
SUBMISSION

**REVIEW OF THE NATIONAL
INNOVATION SYSTEM**

**NATIONAL FARMERS'
FEDERATION**

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Executive Summary

- **Agriculture boasts one of the highest productivity rates of any industry and a strong commitment to R&D is essential for this to continue.**
- **Farming faces many challenges as it competes in the global marketplace for the supply of food and fibre.**
- **A focus on innovation adoption and commercialisation is imperative to any R&D effort.**
- **A major challenge will be attracting people into an agriculture-related career to replace the present number of baby-boomer scientists nearing retirement.**
- **Ensuring that training delivery and education opportunities are available for farmers to gain the necessary high-level skills to undertake innovation and capitalise through its adoption.**
- **Industry engagement and strategic direction alignment with R&D are seen as crucial components of any innovation system.**
- **Greater alignment with international collaborative efforts is required to ensure Australia is not ‘shut-out’ from innovation.**

1. INTRODUCTION

The National Farmers' Federation ("the NFF") is the peak farming lobby group representing producers of all major commodities in relation to issues affecting more than one State or commodity. The NFF's membership comprises State farm and commodity organisations with individual farmer members.

Australian farming has many success stories that can be attributed to the bringing down of trade barriers and responding to international competitive pressures.

These successes would not have been possible without the necessary innovation to farming systems that have concurrently occurred.

Indeed, looking forward to farming's future, the importance of continual innovation is crucial to not just the viability of farmers, but in the ability for farming to continue to feed and clothe the world as it adapts to climate variability.

For 20 years the National Farmers' Federation (NFF) in Australia has strongly argued that the viability of farming – today and tomorrow – and that of Australia's \$30 billion-a-year agricultural export sector – is inextricably linked to international trade and having a competitive economic environment at home.

Most Australian farmers realised this long ago, and led the charge in the 1980's for domestic and international economic and trade reform. For Australian farmers, traditional domestic markets were shrinking (Australia is a country of only 20 million people), so we turned our attention to international markets and the scale economies they could deliver.

Australian farming is overwhelmingly export-oriented. A massive 98% of Australia's wool and cotton is exported. Two-thirds of our beef and three-quarters of our wheat heads overseas. Some 80% of our sugar and over half of our dairy production is destined for world consumer markets.

This drive to be globally competitive without hiding behind the cover of protective barriers has driven average productivity growth of 3.8% during the past two decades and delivered an industry that effectively competes within one of the global market's most distorted sectors.

This is demonstrated by the fact that today, two-thirds of every hectare of agricultural produce that Australia generates is exported and access to international markets is more crucial than ever.

Productivity gains have enabled the majority of Australian farmers to be internationally competitive and achieve their goal of self-reliance, while delivering the highest-quality food and fibre anywhere in the world.

And despite the fact that since 1997-98, Australian farmers' terms of trade have decreased by almost 10%, farmers have dealt with this by improving productivity.

There is, however, increasing evidence that these productivity growth rates are starting to flatten. Some of this can be attributed to the existing drought and to the delay in access to GM technology.

It is worthwhile reviewing the R&D structures and roles that exist in agriculture and ensure that they are continuing to meet their original intentions.

1.1 OUR CLIMATE

The importance of reviewing our R&D is heightened by the prevailing drought and future predictions of temperature volatility accompanying climate change.

Farmers, who occupy and manage 60% of Australia's landmass, know only too well that their future is inextricably linked to sound environmental management. That is why, according to the Australian Bureau of Statistics, farmers spent \$3.3 billion on NRM in 2004-05 alone – over \$1.1 billion on weed prevention and management and \$900 million on land and soil-related activities.

In fact, it is little recognised that Australian farmers plant over 20 million trees for conservation reasons each year. NRM practices are in place on 86% of Australian farms, with 92% of farmers undertaking activity to prevent or manage natural resource issues.

Farmers recognise environmentally-sustainable farm practices are essential and have been engaged in developing and planting drought-resistant crop varieties and pioneering new irrigation systems that target water where and when it is needed, as well as a raft of eco-friendly farm practices.

Instead of ploughing four or five times a year, more and more farmers now use conservation tillage techniques to protect the soil structure, harness soil moisture and minimise erosion.

Australia is a harsh continent. It always has been and always will be.

