per cent of TFP growth – as illustrated in Figure 21 below.

ABARES argues that increased public investment in R&D is required for significant long-term productivity growth in the sector. To that end, ABARES cautions that the “slow growth in public research in recent years may cause a significant drop in broadacre TFP growth in the future, to the extent that there is no growth or a reduction in the public R&D knowledge stock” – given the long lag time between research investments and their contributions to the stock of knowledge (Sheng, et al., 2010).

Figure 21: Contributions to annual broadacre TFP growth between 1952 -2007 (Sheng, et al., 2010)



The National RD&E framework is consolidating research capability

In 2008, the Primary Industries Ministerial Council (PIMC), the Australian, State and Northern Territory governments, rural R&D corporations, CSIRO, and universities began to jointly develop a National Primary Industries Research, Development and Extension (RD&E) Framework. The intent of the framework is to increase collaboration, specialisation, and critical mass and decrease fragmentation across the country's research capabilities.

The PIMC had endorsed the following RD&E strategies:

- Fourteen sectoral strategies for beef, cotton, dairy, fishing and aquaculture, forestry, grains, horticulture, new and emerging industries, pork, poultry, sheep meat, sugar, wine, and wool.
- Eight cross-sectoral strategies covering animal welfare, biofuels and bioenergy, climate change, water use, plant biosecurity, animal biosecurity, soil, and food and nutrition.

An evaluation of the National Primary Industries RD&E Framework conducted in 2012 by Allen Consulting Group for the Department of Primary Industries (Vic) found that the framework had:

- Created a national approach to primary industries research, development and extension
- Successfully promoted collaboration and cooperation between parties, breaking down state barriers and shifting attitudes from competition to cooperation
- Reduced duplication and reallocated resources to areas of priority
- Provided a greater understanding of national capability, identifying gaps and areas of capability that need to be maintained and/or enhanced for the future
- Increased knowledge and information sharing (Allen Consulting Group, 2012).

Privately funded knowledge generation in agriculture is increasing

The proportion of privately funded agricultural R&D has increased over the last thirty years to the point that it comprises roughly one-quarter of total R&D funding. Research by Australian Farm Institute (AFI) indicates that most of the research sponsored by private entities is at the more applied end of the R&D spectrum (Keogh, 2011).

Private funding for agricultural R&D comes from three main types of sources:

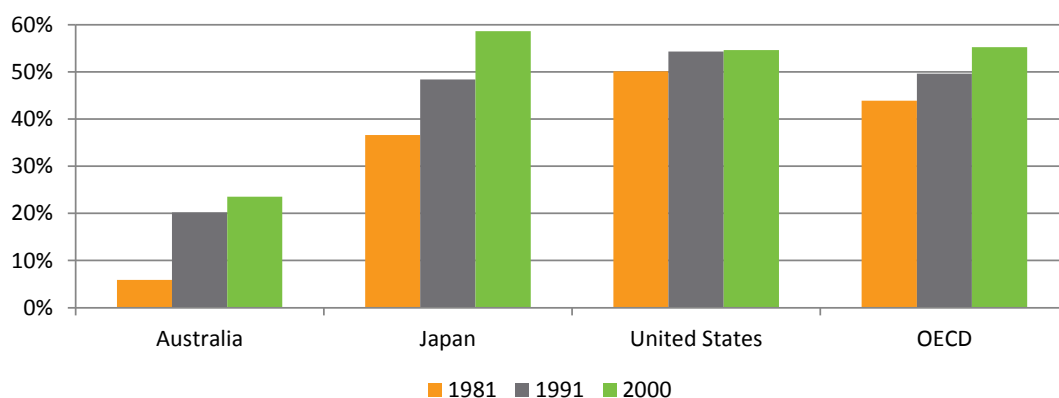
- **Industry payments to the RDCs**, industry-owned research institutions such as BSES Limited – an entity that performs some \$20 million a year of sugar research – and state-based research organisations such as the South Australian Grains Industry Trust and the (WA) Agriculture Produce Commission.
- **Large commercial farming companies** such as Auscott Limited, Clyde Agriculture, Huon Aquaculture, PrimeAg and Twynam.
- **Chemical and fertiliser research companies** such as BASF, Bayer, Dow, Monsanto, Nufarm, Pfizer and Syngenta, which also make large investments in rural R&D internationally.

The role of private companies, predominantly large multinationals, in funding agricultural R&D research in Australia has increased. Their investment is rewarded by the ability to sell the technologies at a premium price, due to the intellectual property ownership rights over specific technologies or plant and animal species. The increase in privately generated knowledge with IP related protections has implications for knowledge transfer within the sector, particularly for those processors that cannot afford the upfront investment in certain technologies (McKinna, 2010).

Despite the increased role of companies in agricultural R&D, the proportion of privately funded agricultural R&D still represents a small proportion of total R&D – particularly when compared with other developed countries (as illustrated in Figure 22 below).

It is also important to recognise that the division between public and private research is not always clear-cut with the emergence of new types of public/private partnerships. An example of this includes the partnership between Dow AgroSciences and the Victorian Department of Environment and Primary Industries (DEPI) through its commercial arm – Agriculture Victoria Services. Since 2009, Dow and Agriculture Victoria Services have worked on a number of research projects such as improving the performance of canola varieties.

Figure 22: Private sector share of total agricultural R&D (Productivity Commission, 2011)



McKinna suggests that further growth in privately funded R&D will be constrained as the Australian market for new technologies is too small relative to cost of investment and the length of legal protection for the IP generated. As a result, R&D by the larger multinational companies is increasingly being undertaken at a global level. An example of this shift can be seen with the IP associated with many new chemicals currently being developed globally for agricultural use which are not registered for use in Australia (McKinna, 2010).

The prominence and nature of publicly-funded agriculture extension has altered progressively

As the role of the private sector in extension has increased over the past several decades, the level of publicly funded extension has decreased. In 1952–53, extension activities represented 24 per cent of total public agricultural R&D funding. In 2006–07, this had shrunk to around 19 per cent. This decline is largely due to the withdrawal of state and territory governments from providing extension services and has been accompanied by increasing private sector involvement (ABARES, 2011).

The publicly funded extension services that remain today are fundamentally different from historical programs – such as the Commonwealth Extension Services Grant that was abolished in 1981. As Core notes in his background report for the National Strategic Rural R&D Investment Plan, “public extension has shifted from one-on-one to group approaches and a production/economic focus, to a broader platform involving environmental and social concerns (Core, 2009).

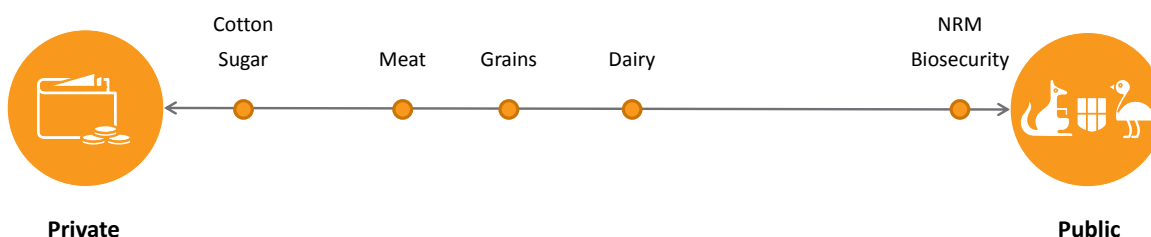
Historically, the predominant model of extension has been ‘supply push’, with researchers at the apex discovering new information and technologies, and these being transferred to farmers by extension agents, with the aim of achieving a change in farm management practices to improve productivity. In more recent times in most developed nations the model has changed. There is now a ‘demand pull’ model, under which farmers identify challenges and opportunities for researchers to investigate, and the extension agent plays a facilitation role between researchers and farmers (Keogh, 2014b).

Farmers are more reliant on information or services provided by consultants

With the ongoing evolution of publicly funded agricultural extension services (see page 65), Australian farmers are becoming increasingly reliant on fee-for-service advisory and consulting services provided by the private sector. A 2011 study by the Grains Research and Development Corporation (GRDC) estimated that around half of grain growers nationally use a range of different types of consultants. These consultants provide primarily agronomic and farm business advice, but increasingly also include areas of marketing, finance and price risk management (GRDC, 2011).

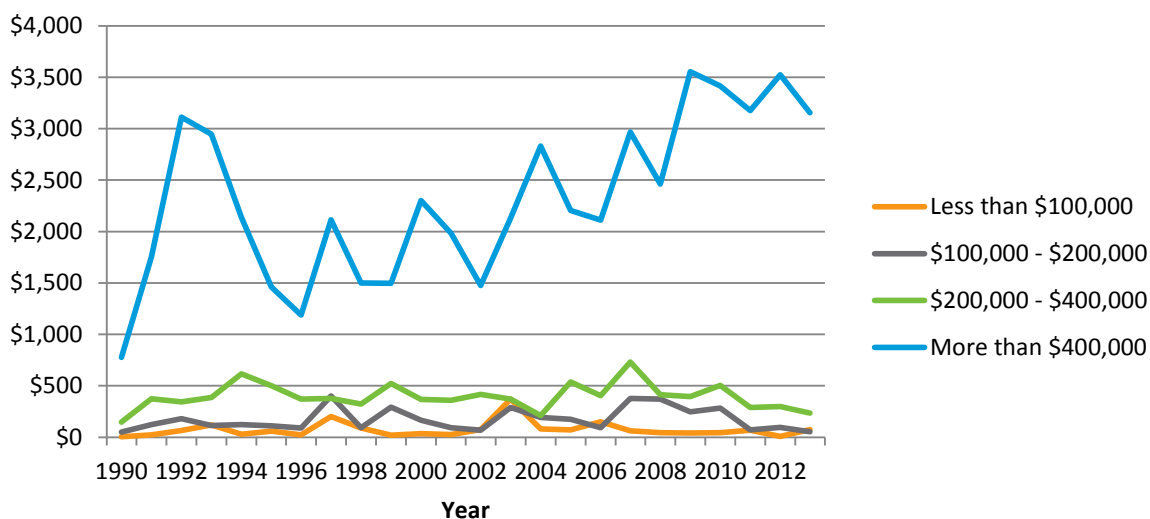
The transition from a primary reliance on publicly funded services to private sector advisors will continue to occur over the coming decade. This change will also occur at different rates for different agencies and sectors (National Primary Industries Research, Development and Extension Framework, 2013). The current relative progress of key agricultural sectors in this transition from public to privately funded advice is shown in Figure 23 below.

Figure 23: The Evolving Extension Model (National Primary Industries Research, Development and Extension Framework, 2013)



Longitudinal data from ABARES annual farm survey demonstrates that large-scale farming businesses pay higher advisor costs than smaller businesses – as shown in Figure 24 below. As Keogh et al note, this trend is not unexpected, as it “tends to indicate that the managers of large-scale farm businesses are more willing to seek out and pay for advice, perhaps a response to the higher level of risk and production complexity faced by the operators of large-scale businesses”. It is also important to note that the cost of agronomic advice may be included in the overall cost of inputs (such as fertilisers or farm chemicals) which makes it difficult to identify trends in advisor expenditure (Keogh & Julian, 2013a).

Figure 24: Average annual amount spent on advisory fees by gross farm income (all broadacre farms nationally) (ABARES, 2013d)



The diverse nature of private sector advice is illustrated by the advisors within the grains industry. Advisors in this sector may operate on a fee-for-service basis and provide agronomic advice to a range of different farm clients in a particular region. Alternatively, these advisors may be employed by a farm input supplier, agrichemical company or fertiliser manufacturer, and provide agronomic advice as part of a sales support function. Other crop advisors also work in partnership with farm business consultants (Keogh & Julian, 2013a).

Recent research by the Australian Farm Institute into the private sector crop advisors in Australia – a sector with a highly established and evolved model of advisors relative to other industries – revealed the following characteristics about the current advisory industry in cropping (Keogh & Julian, 2013b):

- There are approximately forty private sector crop advisors in Australia for every one public-sector crop advisor.
- Approximately two thirds of crop advisors are employed by crop input suppliers (retail crop advisors) and one third operate independently generating income from fees paid by grain growers. Approximately 550 of the estimated 1,500 retail advisors in Australia are employed by the three biggest national farm service organisations.
- The ‘typical’ crop advisor is a university-educated male aged in his mid to late thirties who has between ten and fifteen years of experience as a crop advisor.
- Sixty per cent of crop advisors work full-time as crop advisors and service an average of approximately thirty clients.

The literature available about the effectiveness of private sector extension models is very limited – particularly in relation to the effectiveness of different systems of integration between public research agencies and private sector extension services.

Maintaining a supply of suitably qualified advisors and consultants will be a key challenge for the sector going forward. Historically, many private advisors and consultants began their careers with state departments of agriculture where they gained an acquired set of expertise and local regional knowledge. The gradual reduction in the regional presence of these agencies has therefore reduced the supply of advisors and consultants from what used to be a key training ground (Keogh & Julian, 2013b).

Policy considerations: Provision of public good knowledge

The long-term decline in publicly funded extension and the increasing reliance of farmers on services provided by private consultants and advisors raises a fundamental question about how ‘public-good’ knowledge will be conveyed to farmers in the future. Public good knowledge that was previously conveyed to farmers by state-funded extension officers and regional natural resource management personnel includes issues related to soil management, sustainable crop-pasture rotations, disease and insect pest management, biodiversity maintenance, fertiliser and nutrient runoff, chemical safety and water quality maintenance. The AFI’s recent research on private sector crop advisors indicates that issues such as natural resource management are of relatively low importance in the advice they provide to their clients (Keogh & Julian, 2013b).

Case study 13: Rural Directions

Rural Directions – leading South Australian agribusiness consulting firm

Rural Directions is one of South Australia's largest independent agribusiness consulting firms, comprising twenty four employees. Established in 1997, Rural Directions provides agribusiness consulting services in three core areas: farm and regional business, corporate agribusiness and industry development.

According to David Heinjus, Rural Directions' Managing Director, Rural Directions' client base is wide-ranging. There is no archetypal client (in terms of size, problem or industry). Rural Directions consults with family farms, corporate farms, small regional businesses, agribusinesses and government, as well as Research and Development Corporations. Their issues are similarly varied and can include, but are not limited to, succession planning, employee management, land purchase, governance structures, benchmarking financial performance and weed management.

Heinjus recognises that consultancies such as Rural Directions have filled a non-formal knowledge transfer vacuum, especially as state government funded extension services in South Australia have declined significantly in recent years. As a result, farmers, who are continually inundated with information of varying levels of reliability and relevance, are now more willing to pay for independent and tailored services from consultancies such as Rural Directions.

