

DAIRY >>>
MOVING
FORWARD

Dairy Moving Forward **2015**

**Research, development and extension priorities
for the Australian dairy industry**

The Dairy Moving Forward Steering Committee comprises:

- > Australian Dairy Farmers
- > Australian Dairy Products Federation
- > Dairy Australia
- > The Victorian Department of Economic Development
Jobs Transport and Resources
- > The Commonwealth Department of Agriculture
- > The Gardiner Foundation
- > The Regional Development Programs
- > The United Dairyfarmers of Victoria



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Introduction

Back in 2010, the dairy industry published the first set of priorities for research, development and extension (RD&E) under the national RD&E framework. This collaborative project, known as Dairy Moving Forward, sought to bring together RD&E providers and investors along with other industry stakeholders to set out a blueprint for RD&E investment. This plan has guided investment in dairy RD&E since 2010.

The Dairy Moving Forward project is managed by a steering committee Chaired by the President of the Australian Dairy Farmers and comprises senior members from Dairy Australia, the Commonwealth Department of Agriculture, the Victorian Department of Economic Development, Jobs, Transport and Resources, the Gardiner Foundation, the United Dairyfarmers of Victoria, the Australian Dairy Products Federation and the Regional Development Programs. The Steering Committee also has accountability back to the governments' Agriculture Senior Officials Committee (Research and Innovation Committee).

The Dairy Moving Forward project is divided into the five program areas of Animal Performance, Feedbase and Animal Nutrition, People, Land Water Carbon and Farm Business Management with each of these programs being overseen by a "Program Champion". Each Program

Champion is also supported by a "Community of Interest" drawing on a range of stakeholders with expertise in these portfolios across research, development and extension.

In late 2014, the Dairy Moving Forward Steering Committee determined that it is an appropriate time to review the priorities established in 2010 to ensure they are still relevant and appropriate in 2015. This refresh process has been completed by the program champions and their respective communities of interest and a summary of the revised priorities are contained in this report. This summary of priorities provides the industry with the strategic framework to assist the planning of RD&E investment for the dairy industry into the future.

The Dairy Moving Forward Project continues to support the objectives of the national RD&E framework.

Environmental scan

The dairy industry is Australia's third-largest rural industry behind beef and wheat, with a farmgate production value approaching \$4 billion.

Approximately 6,400 farmers produce 9.2 billion litres of milk annually and the industry provides direct employment of approximately 43,000 Australians. Dairy ranks fourth in Australia's agricultural exports with 40% of milk exported earning \$3.21 billion in 2013/14, while value added processing delivered a wholesale value of dairy products in excess of \$13 billion in 2013/14. Australian dairy products are an essential part of a healthy diet, valued and trusted by millions of people, and consumed around the world.

Dairy market assessments indicate that the volume and value of global dairy product trade will continue to grow in the short, medium and long term, driven by increasing demand in developing dairy markets and regions including China, South-East Asia and the Middle East.

Despite the long-term positive outlook for international dairy markets, confidence across dairy farmers, whilst improving is still variable across individual farmers and regions. Dairy farmers producing for the domestic market are less positive about the future and many are questioning the profitability of milk production. Equally, farmers who have experienced several tough seasons and reduced profitability are focused on short-term issues rather than longer-term opportunities.

Against this background, significant opportunities exist, particularly with expanding international markets, but to capture the potential benefits dairy farmers in Australia will need to structure their businesses and production systems to withstand high price volatility (for both inputs and outputs). This emphasises the need for research, development, extension and education under Dairy Moving Forward that supports dairy farmers to be profitable and achieve their wealth and livelihood goals within this particular operating environment.

Business conditions

Increasing levels of market and margin volatility of the industry in the last decade has served to undermine confidence in the outlook for many farmers who are seeking reliable returns on which to build a longer-term future.

There is no question that Australian dairy farmers are facing an increasingly turbulent business environment and Figure 1 illustrates the enormous volatility in farm business profit experienced over the past 20 years.

Australia's competitive position in dairying has changed over recent years. Farm cost structures have increased in response to the need to adapt to drier conditions, with rain-fed pastures contributing a lower proportion of the total feed available. Despite the increased rainfall in the last couple of seasons, farm cost structures have not returned to those of a decade ago for a range of reasons.

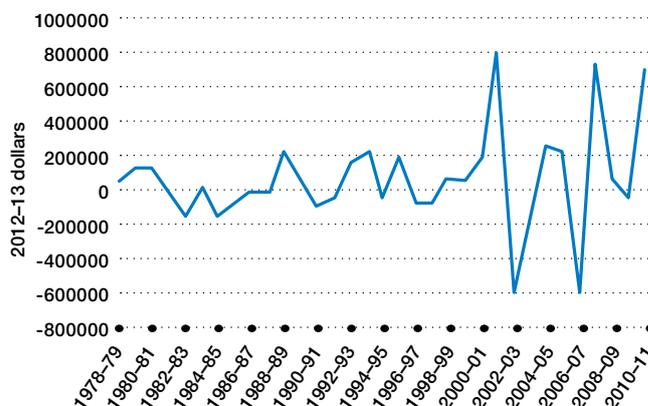


Figure 1. Farm business profit 1979–80 to 2010–11
Source: ABARES

Industry analysis shows that the cost of production in Australia and New Zealand has increased. Australian dairy farmers face continued and increasing competition for resources, land, water, feeds, fertilizers and people and this is resulting in increases in farm input costs including the costs of fuel, fertiliser, purchased feeds and electricity.

As subsidies in Europe and the US have reduced, dairy farmers in these regions have become more efficient and reduced their costs of production. The result is a much more closely aligned global cost of dairy production. In this situation Australia has lost one of its key competitive advantages as an efficient low-cost dairy producer. Pasture-based dairy producers in Australia and New Zealand are now facing direct competition at a similar cost of production from milk producers around the world operating more intensive farming systems.

International competitiveness is important for all dairy farmers regardless of whether they supply a domestic or export orientated market as no Australian market or geography is "protected" from high-quality, lower-cost competitors. A positive future for the Australian dairy industry involves achieving on-farm business success while operating internationally competitive farm systems.

New Zealand's strong milk production growth in the past decade has been largely aided by an entrenched business culture which underpins a focus on wealth creation. This has fostered growth in existing dairy enterprises and provided impetus for conversion of land from other uses into dairy production (as detailed in the Horizon 2020 report).

The cost of producing milk in typically low-cost extensive pastoral production systems, such as those found in the Southern Hemisphere, has increased since 2002. Producers in these lower cost export countries have enjoyed buoyant returns and capitalised them into higher valued assets, primarily land, bringing on-farm production costs to levels similar to those in intensive feed-based dairy systems

(Rabobank – Agriculture in Focus November 2013)

For the majority of Australian dairy farmers, maximising profitability is their main aim, however it is well recognised that there is high variability in profitability between individual dairy farms, between dairying regions and between years. When surveyed, the majority of dairy farmers state that controlling costs relative to income and a focus on home grown pasture are key factors for a successful and resilient business. Management ability was also highlighted as a central factor that contributes to long term profitability as well as being a key strategy to manage risk. Business management skills – such as planning and goal setting, cash flow budgeting, risk management, and investment decisions – are critical factors that determine profitability and the ability of a business to deal with volatility. Horizon 2020 and other reports, including regional priority setting, have emphasised the need to better support farmers to heighten their focus on farm business performance and develop improved farm business management capability. Dairy Moving Forward has a clear role in elevating the importance of farm business success and ensuring appropriate RD&E programs are in place to support this.

Milk production trends

Strong growth characterised the Australian dairy industry through the 1990s, but that growth has stalled in the last decade. In the meantime, our major export competitor New Zealand, has expanded significantly.

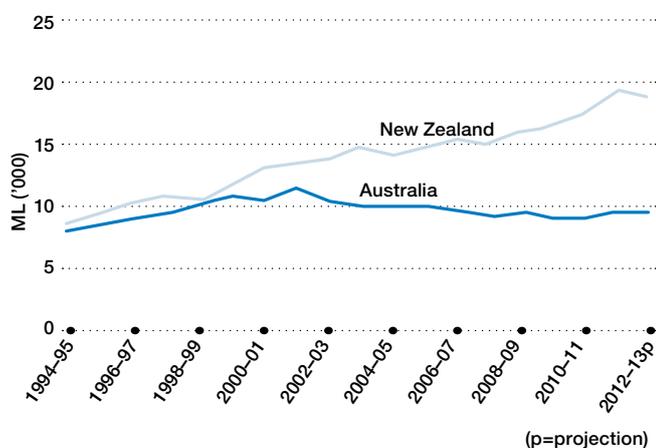


Figure 2. Milk production – Australia and New Zealand 1994–95 to 2012–13.

Source: Dairy Australia

Milk production is currently 9.2 billion litres, down from a high of 11.3 billion litres in 2001–02. Dairy farm numbers have declined since 2001–02 from 11,048 to 6,398 in 2012–13, with cow numbers falling from 2.1 million to 1.6 million over the same period. However, while there are now fewer dairy farms, average farm size has increased by around 47 per cent over the past 30 years.

The concentration of Australian milk production among the states continues to shift considerably, with the southern states expanding and the northern states contracting. In particular, Victoria's share of production increased from 63 per cent in 1999–00 to around 66 per cent in 2012–13. Tasmania's share of production also increased, from 6 per cent in 1999–00 to 8 per cent in 2012–13. In comparison, New South Wales fell from 13 per cent to under 12 per cent, while Queensland fell from 8 per cent to 5 per cent over the period from 1999–00 to 2012–13. The share of milk production from Western Australia and South Australia remained steady at 4 per cent and around 6 per cent respectively over the period.

A key question for many with a stake in the industry is how to arrest this decline in milk production and restore profitability, growth and confidence back into the Australian dairy industry. There are significant advantages for individual farm enterprises, dairy companies and the industry more broadly from setting an agenda for growth.

Sustainability

The Australian dairy industry has a proud history of sustainability. The industry undertakes many programs that contribute to enhancing livelihoods, improving the wellbeing of people and animals, and reducing our environmental impact, for both today and future generations.