Our climate has always been a challenge, but one that farmers have always met – successfully achieving unmatched productivity growth, employing well over one million Australians – across our cities and regions, earning vital export income for the nation and, not least of all, putting food on the national dinner table.

The worst drought on record presents new challenges and pressures, especially on the back of several continuous dry seasons. Even the best farm management practices cannot fend-off the ravages of drought under the current circumstances.

1.2 PROTECTION

Australian farmers are resilient. Despite common misconceptions, Government support for Australian farms represents just 4% of farming income. By comparison, according to the Organisation for Economic Cooperation and Development in the United States it's 17%, in the European Union it's 31%, and in Japan it's some 56%.

To make the point clear, Australian farmers are the least protected in the world.

Despite the negative fervour of a few critics, farming is a mainstay of Australian ingenuity, adaptability and enterprise. Giving up on farming is not an option any of us can afford to contemplate.

1.3 LABOUR

A major factor to farming innovation success story has been the skills, knowledge and expertise of people either working the land or involved in an associated capacity.

A guaranteed labour force that is appropriately skilled is crucial to the future success of farming.

In September 2005, the NFF released its Labour Shortage Action Plan in response to increasingly severe labour shortages in the agricultural sector. The Plan aimed to bring about a better understanding of employment in the industry and consequently, the nature and extent of labour shortages. Based on this, it outlined key measures in a multi-faceted labour sourcing strategy. Importantly, it also identified areas in which the research and development of ideas were needed to more effectively formulate ways in which to resolve regional and rural labour shortages.

In March 2008 the NFF released its second Labour Shortage Action Plan (Attachment A) to review the state of employment in the industry and the efficacy of the measures proposed, as well as to identify further issues, solutions and their implementation.

It focused heavily on education and training as being a way to drive many initiatives to alleviate labour and skill shortages prevalent across all facets of farming and related industries.

In tandem with this, efforts to streamline and improve access to skilled migrants have continued to allow the sourcing of tradespeople, managers, professionals and paraprofessionals for farm occupations.

A number of initiatives have also sought to change misconceptions that farming does not demand skilled or professional occupations when in fact they are crucial to the industry – consider commodity traders, farm managers, veterinary surgeons, ecologists, climate change scientists and horticulturalists, to name a few.

In 2005, it was estimated that as farm output reapproaches pre-drought levels, around 50,000 additional employees would be needed in the farming sector. A concerning finding in the 2008 NFF Labour Shortage Action Plan was that at the beginning of 2008, the estimate has grown to the need for around 100,000 additional employees. Bearing in mind that the current agricultural workforce represents 3.5 per cent of all employed persons in Australia, the significance of needing one third that number again assumes contextual importance. The extent of the increased demand for labour within agriculture is in the order of numbers equal to over one per cent of Australia's total workforce.

Agricultural labour shortages are pervasive by region, subsector and occupation. When considering the range of occupations that have been affected, the crisis is certainly better framed as both a labour and skills shortage.

Attachment B provides a detailed statistical report showing the methodology behind the 100,000 labour shortage figure.

Many farming regions, with generally strong preconditions, are placed for remarkable growth in the next few years, yet the inability to find reliable labour stands to impact on labour-intensive production such as horticulture, which has not become mechanized. Unemployment levels at record lows mean that even this pool of potential labour is far from sufficient to address the shortfall.

1.4 FARM FACTS

Through developing new technologies, seizing environmentally-sustainable farm practices, and improving efficiencies and competitiveness modern farming is essential to Australia's economic, environmental and social wellbeing, and a vital source for Australia's food security and, increasingly, mounting world food needs.

Farming is a mainstay of Australian ingenuity, adaptability and enterprise.

- Australian farms and their closely related sectors generate \$103 billion-a-year in production - underpinning 12% of GDP (based on modelling by Econtech for the Australian Farm Institute, Australia's Farm Dependent Economy Report, 2005.)
- Over the last 30 recorded years (1974-75 to 2003-04), Australian farms have consistently achieved average multifactor productivity growth of 2.8%-a-year - no other industry, with the sole exception of telecommunications and information technology, comes close to this achievement (Australian Government Productivity Commission, Trends in Australian Agriculture 2005).
- There are 154,472 farms in Australia - including those for whom farming is not their primary business. However, there are 137,969 farms solely dedicated to agricultural production.
- The gross value of Australian farm production (at farm-gate) totals \$35.6 billion-a-year.
- Australian farmers **invest \$237 million-a-year in research and development**. This is over and above the \$217 million spent by Federal and State Governments each year on agricultural research and development.