Heinjus identifies a lack of understanding of business, economics and management as the key skills and knowledge gaps amongst Australian farmers. According to Heinjus, it is that leading 50 per cent of farmers who are applying formalised management principles rather than working with intuition. David maintains that formal qualifications will always be relevant, if not at least to meet compliance requirements. However, he cautioned that VET qualifications must deliver real value for employers and students. He warns that rapid, one-week diploma courses devalue the currency of accredited training and will not lead to an employable graduate.

Rural Directions is a lead investor in the newly established FarmInvest Australia. FarmInvest Australia is managing the Australian Farmland Investment Fund which will purchase farm land and lease it to professional farmers with the intention of building a geographically diversified portfolio of cropping, dairy, grazing and intensive agricultural land. David believes the greatest opportunity for Australian agriculture is a significant increase in domestic and foreign investment, as investors continue to express interest in Australian farm land. While still in the equity raising stage, Heinjus hopes that Rural Directions can assist Australian farms to professionalise their operations and open up greater opportunities for alternate financing and ownership structures through funds such as FarmInvest Australia.

Policy considerations: Ensuring that high quality advice is provided by advisors and consultants

With a greater reliance on advice provided by advisors and consultants comes a need to ensure that this advice is of a high quality. Two ways to ensure this are to ensure that advisors and consultants have easy access to relevant and up-to-date information and to also ensure that those individuals providing ill-informed advice to their clients are identified.

Ag Institute Australia – the peak organisation representing professionals in agriculture – argues that Government should encourage ongoing training and that “standards and accreditation programs which ensure excellence in the profession be adopted”. Ag Institute Australia recently introduced the AgCredited and Envirocredited levels of accreditation for its members. These two programs' core units of competency are offered as a Skills Set by CSU Training - Charles Sturt University's RTO. AgCredited and Envirocredited also require ongoing professional development using Units of Competency under the Australian Quality Training Framework (Ag Institute Australia, 2012).

The AFI's 2013 report on “Optimising future extension systems in the Australian grains industry” also makes specific recommendations about GRDC's role as a steward in the private advisory market for grains which are listed below. These recommendations could also be adopted by other industries and their relevant RDCs.

- GRDC should develop a centralised registration system for private sector crop advisors which can be utilised to enhance the access crop advisors have to research outcomes and technical information (including a national grains industry innovation portal), and to provide them with targeted information specific to their interests and needs.
- Grains industry representative organisations and relevant advisor industry associations should be encouraged to enter into discussions with the aim of fostering the staged development of a national accreditation system for crop advisors, and should also undertake to develop incentives to encourage crop advisors to become accredited, including encouraging grain growers to employ accredited advisors, once the system is developed.
- GRDC should take a leadership role, under the auspices of the national grains industry R, D&E strategy, in seeking to ensure that available public sector grains extension resources are utilised in a coordinated way with the private sector crop advisory sector to optimise their effectiveness (Keogh & Julian, 2013c).

Value chain intermediaries are playing a more pro-active role in supplying knowledge

The role of value chain intermediaries in supplying knowledge to agrifood enterprises is well established. For example, input suppliers like Landmark and manufacturers of dairy equipment have long played a role in providing technical advice to farmers. The role of value chain intermediaries in knowledge transfer is evolving though.

Specialist agrifood finance institutions like Rabobank and Rural Finance advise their clients on a range of complex topics like business planning and reporting, succession planning, future trading, risk management and wealth management. Financial institutions are also taking a more active role in facilitating formal learning opportunities for current and prospective clients. For example, Rabobank run an Executive Development Program – two-week long intensive modules run over consecutive years at the Macquarie Graduate School of Management in Sydney. The bank also runs week-long programs for farm managers that cover topics such as business management – managing yourself, managing others and managing a business (Rabobank, 2014a).

RDCs are moving into extension at varying rates

To differing degrees, all of the RDCs also provide extension services related to their research activities. This may variously involve engagement with extension groups, the conduct of workshops, funding for demonstration farms and dissemination of research publications (Productivity Commission, 2011).

For example, in the grains industry, the Grains Research Development Corporation now shoulders an increased share of the extension load in the grains industry, both directly through its own activities, but also indirectly through project funding of research providers like the State Departments, CSIRO and universities, which funds extension and engagement activities by researchers involved in those projects. Since the mid-1990s, the GRDC has been developing models of interaction with grain processors and their advisors. These include hosting grower and advisor updates in regional areas on a regular basis, encouraging the growth and development of grower groups, and supporting groups engaged in specific regional research initiatives (Keogh, 2014b).

An example of more direct RDC involvement in extension services is CottonInfo – a joint venture between Cotton Australia, Cotton Seed Distributors and CRDC which funds a 25-person team of regional development officers (located across the cotton growing valleys from Emerald in central QLD to Griffith in southern NSW), technical specialists (who are each experts on a range of cotton research priorities), and myBMP staff members. This team is the principal pathway by which the outcomes of industry R&D are packaged, promoted and adoption of improved practices is evaluated. They act as network to facilitate industry R&D communication between researchers, growers, consultants, agribusiness, NRM bodies as well as cotton and other industry organisations. The team is also a key resource for industry's capacity to respond to emerging or emergency issues at either a regional or national level. The intention is that CottonInfo will meet the needs of growers currently unmet by private knowledge transfer channels.

Farmers are increasingly likely to engage with farmer industry organisations and production or commodity groups

The Drivers of Land Management Practice Change in Australian Agriculture (DPC) project conducted by ABARES conducted a national survey of broadacre and dairy farm managers in 2010 and 2012. The survey found a marginal increase in farmer membership in information and learning groups' networks over the two year period. Table 6 below shows that there was a small increase in proportion of respondents who were members of farmer industry organisations and production or commodity groups.

Results from the survey also showed differences in membership patterns across industries. For example, “Broadacre and dairy farm managers most frequently reported they were members of farmer industry organisations and Landcare groups [while] horticulture farm managers were mostly members of farmer industry organisations and production or commodity groups” (Kancans, et al., 2014).

Table 6: Farmer membership of groups (Kancans, et al., 2014)

Type of information and learning networks	2010	2012	Percentage change
Farmer industry organisation	36%	41%	5%
Landcare group	27%	28%	1%
Local farming systems support group	16%	18%	2%
Production or commodity group	14%	19%	5%
Research and development corporation network	10%	11%	1%
Conservation group	5%	6%	1%

Farmer driven research groups have become more prominent over the past twenty years

The withdrawal by public-sector extension agencies from on-farm advisory activities has coincided with a growth in the adoption of group activities and other processes that aim to efficiently extend information to large numbers of farmers (Keogh, 2014b). Farmer-driven research groups – which are sometimes referred to as grower groups – emerged in Australia in the early 1990s. These groups have been a growing feature of the agricultural RD&E environment in Australia since that time, albeit to different degrees in different regions and commodity groups. These self-managed RD&E groups range in size from substantial organisations with more than 500 members and 20 staff (e.g. Birchip Cropping Group), down to much smaller groups with less than 50 members and no full-time staff, and appear to be playing an increasingly important role in applied research and extension activities in Australia (Keogh, 2014b). With reduced investment in government extension services, grower groups will likely take on a more prominent role in extension activities in the future and proactively seek to directly partner with public and private knowledge generation institutions. It should be noted that the coverage of existing farmer-driven research groups is not consistent across geographic areas and industries.

Whether such systems are more effective is not clear, and they have often been adopted by necessity rather than by deliberate design (Keogh, 2014b). Challenges for farmer groups in delivering research and extension services include the need to achieve financial and administrative stability, to maintain a sufficiently diverse membership base, and to avoid the exclusion of farmer subgroups, as it has been observed that these groups are often dominated by the more progressive and wealthy farmers (Birner & Anderson, 2007).

The need for new approaches to collaborations that involve verifying, translating, packaging and curating knowledge is becoming more evident with the advent of the internet

The role of verifying, translating, packaging and curating knowledge is a critical link between the generation of applied research and its adoption by end users in industry. This role has historically been played by government and levy funded RDCs and state level primary industries agencies. However, the traditional roles and relevance of publicly funded agencies in translating knowledge is being disrupted with the advent of the internet and the subsequent explosion in the volume of accessible research.

The importance of targeted and relevant knowledge verification, translation, packaging and curation is now even more important given the need to develop new types of “trust networks” in on-line environments. Producers in the agrifood sector are generally time poor, and thus there is a substantial opportunity cost associated with finding and digesting “trusted information” on the latest research evidence emerging from RDCs, CSIRO, universities, government departments, the private sector and other international sources. Furthermore, the search costs associated with finding relevant research in journals or on various different government, university or research websites may be higher than benefits of implementing the research findings (PWC, 2013).

As the volume of research available via the internet has increased, so too has the number of providers that translate, package and curate knowledge online to meet the obligations of their Commonwealth, state or territory department funders or industry levy payers. A 2013 review by the Primary Industries Ministerial Council (PIMC) of primary industries' agency websites identified 254 products that used the internet to deliver services to industries across the following eight themes: business development and management; farm management; breeding/genetics; food/nutrition; industry regulation; resource management; biosecurity (including welfare); and industry communications (DAFF (QLD), n.d.).

In addition to the prevalence of online content that is often duplicated, the current online environment for knowledge translation is characterised by:

- **Fragmentation** due to the very slow adoption of effective on-line collaboration platforms that are underpinned by institutional and individual contributor agreements that allow for efficient collaborations via cross institutional and cross jurisdictional IP sharing agreements
- **Inconsistency** in the quality and timeliness of information as a result of the different processes used by each RDC and government department to develop priorities, align policy aspirations, negotiate project based contracts on a case by case basis and subsequently review and publish information, both in scientific journals and as practice-change content published via project-based web sites and the use of social media platforms.
- **Variations in the provision of local advice** due to of a lack of any coherent approach to sharing resources, content and lessons learned between geographic regions and across different jurisdictions.
- **Lack of sustainability and continuity** that comes from a reliance on individual program or project funding and the current lack of any agreed protocols to support continued access to and efficient re-use of high value legacy content beyond the life of flagship programs or projects
- **Lack of contemporary capabilities** to negotiate and adopt standards, develop, adopt and apply tools and applications to support consistent approaches to the description of research collections, resources, programs, strategies in on-line environments.

The recently launched eXtensionAUS pilot project—has been established to test the applicability of the US model eXtension model. This pilot project has been initiated by the Department of Environment and Primary Industries (DEPI) Victoria and GRDC. It has been designed as an action research project in order to develop a preliminary foundation for addressing some the issues identified above. The eXtensionAUS pilot project commenced in November 2013 and two communities of practice (CoPs) have been

established – the field crop diseases CoP led by DEPI Victoria and the crop nutrition CoP led by DPI NSW. The pilot resource-based website went live in July 2014.

The eXtensionAUS pilot project has been funded for an initial 12 month period with an option to extend for a further four months. It is focused exclusively only on the grains industry. A draft case study related to the outbreak of the Beet Western Yellows Virus in the winter growing period of 2014 provides one type of evidence of the potential for this type of collaboration platform across other sectors and cross sector strategies. It is hoped that over time that an eXtension type model can be further developed within the context of Australia's National Primary Industries RD&E Framework.

Policy considerations: Content curation, quality assurance and adoption of knowledge via on-line learning communities

The success of the eXtensionAUS pilot and other Government led initiatives to support effective content curation, quality assurance and adoption of knowledge via on-line learning communities will become increasingly contingent upon certain enabling capabilities and frameworks being agreed to and introduced across multiple stakeholders and jurisdictions. In the context of the new eXtension pilot, these enabling capabilities include:

New ways of working

- **Developing capabilities to support collaborations** in on-line environments that involve the use of a wide variety of systems, tools, social media applications and quality assurance processes.
- **Committing to a new type of systems approach** that explicitly draws in a wide range of stakeholders (including the private sector) beyond those traditionally involved in the continuum of research, development and extension activities.
- **Developing institutional and individual contributor agreements** to support efficient and effective IP sharing, co-design of solutions and co-evolutionary approaches to problem solving, between institutions, including with the private sector and across different levels of jurisdiction.

Support systems and infrastructure

- **Agreeing and consistently applying metadata** that support a national and international standards-based approach to capturing, preserving and distributing authoritative information about research, development and extension activities, research collections and resources including the publishing of national RD&E sector and cross sector strategies.
- **Expanding the current data tagging system** to further develop the use of common sets of keywords and support the evolving use of appropriate key terms, subjects and concepts across primary industries and natural resource management sectors.
- **Implementing efficient content curation systems** to support the ability of learning communities to curate existing resources for and on behalf of their communities.
- **Committing to the ongoing management program legacy content** beyond the life of funded projects in ways that allows for effective and persistent access to archival resources, collections and contextual information
- **Integrating spatial mapping services** to support the provision of geographic services, including local, regional and national impact monitoring (Jones & McCarthy, 2013).

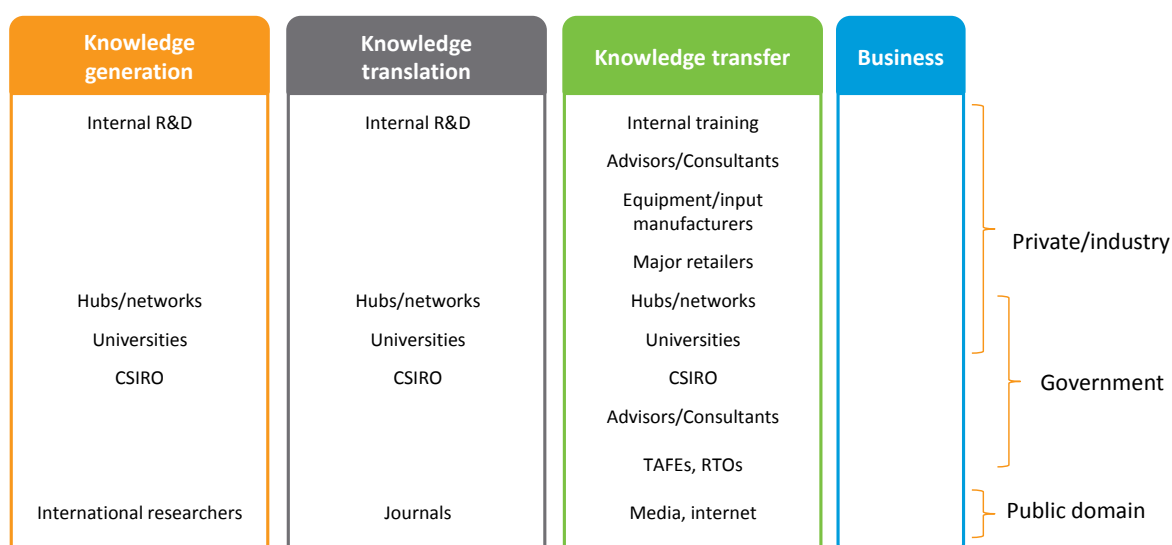
9 Access to knowledge and innovation is easier for larger food processing companies

The knowledge and innovation system within the food processing sector is complex – albeit less crowded and diverse than the equivalent system within agriculture. The role of governments in generating and translating knowledge within the sector is also fundamentally different to agriculture – being much more akin to the roles played by government in other forms of manufacturing. Key actors in the food processing sector’s knowledge and innovation system are illustrated in Figure 25 below.