In recent years, customers have expressed increasing expectations around the sustainability of agricultural practices, and demands to better demonstrate the dairy industry's sustainability credentials have intensified. Many dairy companies in Australia and internationally are experiencing some pressure from their customers to report on the sustainability of their products and their supply chains.

In 2012, the industry endorsed the Australian Dairy Industry Sustainability Framework identifying priority areas, goals and objectives. It builds on significant existing industry activity and sets the direction for continual improvement, providing guidance to farmers, manufacturers and industry bodies about our shared priorities and commitments.

The framework defines seven priority areas under three themes:

- > Enhancing livelihoods
 - Creating industry prosperity
 - Supporting communities
 - Investing in dairy people
- > Improved wellbeing
 - Ensuring health and safety, including safe dairy foods and ingredients
 - Maximising nutrition
 - Caring for our animals
- > Reducing environmental impact
 - Minimising our environmental footprint

The efficient use of resources and energy is an increasing issue for Australian dairy farmers both in terms of cost control and to meet community expectations for environmental performance. The sustainability of nutrient use, particularly nitrogen, is expected to escalate based on experiences in overseas dairy industries (i.e. New Zealand, Netherlands).

Australian dairy farmers are increasingly focused on demonstrating they meet society's expectations of animal welfare. On-farm change in relation to animal welfare will continue to be supported to promote industry recommended practices for priority animal welfare issues – tail docking, bobby calf welfare, disbudding, calf management, calving induction, lameness and downer cattle.

It is critical that Dairy Moving Forward aligns its priority areas, goals and objectives with the industry-agreed Australian Dairy Industry Sustainability Framework.

Climatic conditions and outlook

The Australian dairy industry has experienced a slow recovery from drought with rains returning in recent years replenishing storages and restoring irrigation levels. Milk production growth in 2011/12 of 4% was the strongest in a decade, but 2012/13 saw approximately a 2% reduction due to dry conditions in South East Australia.

Climate variability has potential to impact on the dairy industry's production and sustainability because of higher mean temperatures, with possible increases in extreme high temperatures; changed rainfall patterns (either increased or decreased), with possible increases in rainfall variability and intensity; changed irrigation water availability, and increased CO₂ concentrations.

Predictions for all dairy regions from the 2007 CSIRO report *Climate Change in Australian Dairy Regions* is for warmer and drier conditions, with increased evaporation and less runoff. Increased seasonal variability and extreme weather could make it more challenging for dairy animals and more difficult or expensive to grow quality pasture or supplementary feed.

Climate variability provides added uncertainty for dairy farmers and an additional risk which erodes profitability. Managing climate variability is, and always has been, part of managing a dairy farm and the best preparation for an uncertainty is a comprehensive risk management plan. Improved on-farm efficiency is vital for farm profitability and managing climate challenges.

The messages from the dairy industry's Confidence to Grow project (2007–2010) concluded that:

- > Managing climate variability is and always has been a big part of managing a farm, and
- > Businesses that are efficient and profitable now are best placed, no matter what the future.

These messages remain valid in today's environment and are still applicable to research, development, extension and education under Dairy Moving Forward.

Changes in government and investor directions

Public sector agricultural RD&E funding is progressively declining in real terms, having peaked in 2001, and there appears to be little possibility this trend will be reversed. The major challenge in the future will be to ensure that the available public, levy-funded and private-sector research, development, extension and education resources are most effectively utilised for maximum benefit to the dairy industry.

As State Governments have come under budgetary pressures in recent times, funding of RD&E has decreased or only been secured through the provision of matching industry (farmer) funding. State government-based extension services have been winding down over the past decade and this decline is now accelerating. Individual States are at different stages on this continuum but the South Australian government has already completely exited provision of dairy extension services. In some cases, the private sector and levy funded extension has grown to offset this decline, however, gaps remain across some geographies and technical areas.

The Australian Government is increasingly seeking evidence of collaboration between agricultural industries and in particular between any of the 15 Rural Research and Development Corporations (RDCs) across Australia. This requirement is particularly evident in "cross-sector" areas including animal welfare, climate change and water use in agriculture.

The Australian Government is escalating its focus on the timely adoption and utilisation of research and development outputs. The Rural Research and Development Policy Statement, released in 2012, states that "As a condition of government funding, RDCs should have in place suitably resourced processes to facilitate. This will require each RDC to: include in its strategic plan an extension plan which outlines the pathways to adoption for the R&D it conducts; consider the pathways to adoption in the planning and approval process for each research project, and; report on its extension activities".

At the same time as public sector agricultural RD&E funding has reduced, extension roles and responsibilities within the public, private, collective (levy) and vocational education and training sectors have changed. The continuing growing impact of the private and vocational education and training sectors on the advisory, extension and change management agenda in Australia foreshadowed.

For extension to be effective it must be well coordinated, and partnering amongst providers (public, private, collective and vocational education and training) is critical to achieving the impact that is required. Increasingly the challenge for extension is to be responsive to the opportunities of individual dairy farmers, but also to be clear in its role in driving and enabling change to focus on and meet clear outcomes and targets.

Investors increasingly are seeking very strong farmer outcomes from their investments in RD&E – with an expectation that research is genuinely addressing priority farmer issues based on active feedback from industry stakeholders. Improvements in how farmer and industry needs are better integrated with RD&E will not only drive a more relevant research agenda but also identify farmer innovations that can be tested through research.

Equally, investors are seeking improved integration of research and extension, especially, but not exclusively, within institutions and organisations. Government and industry investors are increasingly taking a global view and developing international opportunities for partnerships, co-investment and collaboration. For example, international Collaborative Agreements and Memorandums of Understanding exist between Australian organisations and similar institutions in New Zealand, Ireland and the United Kingdom. All parties to these agreements have an expectation of increasing collaboration to meet their respective industry's needs.

Increasingly, farmers are also seeking information electronically through the use of applications such as smart phones and the internet. This trend provides the opportunity for non-traditional forms of extension and the development of knowledge hubs and e-extension models.

Dairy Moving Forward has a clear role to play to drive efficiency and improved science quality through fewer, larger integrated investments based on a comprehensive scan of the international RD&E environment and appropriate program development processes.

National and regional RD&E needs

Since the late 1970s, the Australian dairy industry has achieved considerable improvements in farm productivity through the adoption of new technologies and management practices, along with structural changes within the industry.

At the industry level, total factor productivity (TFP) for Australian dairy farms has increased at an annual average rate of 1.6 per cent a year from 1978–79 to 2010–11. This compares favourably with all broadacre agriculture (1.0 per cent), broadacre cropping (1.5 per cent) and the beef industry (0.9 per cent). However, ongoing pressures mean that dairy farmers will need to continue finding productivity improvements to remain profitable in the longer term.

Average productivity growth over the period since 1988–89 has differed among the dairy regions. New South Wales (2.7 per cent) and Subtropical (2.1) realised the highest average annual TFP growth rates. In contrast, the performance of Gippsland (1.1 per cent) and Murray (0.6 per cent) has been significantly lower. In part, these varying rates reflect the initial productivity levels in each region. For example, the Subtropical and New South Wales regions started from a much lower base in terms of the technologies being used relative to other regions.

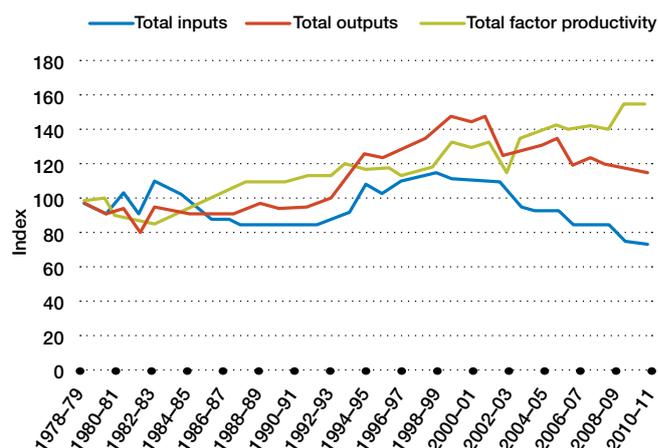


Figure 3. Dairy industry productivity, inputs and outputs, 1979–80 to 2010–11

Source: ABARES

Whilst there are many issues and opportunities that are common across the Australian dairy industry, it is important to acknowledge the differences between regions.

For example, the Australian dairy industry's enormous geographic and farm systems diversity results in large variation in the types of feedbase underpinning dairy production. The key challenge for Dairy Moving Forward in delivering appropriate research, development and extension services is the diversity we have across the Australian dairy industry; that is, eight distinct regions (and a greater number of geographic sub-regions), five categories of production systems, varying scale of operations from under 500,000 litres per annum to over 10,000,000 litres per annum, differing market dynamics and consequent payment systems.

There exists an increasingly complex and diverse range of dairy farms systems due to changes in response to declining reproductive performance of dairy herds, milk pricing signals from milk processor companies and other factors.

In any case, addressing the diversity of needs across Australia's dairy regions is one of the key challenges in delivering appropriate research, development and extension services. Dairy Moving Forward cannot always adopt a "one-size-fits-all" approach when considering RD&E investment.

Dairying in Australia is characterised by a hybrid production system, predominantly pasture-based with ready access to cost effective supplements and purchased feeds. Low cost production of home grown pasture and forages has underpinned the competitive advantage of Australian dairy farmers in the past. However, productivity gains are need in the production and utilisation of home grown feeds and in the conversion of these resources and bought in supplements to milk solids to restore this advantage. Increasing competition for land and water coupled with variable rainfall are driving the need for further increases in home grown feed production and utilisation.

Despite considerable ongoing investment in extension over two decades, estimated home grown feed consumption per hectare is still low compared to potential pasture yields. There has not been a significant change in average pasture or forage consumption over the past decade and there is considerable opportunity for the majority of dairy farmers to improve profit from their existing pastures, forages and supplements.