R&D Income & Expenditure			
	Contribution		Expenditure
	Industry	C'wth	
	\$M	\$M	\$M
R&D Corporation/Council			
Cotton	7	5	13

Dairy	15	15	40
Fisheries	11	16	27
Forest and Wood products	4	3	7
Grain	61	43	127
Grape and Wine	14	12	25
Horticulture	35	34	67
Land and Water Resources	0	13	33
Meat and Livestock	40	40	81
Pig	4	4	7
Sugar	5	5	10
Egg	1	1	2
Wool	39	11	83
Rural Industries	2	15	22
TOTAL	237	217	542

- Department of Agriculture, Fisheries and Forestry, *At a Glance*, 2007.

- **Efficiency gains through new technologies and farm management practices**, achieved on the back of research and development, have enabled Australian agriculture to stay a step ahead of our international competitors – returning average **productivity growth of 2.8%-a-year** over a 30-year period.
- Key to this productivity growth have been advances in knowledge and technology, improved use of available technologies and management practices, and structural changes that have seen increased farm size and shifts in enterprise mixes (Australian Government Productivity Commission, *Trends in Australian Agriculture 2005*).

- As a result, Australian farming is world-leading and ultra-competitive. In fact, despite a 50% fall in agricultural terms of trade since 1960, Australian farmers have tripled their production (from an index measure of 37 in 1960-61, to 107.6 in 2003-04), as well as tripled the real gross value of their produce (from \$10,557 million in 1960-61, to \$30,338 million in 2003-04) (Australian Government Productivity Commission, Trends in Australian Agriculture 2005).
- Despite common misconceptions and the worst drought on record, Government support for Australian farms represents just 6% of farming income. By comparison, according to the Organisation for Economic Cooperation and Development (OECD), in Korea it's 63%, Japan 53%, in the European Union it's 32%, in Canada it's 23%, and in the United States it's 11%.
- In fact, Australian farmers are among the most self-sufficient in the world (OCED, Agricultural Policies in OECD Countries: Monitoring and Evaluation 2007).

2. FARMING INNOVATION

Agriculture, more than most sectors of the economy, has been forced to rationalise and increase its economies of scale in order to combat declining terms of trade.

The Australian Productivity Commission report, Trends in Australian Agriculture (2005), demonstrates that productivity growth in agriculture has more than doubled over the past 14 years, consistently outperforming other sectors. In the past two decades, the Australian farm sector has averaged annual productivity growth of 2.8% a year. Improvements over the past 30 years have resulted in a national 'productivity dividend' of more than \$170 billion.

Such productivity growth has allowed farmers to remain internationally competitive and sustain their businesses and incomes in the face of agricultural

terms of trade declining by 4.8% in the five years ending 2005-06.¹⁵ In addition, it has allowed Australian farmers to remain competitive in what is the most distorted sector of trade in goods.

The last seven years have been a challenging period for Australian farmers with widespread and prolonged drought leading to a severe reduction in farm production and a resultant 40% escalation in farm debt levels. In addition, the strength of the Australian dollar (particularly against the US dollar), has had a dampening effect on farm export returns, while costs of key farm inputs such as fuel and fertiliser have risen exponentially on the back of shortening global supplies.

However, despite the frustrations for Australian farmers, the international market for agricultural commodities has been very strong, with the Westpac-NFF Commodity Index (measuring the weighted average price of key global agricultural commodity prices) reaching record highs in late 2007.

This has been brought about by surging global demand for biofuels, strong economic growth in developing countries, global population growth leading to urban encroachment on arable land and widespread drought in key agriculture production nations.

The underlying fundamentals for Australian agriculture remain extremely strong and are expected to remain so over the medium to long term.

In order to capitalise on these opportunities, Australian farmers, with the assistance of the Commonwealth Government, must focus on areas for which they can realistically manage outcomes. Meaningful adaptation to climate change and seasonal variability, building better and more efficient capacity in areas such as transport and labour, and boosting our efforts in gaining access to key global markets are just a few areas that must be resourced effectively.