At present there is a bias in the sector towards larger food processing businesses being better able to access and generate value from the knowledge and innovation system. The Government’s National Food Plan Green Paper from 2012 noted that “while there appears to be high quality public and private R&D relevant to the food processing sector, much of this work is fractured as public research institutions are only working with the small number of processed food businesses with the capacity and ability to engage productively in R&D” (DAFF, 2012).

Key characteristics and dynamics within the Australian food processing sector’s knowledge and innovation system are explored below.

Figure 25: Actors in the food processing knowledge and innovation system



Government’s role in knowledge generation in food processing is more limited than in agriculture

Commonwealth Government involvement in knowledge generation in the food processing sector is relatively low compared with its role in the agriculture sector. The Government’s current role is split across a relatively small number of research institutes and programs – the majority of which have some level of formal industry partnerships. The food processing sector also draws on general government programs and incentives for innovation and R&D activities (such as the R&D Tax Incentive). It is important to note that the eight active Cooperative Research Centres (CRCs) with mandates related to the food industry do not currently conduct any research that is specific to food processing (The Senate, 2012).

Investment by private companies in R&D and innovation has grown modestly in recent years

Historically, a large portion of knowledge generation and innovation is done in-house through the internal research and development (R&D) programs of companies within the food processing sector. A recent AFGC report found that the total amount spent in the food and beverage sector on research and experimental development increased from \$513.9 million in 2010-11, to \$541.8 million in 2011-12 – a growth of 5.4 per cent. Companies within the dairy product manufacturing industry had the largest R&D expenditure (\$109.3 million) (AFGC, 2014a). Further AFGC analysis of operating costs within the sector found that investment in R&D, new products and new capabilities has been the only investment category that consistently grew each year from FY10 to FY 13 (AFGC, 2014a).

The growth in private labels have provided disincentives to invest in innovation

The recent growth in private label market share has acted as a disincentive for many companies producing branded products to invest in R&D. In recent years, there have been cases of companies being pressured by major retailers (e.g. through threats of product delisting) to share their new product development ideas 12 months from launch. The AFGC notes that another method of acquiring intellectual property (IP) for a branded product can occur when “a product is seen to be successful on the supermarket shelves [and] the retailers then demand a private label version of it, which is almost identical if not identical” (DIIS RTE, 2012). Through these practices the large retailers are able to take advantage of the available intellectual property for their private label brands, without having to make any investment (The Senate, 2012).

Knowledge generation and innovation remains a challenge for many smaller companies

For many companies in the food processing sector – particularly the smaller ones - spending on R&D is often one of the first cost areas to be cut in response to increasing costs pressures in the current market (see Section 1.2) (The Senate, 2012). Analysis by CSIRO from 2011 found that only a small percentage of Australia’s food processing companies have the time and resources to take advantage of the new technologies crucial to advancing their business operations (DIIS RTE, 2012). The recent report by the Food Processing Industry Strategy Group also concluded that while many SMEs are innovative by nature, most of them lack the funds or expertise to undertake research themselves (DIIS RTE, 2012). Initiatives such as the SME Solutions centre, as funded by Food Innovation Australia Ltd, CSIRO and the Queensland Government, have attempted to address this market failure by providing targeted technical expertise for small to medium sized food processing businesses (this initiative is discussed in greater detail within Case study 14 on Food Innovation Australia Ltd).

Attempts by businesses to access external research through collaboration have been mixed

A 2011 survey of 92 food processing businesses conducted by PwC found that half of these companies had partnered with an organisation for research purposes within the last five years – most commonly governments and universities. Satisfaction with the outcomes of these partnerships was relatively high overall and 77 of the businesses surveyed felt they had an influence on the direction of the research undertaken. Research from another survey by the Victorian Government in the same year provided a different perspective on collaboration, by finding that Victorian food processors were not engaging frequently with public research organisations, and when they did, satisfaction levels were not high (DIIS RTE, 2012).

In their submissions to the National Food Plan in 2011, CSIRO identified several challenges inherent in SMEs and other food processing businesses in accessing external research. The first challenge relates to awareness. A CSIRO survey found a lack of knowledge by industry about where pockets of research excellence are located and how to access them. The second challenge stems from the nature of the research that is supplied, in that “individual research providers including CSIRO will not normally provide the type or range of services that SMEs require [and] are often ill prepared to deliver the timely practical

advice that is needed”. Thirdly, SMEs often lack the capacity required to absorb and translate complex research outputs when their information needs are typically very basic. The final challenge relates to the need for specialist advisors “that can interpret the requirement of the SME and then direct them to the best solution provider, be it a private contractor, an equipment or ingredient supplier or interaction with the research and facility provider” (CSIRO, 2011a).

Efforts have been made to improve industry access to publicly funded research and innovation

The final report by the Government funded Food Processing Industry Strategy Group concluded that “collaboration between public research institutions, government support services and Australian processed food manufacturing business could be more strategic, commercially targeted and coordinated” (DIIS RTE, 2012). Since this report was published two years ago, Government has launched a number of initiatives to improve the nature and outcomes of research collaboration in the food processing sector and address some of the challenges identified in the preceding paragraph. Two key initiatives are outlined below:

- **Food Innovation Australia Ltd (FIAL)** – an industry-led, government-funded initiative to accelerate commercially driven collaboration and innovation in the Australian food and beverage industry. FIAL was established following recommendations related to the creation of a new food innovation hub by the Food Processing Industry Strategy Group as well as the Government’s 2013 National Food Plan. Broadly, FIAL assists industry in two areas: building technological capability and improving business processes. Further information about FIAL can be found in Case study 14 below.
- **CSIRO Food Innovation Centre** – a dedicated facility where CSIRO researchers partner with food and ingredient manufacturing companies with a focus on adopting innovative technologies, products and maximise advantages in shelf-life, nutrition and functionality. CSIRO works closely with FIAL in a number of projects, including an annual \$10,000 food innovation research prize for a select business seeking to pursue an innovative idea (CSIRO, 2014).

Over the past two years, the Government has also provided funding through the Australian Research Council’s (ARC’s) Industrial Transformation Research Program (IRTP). To date, in the field of food manufacturing, the ARC has committed approximately \$14.5m to fund Industrial Transformation Research Hubs and \$19.3m to fund Industrial Transformation Training Centres (further information about programs funded to date can be found in Appendix E). The IRTP’s Research Hubs are designed to foster R&D projects focused on the major challenges currently facing the food processing sector. The Training Centres are intended to foster close partnerships between university-based researchers and industry and provide practical industry exposure for Higher Degree by Research students and postdoctoral researchers (ARC, 2013b).

State governments have also introduced their own state-based food processing hubs and networks designed to foster collaboration and innovation such as the South Australian Government sponsored Food Innovation Hub launched in 2014. The Food Innovation hub aims to: connect food manufacturers with expert technical, advisory and testing services for product analysis and development; support training and internships for post graduate students in science and business/marketing to help move into employment in the food sector; identify and support access to food manufacturing facilities and technologies, especially for trialling new processes; and support projects between approved food manufacturing companies and high quality research and technology service providers through the new Advanced Food Manufacturing grants (PIRSA, 2014).

Case study 14: Food Innovation Australia Ltd

Food Innovation Australia Ltd – industry led approach to collaboration and innovation

Established in 2012 as part of the Commonwealth Government's Industry and Innovation plan, Food Innovation Australia Ltd (FIAL) is an industry-led network designed to foster commercially driven collaboration and innovation in the Australian food and beverage industry, to ultimately improve productivity, profitability and resilience of the sector.

FIAL's General Manager for Innovation, Capabilities and Skills, Barry McGookin describes his key role as matching complementary organisations and people – to drive improved business outcomes.

McGookin's program of work is defined by the gap identified by FIAL's industry members. Through a series of engagements, FIAL's broad membership base was and are encouraged to provide their opinion as to the key skills and capability gaps in the industry. From these consultations, FIAL identifies priority areas in which to focus its efforts. Broadly, FIAL assists industry in two areas: building capabilities and knowledge, and improving business opportunities. These categories in themselves, are wide ranging.

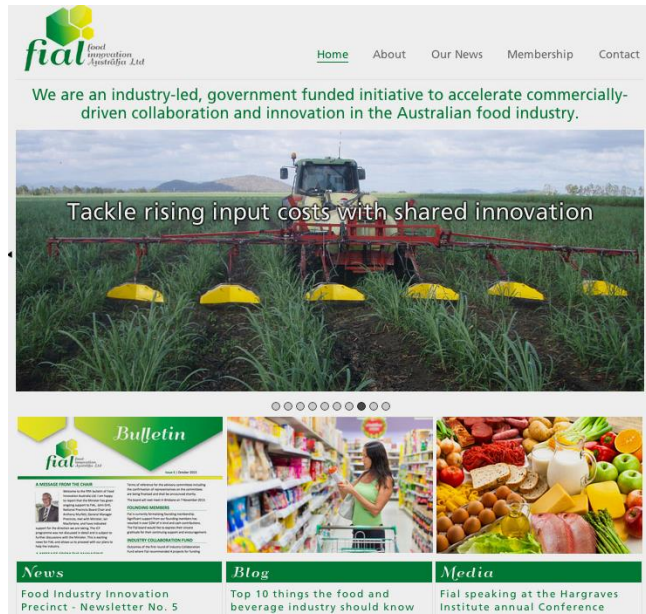
Technological capability projects can involve support for industry to engage with University researchers, to working with leading logistics and freighting businesses}. Similarly, business processes projects can range from strategy development to assisting businesses better understand and apply available R&D incentives. According to McGookin, one of the most commonly identified gaps amongst members is that of project management capability, an issue that often effects mid-sized firms.

The SME solutions centre is seen as one of FIAL's greatest successes. Funded by FIAL in partnership with CSIRO and the Department of Agriculture, Fisheries and Forestry in Queensland, the centre provided targeted expert technical advice and research to companies without the internal capability or capacity to address such technical matters. Currently, the centre has 13 projects underway with others already completed. For example, the centre matched the funding provided by a local producer of finger lime to explore different approaches to improving the storage, shipping quality and shelf life of finger lime – a premium product popular in Asia but grown sparingly in Australia.

FIAL's industry-led approach to innovation has many advantages. Foremost, all FIAL employees have extensive experience inside the agrifood industry and are subsequently better able to understand and communicate with members.

Furthermore, FIAL is structured as an independent for-profit company that provides it with an agility and nimbleness to implement and iteratively and quickly refine initiatives through member feedback.

Looking forward, McGookin believes the greatest opportunity and challenge for FIAL is developing programs and connections which balance both tactical and strategic needs of industry. To achieve this, he believes that the agrifood industry should embrace the opportunities afforded by collaboration, to extend the capabilities of their business by virtue of strong industry connections.



Policy considerations: Research and innovation collaboration in the food processing sector

While the opening of FIAL and CSIRO's Food Innovation Centre have been welcomed by many in the industry, anecdotal evidence suggests that there is still work to be done in increasing cross-industry awareness and engagement with both initiatives.

There may also be value in increasing linkages between the VET system and these new R&D hubs/networks. There are significant untapped opportunities for R&D staff in these hubs/networks to better connect with the current pool of approximately 90,000 enrolled VET students – many of whom are already employed in the agrifood industry – in order to raise awareness of who they are and the types of new knowledge they are creating. These students could provide these hub/networks with a particularly rapid way to get enterprises in the food processing sector onto the first rung of knowledge adoption ('awareness').

There may also be opportunities for the further government sponsored hubs/networks in other parts of the country beyond Victoria and South Australia. In the design and implementation of future government-sponsored collaboration hubs/networks in the food processing sector, it is important to recognise the following factors identified by CSIRO that contribute to successful transfer of R&D outcomes in the sector (CSIRO, 2011a):

- Senior management commitment, encouragement and involvement, in terms of both financial and 'political' support for technology transfer, are critical. Such senior management support is the most critical factor in the success of technology transfer/uptake.
- Long-term relationship building between R & D organisations and industry – on a personal level between individuals, to build trust and credibility in both directions, is very important. Industry will give trust to individuals and project teams, but generally do not trust research organisations or universities.
- Industry should be involved in all stages of the innovation process to maximize the chances that the innovative product or process developed by the R & D organisation will satisfy industry needs. Inclusion of industry in the development process will also help to ensure the success of commercialisation efforts. Communication with industry must be on equal terms and not one-way (i.e. just from the R & D organisation to industry). R&D transfer activities should focus on the mutual benefit to both the R & D organisation and the industry partner. All future research projects should have technology transfer objectives firmly in place. Technology transfer plans should not be an "add-on".
- Two-thirds of major technological changes in organisations fail because of resistance to change. Most of these failures are due to emotional and not technological issues. Effective communication is very important to minimize such resistance to innovation/change. Development of a culture that accepts change as a continuous activity is a key factor in managing the diversity and innovation within a complex organisation. Employees may look forward to change and innovation, if this is linked to a promising future.
- Cross-functional teams (with skills in science, communication, marketing and finance) have been shown to be effective in facilitating technology transfer/uptake.
- Transfer/secondment of people is a very effective mode of technology transfer/uptake as it facilitates the effective uptake/implementation of the technology by industry, but also results in the transfer of tacit knowledge (informal knowledge which is not documented/codified) – which is a very valuable resource for both parties.

Input providers now play a key role in product innovation

In the food processing sector, the role of input providers in fostering innovation has increased as production techniques have become more advanced. There is currently a trend towards original equipment manufacturers (OEMs) outsourcing training for their own equipment and processes to consultants in the use of each brand of equipment and in how best to transfer this knowledge (McKinna, 2013a). Packaging and equipment suppliers are also an important provider of knowledge and driver of innovation. A high proportion of recent new products in the industry have resulted directly from the introduction of new packaging and equipment technology.

Industry led research collaboration between businesses has historically been limited

Instances of non-government initiated collaboration between food processing businesses have been relatively limited in the sector. The Food Processing Industry Strategy Group suggested that the “comparative lack of SME/multinational collaborations” in Australia has been due to a number of factors such as: geographical spread; lack of knowledge about how to collaborate, and who with; and lack of awareness of the potential benefits of R&D (DIIS RTE, 2012).

Recent industry led initiatives suggest that the prevalence and sophistication of research and innovation collaboration may be shifting. One key initiative is the new purpose built Food Innovation Centre recently opened by Mondelēz International in Melbourne – detailed in Case study 15 below.