Animal genetic improvement is a critical source of cumulative productivity gain in the Australian dairy industry and has contributed up to one-third of productivity gains over the past two decades. While genetic improvement has made a contribution to improved productivity, the gains have fallen short of the potential benefits because of a fragmented industry structure, a paucity of good data in some key priority areas and from some key sources, and a lack of integration of genetics with other elements of the production system. The environment in which bull selection and breeding decisions are made has changed markedly in the past 10 years, and the introduction of genomics and genomic breeding values has added an additional dimension to this changing environment

Although there has been variation between breeds and countries, dairy cow fertility has declined globally since around 1980. Dairy Australia's InCalf Data Project (2011) showed that the Australian 6-week in-calf rate decreased by approximately 1% per year over the decade 2000–2010 and while conception rates were a major contributing factor the underlying causes are multi-factorial.

The control of mastitis and lowering of somatic cell counts continue to be raised as important issues by dairy farmers and milk processors as improved management of this disease has direct and obvious financial and milk quality benefits. Other animal health issues such as lameness, heat stress, Bovine Johne's Disease and Pestivirus continue to be relevant to the Australian dairy industry, but vary in their importance over time and between regions.

Larger farm scale has meant that many farms now employ people other than family. Turnover is relatively high in the industry and many dairy businesses report that they have difficulty in attracting and retaining skilled people, and that this is a constraint to business growth and wealth creation. Investing in programs and activities that attract, retain and develop people in the dairy industry is vital to its success. It is evident that people issues – attracting, managing and retaining people – remain a significant issue for the Australian dairy industry.

On a positive note, in relation to people on farms, labour productivity on dairy farms – measured as the number of cows milked or kgMS produced per full time equivalent (FTE) labour unit – has increased on average over recent years.

Dairy Moving Forward

The national framework structure through Dairy Moving Forward has become widely accepted as the basis for coordinated RD&E in the industry. The objective of the national framework is to develop, oversee and guide the coordination and alignment of research, development and extension in the dairy industry and to ensure the outcomes of investments in R,D&E address the industry agreed priorities.

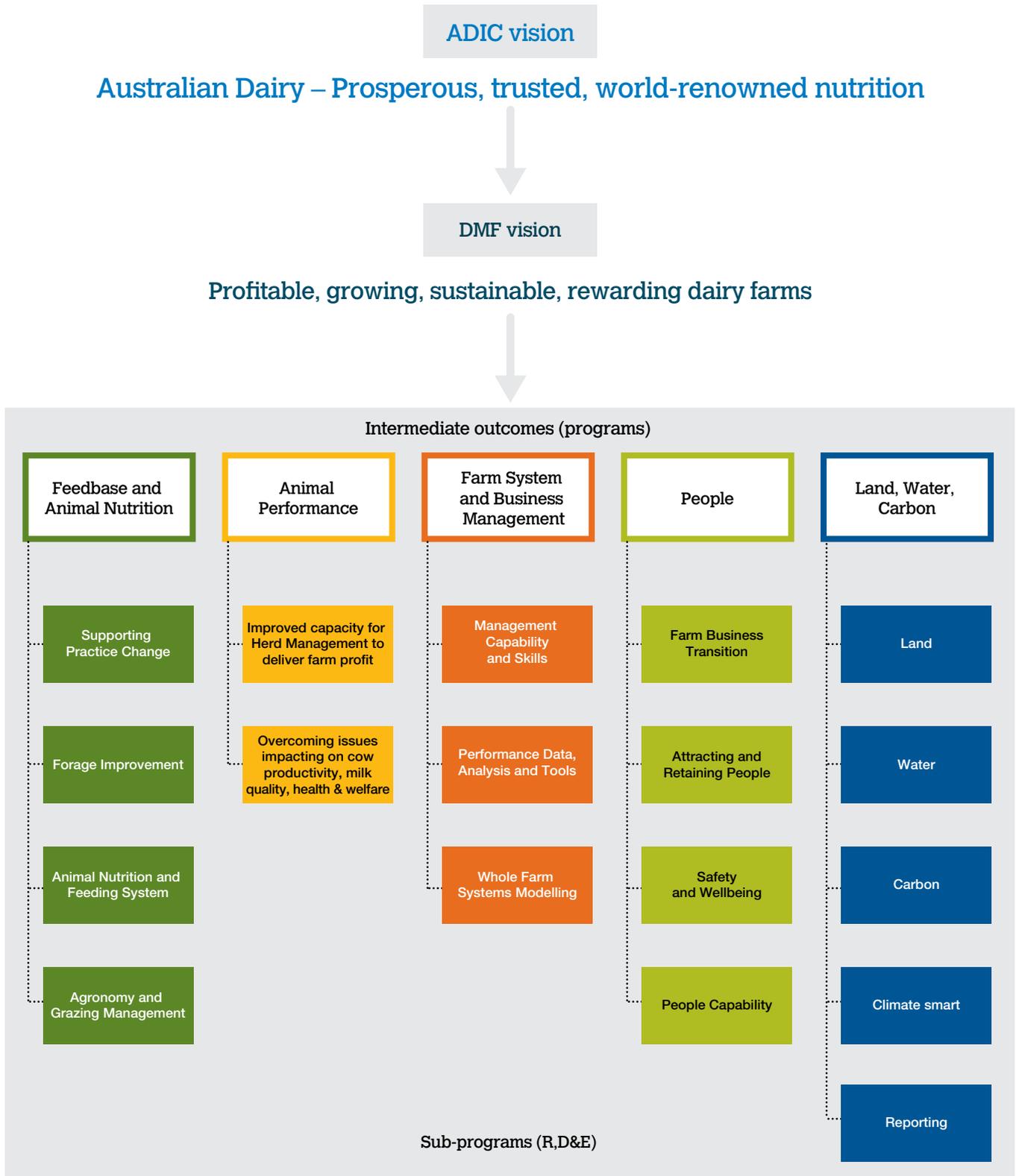
The achievements to date from Dairy Moving Forward have been significant with benefits from improved coordination and collaboration across research, development and extension. The framework provides the structure and institutional arrangements needed to strengthen national research capacity and better address cross sectoral and dairy sector research, development and extension requirements. Ultimately a more coordinated and collaborative approach to RD&E will ensure that national capability is focused, used efficiently and effectively to achieve the best outcome and uptake by the industry.

The Dairy Moving Forward program comprises five interlinked themes: feedbase and animal nutrition, land water carbon, animal performance, farm business management and people.

There are further benefits to be derived from Dairy Moving Forward. The framework has a clear role to play to drive efficiency and improved RD&E quality through fewer, larger integrated investments based on a comprehensive scan of the international RD&E environment and appropriate program development processes. Increasingly Dairy Moving Forward must foster a global view, particularly of R&D investments, to ensure scarce resources are used to best effect.

Dairy Moving Forward project

2015 programs and sub-programs





Feedbase and Animal Nutrition

Feedbase and Animal Nutrition program overview

Dairy farmers growing profitability through improved management of their Feedbase and Animal Nutrition

Sub-program	Outcomes	Focus actions	KPIs
Supporting Practice Change	<ul style="list-style-type: none"> > Sustained practice change leading to more profitable and resilient dairy farms > Easy access for all to R&D knowledge in Feedbase and Animal Nutrition 	<ul style="list-style-type: none"> > Development of a national practice change plan for Feedbase and Animal Nutrition > Innovation in supported practice change that leads to higher levels of sustained change on farm > Ensure store of R&D knowledge is translated, packaged, readily accessible and targeted to greatest effect > Build service provider capacity through up skilling/training to leverage their ability to participate in supported practice change 	<p>By 2020:</p> <ul style="list-style-type: none"> > Increase home grown forage consumption to greater than 1tDM per hectare per 100mm of rainfall and irrigation. <i>Target is for 25% of dairy farms to see a 0.1tDM per hectare per 100mm of rainfall and irrigation increase in consumption.</i> > Achieving 1 kg milk solids production per kg of cow live weight. <i>Target is for a 10% improvement in farms achieving this.</i>
Animal Nutrition and Feeding System	<ul style="list-style-type: none"> > Strategic use of supplements to optimise nutrient supply, dry matter intake and milk production > Farmers able to benchmark the performance of their farm's feeding system (link to FBM) > Large herds able to manage nutrition across herd for maximum outcome > A Lifetime nutrition focus (from calf to cow) that optimises profit 	<ul style="list-style-type: none"> > Understand how best to strategically use supplements to (i) improve nutrient supply, (ii) drive dry matter intake (increased forage consumption and utilisation), (iii) optimise milk production (kg MS/cow and /ha) > Model utilisation of feeds and feeding systems to optimise pasture utilisation, supplement intake and profit > Development of precision technology and tools to optimise decision making process within feeding systems > Whole-of-life and profit optimisation approach to nutrition – calf to cow > Focus on the unique needs of feeding strategies and systems for large herds > Continue to innovate in delivery of current knowledge for creating sustained practice change in this field 	<ul style="list-style-type: none"> > To have total feed costs less than 40% of total farm income. <i>Target is for a 10% improvement in farms achieving this.</i> > These KPIs are measurable and attributable to a prolonged investment in RD&E. Other measures which describe whole farm profit or industry-level objectives were deemed less appropriate as they were either difficult to measure or had multiple influences making them difficult to attribute to specific RD&E investments in Feedbase and Animal Nutrition. As such these KPI's need to be understood as lead indicators of high performance as opposed to actual drivers of performance in their own right. > These three KPI's need to be understood as a whole and be pursued in unison for high farm performance.
Forage Improvement	<ul style="list-style-type: none"> > Reliable and persistent perennial forage base > Objective means of assessing the merits of different PRG cultivars and endophytes > Maximised production and utilisation of home grown forage > A greater rate of gain and utilisation of improved pasture genetics 	<ul style="list-style-type: none"> > Develop next generation pastures and forages that result in improved DM and nutrient supply > Explore novel ways to maximise pasture growth and persistence > Provide an objective means of assessing the merits of different PRG cultivars and their endophytes > Continue to innovate in delivery of current knowledge for creating sustained practice change in this field 	
Agronomy and Grazing Management	<ul style="list-style-type: none"> > Improved home grown forage utilisation > Management that improves persistence of perennial pastures > Optimal use of fertiliser and water inputs 	<ul style="list-style-type: none"> > Continue to innovate in delivery of current knowledge for creating sustained practice change in this field > Continue to explore ways to optimise the consumption of home grown forage through better management practices > Further explore ways to improve fertiliser/nutrient/water use efficacy > Investigate the application of improved and alternative forages in filling feed gaps > Management practices that optimise supplement use with forage utilisation and consumption 	