As previously stated, Australian farming boasts one of the most impressive productivity growth levels of any industry. Much of this productivity growth can

be directly attributed to R & D investment which has improved inter alia crop varieties, new technologies and systems and other efficiency gains.

The partnership approach between industry-funded and government matched R&D Corporations has demonstrated success stories.

The direction and drive that industry-focussed research has delivered is a key feature of the R&D approach.

Industry is directly calling the funding ‘shots’ and investing research effort into areas it places greatest value and expected return.

It is therefore vital R & D investment (both government and industry) be continued into the future so that this focus on continuing to make efficiency gains continues.

2.1 RURAL RESEARCH & DEVELOPMENT CORPORATIONS

Rural R&D Corporations (RDCs) have generally proven responsive to changing external conditions relating to their particular industry sector or commodity.

However, there exists a significant gap in RDCs on big picture Agriculture issues

For issues such as climate change, water, skills, carbon, RDCs have informal mechanisms to cooperate, but generally undertake piecemeal efforts, or even worse, tend to duplicate each other’s work.

There is strong evidence that a central R&D for rural industries is required that either coordinates/collaborates amongst RDCs or is beefed up to take on these ‘all-of-farming’ issues.

Funding towards such research goals should not be at the expense of the existing RDC budgets, but would need to be new money.

As researching and understanding such issues carries a significant public good, the NFF submits that the funding for this to occur is best carried by the Australian Government with industry-direction and guidance provided by the respective peak farming bodies.

There are also criticisms levelled at RDCs that their focus is solely on everything inside the farm-gate and that scant attention is applied to the supply chain.

NFF recognises that the levy-payers are the farmers, and that research should be targeted to delivering outcomes to those who pay the bill.

It would be counter-intuitive to introduce a levy to drive R&D in the farm and food-production supply chain.

In a flexible price competitive international market, any increase to the costs of participants in the supply chain is passed back down to the farmer level.

As such, it would ultimately be the farmer who wears the R&D levy of any imposed on the supply chain.

Whilst the supply chain has great potential for productivity improvements and is deserving of R&D investment, this would be to the direct benefit (and profit) of those engaged in the supply chain and would not be passed on as reduced input costs to farmers.

The NFF applauds the industry-driven nature of RDCs.

Aligning strategic research priorities to the respective industry ensures that they are flexible, are able to rapidly adjust, yet also take a long-term view to the R&D required by that sector/commodity.

The industry-levy has achieved for a market that has a clearly demonstrated failure to undertake research on its own.

Yet, in an almost perverse way, it is the levy system that has failed farming when it is most needed. The present drought has seen levy contributions and the matching government funding to RDCs diminish in a time when it is most needed.

As the government sets out its ambitious priority areas for RDCs to address and industry is demanding solutions through R&D, the RDCs find themselves more poorly resourced than at any time to deal with the issues.

As levy funds are variable to the productive outcomes of particular commodities, there is scope for additional Government support to maintain a 'floor' during periods of poor production from natural events such as the present drought.

The role of RDCs in providing extension services and training is also an area for improvement. This is outlined under section 3 of this submission.

2.2 COMMERCIAL OUTCOMES

As previously mentioned, one of the defining characteristics of rural innovation has been the basis upon delivering commercial outcomes rather than focussing on research quality or registering IP.

NFF submits that Australia, and its place in the world of R&D, should not overly emphasise IP outcomes in its funding model.

Rather, we should be engaging collaboratively with our principal research partner countries (the EU and the US) to leverage industry outcomes.

A focus on IP outcomes usually result in protracted periods of bringing a product/service to market and acts as a barriers to innovation adoption and slows productivity growth.

Instead the justification of public monies on R&D should focus on recognising the value of research and its exploitation by Australian interests

2.3 CRCS

CRCS were originally established to translate "research outputs into economic, social and environmental benefits".

This core belief remains valid today and has benefited farming and agriculture significantly through the many rural-related CRCs that have existed and continue to exist.

The long-term view of CRCs and their research priorities have allowed them to break out of the ‘immediate’ return mentality that pervaded research prior to their existence.

However, it is also recognised that this lack of flexibility, has hindered them in adjusting to new industry or government priority research areas.