Case study 15: Mondelēz International’s Food Innovation Centre

Mondelēz International’s Food Innovation Centre – Industry led collaborative innovation

Mondelēz International recently completed its new Food Innovation Centre based in Ringwood, Victoria. The centre provides access to dedicated infrastructure and the latest technologies for over 100 co-located food innovators. The centre is the largest facility of its kind in Australia and one of the biggest in the Asia Pacific region.

The centre has been launched in two stages, in January 2013 and October 2014. Overall, it possesses pilot manufacturing facilities for new products, a design and packaging lab, sensory facilities to deliver quality testing, a virtual store, collaboration spaces and planning rooms which are available for use by Mondelēz and the broader industry.



According to Mondelēz, the centre’s objective is to “unlock consumer insights and product innovation for export into Asian markets [by] de-risking innovation [and] connecting small to medium sized enterprises, people, State and Federal governments, industry, higher education and technology through collaborative programs”. The centre’s “open door” approach allows SMEs in particular to access facilities and launch a new product at significantly reduced costs relative to markets rates.

The centre is a response to what Mondelēz sees as a decline in food innovation in Australia over the past two decades. This decline has resulted in the loss of significant research and development centres and talent to Singapore, Hong Kong and Shanghai and a shift towards viewing Australia within the region as only a supplier of food commodities rather than a high-value food innovator.

One of the centre’s key engagement activities is its free three-day SME innovation and collaboration workshops. According to Angeline Achariya, the Food Innovation Centre’s General Manager, the goal of these workshops is to demystify Asian markets and the new product innovation process to interested SMEs. In its short time, approximately 180 SMEs have participated in the program, with a significant portion coming from word-of-mouth referrals.

The Food Innovation Centre is also responsible for Mondelēz Australia’s entire graduate program, hosting a 20-month ‘Intrapreneur Training Program’ for approximately 12 new graduates in all areas of the business, from R&D to marketing. Graduates are provided innovation-related professional development opportunities and work in the centre to translate their ideas into profitable finished products, services or models through “assertive risk-taking and innovation”.

Mondelēz’ has also developed a Master of Food and Packaging Innovation in conjunction with the University of Melbourne. The purpose of the program is to ensure that Australia’s food workforce will have the packaging ability to meet the expected 50% growth in food demand over the next 40 years. As the time of writing, the course is expected to begin with approximately 25 students in early 2015 but with capacity to increase to 50 over time as marketing efforts and awareness increase.

Ms Achariya says that the development of the Master program has already been successful in increasing collaboration across the food manufacturing industry, a traditionally parochial sector. An Industry Advisory Group, comprising food companies of all sizes (including Mars, Simplot and Fonterra) has played a key role shaping the design and direction of the program. As the program commences, the Advisory Group will continue to regularly meet to ensure that the program maintains a close connection to industry.

Instances of region-based collaboration are also emerging. An example of this is the East Gippsland Food Cluster, an initiative involving twenty three food manufacturers in Victoria's South East. The Cluster's activities are funded by member organisations and the Victorian government. Their activities are discussed in more detail in Case Study 16 below.

Case study 16 East Gippsland Food Cluster

East Gippsland Food Cluster – A Regional approach to innovation

Established in 2011, the East Gippsland Food Cluster (EGFC) is an industry member-based not-for-profit organisation, partly funded by the Victorian Government, comprised of major food manufacturers and horticulturalists in the region. Its primary objectives are:

- To sustainably grow the East Gippsland Food Sector
- To identify opportunities to improve productivity through innovation and supply chain synergies
- To develop workforce capability to support the sector and promote industry excellence.

According to EGFC's Executive Officer, Dr Nicola Watts, the cluster emerged from a common view among eight of East Gippsland's biggest food businesses that there was benefit to be gained from collaboration across industries to generate economic growth, export opportunities and employment for the broader East Gippsland region. As of 2014, the cluster has 23 member organisations.

The cluster operates largely on a 'project basis', whereby a 'pool' of concepts is maintained and periodically reviewed by the EGFC Board. Any member is welcome to include their own ideas. The key factors when considering a particular idea are resource availability, project complexity, available funding opportunities, potential benefits for cluster members and the region and the potential for synergies with other projects. If approved, an idea will then move to the subsequent phases of 'pre-feasibility', 'feasibility' and 'implementation'.

The EGFC has a number of projects of varying duration and complexity underway at any one time. Currently, the Cluster has seven ongoing projects, with implementation phases ranging from 3 to 36 months.

One of these shorter projects is an annual joint procurement initiative on bulk purchases for a number of cluster members. In the past, this initiative has involved brokering a deal with a major laboratory which reduced lab testing costs by up to 20% for cluster members.

Recently, EGFC's traineeship programme won the Industry Collaboration category at the 2014 Victorian Training Awards. The programme connects young adults with the local agrifood industry by providing rotating industry placements with all participating organisations, from the vegetable fields of Lindenow to a large pie factory in Bairnsdale. The initiative was said to provide participants with valuable "paddock to plate" exposure to the opportunities in the agrifood sector.

Lastly, the Cluster is currently in the early stages of its most ambitious project, an e-commerce and distribution platform, or 'online farmers' market', for East Gippsland Producers 'built on the principles of provenance'. The project, which is expected to take another two years to be complete, seeks to be a hub for regional produce aggregation, opening markets for local producers. Closely intertwined with this project is the strengthening of the East Gippsland produce 'Brand'.

Dr Watts believes there is a strong future for regional clusters. Increasingly, both regional and state governments are delegating responsibilities that have traditionally been regional or state development initiatives. Dr Watts says that "State Governments and Shire Councils are realising that industry or regionally-led groups are better able to 'bring industry to the table'.

10 Demand for formal learning will remain low but new channels are emerging

With the exception of professions and trades, the preferred learning models for the agrifood industry have historically been non-formal and informal.⁸ As AgriFood Skills Australia notes, “the agrifood learning culture is typically incremental, socially embedded and occurs over a lifetime” (Agrifood Skills Australia, 2013). Knowledge and skills acquired through non-formal and informal channels are typically perceived within the agrifood industry to be easier to access and more relevant.

In response to industry feedback, providers of formal learning within agrifood have begun to move beyond the traditional ‘one size fits all’ approach to offer courses and degrees that offer the same levels of sophistication and complexity now found in successful agrifood enterprises.

This section explores some of the key trends in how the demand and supply of formal training in the agrifood industry is evolving in the context of embedded cultures and attitudes, ongoing education market reforms and the emergence of new types of formal learning opportunities.

10.1 Deeply held beliefs will continue to affect demand for formal training

The agrifood industry has historically found it hard to attract prospective workforce members

The agrifood industry continues to suffer a perception problem among school students and young people in general, which has deterred many prospective students from entering the industry. To a large extent the views of young people are a reflection of broader societal attitudes towards agriculture. As AgriFood Skills Australia argues, “outside of regional Australia, there is little understanding of how modern agrifood operates, its breadth and interrelationship between sectors, and the extent of available career opportunities” (Agrifood Skills Australia, 2014b).

In his 2013 review of agricultural education and training in NSW, Professor Jim Pratley noted the following messages from the school, TAFE and university students that were consulted as part of the review:

- Students undertaking agricultural subjects were subjected to the views from their non-agricultural student peers as being ‘second class’. In some cases they were given derogatory nicknames which reflected the lack of respect from others for their choice of study. Students also felt that some staff members were of the same attitude.
- In non-agriculture subjects where agriculture was used as an example (e.g. environmental studies) the context was negative towards agriculture and did not reflect the progress that agriculture had made over the last thirty years to address its environmental challenges.
- Some career advisors discouraged students away from a career in agriculture. In the discussions with new students at the University of New England and Charles Sturt University (some 250

⁸ Non-formal learning is learning that may or may not be intentional or arranged by an institution, but is usually organised in some way, even if it is loosely organised. There are no formal credits granted in non-formal learning situations. Informal learning is never organized and is often thought of as experiential and spontaneous - rather than being guided by a rigid curriculum (Ainsworth & Eaton, 2010).

students) fewer than five students in total indicated encouragement towards agriculture from careers advisors. A large majority in both cases indicated the negative message. At the University of Sydney, new students did not associate as strongly with the negative message but only a very small minority received supporting advice from advisors (Pratley, 2013).

As a result of these beliefs and attitudes, the majority of young people in Australia today do not see a career in the agrifood industry as a compelling long term proposition (Agrifood Skills Australia, 2014a).

Increasing awareness of agrifood careers and education will remain an ongoing challenge

A range of stakeholders are currently working to increase awareness of agricultural careers and education in agriculture such as the Primary Industries Education Foundation (PIEF), the Primary Industry Centre for Science Education (PICSE) and the Australian Council of Deans of Agriculture (ACDA) (Australian Government, 2014).

Government funded initiatives that specifically target school students include the VET in Schools programs, applications of the AgriFoods Career Access Pathway (Ag-Cap) and the Agriculture and Food in the Australian Curriculum project (Agrifood Skills Australia, 2014b). In July 2014 the Government also announced \$2 million in funding for the new Agriculture in Education programme which is designed to develop new resources to help teachers better understand food and fibre production and processing, and promote the range of agricultural careers available (Commonwealth of Australia, 2014b).

Policy considerations: Increasing awareness of agrifood careers and education

There are several issues to consider in expanding existing or introducing new programs designed to increase the number of young Australians studying agrifood courses and entering the sector:

- **Potential overlap** – with the growing number of programs targeting young people, there is a risk that some of these programs may overlap in their coverage and mandates.
- **Lack of evidence base** – To date there have been no publicly available evaluations⁹ of existing school and university based programs which makes it difficult to assess the effectiveness of the varying approaches to this issue.
- **Risk of programs not gaining traction** – Feedback gathered by Jim Pratley during his review of agricultural education in NSW found that, “students were largely unaware of the specialist website “Career Harvest” which has been developed to provide a comprehensive account of professional employment in the primary industries” (Pratley, 2013) This highlights the challenges inherent in capturing the attention of students in a market where many similar industry awareness programs exist.
- **Lack of coordination** – There is no central body with oversight of the multiple bodies that run related programs.
- **Underlying image issues** – It is likely that efforts to increase the numbers of young people entering into the agrifood industry – particularly in rural areas – will be hampered as long as long-standing community perceptions about farm life are not countered.

On the last issue, the Future Farmers Network observe that “young people working in Australian agriculture would like to see their city counterparts more educated on what the reality is of the industry, explaining the scientific nature of modern farming and the skill set farmers need to have to remain competitive in today’s marketplace”. In order to begin a concerted campaign to change attitudes, they recommend undertaking a “baseline study aimed at understanding city perceptions of Australian agriculture” in order to “identify what the real perceptions are and set out what can be done to correct false perceptions” (Future Farmers Network, 2014).

⁹ ACIL Allen recently completed a review of the Government funded Food in the Australian Curriculum Programme which is delivered by AgriFood Skills Australia. At the time of writing this evaluation had not been publicly released.

The potential returns on investment for training are not widely understood across the industry

The business case for investing in training at the enterprise level is poorly understood by many employers in the agrifood industry (AWPA, 2013b). In these cases, firms typically believe that the cost of training exceeds its benefits. This may be exacerbated by the geographic isolation and operational conditions of businesses in the agrifood industry which often results in above average costs for training when compared to other industries. Another related barrier to investing in formal training may be the insufficient capability with agrifood enterprises – particularly smaller ones – to evaluate their training needs, identify training options and find and procure the delivery of suitable training programs from qualified suppliers (ACIL Allen, 2014a).

The internal culture of businesses in the sector also inhibits the uptake of formal training. Many farming businesses and SME food processing companies tend to lack a culture of investing in training and career development, and instead see it as an unnecessary cost. Similarly they tend, on average, to be poor employer's underpaying, not rewarding achievement, not creating career opportunities and often having unsafe workplaces. In the agriculture sector, these issues are compounded by the very high proportion of casual labour (approximately 43% of all employees – nearly double the all industry average) which adds a further disincentive for employers to invest in formal training for their workforce (ACDA, 2012).

In some cases, this underinvestment in workforce development may be in part driven by the fact that farms are family owned and there may be a strong bias towards the status quo – that is, doing things the same way that they have always been rather than investing in novel or bespoke training and workforce development solutions regardless of the potentially higher Return on Investment (ROI) for training associated with such training (ACIL Allen, 2014a).

Changing entrenched views about training ROI will be challenging

The AWPA food and beverage workforce study argues that the employers in the sector will “need to be convinced that there will be a return on investment, particularly in the current environment of low margins and high costs” (AWPA, 2013b).

Historically, there has been a paucity of documented evidence to support the business case for training in the agrifood industry. AWPA and AgriFood Skills Australia recently commissioned two related pieces of analytical and case study-based research on training ROI in agrifood. This work demonstrated the benefits of both the wider use of independent high quality occupation needs analysis and the positive returns of a more considered approach to training in the sector (Agrifood Skills Australia, 2014a).

Policy considerations: Communicating the positive benefits of training

The AWPA study recommends that, “AgriFood Skills Australia develops a communication campaign aimed at employers across the agrifood supply chain, informed by the results of AWPA’s return on investment research project to encourage more employers to invest in lifelong learning of their workforce and to adopt high-performance work practices” (AWPA, 2013b).

AgriFood Skills Australia currently plans to demonstrate ROI by encouraging uptake of ROI assessment and will “promote the use of the online tool including through technical workshops and other awareness raising activity” (Agrifood Skills Australia, 2014a).

Gaining traction with this message in a sector that has traditionally not valued formal training will remain challenging. The ACIL Allen research on ROI in the sector notes that “information on the benefits and ROIT is not likely to have an impact on all firm types” and that if the findings of the ROI research are to prove persuasive to a firm it must first: take an active approach to investment; have capital available for investment; and recognize training as an opportunity for investment (ACIL Allen, 2014b).

Many farmers will continue to prefer accessing new knowledge in person

Despite the increased sophistication of many farmers – particularly in the corporate/productive segment – and the willingness of younger farmers to access knowledge through new channels, there is still a strong preference among the majority of farmers to receive new knowledge in person. This can be attributed to a number of inter-related factors:

- The difficulties associated with ‘integrating’ new knowledge or information into complex farming systems – which generally requires face-to-face dialogue, demonstration and targeted interactions.
- A natural inclination for many producers of all ages to turn to known, trusted suppliers and providers of information where trust is established through personal relationships.
- A preference for learning through seeing the practical implications of new knowledge for their businesses.
- Farmers in some industries – such as horticulture – tend to come from Non-English Speaking Backgrounds (NESB).

The historical preference of farmers to access knowledge through non-formal and informal learning channels (e.g. extension programs) rather than through formal learning channels (e.g. accredited courses) is also unlikely to change in the near future. Non-formal and informal channels allow for learning that is more incremental, faster, and often more relevant than formal channels. If anything, the advent of new non-formal and informal learning channels through the internet, professional networks and scholarship programs *is likely to further decrease the demand for learning through formal channels*.