Investments and forward priorities

Portfolio investment 2014/15

Current projects

Sub-program	Project name	Start date	End date
Supporting Practice Change	Feedbase research information development	1/02/2014	31/07/2014
	Regional Feedbase Extension Activities	1/09/2014	30/06/2016
	Development & Demonstration Pilot Project	1/07/2014	30/06/2015
	Hills & Fleurieu Dairy Forage Network	1/10/2014	30/06/2017
Animal Nutrition and Feeding System	Productive Dairy Feeding Systems (previously Feed Efficiency R&D)	1/10/2013	30/06/2015
	Supplementary Feeding Response Functions	1/01/2013	30/06/2015
	Cross Industry R&D Feedgrain Partnership	1/07/2012	30/06/2015
	Managing the economics of feed supply on dairy farms	1/07/2014	30/06/2017
	Building Animal Nutrition capabilities	1/01/2015	30/06/2016
	WA Dairy Feeding Systems		
Forage Improvement	Perennial Ryegrass Evaluation	1/03/2014	30/06/2017
	Perennial ryegrass ecotype x irrigation region (N Vic)	1/05/2014	30/06/2017
	Forages Stream of CRC	1/01/2010	30/06/2016
Agronomy and Grazing Management	More Milk from Forage Systems	1/07/2012	30/06/2015
	Filling agronomic capability and knowledge gaps	1/01/2013	31/12/2015
	Queensland and Subtropical Research, Development & Extension	1/07/2014	30/06/2017

Potential economic benefits

This has been modelled using the KPI's rather than the sub programs or individual projects. This view is a simplistic one and avoids taking single projects or opportunities which are currently in progress and analysing them further. Some single initiatives may offer a greater benefit however they all have varying degrees of risk around achieving success.

Even within the KPI's, KPI 1 will have benefits which are closely linked to KPI 2 and 3 and hence only the benefits from KPI 1 have been calculated to reduce any duplication.

Program/sub-program	Potential economic benefit 2020	Other benefits
KPI 1 – based on 25% of farms seeing an approximate 1t/ha improvement in home grown forage consumption. 1575 farms @ 140ha x \$250/ha benefit (benefit = reduced bought in feed costs + increased milk income, these are also both benefits of KPI 2/3)	\$55 M	A more resilient system

Knowledge gaps and future priorities for investment

With a broad and complex program area covering the largest cost category for dairy farmers this presents a challenge in short listing the priorities for investment. The Community of Interest (COI) came up with a mix of whole of program priorities and sub program focuses.

There was an overwhelming view by the COI that the key gap to seeing meaningful practice change on farm was around the immediate transfer of current Feedbase and Animal Nutrition Knowledge. The COI felt there is a clear and ongoing need for supported practice change within the industry in this domain. Whilst there have been many successes through the current approach to extension and education, innovation is required to see a faster and more broad uptake of current knowledge. Based on the limited data available, farming practice has been stubbornly resistant to change in this domain. A great deal of

information and knowledge already exists in Feedbase and Animal Nutrition to assist dairy farmers to improve their operations, hence the key priority is for an increased focus on innovation in the traditional field of “Extension” to drive a greater more sustained level of practice change to increase the profitability and resilience of dairy farms.

The second priority from the COI was looking at the current breadth of RD&E and identifying that while we service the majority of farmers well we seldom conduct RD&E which is focused on the leading farmers. These farmers are frequently operating well beyond the current KPI targets and hence we need to encourage some sectors of RD&E to look to fill the needs of this segment of farmers with innovation in technology, practices and tools.

The table below represents the key priorities within each sub program.

Sub-program	Focus area for priority
Supporting Practice Change	<ul style="list-style-type: none"> > Innovation in supported practice change with focus on the delivery model > Greater understanding of the barriers to change > Identify world leading approaches to supported practice change > Improving the skill base and capability of those involved in extension be it public or private
Animal Nutrition and Feeding System	<ul style="list-style-type: none"> > Manipulating animal intake to optimise nutrient intake and milk production for given feeding systems > Large herd feeding strategies > Feeding system design and management to optimise farm profit > Lifetime view of animal nutrition management
Forage Improvement	<ul style="list-style-type: none"> > Perennial pasture improvement and evaluation > Molecular plant breeding technologies that will lead to next generation pastures and forages
Agromony and Grazing Management	<ul style="list-style-type: none"> > Maximise consumption of home grown forage through better management practices > Continued improvements in nitrogen and water use efficiency

The Feedbase and Animal Nutrition COI see the opportunity to increase the focus and spend on innovation in D&E part of the program. With significant investment already completed in many of the sub programs the opportunity is to balance this with new investment into D&E with a focus on supported practice change.

Key cross-program integrations

The Feedbase and Animal Nutrition program has identified D&E (supported practice change) as a key gap and area for improvement. This can be assumed to be common to all DMF programs and hence a combined effort should be considered when trying to tackle the issue of innovation in practice change. This area is also part of a current larger cross sector proposal for funding to the Rural Research and Development for Profit Programme.

There is also significant linkages to the Farm Business Management program with a number of initiatives around linking farm financial performance to decision making in the feedbase and animal nutrition sector. Further collaboration will occur when the FBM team launch Dairy Base which will enable deeper analysis of the KPI's and levers driving farm profitability.

The Animal Nutrition sub program will align with a number of aspects of the Animal Performance program. In particular the links between feeding systems and improved genetics. The area of lifetime nutrition will also link with reproduction, animal health and welfare areas.

Within the Agronomy and Grazing Management sub program the scope around fertiliser and water aligns and integrates with the Land, Water and Carbon program and hence there will need to be a level of collaboration here to ensure positive outcomes for both programs.

Collaboration with other programs will be achieved with the program champions meeting regularly to ensure priority areas which are in common are being focused on with a mutual outcome. To date this has occurred with key FBM issues from Feedbase and Animal Nutrition already discussed and factored into the FBM program of priorities.

Working group

Member	Organisation
Steve Little	Private Consultant
Cameron Smith	Private Consultant
Sean Kenny	Private Consultant
Scott Barnett	Private Consultant/Dairy Farming Operation
Joe Jacobs	DEDJTR
John Evans	DEDJTR
Richard Rawnsley	TIA
Hugh Archibald	AARN/Nutrition Consultant
Tyran Jones (Chair)	ADF/ Dairy Farmer
John Verstedden	ADF/ Dairy Farmer
Richard Romano	Dairy Australia



Animal Performance

Animal Performance program overview

Dairy farmers confidently managing animal performance to deliver farm profit, health and welfare outcomes

Sub-Program	Outcomes	Focus actions	KPIs
Improve capacity for herd improvement to deliver farm profit	<ul style="list-style-type: none"> > Herds that perform in Australian conditions > Reliable ABVs > Collaborative industry that works together to promote herd improvement and innovative service delivery > Banks and milk companies advocate for herd improvement based on its impact on farm profit 	<ul style="list-style-type: none"> > Increase the ability of herd improvement to deliver profit > Improved oversight and coordination of the herd improvement industry > Demonstrate herd improvements impact on profit > Improve service delivery at farm level > Ensure alignment of genetic evaluation with the market > Focus herd improvement on the importance of people 	<p>By 2020:</p> <ul style="list-style-type: none"> > Genomic breeding values that are 70% reliable. > 95% of farmers using Australian profit metrics leading to \$15 per cow per lactation genetic gain > 70% of farmers use herd analyses to manage their herds and have access to single-entry, multi-use data > Number of herds providing performance information to ADHIS >3,100 > Number of females receiving genomic breeding values >3,000
Overcome issues and practices impacting on cow productivity, milk quality, health and welfare	<ul style="list-style-type: none"> > Increased reproductive performance with reduced reliance on and use of calving induction > Improved milk quality and more efficient milk harvesting > Dairy herds are protected from significant biosecurity risks > Dairy industry meets National Animal Welfare Standards 	<ul style="list-style-type: none"> > Adoption of best practices in animal husbandry and on-farm biosecurity > Increase farmer ability to control cell counts and microbes in raw milk and reduce the occurrence of mastitis > Increase farmer ability to manage herds to achieve good reproductive performance 	<ul style="list-style-type: none"> > 70% of farms achieving average annual BMCC of <250,000 cells/ml and 97% of farms achieving <400,000 cells/ml by December 2020 > 4,000 farmers complete “Cups On Cups Off” training by December 2020 > 100% of industry complying with legislated animal welfare standards by December 2020 > 100% of industry adopting relevant industry recommended practices for animal care by December 2020* > National average 6 week in-calf rate of 60% by December 2022