Additionally, the strategic needs of industry are not always the focus or stated outcome of collaborative research.

NFF submits that CRCs would benefit from closer alignment with industry and government national research priority areas and to regain the focus on research outcomes than the laying down of ‘sandstone’ administrative structures.

Rural industries have successfully partnered with many CRCs with significant science and core research occurring over their life, but have been frustrated at continuing some of that good work.

CRCs would benefit from some strategic assessment of a continued existence after their seven years of life as long as it was delivering commercial and strategic outcomes.

2.4 R&D TAX CONCESSIONS

NFF submits that there should be a continuation of the tax rebate scheme, which promotes R&D investment and assists with organisational attention towards innovation solutions.

Further increasing the level of concession (and keeping a broad definition) is expected to drive a new wave of innovation and provide a strong incentive for Australian business to invest in this area.

Agriculture, and its related supply-chain industries, significantly benefit from industry grants to bring innovation into commercial reality.

There have been a number of successful grant programs that have operated across agriculture and food production that rely on matching funding to commercialise.

3. INTERNATIONAL COLLABORATION AND IMPROVED EXTENSION SERVICES

Australian Research and Development has led to some of the most impressive productive gains in farming of any industry.

However, the focus Australia has had through its levy system and matching Government contribution, is in serious difficulty moving forward.

Our major international competitors, faced with FTA and WTO decisions limiting their direct support for Agriculture, are now directing these monies increasingly towards R&D.

Equally, our own outcomes from R&D are not seeing the follow through and uptake on the farm.

These twin challenges for Australian farming need to be addressed to ensure we can continue to realise productivity gains and remain internationally competitive.

Australia, as previously indicated, provides very little financial support to its farmers in comparison to our major trading competitors.

A significant increase in Government funded research and development is required if Australia is to capitalise on growing international demand for farm produce and remain competitive with our competing nations.

Additionally, our major global competitors and their sheer scale, will continue to drive innovation. It is important that Australia plays a collaborative approach with these countries R&D efforts and not risk being locked out of future productivity gains through intellectual property (IP) mechanisms. Our relatively small R&D funding in comparison must be wisely used to contribute to industry outcomes.

Equally, there must be a significant focus on improving the extension services available to farming so that our innovation advances are capitalised on the farm.

Case in point has been the slow adoption of minimum till. Developed nearly twenty years ago, there are still significant parts of the Australian cropping industry who are yet to adopt this productivity gain.

If Holden or Ford spent significant money on R&D that leads to innovation, it is immediately implemented on the factory floor.

Australian farming, however, tends to have a wait and see approach that results in decades of waiting prior to adoption.

This approach is simply not sustainable and a new wave of extension and adoption support is desperately needed.

4. EMISSIONS TRADING SCHEME

The Australian agricultural community is extremely concerned that measures designed to continue such productivity improvement may be stunted or indeed reversed, by the potential penalties for increasing greenhouse gas emissions from building livestock numbers and/or continuing nitrogenous fertiliser use. It is the NFF's view that the ETS design must not inhibit productivity gains to the significant detriment of Australian agriculture and the domestic economy.

On the contrary, the NFF argues that increasing Australian agricultural production volumes is in the interest of the world community in its efforts to reduce total global emissions. Lincoln University in New Zealand specifically undertook research looking into the issue of food miles. The result of this study demonstrated that dairy produce emerging from farming systems in New Zealand are significantly less emission intensive than those from the British dairy system (Lincoln University, July 2006, Food Miles – Comparative Energy/Emissions Performance of New Zealand's Agriculture Industry).

While further LCA analysis specific to the range of Australian farming systems is required in this area, the NFF is confident that findings will unequivocally support this notion across the wide spectrum of Australian agriculture.

The NFF also believes that forcing reductions in nitrogenous fertiliser use by agriculture, in the absence of viable alternatives, will not have a clearly defined impact on the net carbon footprint of Australian agriculture. It must be remembered that such fertiliser use is designed to enhance vegetation growth and in doing so, boost the carbon sequestration potential from the farming system. It also increases the water use efficiency of the plant. Furthermore, reducing fertilizer use will potentially reduce livestock growth rates, thereby increasing livestock age at turn-off and emissions per kilogram of meat production.