10.2 Accessing formal learning in regional areas can be challenging

There may specific market failures in the supply of formal training in regional areas

Increasing the demand and supply of formal learning opportunities in regional areas continues to be hampered by potential market failures. A recent report ACIL Allen for AgriFood Skills Australia highlighted “multiple concurrent market failures that have led to underinvestment in skills and workforce development in the agrifood industry in regional Australia”. These failures include:

1. **Information market failures** whereby employers and learners do not have the information to assess whether there is likely to be a return on investment in training, or whether the training offered is likely to be of adequate quality or relevance.
2. Regional communities suffer from **thin markets** for education and training. Compared to those industries based in metropolitan areas, employers and learners in the agrifood industry generally do not have access to a range of competing training providers. This means that even well-resourced businesses in rural or regional areas struggle to provide their staff with appropriate training (Commonwealth of Australia, 2012).
3. There are **external coordination costs** associated with planning, publicising and securing the necessary attendance to make training and workforce development programs viable in regional areas. RTOs generally perceive rural and regional areas lack sufficient demand to offer a critical mass of individuals to undertake training and compensate these additional efforts (ACIL Allen, 2014a).

Recent initiatives have attempted to improve access to training in regional areas

Some efforts have been made to redress the types of market failures common to the provision of training in rural areas such as the AgriFood National Regional Initiatives – which is outlined in Case study 17 below.

Case study 17: AgriFood National Regional Initiatives

AgriFood National Regional Initiatives – Take a regional approach to skills development

The AgriFood National Regional Initiatives (ANRI) program aimed to increase collaboration between industry, government and training providers to share intelligence and develop regional solutions to secure and sustain a skilled workforce.

AgriFood Skills Australia received approximately \$5 million under the now defunct National Workforce Development Fund (NWDF) from four state governments to deliver the program over two financial two years (2012-13 and 2013-14). ANRI was delivered in four regions: Warren Blackwood in Western Australia, Eyre Peninsula in South Australia, Loddon Mallee in Victoria and Western Downs in NSW.

The ANRI program has five components:

1. Regional Skills Demand Analysis and Timeline – mapping of regional workforce and skills needs, labour demand shifts throughout the year and structural adjustment challenges.
2. Skills Needs Analysis – diagnosis of skills and workforces needs in different sectors and individual firms, including through the Employer of Choice program.
3. Skills Recognition and Training – formal recognition of prior learning, up-skilling and gap training for employees and job seekers.
4. Employer Capacity Building – developing employer skills in business management and human resources management.
5. Cross-industry Skilling – facilitating transferrable skills, developing a mobile workforce deployment strategy, and placing local mentors in the community.

An evaluation of ANRI by ACIL Allen from early 2014 found “strong overall support for ANRI among stakeholders in the regions, both as a whole and its individual components” and that “ANRI is well placed to meet local needs compared to other similar national programs” (ACIL Allen, 2014a).

10.3 Enrolments in agrifood courses are broadly in decline

VET enrolments and completions continue to decrease

Publicly funded commencements in food industry vocational training have not kept pace with the general growth in VET commencements in recent years, and completion rates remain low.

While enrolments in publicly funded agrifood-related qualifications increased two per cent between 2007 and 2012, it was significantly less than the six per cent increase in overall AQF enrolment growth over the same period. The majority of commencement growth is attributable to increased enrolments in Certificate III and II level courses (AWPA, 2013b).

Furthermore, completion rates remain low in the VET sector. While Food Processing qualification completions have increased by an average of 8.2 per cent per annum between 2006 and 2011, this is still a slower rate of increase than for all AQF qualifications (12.3 per cent per annum). The large difference between annual commencement and completion numbers suggests that less than a third of commencements lead to completion of a formal qualification, although there is some variation between different Training Packages and qualification levels. In some cases, non-completions result from students gaining the units they need and dropping out of training before they complete (AWPA, 2013b).

The trends towards competitive VET markets will impact agrifood course enrolments

Australian state and territory governments have been undertaking significant reforms of their VET systems in recent years. In 2012, the Council of Australian Governments (COAG) revised its National Agreement for Skills and Workforce Development, the Agreement which defines the long-term skills and workforce development objectives of the Commonwealth, States and Territories. In doing this, states and territories agreed to open up their respective VET systems to achieve a more contestable, demand-driven and client-focussed system. This would be achieved through the opening of the national VET system to market forces, transferring the cost of VET funding from Government to individuals (Council on Federal Financial Relations, n.d.).

The pace and extent of reform varies between jurisdictions – as illustrated in detail in Appendix F. Victoria and South Australia were early reformers, introducing market-based VET systems in 2009 and 2012 respectively. Other states such as Western Australia, Queensland and most recently, New South Wales, have commenced their own respective VET reform agendas. However, the broad national trend is towards a more contestable market.

These reforms have resulted in a significant increase in the number of for-profit private Registered Training Organisations – which are now receiving government funding for ‘high priority’ courses – and a decline in VET market share for TAFEs. In 2013, TAFEs and other public providers accounted for just 63 per cent of total publicly funded full time equivalent student load, down dramatically from 81 per cent in 2009 (Trounson, 2014).¹⁰ In comparison, non-TAFE providers have been increasing their market share of public VET funding. Between 2008 and 2012, payments to these providers increased by \$950 million, an increase of more than 200% (Noonan, 2014). As of 2013, more than half of Victoria’s publicly funded VET student market is provided by private RTOs with South Australia and Queensland to follow suit shortly (Trounson, 2014).

In some states like Victoria VET market reforms coupled with government policies of funding students on commencement of a course have created a pattern of subsidised training with low completion rates and high turnover. The market in Victoria has seen the emergence of providers that offer zero-fee, or very low cost training, and employer incentives including commissions. Characteristic of these offers include low costs, short duration courses, low physical engagement, no or minimal practical training and an emphasis on provision of a certification rather than sustained learning outcomes. This model typifies training certifications as a commodity. The experience of providers and employers within the market suggests that this approach does not necessarily provide the learning and skills needed to perform in the workplace.

Given that the majority of VET qualifications in agrifood attract a government subsidy - and in some cases a wage subsidy as well – there is a risk that these courses will continue the trend to commodification typically resulting in sub-optimal learning outcomes for the employer and the individual and high student churn rates.

The growing expectation by governments that employers will contribute an amount towards government-subsidised programs – such as the new Industry Skills Fund – also represents a significant cultural shift in the industry which will test the willingness of employers to invest in workforce development in new ways.

¹⁰ Note that full time equivalent load is lower than total students since it aggregates students studying part time.

The number of agrifood higher education graduates may be showing signs of increasing

Over the last two decades, there has been a consistent decline in, and low supply of, higher education graduates in agriculture and related areas including horticulture (Pratley, 2013). Between 2001 and 2011, the number of students enrolled in undergraduate courses fell from approximately 4,500 to 2,500 students (The Allen Consulting Group, 2012). Table 7 below shows that undergraduate and postgraduate commencements in agrifood-related fields of education have fallen across most disciplines.

Table 7: Higher education domestic commencements in 2011 in fields of education directly related to the agrifood industry (AWPA, 2013b)

Field of education	Undergraduate	Five-year change	Postgraduate	Five-year change
Food Science and Biotechnology	390	–30.0%	95	–30%
Food Processing Technology	45	104.5%		
Agriculture	806	–1.8%	184	3%
Horticulture and Viticulture	145	–44.9%	69	–15%
Aquaculture	16	–51.5%	13	30%
Farm Management and Agribusiness	52	–50.0%	22	340%

Market research of first year science students have found that agriculture suffers from poor perceptions based on lack of understanding of what agriculture entails. The major factors influencing career choices among first year science students were: having interesting or challenging work; having a secure future; help/working with animals; good lifestyle; and working on important issues (The Allen Consulting Group, 2012). This trend is more pronounced in Queensland and Western Australia, states with more prominent mining sectors. Farmers and agribusinesses report significant trouble recruiting and retaining staff. Mining typically pays significantly higher wages than agriculture.

According to the Australian Council of Deans of Agriculture, the decline in agriculture higher education enrolments and completions has led to a decline in agricultural and related higher education facilities. Between the 1980s and 2011, the number of campuses in Australia providing agriculture/agricultural science degrees has declined from 23 in the 1980s to approximately nine in 2011. The number of campuses in regional Australia has declined from nine to four over the same period (ACDA, 2012).

Declining higher education agriculture enrolments and facilities contribute to a negative feedback loop resulting in skills shortages in agriculture and poorer productivity. While skills shortages in agrifood are difficult to quantify across sectors as diverse and fragmented as agrifood, it is evident that different components of the sector are facing different shortages to different degrees. For example, Elder's, the national agribusiness company, found that there is an ongoing labour market shortage in the field of agricultural science. In 2010, only 40% of advertised positions were filled and there were 1.1 applicants for each job. This is down from 65% filled vacancies and 1.4 applicants per job in 2009 (Commonwealth of Australia, 2012).

Some TAFEs – such as NMIT in Melbourne - used the declining enrolments at universities as an opportunity to move into agrifood courses at a Degree level. However, demand for courses like NMIT's Bachelor of Agriculture and Land Management has been low as students must meet the full cost of the course. In the case of NMIT, a partnership that has been established with La Trobe University as Melbourne Polytechnic has resulted in a new Bachelor of Agriculture and Technology with Commonwealth Supported Place (CSP) funding to subsidise the cost to students. It has yet to be seen whether this approach will result in increasing student demand.

Despite the historic decline in enrolments over recent years, this trend may be showing signs of reversing. Recent data from the Department of Education indicates that preferences for agriculture-related courses increasing by eleven per cent in 2013 (Commonwealth of Australia, 2014b). Other signs of this reversal include the doubling of Bachelor of Agriculture enrolments at the University of Melbourne between 2011 and 2013, with further rapid growth expected in future years. Similarly, Charles Sturt University is said to have experienced significant increase in student demand for the same course over the same period.

10.4 Efforts to make training more responsive and relevant are ongoing but the effect on future demand is hard to predict

Industry satisfaction with formal learning remains mixed

Satisfaction among agrifood industry enterprises with the current supply of formal learning opportunities remains mixed. Key issues typically raised by industry include:

- **Recruits from the TAFE system are not 'industry ready'** when they graduate (i.e. graduates do not have the appropriate skills or experience to do the job when they finish formal learning). Interviews with industry figures indicated that many employers in the agrifood industry are often resigned to the fact that they will need to provide significant training to new graduates to ensure they are able to undertake their role. This can be acute with small businesses which tend to be limited in their ability to invest in training for their small number of employees.
- **Higher education offerings have not responded to changing demands** (e.g. for international agribusiness, global supply chains, brand development and marketing).
- **Inconsistent VET funding** models across states and territories which have created significant variations in the quality of training outcomes and the nominal availability of VET pathways. A recent review of current funding levels provided across jurisdictions for indicative Agricultural and Horticultural qualifications at the Certificate II, II, and IV level through to traineeship and apprenticeship pathways highlighted a myriad of different approaches, differing priorities and determinations about the funding levels required to deliver training at particular AQF levels (NFF, 2014).

The mixed views of industry are reflected in recent data from the National Centre for Vocational Education Research (NCVER) (Table 8) which shows that within the Agriculture, forestry and fishing and Manufacturing industry divisions, employer satisfaction with formal training is generally lower than the all industries averages.

Table 8: Employers who are satisfied¹¹ with training as a way of meeting their skill needs by type of training and employer characteristics (2013) (%) (NCVER, 2013b)

Measure	Agriculture, forestry and fishing	Manufacturing ¹²	All industries
Employers with vocational qualifications as a job requirement	75.2%	78.0%	78.3%
Employers with apprentices/trainees	70.8%	68.5%	78.8%
Employers using nationally recognised training	77.1%	79.7%	83.1%
Employers using unaccredited training	84.5%	92.9%	90.3%

Student satisfaction with training is higher than employers

In contrast to the views of industry, students in agrifood courses are very satisfied with the overall quality of their training relative to their peers in other industries according to NCVER's 2013 Australian Student Outcomes Survey. As shown in Table 9 below, 89.1 per cent of students surveyed also felt that their agrifood course "fully or partly achieved main reason for doing training".

The cross-industry leading levels of satisfaction among training graduates (Table 9) in the agrifood industry are a contrast to the relatively low levels of employer satisfaction with training (as per Table 8 above). The reasons for this apparent disconnect may be due to unrealistic expectations among some employers about what training should prepare a person for and at what it should cost them.

Table 9: Findings for graduates by various training characteristics by ISC in 2013 (NCVER, 2013a)

Measure	Agri-Food	All ISCs
Fully or partly achieved main reason for doing training	89.1%	84.9%
Satisfied with overall quality of training	90.7%	87.2%

Improving industry engagement with VET Training Packages will prove challenging

A key to improving industry satisfaction levels with VET training may be to ensure that the content of the agrifood qualifications reflect their current and future business needs.

Two recent reforms by the Government aim to improve the quality and relevance of VET Training Packages. These include a forthcoming review of current Training Packages and accredited courses to determine: how they can better support delivery and assessment practices; how they can better adapt to rapid technological change; how the specific or local needs of employers can better be addressed; and whether the same levels of quality assurance regulation across all occupations and all certificate levels are still needed (Department of Industry, 2014a).

The second reform will see a move towards a more contestable model for the development and maintenance of Training Packages once the current contract period with Industry Skills Councils (ISCs) (Department of Industry, 2014b).

¹¹ Satisfied was rated as 4 or 5 on a 5-point scale. It includes employers who were satisfied and very satisfied. Dissatisfied was rated as a 1 or 2 on a 5-point scale and includes employers who were dissatisfied or very dissatisfied.

¹² Satisfaction data is not available for the 'Food Subdivision 11 Food Product Manufacturing'.

Policy considerations: Training Package reforms

The outcomes of the recent round of Government reforms in the context of the agrifood industry are not obvious for the following reasons:

- **Lagging indicators** – Maintaining the currency of Training Packages in light of new and emerging food processing or production techniques and business practices will always be inherently difficult as Training Packages by their very nature will always be a lagging indicator of industry needs as they only reflect existing work practices.
- **Industry ownership and engagement not guaranteed** – The question of whether industry associations are willing to make the investment in coordination systems and know-how required to develop and maintain Training Packages remains unanswered at this stage.
- **Under-representation of innovative businesses** – There is a risk that the needs of enterprises at the cutting edge of agrifood innovation (e.g. SMEs processing niche food products) may be under-represented in the development of Training Packages or constrained by the uniformity required by Training Package structures.
- **Fragmentation within some industries** – Reforms to the VET sector are somewhat dependent on effective advocates from industry for improved training requirements. Some of the more fragmented industries within the agrifood industry – like horticulture – may not be as effective at advocating for the needs of all enterprises in the industry relative to other industries that are more uniform and have a longer track record of cooperation.
- **Demand will continue to be stymied by attitudinal factors** – in many sections of industry there are deep-seated cultural and attitudinal biases against investing in workforce development by employers (see page 82).