*Industry Sustainability Framework

Investments and forward priorities

Portfolio investment 2014/15

Outline of current major projects

Project domain	Type	Description	Funded by	Lead agency	Completion date
Reproductive performance					
InCalf	DE	Promoting adoption of best practices Adviser training and support	Dairy Australia	Dairy Australia	June 2017
Calcium metabolism x fertility	R	PhD: Effect on fertility of nutritional strategies in transition period	Dairy Australia	University of Sydney	June 2016
Cross breeding strategies	RD	Implications and strategies for successful crossbreeding	Dairy Australia	University of Melbourne	January 2017
Heifer management	RD	PhD: Effect of pre weaning calf health on production	Dairy Australia	University of Melbourne	August 2015
Economic modelling of reproduction	RD	Reproductive interventions and economic performance at farm level	Dairy Australia/ DEDJTR	DEDJTR	June 2015
Milk quality					
Mycoplasma control	RD	Epidemiological study and formulation of control guidelines	Dairy Australia	University of Sydney	March 2017
Milk harvesting technology	R	PhD: Effect of milk harvesting biomechanics on mastitis risk	Dairy Australia	University of Madison -Wisconsin	January 2017
Animal husbandry/health					
BVDV control	RD	Economic modelling and formulation of control guidelines	Dairy Australia	AgVet Projects	March 2015
Welfare outcomes vs herd size	R	PhD: Ensuring welfare outcomes with increasing scale of production	Dairy Australia	University of Melbourne/AWSC	December 2016
Dairy residency program	RDE	Capability building, applied clinical research and extension delivery	Gardiner Foundation/ Dairy Australia/ vet practices	University of Melbourne	December 2015
Health data for healthy cows	R	Collation and analysis of herd data on 100 herds in GINFO study	Gardiner Foundation	AgriBio/Holstein Australia	June 2016
Herd improvement					
Dairy Futures CRC	RD	Improve existing genetic tools and develop new ones to allow farmers to breed more profitable cows	Dairy Australia/ DEDJTR/ Commonwealth	Dairy Futures CRC	June 2016
ADHIS	DE	Provide accurate genetic evaluations of bulls and cows	Dairy Australia/ DEDJTR	ADHIS	Ongoing
DemoDHI	DE	Showcase 31 farms to demonstrate the impact of herd improvement on farm profit	Gardiner Foundation/ DEDJTR/Dairy Australia	DEDJTR	June 2018

Potential economic benefits

Sub-program	Potential economic benefit	Other benefits
Improve capacity for herd improvement to deliver farm profit	<ul style="list-style-type: none"> > Lacey and Coats 2013 estimated that the gap between actual and potential genetic gain was worth \$25 million per year in extra farmer profit 	<ul style="list-style-type: none"> > Improved reproductive performance > Improved health and welfare outcomes > Improved feed efficiency
Overcome issues and practices impacting on cow productivity, milk quality, health & welfare	<ul style="list-style-type: none"> > Every missed conception costs \$100–400 per cow. A 5% improvement in conception rate nationally means an extra \$20 million pa for farmers > High Bulk Milk Cell Counts cause milk payment penalties and on-farm costs. Achieving the BMCC KPIs will deliver \$9 million pa in direct farmer benefits > Every case of clinical mastitis costs a farmer \$270, equivalent to ~\$30 million pa across the industry. A 50% reduction (from 5 to 2.5 cases/100 cows) would save \$6 million pa > Excess microbes in raw milk cost farmers up to \$75 million pa in penalty payments (equivalent 20% of average farm profit margin) 	<ul style="list-style-type: none"> > Reduction in reliance on calving induction > More rapid genetic gain > More milk processed into high value products and less milk discarded > Improved animal welfare > Reduced risk of anti-dairy animal rights campaigns > More milk processed into high value products and less milk discarded

Knowledge gaps and future priorities for investment

Herd Improvement

The key priorities which address the gaps in herd improvement were identified by HIISSG as increasing the ability of herd improvement to deliver profit, improving the oversight and coordination of the herd improvement industry and demonstrating herd improvement's impact on profit. The next priority area is to improve service delivery at farm level, which involves working with commercial entities. Aligning genetic evaluation with the market was also identified, with two key work areas being ongoing phenotypic data collection and unblocking the genomic pipeline. The final priority area identified was people development which was viewed as a lesser priority. There is work being planned or being undertaken across all these areas, but there will be a need to develop formal proposals within each area. These individual projects will then be prioritised.

Milk Quality top priorities for RDE

- > Manage the issue of microbial contamination of raw milk (Microbes in Milk)
- > Promote accredited training in milk harvesting through Cups on Cups
- > Provide training for advisers on milk quality and mastitis
- > Reduce antibiotic contamination of milk
- > Address shortage of highly trained technical people in milk harvesting RD&E

Reproductive performance top priorities for RDE

(ranked in order of effect on the national 6-wk in-calf rate)

- > Genetics: Improved daughter fertility ABV (RDE)
- > Improved semen fertility (AI sire selection and management, semen processing, sexed semen and pre-farm semen handling) (RD)
- > Effects of calcium nutrition additional to recommended transition cow management (R)
- > Cross breeding (DE)
- > Transition cow management (E)
- > Cow age effects (R)
- > Protein nutrition (fishmeal response) (R)
- > GnRH mid-cycle (11–13 days post AI) treatments (R)
- > AI timing (RDE)
- > AI technique and on-farm semen handling and storages (E)
- > Treatment of non-cyclers to minimise long returns (R)
- > Post AI progesterone treatment (R)

Animal Husbandry top priority issues for RDE

(ranked in order of importance)

- > Bobby calf numbers and disposal
- > Lameness
- > Downer cows
- > Mastitis
- > Induction
- > Disbudding
- > Heat stress
- > Body condition
- > Tail docking
- > Animal handling skills
- > Access to pain relief drugs
- > Antibiotic usage

To prioritise issues between the three sub programs listed above is challenging as they address a wide range of farm business profit drivers and industry risks. Within the three sub-programs the most urgent priorities are:

1. Milk quality

The quality of raw milk has the most direct link to individual farm incomes and 38% of milk produced is currently at risk of downgrades for quality issues, costing farmers ~\$100 million pa across Australia. A recent economic analysis has found that bacterial counts in raw milk cause twice the penalties of high BMCC. Yet there is no coordinated industry response or collective investment to assist farmers and milk processors to address this issue.

2. Reproduction

While genetics is the largest potential lever for improving reproductive performance for the industry much of the RD&E required is covered under the HISSG strategy. Better adoption of transition cow management practices has the potential to not only improve cow fertility but has significant benefits for cow health, welfare and milk production. Further investment in extension in this area should be considered as only ~50% farms have adopted best practices.

3. Animal husbandry

In the animal husbandry area the management of bobby calves has been unanimously nominated by the Steering Group as the most important issue in terms of magnitude of welfare risks, number of animals involved and community perceptions. RD&E investment could be used to underpin a broader approach to this issue, such as the bobby calf strategy developed in the UK in 2006. This was a consensual approach amongst all the stakeholders, including farmers, processors, retailers and other food outlets, academics and non-governmental organisations and resulted in new markets being developed and steady progress on welfare goals. Further RD&E investment into the barriers to adoption of sexed semen technology would.

Key cross-program integrations

The Animal Performance program has two joint DMF Program Champions: the Dairy Australia Program Managers for the Genetics & Data and Animal Health & Fertility Programs respectively. Currently there are four communities of interest that guide dairy industry RD&E investment in Animal Performance. The organisations represented in the Animal Husbandry, Reproduction and Milk Quality Steering Groups are largely the same and share a common secretariat. Some members currently sit on more than one of these Steering Groups (refer to membership lists in section 5). The coordination and reporting of activities undertaken by these three Steering Groups is complex and time consuming for one Program Champion, with up to 9 meetings being held per year plus participation in multiple working groups. It has been proposed that these three Steering Groups could be replaced by a single Steering Group supported by expert working groups drawn from the existing membership to address specific projects or issues. This approach would also deliver savings in meeting costs, travel expenses and administration overheads.

Within the dairy reproduction area Dairy Australia's InCalf project, DEDJTR, ADHIS, NCDE and NHIA have overlapping responsibility with for extension and training activities. The planning of activities between these respective organisations could be better coordinated. Dairy Australia's Program Manager works closely with the DEDJTR Animal Performance development specialist to share and discuss our respective work plans each year, and the joint Program Champions for Animal Performance are working on a more synergistic approach in the genetics/herd improvement area. Dairy Australia is also encouraging advisers working within the artificial breeding industry to undertake in depth training in herd reproduction advisory skills through the "Repro Right" course to ensure their approach is aligned with industry messages developed by InCalf. Several identified issues in the reproduction area involve innovation in AI practices and semen technologies and addressing these will require closer collaboration with the artificial breeding sector.

The issue of transition cow management has relevance to both the Feedbase and Nutrition program and the Animal Health and Welfare program. Integration and coordination of these activities occurs at the Program Manager level within Dairy Australia. DEDJTR is currently developing an on-farm extension discussion group module on this topic for delivery through Dairy Australia's InCalf initiative and the DEDJTR dairy extension network. Within the Animal Husbandry area, the Animal Welfare Science Centre's priority setting is being informed by the DMF process.

Community of Interest

Herd Improvement

Member	Organisation
Simone Jolliffe	ADF
Ben Hayes	DEDJTR
David Nation	Dairy Futures CRC
Daryl Hoey	ADF
Irene Clarke	ADF
Trevor Saunders	Farmer
Patrick Glass	Holstein Australia
Rob Derksen	Genetics Australia
Matt Shaffer	Dairy Australia
Carol Millar	NHIA
Graeme Gillan	NHIA
Tony Francis	HICO
James Mann	Farmer
Daniel Abernethy	ADHIS