The NFF believes that significant R&D funding is required to support the development of commercially viable alternatives to conventional fertilisers, such as the hybrid organic and chemical fertilisers. In the meantime, however, further LCA analysis in this area is required prior to the Australian Government making any policy decisions with regards to the use of nitrogenous fertilisers in Australian agriculture. Australian agriculture has a history of embracing innovation with regard to sustainable farming practices.

Government must recognise, however, that many abatement opportunities for agriculture are currently either under-developed, forbidden by current scheme rules, or not yet cost-effective. For example, while methane capture is technically available today, it is not cost-effective in the context of global competition. Genuine commercial options to abate must be provided to agriculture before penalties on agricultural emissions can be fairly imposed.

On the issue of methane emissions from livestock, the NFF believes Government must also look at accounting for methane emission intensity (i.e. methane output per unit of production) rather than total methane emission reporting. The potential for emissions intensity benchmarking in agriculture to provide creative and innovative approaches to deliver multiple greenhouse and productivity benefits has been clearly outlined by the Climate Change in Agriculture and Natural Resource Management (CLAN) Working Group report titled Emissions Intensity Benchmarking in Australian Agriculture: Report on National Consultation 2006-07.¹⁷ The NFF believes that this is a potential mechanism to avoid perverse productivity and leakage outcomes for the livestock sector in particular and, as with all aspects of farm sector abatement and sequestration, further R&D in this area is required.

5. LABOUR/SKILLS SHORTAGES

Although skilled labour shortages continue to represent a major problem for the agricultural sector, entry level positions are just as problematic, but have not received nearly the attention that the skilled occupations have at the levels of both policy and practical initiatives.

A significant capacity constraint on farming continuing to meet its objectives in terms of export growth and volume, will be a labour force that is appropriately skilled to match desired volume levels.

In 2005, it was estimated that as farm output reapproaches pre-drought levels, around 50,000 additional employees would be needed in the farming sector. At the beginning of 2008, the estimate has grown to the need for around 100,000 additional employees.

Bearing in mind that the current agricultural workforce represents 3.5 per cent of all employed persons in Australia, the significance of needing one third that number again assumes contextual importance.

The extent of the increased demand for labour within agriculture is in the order of numbers equal to over one per cent of Australia's total workforce.

Agricultural labour shortages are pervasive by region, subsector and occupation. When considering the range of occupations that have been affected, the crisis is certainly better framed as both a labour and skills shortage.

5.1 TRAINING SYSTEMS

As farms become more business orientated, they are recognising the importance of training and an educated workforce and are dismayed at the present deficiencies in training providers.

There are exceptions to this rule, with some sections within TAFE who are willing to “work around” the rigid and controlling structures and funding formula’s imposed on them by the educational bureaucracy. These are the providers who will organise training delivery to occur at a ‘time and place’ suitable to the employer and employee. Rather than prescribing the apprentice is expected to be at the TAFE campus at 10.00am every Monday, they will holistically conduct training at the employers property at a time that does not conflict with work priorities or issues such as seasonality and production calendars.

The highly successful and well supported FarmBis program operated by the federal Department of Agriculture, Forestry and Fisheries, was well tailored to the short-course, seasonal appropriate nature of farm businesses.

Whilst this program has been cut by the Australian Government as it moves to a focus on climate adaptability, there is a significant opportunity to review the FarmBis program and expand it into a much wider, broader and more encompassing approach to agricultural education and training. Such a focus would reflect regional and rural training needs with:

- A drive to online learning
- Funding of training that reflects the higher costs and time for regional delivery of training
- An improved Recognition of Prior Learning system
- Specific training tailored to commodity group areas
- Farmer friendly language on education and training programs
- Support funding of skill sets and encourage greater flexibility in delivery
- Development of a ‘skills passport’ that cooperatively works with other industries or commodities to resolve single employment issues. Such a passport could be utilised to match skills, plan work schedules and coordinate labour supply originating domestically or abroad.
- Promotion of farming and its attractiveness as an industry and career path

5.2 HIGHER SKILL LEVELS

The agricultural sector is in the midst of pervasive changes in terms of the approach and method in which farming is conducted. Technological and scientific developments have been increasingly pertinent to an industry facing harsher climatic conditions and striving to remain internationally competitive on global markets. Traditionally, the skills necessary to working in the industry have been hands-on, developed through on-the-job training.