A greater industry focus on skill sets may enable more flexible learning opportunities

In a sector that prefers to focus on fulfilling very specific skills needs, there is a need for more flexible and targeted formal learning opportunities which suit the production cycles of many agrifood businesses. Enrolment and completion data for publicly funded training places in agrifood indicates that once individuals in the sector have acquired the sought after skills, many of them withdraw from the remainder of the qualification and the publicly funded system (AgriFood Skills Australia, 2010).

As noted by AgriFood Skills Australia, the “VET system’s focus on full qualifications as the basis for how it plans, funds and delivers training sits at odds with the long established learning culture prevalent across agriculture (and regional Australia) which is incremental, socially embedded and occurs over a lifetime” (AgriFood Skills Australia, 2014a). AgriFood Skills Australia also argue that within the sector, “the need for Skill Sets remains the single most commonly and strongly voiced issue raised by industry and the most frequently cited blockage faced by RTOs when trying to respond to enterprise needs” (AgriFood Skills Australia, 2014b).

Policy considerations: Skill sets

With the likely introduction of support for skill sets under the Government’s new \$476 million Industry Skills Fund, it will be important for the Government to address several key issues:

- Reforming current policy settings to enable delivery of incremental ‘building blocks’ of skills and encouraging participants to gain a fully transferable recognised qualification.
- Clarifying the expectation of employers as to whether or to what extent they fund the development of skills required to undertake an occupational tasks.
- Ensuring student entitlements are not dissipated by pressure to use the entitlement to subsidise their ongoing employment.
- Considering whether the funding of short term skill sets is an expenditure priority for Government that warrants a change in the allocation of scarce training resources from full qualifications.
- Ensuring the consistent uptake of skills sets in light of the current inconsistencies in levels of funding support across states - whereby only one state funds skills sets systemically on an equal footing with qualifications, and some jurisdictions fund them only under certain short term programs.

A new generation of agrifood courses are emerging

In response to industry concerns about the perceived relevance of more traditional agrifood courses and degrees, selected universities and TAFEs have been developing new types of offerings that reflect the increasing complexity of the modern agrifood enterprise. Selected examples of this new generation of courses and degrees are outlined in Table 10 below.

Key changes over the last five in the types of degrees offered in agrifood include:

- **Industry involvement** – A greater focus on industry partnerships that inform course design and provide new opportunities for industry placements and internships.
- **Re-branding titles** – Removing words like 'agriculture' and 'animal science' from degree titles and including more modern concepts like 'sustainability'.
- **Focusing on generalists** – Increasing opportunities for students to be exposed to a wider range of subject areas so they can make more informed decisions about later areas of specialisation. This includes offering new opportunities to combine agriculture with other disciplines through double degrees.
- **Merging degrees** – Combining existing bachelor of agriculture and bachelor of agricultural science degrees into one program.
- **Providing optional exit points** - Changing the structure of four-year programs to include exit points after three years and making the fourth year optional (The Allen Consulting Group, 2012).
- **Work-based learning** – in VET offerings in agriculture some providers are moving away from traditional campus based learning through a greater emphasis on work based learning options such as industry partnerships, traineeships and VET for schools

In their submission to the Agricultural Competitiveness White Paper, ACDA also outlined plans to establish a national graduate school for agriculture that will be pooled across the ACDA universities. Under this new model, “universities will open their agricultural facilities to all participants in the graduate and training program [which] will act as strategic underpinning and training for the RDCs, DPIs, CSIRO and private sector users, including multi-nationals” (ACDA, 2012).

Table 10: Selected examples of new generation agrifood qualifications

Provider	Overview of new course
Charles Sturt University (CSU)	<p>Bachelor of Agricultural Business Management</p> <p>This undergraduate degree was created by CSU in 2009 by two courses offered through its Faculties of Science and Business. The Bachelor of Agricultural Business Management provides an equal balance of business, management, production, and science subjects that allow students to pursue careers in a variety of agricultural industries. The course allows students to either study full-time for three years in Orange or Wagga Wagga, or six years part-time by distance education, or a mixture of both (CSU, 2009).</p>
TAFE Western (NSW)	<p>Diploma of Holistic Management - Sustainable rural lands, - Business and Communities</p> <p>This new Diploma is designed to provide students with the knowledge and skills to holistically manage their land, agricultural production systems, rural based businesses and/or publicly owned land resources in a way that is ecologically, financially and socially sustainable. Students are taught skills such as ecosystem management, assessing landscape health, grazing planning, decision making, financial planning, and land planning (TAFE NSW, 2014).</p>

Provider	Overview of new course
University of Melbourne	<p><i>Master of Food and Packaging Innovation</i></p> <p>This new cross-disciplinary post-graduate course forms part of a joint University of Melbourne and Mondelēz International initiative, with the support of the Victorian Government. The degree is intended to provide students with practical skills and knowledge around project management, managing for value creation, entrepreneurship and leadership as well as the science-based aspects in food chemistry, safety and quality. The degree is delivered via a combination of online, evening and intensive delivery and includes an internship subject (University of Melbourne, 2014).</p>
University of New England	<p><i>Bachelor of Agrifood Systems</i></p> <p>This new degree was developed by UNE in partnership with TAFE New England. The degree offers a formal pathway for students that begins with industry-based Diploma units before they articulate to complete the remaining courses at UNE. These articulation arrangements were recently extended to partnerships with a range of RTOs in NSW and Queensland. The new course is designed for students wanting to progress their career into agricultural management and offers areas of specialisation via majors: crop production; livestock production; production horticulture; or poultry production.</p>
University of Sydney	<p><i>Bachelor of Food and Agribusiness</i></p> <p>This new degree was developed with support from industry and includes a 12-week internship in the third year. The new degree recognises that there will be a future demand for skills related to post farm-gate processes, food processing and the distribution chain. It also covers issues which are likely to become more important with the increasing globalisation of food supply including food safety policy and regulation (AWPA, 2013b).</p>
University of Tasmania	<p><i>Master of Business Administration (Professional) in Agricultural Innovation</i></p> <p>This new Master's program is a joint State Government and University of Tasmania initiative that was created to support the Tasmanian Government's vision of the State as a premium food producer. The degree provides postgraduate training with a focus on developing agribusiness and innovation skills. The design of the degree includes six core units – two of which are business electives with the remaining four units coming from the Agricultural Innovation specialisation (University of Tasmania, 2014).</p>

10.5 Several new formal learning channels are emerging

The number of cross-sector scholarship programs are increasing

There are leadership and professional development programs within the agrifood industry. Historically, agrifood has had a strong history of funding and implementing leadership initiatives for its workforce. These programs can be industry specific, but often address cross-sectoral skill sets relevant to various farmers and food processors and include:

- ***Industry wide prestigious study scholarships*** such as the Nuffield Scholarship, which aim to increase practical farming knowledge and management skills and techniques by awarding scholarships to Australian farmers seeking to study farming practices abroad. Upon their return, Nuffield Scholars are expected to proactively share the knowledge and understanding they have gained amongst fellow farmers and others.
- ***Industry-specific leadership programs*** such as the Developing Dairy Leaders' Program and the Australian Grains Farms Leaders' Program, National Seafood Industry Leadership Program.
- ***Multiple non-industry specific leadership programs*** run by the Australian Rural Leadership Foundation, a not-for-profit organisation which runs multiple programs to prepare and support both established and future rural Australian leaders.

Such programs attract high achievers in the industry and sometimes focus on young farmers in the hope that training will provide these farmers with the practical skills, technical knowledge and business understanding needed to be successful in the future. A number of programs include a mentoring component to assist candidates to further their careers and take on leadership roles (AWPA, 2013b).

MOOCs may offer some new opportunities in regional areas

Massive open online courses (MOOCs) emerged in 2012 as a break-through innovation in higher education, garnering significant attention given the involvement of prestige universities. MOOCs are largely free, widely accessible, mass enrolment courses typically without formal accreditation. Despite issues of apparently high attrition and variable quality, the model has been adopted by institutions in Australia and elsewhere. It is still evolving in terms of the ability to link MOOCs completion to formal assessment processes and credit towards formal qualifications, cost structures and pedagogies for a mass audience. Its three key contributions to higher education innovation were: first, to expose a whole new market in the adult 'lifelong learner'; second, to create sharper separation between course content and delivery on one hand, and assessment on the other; and third, to generate scenarios of mass delivery of best-available content in course areas that are both popular and easily standardised (e.g. 'macroeconomics 101').

There is potential with enhancements to broadband capacity in regional areas for MOOCs to address some of the market failures outlined in Section 10.1. The University of New England, for example, made a substantial commitment to on-line learning delivery modes in its course offers to reach a more broadly distributed student body, but the reliance on this strategy has been reduced by the university's new incoming Vice Chancellor.

Policy considerations: Massive open online courses

Nous' judgement is that massive expansion of online learning that has been witnessed in the USA will not take on the same degree of market dominance locally but will have repercussions throughout the system in terms of disruption to post-graduate course or program delivery and a qualitatively different student experience. More fundamentally, the impact of developments such as MOOCs will potentially trigger different business models for specialised services in higher education – separating teaching from research and content production for example – which will lead to a more diversified market.

As such, regulatory and funding settings will need to adjust to enable the emergence of new models, notably 'unbundled' higher education services. The challenge will be to maintain the integrity of regulatory regimes governing higher education quality while freeing-up legislation that prescribes the different types of entities that are allowed to operate in the market. A key challenge for policy-makers will be weighing the benefits of specialisation and scale against the advantages of a seamless provision of 'bundled' higher education components. The choice is not either/or, but rather whether there is a) demand from the market to experiment with new models and b) a willingness to allow regulatory room for such models given the associated disruption and risks.

There is also the issue of a student's capacity to engage in online learning, particularly as a first-time higher education student: what access do they have to the necessary space and tools; do they have special needs? What is their level of personal motivation to study, beyond the desire to gain a marketable qualification? Studies show that online learning reinforces the quality of education outcomes for intrinsically motivated students and potentially acts as a demotivating factor for those that underachieve (Rakes & Dunn, 2010). This suggests that providers and policy-makers alike have an interest in ensuring that there are mechanisms to help students self-select out of fully online delivery if there is a risk of incompleteness or poor performance.

RDCs are engaged in education and workforce development activities to varying degrees

Over the last five to ten years, RDCs have moved into education and workforce development activities to varying extents. Most RDCs now directly fund scholarship programs and run ad-hoc training activities and workshops for their members – either directly or in partnership with other research institutes like CSIRO or TAFE providers.

A small number of RDCs have also moved into offering training in units of competency or certificate level courses. For example, Meat and Livestock Australia (MLA) and the Australian Meat Processor Corporation (AMPC) offer several units of competency through their joint venture AUS-MEAT, and the Australian Egg Corporation Ltd (AECL) offers a Certificate III in Agriculture for egg processors and their staff.

In contrast to its peers, Dairy Australia is deeply engaged in industry-led approaches to formal training and workforce development (see Case study 18 below). Dairy Australia's National Centre for Dairy Education Australia (NCDEA) – a national alliance of partnerships with RTOs – offers industry-specific courses that range from Certificate I to Advanced Diploma level, and articulation to Degree and Post Graduate qualifications.

Case study 18: Dairy Australia

Dairy Australia – Leading industry-wide workforce development programs

As one of its three strategic priority areas, Dairy Australia has heavily invested its government and industry levy funding into workforce development programs over the past ten years under the banner of 'People in Dairy'. This program includes a diverse array of initiatives – some of which are listed below:

- **Dairy Industry People Development Council** – to lead and inform an industry workforce development framework designed to regional and national needs of dairy organisations and farmers.
- **The National Centre for Dairy Education Australia** – through agreements between Dairy Australia and RTOs, the centre has an ability to generate significant scale in education and training provision, allowing it to attract high-calibre trainers, invest in resource development, and offer specialised training in technical, business management and industry leadership skills. The industry leadership development programs align to, and support, a three-tier leadership strategy.
- **Regional Development Programs** – operating in each dairy region to support Regional Education and Extension Committees, which establish regional plans of action for workforce development.
- **The People In Dairy Website** – which contains over 300 downloadable resources.
- **Diploma of HRM (Dairy)** – a specifically tailored people management qualification for advisers who service the dairy industry and provide advice on human resources and workforce planning.
- **Young Dairy Network Australia** – supporting young farmers in all regions with social, technical and leadership programs.
- **Employment Starter Kit (ESKi) - Employment Starter Kit** – an easy to use kit that helps farmers recruit, employ, develop and retain their staff. A recent survey by Dairy Australia revealed that 86% of farmers who used the kit reported they had improved their employment practice.
- **Stepping Stones** – a kit that explores the various career paths through the dairy industry. Components of the kit also assist those who are *Stepping Up* to farm business ownership and those who are *Stepping Back* at the end of their career.
- **DairySage Mentoring** – which assists dairy farmers to form mentoring relationships between experienced and younger farmers.
- **Cows Create Careers** – a secondary school program linking 340 schools to their local dairy industry through curriculum-based learning about dairying, dairy manufacturing and related careers.

Policy considerations: Expanding Industry led workforce development programs

Other industry bodies are currently looking at whether a targeted grass-roots program like The People in Dairy – specifically their Employment Starter Kit (ESKi) – can be successfully applied to other agrifood sectors.

The successful expansion of the type of approach adopted by Dairy Australia is not guaranteed. As AgriFood Skills Australia note, “While many bodies have an interest in skills development, few have the required depth of understanding or necessary resourcing to take an active role in advising members on the issue” (Agrifood Skills Australia, 2014b).

It is also important to note the particular attributes of Australia’s dairy industry – which is characterised by a large number of relatively homogenous small businesses, often in regional clusters, with very labour-intensive operations – make it ideally suited to collective action. This is in contrast to the horticulture industry for example, which is highly heterogeneous by comparison and comprised of a smaller number of larger players that are directly competing with each other, predominantly in the domestic market.

Ruth Nettle – a researcher from the University of Melbourne who has been intimately involved with the development of Dairy Australia’s programs – has ‘Readiness indicators’ or pre-conditions for other agricultural industries seeking to take a successful industry-based approach to developing their workforce. These ‘Readiness indicators’ include:

- The region, group or organisations have focused on workforce issues or have identified and stated people and workforce as a priority.
- There is commitment by member/boards in time and money: to sharing experiences and interest in the sustainability of action/legacy.
- There is current capacity in workforce development skills and understanding.
- There is some connectedness: with farmers and non-agricultural stakeholders about workforce issues.
- There is a capacity for systems thinking and understanding: reflexivity and a culture of learning around the workforce development system (Nettle & Moffatt, 2014).