DMF Animal Performance – Milk Quality Community of Interest

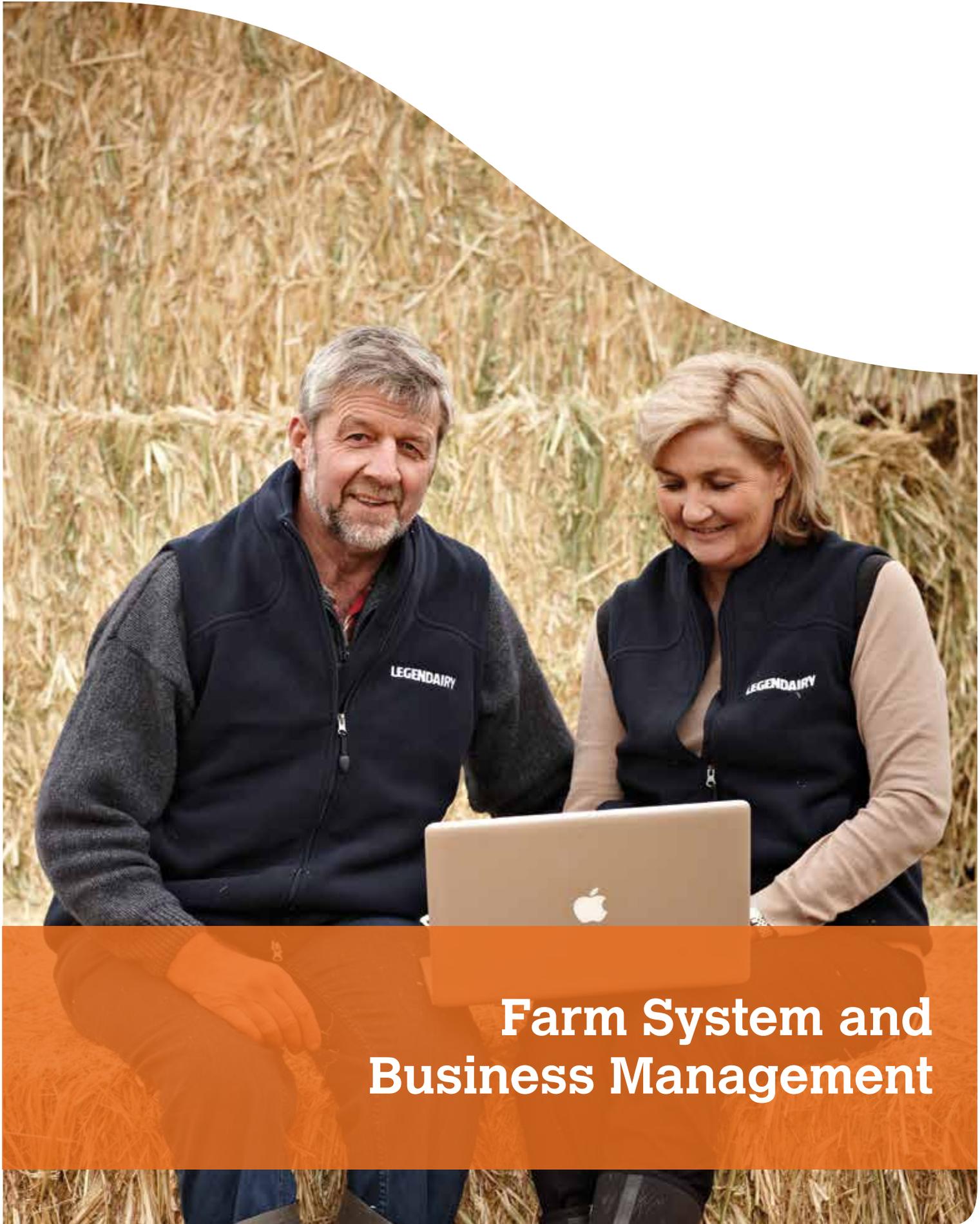
Member	Organisation
Aaron Gosling	Gardiner Foundation
Carol Millar	NHIA
Daniel Dickeson	LionCo
David Beggs	University of Melbourne
Geoff Matthews	DaviesWay
Graeme Mein	Consultant
Jakob Malmo	Consultant – Maffra Veterinary Centre
John House	University of Sydney
Kathryn Davis	Dairy Australia
Mark Humphris	Consultant 2020 – Countdown project
Meaghan Johnston	Murray Goulburn
Ruth Kydd	Farmer
Sarah Carter	Fonterra
Sarah Chaplin	DEDJTR Victoria
Robin Bell	NCDE
John Craven	Secretariat
Stuart Griffin	Chair – ADF

DMF Animal Performance – Dairy Reproduction Community of Interest

Member	Organisation
Aaron Gosling	Gardiner Foundation
Carol Millar	NHIA
Craig Dwyer	Australian Cattle Veterinarians
Daryl Hoey	Farmer
Grant Archer	Farmer
Ian Lean	Consultant – SBScius
Jennie Pryce	DEDJTR Victoria
Kathryn Davis	Dairy Australia
Carol Millar	NHIA
Michelle Axford	ADHIS
Matt Shaffer	Dairy Australia
Oscar Negus	Farmer
Kerry Kempton	DPI NSW
Richard Shephard	Consultant – InCalf Project
Jock Macmillan	Consultant
John Morton	Consultant – Jemora
John Craven	Secretariat
Ron Paynter	Chair – ADF

DMF Animal Performance – Animal Husbandry Community of Interest

Member	Organisation
Lisa Dwyer	Farmer
Cheryl McCartie	Farmer
Andrew Fisher	University of Melbourne
Geoff Kroker	DEDJTR Victoria
Paul Hemsworth	AWSC
Sarah Carter	Fonterra
Kathryn Davis	Dairy Australia
Melina Tensen	RSPCA Australia
Craig Dwyer	ACV
Jasbir Singh	NCDE
Robin Condron	Dairy Australia
John Craven	Secretariat
Nita Harding	DairyNZ
Terry Toohey	Chair – ADF



Farm System and Business Management

Farm System and Business Management program overview

Sub-program	Outcomes	Focus actions	KPIs
Management Capability and Skills	<ul style="list-style-type: none"> > An increasing number of Farmers/farm business managers are equipped with the necessary knowledge and skills to effectively manage their farm businesses > There is a sufficient number of skilled consultants/service providers specialising in farm business management to meet the industry needs across all regions 	<ul style="list-style-type: none"> > Develop an industry reference document for key FBM terminology and metrics > Create a national strategy for FBM capability, including positioning within the extension and education structures > Develop 4 Key Capability building programs covering from Novice to Expert in FBM > Utilise and imbed Core Capability building programs for NCDE FBM course and other industry activities > An industry accreditation in FBM expertise is in place for service providers and farmers > Develop a formal qualification or industry accreditation that acknowledges a high level of expertise in FBM 	<p>By June 30 2020:</p> <ul style="list-style-type: none"> > 50% of all dairy business complete a monthly cashflow budget that is used to help manage the business > Agreement in the use of terminology and metrics for the 5 key measures of farm business performance > 40% of all dairy business managers have participated in a FBM capacity training > There are a minimum of 30 accredited FBM specialists servicing the Australian Dairy Industry
Performance Data, Analysis and Tools	<ul style="list-style-type: none"> > DairyBase is imbedded as a user friendly industry database to support farm business performance analysis by farmers, service providers, consultants, researchers and industry organisations across the full spectrum from an individual farm to regional and national perspectives > DFMP continues to be seen by industry as the provider of the core high quality data for the purposes of benchmarking and economic research > FBM tools are used effectively and appropriately to improve the farm business performance > Widespread use of FBM capability and tools that improve understanding of the farm better and assist in better decision making 	<ul style="list-style-type: none"> > DairyBase has a sufficient number and breadth of farm data sets to allow analysis across all regions, climatic zones and production systems > DairyBase has detailed data sets from other key dairying regions eg. NZ, USA, EU > Complete the DairyBase build to the current contracted design specifications > Update DairyBase with all relevant historical data sets ie TasMilk60, Tasmanian Dairy Business of the Year > Continue with DFMP across all dairying regions to ensure there is a minimum amount of high quality data for purposes of benchmarking and research > Establish relationships with service providers, consultants, accountants to provide high quality data sets. > Develop an integrated feed budgeting, milk production and cash flow tool, aligned and integrated with DairyBase > Develop and promote a standardised/ minimum standards chart of accounts across the accountancy profession and farming community > Develop new tools resulting from the WFSM and Dairy Directions activities eg. DairyMod PGR predictor 	<ul style="list-style-type: none"> > DFMP covers all relevant regions and production systems with a minimum of 300 data sets per year. > Private industry/individuals annually contribute an additional 300+ sets of high quality data > More than 50% of farmers fully understand their financial position and farm business performance through appropriate tools and processes > DairyBase contains a minimum of 50 data sets from the significant dairying regions outside of Australia eg. NZ , EU, USA > In any year at least 15% of dairy businesses complete a DairyBase analysis and over a 3 year period at least 30% of all dairy businesses have participated in a benchmarking exercise
Whole Farm Systems Modelling	<ul style="list-style-type: none"> > Dairy farmers decision making (tactical & strategic) utilises a whole farm systems approach > Whole farm systems modelling aids priority setting for dairy research 	<p>An active whole farm systems modelling community of practice is in place to foster:</p> <ul style="list-style-type: none"> > Capacity in whole farm systems modelling > Capacity in the design and construction of Whole Farm systems modelling tools > Establish a clearly defined Whole Farm Systems Modelling Protocol to include Dairy Directions 	<ul style="list-style-type: none"> > WFSM capabilities and tools (including economic analysis) are integrated across the full spectrum of researcher projects to assist in project design, priority setting and evaluation > WFSM (including economic analysis) continues to make a meaningful contribution to informing industry about profitable and sustainable dairy farm systems

Investments and forward priorities

Potential economic benefits

Current projects

Sub-program	Potential economic benefit	Other benefits
Management Capability and Skills	<p>The overarching aim of the FBM program is to imbed FBM thinking as a priority across all sectors of the Australian dairy industry. Achieving this aim will improve how well farmers and service providers understand the business of dairying farming, in particular:</p> <ul style="list-style-type: none"> > the linkages between strategic and tactical use of inputs, their influence on output and how they influence the level of farm profitability and risk profile 	<ul style="list-style-type: none"> > Growth in milk production is a by product of successful profitable farm businesses > While better NRM practices can increase farm profitability (eg more targeted use of fertiliser), improved profitability allows for greater investment in NRM > Better HR practices and lower staff turnover leads to improved profitability
Performance Data, Analysis and Tools	<ul style="list-style-type: none"> > Understanding the role of cost control within the business and the key aspects in achieving a low cost of production > Understand the potential threats to their business posed by seasonal, milk price and input prices. By having this level of understanding farmers are able to implement the appropriate risk management strategies <p>By being better equipped with these skills not only will more farmers lift their level of profitability 'in a run of normal years' the impact of extreme climatic and economic events will be reduced</p>	
Whole Farm Systems Modelling	<p>Dairy industry will be increasingly seen as a valid pathway for long term wealth creation</p> <p>As an industry we have a better understanding of the Key Profit Drivers for the full range of production systems As a result resources are better directed to meet industry needs</p>	

Knowledge gaps and future priorities for investment

The highest priority in Farm Business Management is to improve farmer capability and confidence in discussing farm business performance including developing a stronger understanding of how physical performance links to business performance.