For a significant majority of occupations on farms, this continues to be how employees are trained. It should, however, be noted that the nature of farming has and continues to significantly change.

Mechanisation, automation, and technological advancements have made farming a much more highly skilled industry than ever before.

As an export competing industry, Australian farming boasts the highest productivity improvements of any other outside of Information Technology.

Farming has needed to reduce its cost inputs every year in order to remain internationally competitive. This has resulted in GPS guided tractors, soil moisture profiling, computerised drip irrigation systems, laser levelling and minimum-till farming methods replacing previously manual labour.

With the increased skill requirements to work in farming, the importance of appropriate education and training that can meet the demands of the industry and also prospective employees, has been reinforced.

Further, education and training in the agricultural sector must be wider ranging than simply focusing on employees.

By its very nature, training and education must be broadly handled and encompass all those who work on a farm including the owner/operator of a family farm business.

A sustainable farming industry requires an improvement in the skill capacity of all those who work on a farm. This adjustment in farmers' attitudes to learning is seen as a crucial step towards improving the sustainability of farming. There is a crucial need to ensure that all those involved in agriculture have high level skills and capacity to undertake work in the sector to enable the agricultural industry to remain competitive and productive in an international market place both now and into the future.

Training delivery is needed across the age spectrum to those already involved in the industry and to educate those interested in the industry on the role farming plays in Australia's economy.

Skills development is complicated by the mobility and comfort of young people to change careers. Whilst agriculture has generally chosen to bury its head in the sand in dealing with Generation Y, greater attention to catering to the needs of this generation in a rural setting needs to occur.

There is also a strong need for farming to move towards higher level skills in order to compete with the job attractiveness of other industry groups.

As the majority of Vocational and Tertiary education delivery is actually at the farm owner/manager, it is imperative that the training delivery needs of this person are integral to creating a culture of learning on the farm.

If this person suffers a poor experience or perceives low value in pursuing learning opportunities for themselves, then this perception will transfer to their family members and workforce. To counter these perceptions, it is extremely important that learning is delivered upon the fundamental adult learning principles.

Attitudinal change in the farming population is needed so that farmers and their workforce are prepared to identify their deficiencies, adapt to change, and establish risk management practices.

There are series of studies that show the educational outcomes of regional Australia are severely behind that of metropolitan Australia. A serious coordinated effort is required to lift the educational standards of non-metropolitan Australia.

5.3 TERTIARY

Enrolments in tertiary Agricultural courses continue to decline. This creates the possibility that tertiary learning institutions will close down or limit farm course offerings. The “thinness” of the market, particularly with regional campuses, exacerbates this problem. Under present funding formula and the move by Universities to greater commercial basis in their operations, it will become highly tempting to remove agricultural science courses. This is not just due to the smaller number of enrolments, but the reasonably significant costs of equipment, technology, and delivery in comparison to soft-study courses such as Commerce or Public Affairs which only require text-books and a lecturer.

While recognising the decline in Agricultural Science graduates, it is acknowledged that there has been an increased interest in Conservation and Land Management students.

Agriculture has an opportunity to capture these students, but will need assistance to fill in the knowledge and skills gaps required by the industry.

The expected collapse of tertiary graduates would create major problems for farming, especially in research and agronomy and will have debilitating effects on our international competitiveness, especially in areas such as gene technology and adapting to climate variability.

It is recognised that there has been a significant failure amongst careers advisers to demonstrate all the options available to a student interested in farming. There is a weight of evidence that indicates regional campuses assist in the retention of people in regional and rural centres. Once a regional student departs for a city-

based education, there is only a 40% likelihood that they will return to a country area.

The lowering of entrance requirements to attract people to an agricultural-based degree has impacted on the quality of graduates; however, the labour shortage has found major agribusiness companies seeking to lure students to work for them prior to the completion of their formal qualifications.

Particularly in regional Australia, there is growing interest in the trades as an education path with Certificates and Diplomas give greater career options and can still lead to a University degree. It is therefore, essential that the tertiary sector embrace and recognise this prior learning rather than create artificial entrance or completion barriers so that course fees can be realised.