Nettle also cautions that “the formation of innovation platforms in agricultural workforce development as precarious”. This is largely due to “the impetus for change being so heavily reliant on agricultural sectors building their own capacity to take action in workforce development with others” which is “unrealistic and time consuming, when strengthening institutions and stimulating innovation are a key role for the State”. As a result, “without a single institution (e.g. government) or collective agreement between key institutions (e.g. government, industry, education) to form innovation platforms for agricultural workforce development, the establishment of such platforms as a response to the current challenges will be limited” (Nettle & Moffatt, 2014).

11 Agrifood still lacks clear cross-industry coordination of workforce development

As noted in the preceding sections of this report, there is a wide range of workforce, skills and training initiatives being undertaken by government, training and industry bodies to address workforce development across the agrifood industry. In their food and beverage workforce study, AWP identified over 70 programs that range from school-level activities to raising awareness of food career paths, to university scholarships, industry placements, workforce planning, workforce participation strategies, skills development and leadership programs (AWP, 2013b).

The first recommendation in AWP's study is that "the workforce development agenda for the food industry be invested in a national coordinating body comprising industry, governments, employee representatives and the tertiary education sector to provide leadership in skills and workforce development across the agrifood industry" (AWP, 2013b).

The AWP report is one of several inquiries and studies in recent years that has recommended the creation of a national body to coordinate and oversee the skills and workforce development needs of the agrifood industry (NFF, 2014). For example, the 2012 Senate inquiry into higher education and skills training in the agrifood industry proposed in Recommendation 9 that, "the government facilitates the development of a national peak industry representative body for the agricultural production and agribusiness sectors". The inquiry noted that, "the absence of a peak body that can pull together the food sector supply chain from paddock to plate has meant that each sector is advocating in isolation for its own interests" as well as "duplicating efforts in important areas such as the creation of networks with universities and attracting workers, the duplication also minimises the ability of the industry to communicate with governments" (The Senate, 2012).

A key question for the industry, particularly in seeking government support for education and training initiatives, is where best to locate the responsibility for its efforts in this field. This will require a cross-industry decision that involves all parts of the industry working collaboratively, to decide its own level of investment in education and training, and the place(s) where industry funds and government funds can be invested to maximum effect. ***Ideally these cross-industry decision making and strategy setting responsibilities would sit within a pre-existing entity or entities.***

The key challenges going forwards for any entity with a cross industry mandate in agrifood include:

- Attract a new generation of motivated, skilled and smart workers that are not deterred by traditional and unrealistic notions of what it is like to work in the agrifood industry
- Support enterprises in the 'aspirational' segment of farmers and small scale processors of successful niche products that want to make a major productive leap
- Embed world-class business management capabilities in formal and non-formal learning channels across the industry
- Reconceive the role and relevance of VET in light of recent market reforms and the ongoing need for more skilled agrifood employees
- Support industry associations to work with their members on workforce development
- Create employers of choice across the industry that value and invest in their employee's development
- Re-conceive the role of government in quality assuring, translating, and disseminating knowledge in the new digital era.

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Appendix A Stakeholders consulted




Name	Role	Organisation
Angeline Achariya	General Manager, Food Innovation Centre	Mondelēz Internationa
Arthur Blewitt	Chief Executive Officer	AgriFood Skills Australia
Michael Claessens	General Manager, Workforce Development & Analysis	AgriFood Skills Australia
Robert Wilson	General Manager, Research & Industry Engagement	AgriFood Skills Australia
Graeme Lynas	Regional Development Manager, Victoria	AgriFood Skills Australia
Mick Keogh	Executive Director	Australian Farm Institute
Geoffrey Annison	Deputy Chief Executive	Australian Food and Grocery Council (AFGC)
John Gladiglau	Director	Collaborative Farming Australia / Bulla Burra
Richie Roberts	Divisional Manager	Costa Group
Bruce Finney	Executive Director	Cotton Research and Development Corporation (CRDC)
Ian Halliday	Managing Director	Dairy Australia
Shane Hellwege	Group Manager, Industry People and Capability	Dairy Australia
Matthew Dart	Director	DB Ag (DB Group)
Elton Miller	General Manager Strategic policy and planning	Department of Agriculture, Fisheries and Forestry (QLD)
Geoff Johnston	Principal Project Manager, Agriculture	Department of Agriculture, Fisheries and Forestry (QLD)
Ron Harris	Executive Director, Food and Agriculture	Department of Environment and Primary Industries (VIC)
Emily Phillips	Deputy Secretary Water	Department of Environment and Primary Industries (VIC)
Lill Healy	Executive Director, Agriculture Policy	Department of Environment and Primary Industries (VIC)
Neil Barr	Researcher	Department of Environment and Primary Industries (VIC)
Richard Vines	Knowledge Management specialist	Department of Environment and Primary Industries (VIC)

Name	Role	Organisation
Tim Ada	Executive director, Farm Services	Department of Environment and Primary Industries (VIC)
David Lawrence	Manager, Food Industry Policy	Department of Industry (Cth)
Jennifer Ranson	Director, Skills and Industry Responsiveness	Department of Industry (Cth)
Simon Stratton	Assistant Director	Department of Industry (Cth)
Michael Bullen	Deputy Director, General Agriculture	Department of Primary Industries (NSW)
Cameron Archer	Principal	Department of Primary Industries (Tocal college) (NSW)
Dr Nicola Watts	Executive Officer	East Gippsland Food Cluster
Barry McGookin	General Manager Innovation, Capabilities and Skill	Food Innovation Australia Ltd (FIAL)
Georgie Aley	Chair	Future Farmers Network
Corinne Noyes	General Manager	Madame Flavour
David McKinna	Principal	McKinna et al
Sarah McKinnon	Manager, Workplace Relations & Legal Affairs	National Farmers Federation
Justin Ross	Director Agriculture, Food and Wine	Primary Industries and Regions SA
Gary Cristian	Chief Executive Officer	QMI Solutions
Nicky Jackson	Chief Executive	RANGEme
David Heinjus	Managing Director	Rural Directions
Rob Goudswaard	CEO and Director	Rural Finance Corporate
Margo Andrae	Research Manager	Rural Industries Research and Development Corporation
Bill Hamill	Chief Executive Officer	Rural Industries Skill Training Centre Incorporated (RIST)
Elizabeth McGregor	Institute Director	TAFE NSW - North Coast Institute
John Buchanan	Professor and Director, Workplace Research Centre	University of Sydney
Ross Kingwell	Professor, School of Agricultural and Resource Economics	University of Western Australia

Appendix B Selected sub-sector analysis

B.1 Agriculture sector

Table 11: Key trends, challenges and opportunities across selected agricultural sub-sectors

Sub-sector	Key trends	Future challenges and opportunities
 <p>Livestock</p>	<ul style="list-style-type: none"> Increased direct sourcing of red meat supplies by supermarket chains. Increased value-adding and integration featuring wholesalers and specialty retailers. Rising domestic meat consumption, increasing beef prices and a shift towards organic beef. Rising value and volume of live cattle exports to Asian markets. 	<ul style="list-style-type: none"> Attaining sufficient volume to meet needs of key export markets. The increasing importance that farmers manage their livestock, their welfare and characteristics along the supply chain. Rising turnoff rates due to high input prices and high proportion of non-employing family businesses (85%).
 <p>Dairy</p>	<ul style="list-style-type: none"> Increased demand for liquid milk exports to Asia. Increasing international competition and decreased market share of Asian dairy imports. Total cash receipts reduced approximately 20% between 2008-13. Decline in number of dairy farm from 12,500 to 7,500 between 200 and 2011. Purchase of farms by corporations and superannuation funds. 	<ul style="list-style-type: none"> Attaining sufficient volume to meet needs of key export markets. Maintaining competitiveness, especially against New Zealand processors. Exceeding consumer expectations while meeting quality and compliance requirements of government major supermarkets and other major retailers.
 <p>Horticulture</p>	<ul style="list-style-type: none"> Critical dependence on major supermarkets (which account for 72% of retail share). Surge in imported processed vegetables and to a lesser degree, fresh vegetables Limited export performance and history. 	<ul style="list-style-type: none"> Maintaining a consistent supply of quality, fresh product to supermarkets. Gatekeeping 'category managers' which now manage access to supermarkets and display a strong preference for big farms capable of efficiently delivering to scale. Increasing pressure on lead times to develop and manage new plant varieties/vegetable products. Intensifying competition from cheap processed imports. Increasing exports in what is generally a domestically driven sector.

Sub-sector	Key trends	Future challenges and opportunities
 <p>Grains and other crops</p>	<ul style="list-style-type: none"> • Period of significant revenue growth with a 5-year growth in total cash receipts of 41%. • Shift to large-scale (average farm size has increased 60% in previous 5 years), precision production and the subsequent reduction in low skilled labour. • Significant expansion of product variety, style and functionality, which has added value (including the emergence of private labels). 	<ul style="list-style-type: none"> • Need for skilled technicians to manage and operate advanced machinery. • Managing fluctuations in grain crop volumes. • Limited use of risk management strategies. • Low margins in bakery products leading to low margins across supply chain (limiting innovation and ability to absorb change in inputs costs).
 <p>Seafood</p>	<ul style="list-style-type: none"> • Declines in Australian seafood production as result of overfishing, climatic conditions, disease, increased fuel costs and reduced quotas and access due to management policies supporting sustainability. • Heavy competition from imports, especially from increasingly sophisticated import markets across the Asia Pacific such as Thailand, Vietnam and China. • Positive media attention on the benefits of seafood and increasing consumer health awareness has allowed domestic demand to remain steady. 	<ul style="list-style-type: none"> • Capturing global demand for high-value Australian seafood (e.g. abalone and rock lobster) which is expected to increase in North America, Europe and emerging neighbouring economies. • Competing with cheaper imports to meet domestic seafood consumption. • Managing fishery policies, cost of production, climate, disease and technological developments to optimise domestic production. • Expected continued implementation of government policies to increase the sustainability of Australian seafood stocks. • Meeting the potential for value-adding initiatives include transforming lower value products into higher value products, such as oven-ready items for use by the fast-food trade or processing small fish into larger fillets.

B.2 Food processing sector

Table 12: Key trends in major food processing sub-sectors

Sub-sector	Enterprises	Change since 06/07	Employment	Change since 06/07	Sales and service income ('000)	Change since 06/07	Key trends
Meat and meat product manufacturing	1,148	3%	59,748	1%	\$22,560	19%	<ul style="list-style-type: none"> • Rising consumption in export markets, particularly in Asian countries and increased competition from other meat exporters. • Recent stagnation in domestic red meat consumption which is expected to continue. • Expected increase in meat production as farmers re-establish themselves following favourable conditions. • National and international consumer trends, like halal and certified organic meat production.
Seafood processing			3,314	9%	\$1,100	-21%	<ul style="list-style-type: none"> • Lower cost imports and heavy competition resulting in increased competitions from importers in the domestic market. • Ongoing declining domestic production, primarily due to overfishing, climatic conditions, diseases, increased fuel costs, reduced quotas and access due to fisheries management policies supporting sustainability. • Falling seafood prices, due in part to an increase in imported processed seafood.
Dairy product manufacturing	450	-6%	17,552	-6%	\$13,432	17%	<ul style="list-style-type: none"> • Increasing size, operating scale and influence of major supermarket retailers on every part of the value chain. • Increasing bypass of wholesalers in the dairy supply chain. • Strong growth in the food-service channel – particularly amongst restaurants. The fragmented nature of the food service sector discourages major manufacturers, thereby favouring dairy wholesalers. • Increased global and domestic dairy prices, particularly due to increasing demand from the emerging middle classes in Asia.

Sub-sector	Enterprises	Change since 06/07	Employment	Change since 06/07	Sales and service income ('000)	Change since 06/07	Key trends
Fruit and vegetable processing	214	-15%	12,736	-11%	\$5,606	30%	<ul style="list-style-type: none"> Increased competition from imports and private label product has resulted in a reduced market share for local operators over the past five years. Increased business exits or relocations, partly due to high industry overheads, wages costs and the relatively high Australian dollar (e.g. Heinz manufacturing plant from New South Wales to New Zealand). Reduced negotiating power given the consolidation of retail buyers, in particular, major supermarket retailers.
Oil and fat manufacturing	216	-19%	1,447	-27%	\$1,633	-9%	<ul style="list-style-type: none"> Rising concerns about health and nutrition have led to decrease in consumption of animal fats. Consumer concerns have led to switch towards healthier oils such as extra virgin olive oil and uptake of innovative new oils. Modest growth forecast over next five years based on projected stabilisation of oilseed growing conditions and a continued modest upward trend in apparent fat consumption per capita.
Grain mill and cereal product manufacturing	304	1%	9,207	20%	\$5,552	37%	<ul style="list-style-type: none"> Fluctuating global wheat and grain prices, the main raw inputs into the sub-sector. Increasing global consumption, particularly in Asia. Deregulated grain exports allowing producers greater freedom to adopt new and innovative marketing tools. Reducing employees due to greater efficiencies, better systems and enhanced technology.
Bakery product manufacturing	814	-23%	67,631	5%	\$7,997	17%	<ul style="list-style-type: none"> Significant shift away from factory-baked bread towards speciality and artisan retailers. Growing competition from supermarkets' in-store bakeries have caused the market share of independent manufacturers to fall. Volatility in commodity prices have dampened industry growth prospects and reduced profit margins. Functional and fortified bread segment is expected to drive demand, as consumers become increasingly time-poor and health conscious.