An important aspect of this will be DairyBase and ensuring that farmers and service providers are sufficiently skilled in its use to inform all discussions relating to farm business performance and analysis.

Priority	2014/15 Current situation	2015/16 Action required	2016/17 and beyond Steady state
Embed FBM thinking as a priority	<ul style="list-style-type: none"> > FBM is becoming more topical and there is greater acknowledgement of the importance of FBM 	<ul style="list-style-type: none"> > Promote better FBM practice and awareness through regular DairyBase and FBM articles > All significant industry seminars and conferences include FBM presentations 	<ul style="list-style-type: none"> > All dairy articles written in the rural press that include key FBM measures include FBM measurements such as Cost of production, Return on Total Assets, EBIT
Coordinated approach to FBM capability	<ul style="list-style-type: none"> > Limited coordination in development and delivery > Lack of consistent terminology and metrics used to describe and measure farm business performance 	<ul style="list-style-type: none"> > Finalise development of 3 of the 4 capability building programs > Roll out of industry standard programs > Industry standards for key FBM terminology and metrics are agreed to and endorsed by industry 	<ul style="list-style-type: none"> > Incorporation of capability building programs into NCDE > Formal qualification/units in FBM aiming at degree level and higher specialising in Dairy FBM > Across the dairy industry a common language is used to describe and calculate Farm Business performance
Consolidated industry data set	<ul style="list-style-type: none"> > DairyBase currently being built > DFMP expanded across Aust to include all dairying regions > Doesn't include any significant private data sets or data from other DA funded projects 	<ul style="list-style-type: none"> > All DA funded data sets included DairyBase > Individual data sets supplied by farmers > DA funded discussion group members supply data into DB > Consolidated data sets from consultants, accountants, milk processors start to be supplied into DB 	<ul style="list-style-type: none"> > All relevant private data sets are supplied directly or indirectly (via 3rd party) into DairyBase > Consolidate existing historical data sets
Build sufficient capacity amongst the service provider sector	<ul style="list-style-type: none"> > No official industry recognition or accreditation 	<ul style="list-style-type: none"> > Identify existing cohort of FBM specialists and create a formal group. > Identify potential up and coming FBM specialists 	<ul style="list-style-type: none"> > DA/industry approved accreditation in FBM > Professional development opportunities in FBM for service providers
Data gaps eg large herds, robotics, OAD, TMR	<ul style="list-style-type: none"> > Identify gaps in the existing data sets 	<ul style="list-style-type: none"> > Target activities in collecting data where specific gaps occur 	<ul style="list-style-type: none"> > Continue to identify gaps in the data
Better understanding of the impact of individual management decisions on farm profitability	<ul style="list-style-type: none"> > Limited quantifiable proof linking farm business performance to decisions relating to genetics/breeding, pasture management, HR 	<ul style="list-style-type: none"> > Retro fitting existing data with APR data 	<ul style="list-style-type: none"> > Include new questions into DairyBase & DFMP that capture management decisions
Whole farm systems modelling capabilities	<ul style="list-style-type: none"> > Series of WFSM modelling tools that are not integrated or user friendly 	<ul style="list-style-type: none"> > Community of practice in place that ensures development of WFSM capabilities is conducted in a coordinated manner across the industry 	<ul style="list-style-type: none"> > Tools previously developed for research form the basis of easy to access, user friendly decision support tools
Provide to industry fully integrated suite of operational and FBM cash flows, feed budgets, chart of accounts	<ul style="list-style-type: none"> > Uncoordinated approach across the industry 	<ul style="list-style-type: none"> > Feed and milk production budget linking to cashflow > DA accredited Dairy Chart of Accounts 	<ul style="list-style-type: none"> > Multiple data sources feed into a fully integrated farm operational model and cashflow. May take the form of a 'Dashboard'

Key cross-program integrations

	Management capability and skills	Performance data, analysis and tools	Whole farm systems modelling	Economic research and analysis
Land, Water, Carbon			> WFSM includes GHG and Nitrogen movements	> Economic analysis included in all projects to assess impact
Feedbase and Animal Nutrition	<ul style="list-style-type: none"> > Building greater understanding of the connections between the different feed sources and how they connect to profit > Build a better understanding of what the key management decisions are round feed base that impact on farm business performance > Ongoing focus on farm business performance 	<ul style="list-style-type: none"> > Incorporate questions relating to specific pasture and feeding management > Help refine feedbase KPIs > Feed budget and animal performance links to cash flow 	> WFSM used to assess various forage and pasture management options	
Animal Performance		<ul style="list-style-type: none"> > Investigate retrofit breeding values into data sets > Incorporate breeding values into data collection 	> Incorporate dynamic herd model into WFSM	
People	> Building capacity and align with the likes of Stepping Stones	> Incorporate questions relating to HR management and staff turnover		

Community of Interest

The previous Community of Interest (Col) was a much larger group which operated more as a community of practice. The community of practice concept will continue (see below) as it will add significant value to the dairy industry with regards to professional development and consistent dissemination of key FBM messages.

In the next phase of DMF the primary role of the FBM Col is to provide high level direction for RD&E activities. While it will be a significantly smaller group the aim of new Col is to be representative of all key dairy industry stakeholder groups so as to provide the necessary input and insights into establishing FBM priorities across all aspects of RD&E. It is envisaged that the Col will meet at least twice per year.

Member	Organisation/representing
Neil Lane & Helen Quinn (Program Champions)	Dairy Australia
Bill Malcolm	DEDJTR
Kerry Kempton	NSW DPI
John Mulvany	Dairy Consultant
Cameron Smith	Dairy Consultant
Basil Doonan	Dairy Consultant
Adam Jenkins	Farmer/ADF
David Binney	Farmer/Sub tropical board member
Matt Watt	Processor representative
Accountant or banker	Banking or accounting sector

Working groups

The working groups is a new initiative for the next phase of DMF and will be established for each of the sub programs. The primary focus of each of the working groups is to:

- > ensure industry needs are being met from both short and longer term perspectives
- > provide direction for future activities
- > facilitate the coordination of various activities across the industry and help minimise unnecessary duplication.

Sub-program		
FBM Capability, skills and practice	Comparative analysis and Integrated Farm business management tools	Whole Farm Systems modelling
Gavin McClay (DEDJTR)	Bill Malcolm (DEDJTR)	Richard Rawnsley (TIA)
Kerry Kempton (NSW DPI)	Christie Ho (DEDJTR)	Richard Eckard (Uni Melb)
Karen Morath (Dairy Australia)	Helen Quinn (Dairy Australia)	Ian Johnson (IMJ Consulting)
Cam Smith (Consultant)	Jon Hauser (Xcheque)	Cathy Phelps (Dairy Australia)
Adam Jenkins (Farmer/ADF)	Dan Armstrong (Consultant)	Christie Ho (DEDJTR)
Paul Groves (Consultant)	Wolfie Wagner (Farmer)	Richard Romano (Dairy Australia)
Neil Lane (Dairy Australia)	Natalie Nelson (DEDJTR)	Angus Drummond (Consultant)
Tony Seymour (NCDE)	Kerry Kempton (NSW DPI)	Neil Lane (Dairy Australia)
	Ray Murphy (DAFFQ)	

Community of Practice

The previous Col was comprised of 30–40 dairy industry people with a specific interest and experience in FBM. While the Col met infrequently the general consensus was that a forum for those with a common interest in improving both the understanding and level of FBM performance was valued and appreciated by the attendees. As such the DMF strategy aims to continue to provide this type of interaction as a Community of Practice (CoP) whereby those specialising or with a particular interest in FBM could meet to exchange ideas.

Meetings of the Community of Practice will also be an ideal forum professional development and as a first step of broader industry engagement.

Other roles for the CoP would be to support and promote:

- > A formal FBM qualification and/or accreditation system
- > Highlight case study examples of best management practice
- > A national event and/or activity showcasing excellence in FBM

It is envisaged that the CoP would draw membership/ participation from the across the industry including:

- > Farmers
- > Consultants
- > NCDE
- > Universities
- > Economic researchers
- > Rural Accountants
- > Rural Bank managers
- > Milk processors
- > Rural financial counsellors
- > State government DEDJTR, NSW DPI
- > Industry bodies eg. Dairy Australia, GGF