There are a number of activities that Australia can undertake to address the high level skill needs and educational requirements. These are:

- Undertake research that assesses the future graduate employment demand and disciplines for farming and provide incentives (similar to that offered to nurses) to match these needs, coupled with research into the reasons students are not choosing agricultural university courses noting that salaries and lifestyle are comparable with similar occupations in other industries.
- Increased support for specialised degree courses based on commodity grouping, and support for cadetships in which farming companies and commodity groups sponsor a student through their degree.
- Introduce programmes and initiatives that encourage city students to undertake their further education in a regional centre, and similarly, appropriate infrastructure and initiatives to allow regional and remote students to acquire their degrees in those areas, either through locally situated institutions or the internet, or both.
- Greater governments support for regional and rural students accessing scholarships, changes to the ‘means test’ on farmers allowing rural

students to immediately attend University after leaving school and the encouragement of University and centres of higher learning to locate campuses in regional centres.

6. PERCEPTIONS OF FARMING

Changing the perception of farming is not an overnight activity. The need to educate consumers, teachers, students, and parents on modern farming practices has never been more paramount. Accordingly, the qualitative and quantitative research commissioned by the NFF has highlighted that the majority of Australians still hold the old-world view of farming.

It is perceived as a ‘sunset’ industry with no future. For Australia to continue to produce its own food and to environmentally manage vast tracks of land to keep free of pests and invasive weeds, these stereotyped old-world misperceptions of Agriculture must change. Australia still needs to attract people to work on the farm and its related industries.

Without the ability to attract new agricultural and food scientists, the productivity of Australian farms will start to slip, putting us at a competitive disadvantage with our international competitors. This will have serious repercussions for Australia’s terms of trade, export performance, and gross domestic product.

For example, Treasury has predicted that farming coming out of the drought would add an additional 0.5% to GDP. The great threat to this being achieved is not having the necessary labour pool with the requisite matching skill sets.

Farming must take a leadership role in the positing of the industry in the eyes of the world. The successful positioning of farming with media, politicians and third-party groups will lead to positive discussion and debate, and influence the public commentary of others on prevailing issues. A need to more thoroughly and

closely engage with educators and families on ‘modern farming’ is also of paramount importance.

Farm bodies presently produce a large range of educational materials and learning aids for use in the classroom. When approached, teachers are interested in information on modern farming, especially as it relates to the environment and sustainability. However, these two groups are not converging to achieve mutually beneficial outcomes.

The NFF is presently engaged on a number of fronts in educating the public on agriculture including involvement with ‘Ollies Island’, National Farm Day 2008 activities, and television advertisements.

It is working with Agricultural Scientists, Deans of Agriculture and other interested bodies in staying on message with its Communications Plan.

Additionally, the NFF has taken a leadership role with the Primary Industries Education Foundation that seeks to bring farm industry learning materials to teachers through a credible and respected organisation.

School education curricula have undergone numerous changes over the last several decades, but the area of food and fibre production and environmental management has largely been sidelined and not kept pace with modern farming practices. This is despite the great world-wide interest in the environment and consumer desire to know more about the world in which they live, and the food they eat.

Farming should continue to pursue activities that will educate consumers that “milk comes from a cow and not from the carton in the fridge”. Farming has achieved a great deal of technological advancement and has a resilient and adaptive history of which it should be proud – moreover, this history of meeting challenges evidences soundly the extent of the promise and prospects the modern industry faces.

To ensure continued interest amongst school students, parents, and teachers that farming offers exciting careers and is a modern employer, this world of opportunities must be promoted in a holistic manner, with particular reference to the personal and professional opportunities and challenges farming presents to those who opt for a career in the sector. Real jobs and opportunities need to be showcased to evidence and highlight exactly how rewarding, lucrative and challenging agricultural careers can be to discerning kids, parents, potential tree changers and new Australians.

7. CONCLUSION

Rural industries have a lot to boast about from their engagement in research and development.

The productivity gains achieved have allowed Australian farmers to compete against other nations who have significantly lower input costs or who benefit from government subsidies and trade barriers.

It is timely to note some of the key drivers of this success and to refine the existing innovation system.

The role and guidance that an industry can have over R&D cannot be disputed.

For Australian farming to deal with the challenges it faces, R&D will be of vital importance to its continued survival.