Sub-sector	Enterprises	Change since 06/07	Employment	Change since 06/07	Sales and service income ('000)	Change since 06/07	Key trends
Sugar and confectionery manufacturing	2,210	4%	16,863	1%	\$8,584	16%	<p>Sugar</p> <ul style="list-style-type: none"> Strong Australian dollar has reduced industry exports which have been partly buoyed by strong sugar consumption in South-East Asia. Reduced production of sugar cane, the industry's key input, negatively affected production Increasing dominance of vertically integrated multinational companies. <p>Confectionary</p> <ul style="list-style-type: none"> Increasing consumer demand for ethical and sustainable production methods. Strong brand loyalty, product innovations and aggressive marketing strategies will drive growth over this period. Potential threat of greater regulatory constraints relating to product labelling, food safety and marketing threats.
Soft drink, cordial and syrup manufacturing	207	68%	8,751	-5%	\$5,713	30%	<ul style="list-style-type: none"> Heavy discounting and changing consumer trends have restrained revenue growth in the five years leading up to 2014/15. Rising health awareness and concern over high sugar content will lead to increased diet or 'lite' products. Industry growth will be underpinned by strengthening demand, ongoing marketing initiatives and product innovation.
Wine and other alcoholic beverage manufacturing	7,507	-1%	15,970	-9%	\$5,252	-16%	<ul style="list-style-type: none"> Rising competition from overseas low-cost wine producers have negatively affected wine exports. Oversupply of wine has pushed wine and poor bargaining position of domestic producers with major super market retailers has pushed wine prices downwards, lowered profit margins and forced many producers out of business. Declining domestic beer consumption in favour of wine, cider and spirits.
Other food product manufacturing	77		-3%	22,440	9%	\$10,424	22%

Sources: (IBISWorld, 2014f; AFGC, 2014a; AFGC, 2014b)

Appendix C Emerging agricultural technologies

Table 13: Emerging agricultural technologies (Zappa, 2014)

Category	Technology	Description	Date
Sensors	1. Air and soil sensors	Fundamental additions to the automated farm, these sensors would enable a real time understanding of current farm, forest or body of water conditions.	2015
	2. Equipment telematics	Allows mechanical devices such as tractors to warn mechanics that a failure is likely to occur soon. Intra-tractor communication can be used as a rudimentary “farm swarm” platform.	2016
	3. Livestock biometrics	Collars with GPS, RFID and biometrics can automatically identify and relay vital information about the livestock in real time.	2020
	4. Crop sensors	Instead of prescribing field fertilisation before application, high-resolution crop sensors inform application equipment of correct amounts needed. Optical sensors or drones are able to identify crop health across the field.	2018
	5. Infrastructural health sensors	Can be used for monitoring vibrations and material conditions in buildings, bridges, factories, farms and other infrastructure. Coupled with an intelligent network, could feed information back to maintenance crews or robots.	2025
Food	6. Designer food	The creation of entirely new strains of food animals and plants in order to better address biological and physiological needs. A departure from genetically modified food, genetically designed food is engineered from the ground up.	2021
	7. In vitro meat	Also known as cultured meat or tubesteak, it is a flesh product that has never been part of a complete, living animal. Several current research projects are growing in vitro meat experimentally.	2024
Automation	8. Variable rate swath control	By pre-computing the shape of the field where inputs are to be used, and by understanding the relative productivity of different areas of the field, tractors or agbots can procedurally apply inputs at variable rates throughout the field.	2016
	9. Rapid iteration selective breeding	The next generation of selective breeding where the end-result is analysed quantitatively and improvements are suggested algorithmically.	2017
	10. Agricultural robots	Also known as agbots, these are used to automate agricultural processes, such as harvesting, fruit picking, ploughing, soil maintenance, weeding, planting, irrigation, etc.	2020
	11. Robotic farm swarms	The combination of dozens or hundreds of agricultural robots with thousands of microscopic sensors, which together would monitor, predict, cultivate and extract crops from the land with practically no human intervention.	2026

Category	Technology	Description	Date
Engineering	12. Closed ecological systems	Ecosystems that do not rely on matter exchange outside the system. Such closed ecosystems would theoretically transform waste products into oxygen, food and water in order to support life-forms inhabiting the system.	2020
	13. Synthetic biology	Synthetic biology is about programming biology using standardized parts as one programs computers, by using standardized libraries today. Includes the broad redefinition and expansion of biotechnology.	2023

Appendix D Occupation employment forecasts

Table 14: Five year employment forecasts for ANZSCO occupations in the agrifood industry (Department of Employment, 2014)

Code	Occupation	Employment level – Nov 2013 ('000)	Projected employment levels – Nov 2018 ('000)	Projected five year employment growth	
				('000)	%
1	Managers	316.9	315.9	-1.0	-0.3
12	<i>Farmers and Farm Managers</i>				
1211	Aquaculture Farmers	1.7	1.8	0.1	3.5
1212	Crop Farmers	48.2	47.9	-0.2	-0.5
1213	Livestock Farmers	72.5	75.2	2.7	3.7
1214	Mixed Crop and Livestock Farmers	26.5	23.5	-3.0	-0.1
2	Professionals	38.8	41.6	2.9	7.4
2245	Land Economists and Valuers	11.0	11.6	0.6	5.6
2341	Agricultural and Forestry Scientists	11.2	11.2	0.0	0.1
2342	Chemists, and Food and Wine Scientists	9.2	10.4	1.2	12.5
2347	Veterinarians	7.3	8.4	1.1	14.8
3	Technicians and trades workers	74.0	77.9	3.9	0.1
3111	Agricultural Technicians	1.4	1.3	-0.1	-6.8
3113	Primary Products Inspectors	1.7	1.6	-0.2	-9.1
35	<i>Food Trades Workers</i>				
3511	Bakers and Pastrycooks	21.2	22.3	1.2	5.5
3512	Butchers and Smallgoods Makers	22.7	23.1	0.4	1.8
36	<i>Skilled Animal and Horticultural Workers</i>				
3613	Veterinary Nurses	10.0	12.1	2.1	20.9
3624	Nurserypersons	5.3	5.4	0.1	1.7
7211	Agricultural, Forestry & Horticultural Operators	11.8	12.2	0.4	3.1

Code	Occupation	Employment level – Nov 2013 ('000)	Projected employment levels – Nov 2018 ('000)	Projected five year employment growth	
8	Labourers	180.6	180.2	-0.4	0.0
83	<i>Factory Process Workers</i>				
8311	Food and Drink Factory Workers	27.1	30.7	3.5	12.9
8312	Meat Boners and Slicers, and Slaughterers	8.5	7.6	-0.9	-10.7
8313	Meat, Poultry and Seafood Process Workers	13.0	13.0	0.0	0.3
8393	Product Quality Controllers	13.2	13.2	0.0	-0.1
8399	Other Factory Process Workers	8.0	8.7	0.6	7.9
84	<i>Farm, Forestry and Garden Workers</i>				
8411	Aquaculture Workers	0.3	0.3	0.0	1.8
8412	Crop Farm Workers	23.7	21.9	-1.8	-7.8
8414	Garden and Nursery Labourers	35.1	34.8	-0.3	-0.8
8415	Livestock Farm Workers	32.2	29.4	-2.8	-8.8
8416	Mixed Crop and Livestock Farm Workers	2.9	3.0	0.1	2.8
8419	Other Farm, Forestry and Garden Workers	10.0	10.6	0.6	5.7
89	<i>Other Labourers</i>				
8992	Deck and Fishing Hands	6.5	7.1	0.6	9.6

Appendix E ARC funded food processing research

Table 15: Industrial Transformation Research Hubs (ARC, 2013a; ARC, 2013b)

Project title and summary	Administering Organisation	ARC Funding	Funding round
<p>Commercial development of rock lobster culture systems: the cutting edge of aquaculture</p> <p>This Research Hub will develop unique aquaculture systems, using novel engineering manufacture to mass produce lobster seed stock. A reliable, large-scale supply of seed will enable seacage culture, evaluation of wild stock enhancement and lead to sustainable food production.</p>	University of Tasmania	\$5m	1
<p>Dairy Innovation Hub: transformational research to underpin the future of the Australian dairy manufacturing industry</p> <p>The Research Hub will develop transformational processing technologies and innovative products to enhance productivity, growth and sustainability in the dairy manufacturing industry.</p>	University of Melbourne	\$5m	1
<p>Unlocking the food value chain: Australian food industry transformation for the Association of Southeast Asian Nations (ASEAN) markets</p> <p>The University of Melbourne and Kraft Foods will lead an integrated research program to enhance Asian export opportunities for manufactured confectionery. The Research Hub will develop new product insights and innovative production technologies that will enable Australia's largest manufacturing sector to exploit new markets such as India and China.</p>	University of Melbourne	\$2m	1
<p>Pathways to market: transforming food industry futures through improved sensing, provenance and choice</p> <p>This Research Hub aims to transform the Australian food industry by demonstrating how new knowledge of food production and consumption generated through novel sensing technologies and advanced modelling techniques can be implemented in smart applications to power competitiveness, sustainability and innovation in food value chains.</p>	University of Tasmania	\$2.5m	1

Table 16: Industrial Transformation Training Centres (ARC, 2013a; ARC, 2014)

Project title and summary	Administering Organisation	ARC Funding	Funding round
<p>Agents of change: transforming the food industry for Australia, Asia and beyond</p> <p>This Training Centre will train a cohort of innovation scientists who will facilitate transformation of the Australian food industry. This will include manufacturing, processing and value chain analysis, and take advantage of opportunities for Australia to meet the demand for safe, healthy and high quality foods and retail ready ingredients in the Asian century.</p>	The University of Queensland	\$2.7m	1

Project title and summary	Administering Organisation	ARC Funding	Funding round
<p><i>Innovative wine production: responding to climate, water, market and economic challenges</i></p> <p>This Training Centre will provide new knowledge, methods and technologies as well as highly skilled PhD and postdoctoral researchers to tackle the main challenges for industry: Climate warming, water restrictions, changing consumer preferences and rising wine alcohol content, in order to help make the wines that consumers want.</p>	University of Adelaide	\$2.4m	1
<p><i>A molecular technology platform for enabling the next revolution in the food industry</i></p> <p>This Training Centre will train young scientists in the application of applying molecular analysis skills to solve specific problems that the food industry faces in the whole process of taking food production from “field to fork”.</p>	Macquarie University	\$2.1m	1
<p><i>Training Centre for Advanced Technologies in Food Manufacture</i></p> <p>This Training Centre will enable Australian food processing and manufacturing companies to meet the increasing threats of international competition. It will do this through collaboration between industry and the Training Centre’s food science, nutrition and engineering researchers and the development of innovative technologies</p>	University of New South Wales	\$2.1m	1
<p><i>Australian Food Processing Industry in the 21st Century</i></p> <p>This Training Centre will educate a new generation of engineers and scientists and foster the capacity of Australian food industries to further develop advanced technologies in manufacturing and product improvement. The key objective is to support industry production of nutraceuticals for the promotion of health and well-being. In enabling the production of these nutraceuticals, the Training Centre will design cost-effective and sustainable processes that minimise waste-products, enhance efficiency and minimize the energy consumption.</p>	University of Sydney	\$3m	2
<p><i>Food and Beverage Supply Chain Optimisation</i></p> <p>This Training Centre will train the next generation of multi-disciplinary researchers capable of designing and managing safe, sustainable, and cost-effective, food supply chains.</p>	University of Newcastle	\$2.1m	2
<p><i>Innovative Horticultural Products</i></p> <p>The Training Centre will develop fresh foods with improved shelf life and sensory quality, through a suite of food science and market analysis projects relevant to the horticultural supply chains of Woolworths supermarkets.</p>	University of Tasmania	\$2m	2
<p><i>Functional Grains</i></p> <p>The Training Centre aims to improve the profitability of the Australian grains industry. It plans to achieve this by adding value to rice, canola and pulses through: the development of a better understanding of market opportunities; improving storage technologies; the development of products which improve returns to the industry and result in better health outcomes for consumers; and improving processing methods to generate these products.</p>	Charles Sturt University	\$2.2m	2

Appendix F VET reforms in Australian states and territories

		Victoria	NSW	ACT	Queensland	SA	NT	WA	Tasmania
Target categories of reform	Reform Name	<i>Supporting a Modern Workforce</i>	<i>Smart and Skilled</i>	<i>Skilled Capital</i>	<i>Great Skills. Real Opportunities.</i>	<i>Skills for All</i>	<i>NT flexible and specific skills reforms (No title)</i>	<i>Future Skills WA</i>	<i>Skills for Work</i>
	Funding changes	Subsidies set on the basis of assessed public value and private benefit of each course	Links NSW Govt's investment in training with NSW economy needs through a skills list	Provides \$21m of funding direct to providers over 3 years to improve access	\$86m over 6 years as training investment directed towards priority courses for employment	Investment is directed by price banding of courses based on a public value framework	Improvements underpinned by an Endorsed Provider Model (EPM)	\$118.4m in total structural reform payments out to 2017	\$39m in funding over 5 years through National Training Entitlement and Income Contingent Loans
	Role of industry	Introduced Industry Participation Model	Industry consultation for priority skills list	Minimal apparent industry involvement	Industry partners to guide investment	Industry connected training is being piloted	Wrap-around model to improve RTO/industry links	Industry role through Priority Industry Qualifications List	<i>Skills Tasmania</i> consults industry on growth areas to support
	Monitoring and quality assurance	New compliance and enforcement framework Established Market Monitoring Unit for subsidised training market Greater regulatory powers to VRQA	Training providers must meet criteria to guarantee quality, through a new approval process New consumer protection arrangements for students	RTOs must be approved for <i>Skilled Capital</i> and must already be approved under the ACT Funding Agreement RTO must evidence a strategy for providing foundation skills	Work with providers, unions and the sector to develop standards of accreditation for Queensland trainers and assessors. Create voluntary accreditation arrangements	DFEEST monitors behaviours and delivery of <i>Skills for All</i> RTOs, including brokers and recruitment agents including the use of incentives and inducements to enrol	Northern Territory Student Entitlement Model (NTSEM) which includes performance monitoring and improved contract and payment management systems	All RTOs seeking a contract to deliver publicly funded training under Future Skills WA in 2014, will need to achieve 'preferred provider' status	Quality assured through an Endorsed Registered Training Organisation System and Independent Validation of RTO Assessment
	Provision of information	Victorian Skills Gateway website gives online market	New website and provision of NSW Skills course list	Provision of <i>Skilled Capital</i> qualifications list for RTOs	A single portal to compare providers and course options	Indicative course list and online tools to calculate eligibility	Information just delivered through <i>MySkills</i> website	Dedicated <i>Future Skills</i> website	SkillsFacts mailing sends out funding opportunities

		Victoria	NSW	ACT	Queensland	SA	NT	WA	Tasmania
	Supporting TAFE networks	Introduced contestable funding for TAFE structural and business change	TAFE NSW given separate budget, and governance from NSW DEC	Does not discriminate between TAFES and other RTOs	TAFE Qld. established as an independent statutory body with a commercial focus	TAFE SA changed to operate under an independent Board of Directors.	NT does not have a TAFE sector and relies on two major providers	TAFE network not supported, TAFEs to become State Training Providers	TasTAFE supported to ensure a strong public provider
	Supporting regional areas	Regional partnerships now funded through Regional Partnerships Facilitation Fund	Subsidised courses based on regional job prospects and industry needs Regional RTOs get additional funding	ACT services regional surrounds, funding assists support services to ensure students are accessing training	Support SME employers in regional areas through 43m Regional Workforce Development Initiative	Training pilots for regional areas being developed with industry and RTO partners to meet specific demands	Wrap-around service (WAS) model proposed and trialled, including foundation skills and LLN model	State Priority Occupations List (SPOL) lists priority qualifications for regional areas, which are subsidised	Compliance and viability audit of existing polytechs to identify use and accessibility with a view to improve
	Other notes	N/A	TAFE NSW to reform employment model	N/A	Assets mgmt. separated from TAFE to improve facilities	N/A	Very thin client market for VET in NT, means less reforms	SPOL complements industry list for subsidies.	Small market allows more engagement with individual RTOs