People

People program overview

The dairy industry has the people it needs

Sub-program	Outcomes	Focus actions and practices	KPIs
Farm Business Transition <i>Creating the opportunity for careers and wealth creation in dairy farming</i>	<ul style="list-style-type: none"> > Farm careers pathways are clearly articulated and supported > Farm business transition models and pathways are developed, understood and supported 	<ul style="list-style-type: none"> > Identify and describe and publicise the variety of farm career pathways available in the industry. > Identify and describe different business models for farm ownership. > Develop tools and codes of practice to support the career and business pathways. > Encourage and support the use of the Stepping Stones planning guide > Encourage and support all agencies and advisers to use the common tools and codes of practice > Utilize the Young Dairy Networks to actively develop and deliver programs > Ensure the Farm Business transition programs are fully integrated with the broader Farm Business Management suite. 	By 2020: <ul style="list-style-type: none"> > 30% of people working in the dairy industry have a documented career plan > 40% of dairy farms have a well-developed and documented business transition plan*
Attracting and Retaining People <i>Building the next generation and making the dairy industry a desirable and rewarding place to work</i>	<ul style="list-style-type: none"> > Farms are desirable and rewarding places to work > Dairy businesses become employers of choice > Vacancies are adequately filled in a timely manner and good staff are retained > People management capability is best practice > Adviser HR capability is contemporary 	<ul style="list-style-type: none"> > Deliver schools programs through the Cows Create Careers suite. > Improve recruitment and employment practices through the use of tools such as eMe and ESKI > Utilise resources and develop programs to improve people management practices and workplace culture > Develop and encourage the use of People in Dairy resources > Develop and deliver HR programs for key industry advisers and farmers > Deliver programs through the Young Dairy Network to develop employee capability > Utilise case studies to promote opportunities and success in the industry 	By 2020: <ul style="list-style-type: none"> > 30% increase in the number of suitable applicants applying for positions in the dairy industry* > 20% increase in the number of skilled and motivated employees retained in the industry*
Safety and Wellbeing <i>Creating a safe and healthy work environment for all people in the industry</i>	<ul style="list-style-type: none"> > Owners, employees, family, contractors and visitors are safe on the farm > Systems for managing workplace health and safety (WHS) are implemented and maintained 	<ul style="list-style-type: none"> > Establish central and regional teams to understand the current situation and improvement opportunities. > Develop tools, resources and programs to meet regional needs through pilot groups. > Take successful pilot programs to all regions. > Develop programs that assist farmers to complete risk assessments and establish priorities > Assist dairy businesses to develop and implement induction programs that include WHS. > Develop systems for continuous improvement of WHS > Increase the use of collaborative partnerships with community and industry organisations 	By 2020: <ul style="list-style-type: none"> > 70% of dairy businesses will have a documented OHS plan and prioritised actions > All farm workers and contractors receive an induction that includes OHS* > There will be a 30% reduction in Lost Time Injury Frequency rate* > There will be zero workplace fatalities*
People Capability <i>Develop dairy industry people so that the industry has the skills and knowledge for long-term success</i>	<ul style="list-style-type: none"> > Dairy people have the technical, management and leadership skills to support a growing and vibrant industry > Strong and effective leadership in our industry organisations > Strong and effective leadership and people management on farm 	<ul style="list-style-type: none"> > Establish and support a national education delivery framework through the NCDE > Support and enable effective collaboration between RDPs, NCDE and Extension provision > Utilise the NCDE alliance to develop and deliver high quality programs in response to regional and national needs. > Support the effective scheduling and marketing of programs > Track knowledge and skills implementation against the national framework > Refresh the suite of Leadership Programs > Identify potential leaders and mentors. > Develop and deliver high quality leadership programs to support the industry leadership blueprint > Encourage industry groups look to program participants for their next generation of leaders > Support alumni programs for leadership program participants > Track changes and impact measures 	By 2020: <ul style="list-style-type: none"> > 50% increase in numbers attending training activities* > 40% of participants are returning to development activities at a higher level > There is a 25% increase in the number of businesses reporting a positive impact on business profitability > 50% of participants in leadership programs have taken up roles in the industry or community resulting from participation in development programs

* Sustainability Framework Target

Investments and forward priorities

Potential economic benefits

The Benefit/Cost Ratio (BCR) for each associated DA program has been calculated and included in the table below. This does not take into account investment by other organisations.

Sub-program	Potential economic benefit	Other benefits
People	The benefits of getting the people issues right around sourcing and deploying of the workforce in the farm business can be significant. Conservative estimates suggest that productivity and profitability improvements alone can mean as much as \$200/cow profit on some farms. This becomes a sizable industry wide figure, for example it is worth \$52,000 for a farm of 260 cows and around \$80M per year to the industry if achieved on one-in-five farms	
Farm Business Transition	DA – BCR – 2.7	To provide a variety of models and strategies for farm owners to consider when they are reducing or ceasing their role in active dairy farming: <ul style="list-style-type: none"> > To contribute to the sustainability of the dairy industry by keeping dairy farms via the provision of the information, tools, support and education required at all levels of career progression and career pathway planning that includes wealth creation strategies for the various types of business investment or ownership via the stepping stones initiative. > Develop networks and build the capacity of our young people through local young dairy networks with the aim of enhancing skills and knowledge, and celebrating achievement in industry programs and events.
Attracting and Retaining People	DA – BCR – 3.6 “It is estimated that the annual exit rate out of the dairy industry (measured by the % of people needed to be recruited into the industry from outside) is 15.5% Turnover is conservatively estimated to have a direct cost to the dairy industry between \$60 and \$200M annually.” ¹	Raising awareness and promotion of dairy industry career paths, enhancing the experience of people who work on a dairy farm, supporting dairy farms with compliance of regulatory requirements will be long term benefits for the dairy industry. The programs aim for increased capacity for the dairy regions to address people issues and better access to capability on farm by attracting and retaining labour. The engagement with agricultural science programs at secondary school level will ensure a sustainable and well supported dairy industry and secure a greatly coveted space for the dairy industry in school curriculum. <ul style="list-style-type: none"> > Improved staff recruitment practices on farm > Business and governance capacity building > Building advisor capability > Human resource management > Dairy industry is considered a desirable place to work The social aspect of young farmer events should not be under estimated as one of the benefits for the dairy industry including the health and well-being and thus the retention of young dairy farmers who feel less isolated after connecting with their local network.
Safety and Wellbeing	DA – BCR – 2.7	<ul style="list-style-type: none"> > Reduction of business risk related to safety. > Improved health and reduced stress result in improved business decisions. > Improved perception of the dairy industry as a safe place to work – easier to attract new workers. > Safer working environment for employer and employees has a direct flow on for contractors, visitors and family on the farm.
People Capability	DA – BCR – 2.4	<ul style="list-style-type: none"> > The provision of industry focused training that is recognized nationally will provide individuals with skills that are transferable and recognized across regions and state. This project will lead to individuals who are more skilled and more highly qualified contributing to the dairy industry and dairy communities across Australia. > Increasing capacity and resilience in dairy communities by investing in leadership development is also expected to result in social benefits for dairy individuals and families. > The major social benefits deriving from the outcomes of this project are around improving the standing of the dairy industry by having a structured visible career and education pathway.

1. Retention of people in dairyfarming – what is working and why?

Dr Ruth Nettle, Augusto Semmelroth, Dr Rebecca Ford, Dr Connie Zheng, Aman Ullah

Knowledge gaps and future priorities for investment

People program

All people programs need to have a clear line of sight with profitability. We need to start changing the language, create strong links with Farm Business Management, and include the “people” component in other programs that farmers engage with and link with profitability.

Sub-program	Gaps (in priority order within the sub-program)
Farm Business Transition <i>Creating the opportunity for careers and wealth creation in dairy farming</i> Priority score 25/100	<p>Tools</p> <ul style="list-style-type: none"> > Tools and codes of practice need to have the ability to be personalised to a dairy businesses specific needs <hr/> <p>Farm business transition</p> <p>Better understanding of transition models and pathways</p> <ul style="list-style-type: none"> > Development of robust models which reduce scale of risk for new entrants. > Working on retirement strategies for exiting farmers > Engagement strategies for disengaged farming businesses on this issue – culture of forward planning. Use YDNA to help understand this issue. > Focus on family farm business transitions (market will serve the corporates) <hr/> <p>Farm advisers</p> <ul style="list-style-type: none"> > Capability building for professionals > Program partnerships with key stakeholders – processors/banks – co investment models
Attracting and Retaining People <i>Building the next generation and making the dairy industry a desirable and rewarding place to work</i> Priority score 30/100	<p>Tools</p> <ul style="list-style-type: none"> > Extend delivery of WPA current tools – ESKI/ Eme etc. <hr/> <p>Retention</p> <ul style="list-style-type: none"> > Better understand cultural shortcomings re;”power of people” > Research why most employees leave rather than being removed from a position > Understanding the HR environment. People don’t necessarily stay in a position if it doesn’t suit their personal needs whether that be financial/lifestyle/career <hr/> <p>Farm HR advisers</p> <ul style="list-style-type: none"> > Build on HR advisory pool > Who else can we collaborate with? <hr/> <p>Networks</p> <ul style="list-style-type: none"> > Use NCDE to help with careers advice and tap into career adviser networks > Connect with other RDCs to promote careers in Agriculture <hr/> <p>School programs</p> <ul style="list-style-type: none"> > Relationship with schools needs to be revisited. What does an effective schools based program look like? > Engagement with schools. Cows Create Careers is good, but only part of the story, and needs to be ‘located’ in the bigger picture, especially since the main investments around dairy in schools could be \$s from outside dairy > Need a better value proposition from programs such as CCC > How do we close the 10–12 gap, and how do we measure the effectiveness of the programs?
Safety and Wellbeing <i>Creating a safe and healthy work environment for all people in the industry</i> Priority score 15/100	<p>Value proposition</p> <ul style="list-style-type: none"> > Crucial component – the real cost of farm safety needs to be better understood – and some strong prioritisation of risk factors for attention > Articulate the value proposition in terms of \$’s and trauma <hr/> <p>Collaboration</p> <ul style="list-style-type: none"> > Investigate where collaboration could occur with organisations who specialise in this space <hr/> <p>Strategy</p> <ul style="list-style-type: none"> > Need to determine how much Industry needs to drive this activity. What should the approach be – what works? > Need to develop a better understanding of DA role in investing in change > Strategic Leadership – not the doing. There are many other stakeholders in this space – including the regulatory drivers > The dairy industry is the player that can ‘engage’ farmers for change (most of the others can’t very effectively) The focus should be on understanding and influencing the things that are dairy, across the industry > No more research is required. It is more about collation of existing resources and making them relevant to dairy

Sub-program	Gaps (in priority order within the sub-program)
People Capability <i>Develop dairy industry people so that the industry has the skills and knowledge for long-term success</i> Priority Score 30/100	Farm business management <ul style="list-style-type: none"> > Develop and trial a new delivery model for farm management level training > Need to understand the best delivery model for farm management level training for contemporary farm managers
	Delivery arrangements <ul style="list-style-type: none"> > Consolidate delivery frameworks given TAFE funding cuts > Revisit arrangements for utilising DA resource materials by non NCDE providers
	Value proposition <ul style="list-style-type: none"> > Perception change to view training as an opportunity rather than requirement > Still important to find out what farmers actually think about the role/value of qualifications (professionalisation) for their businesses – to better understand our target audiences > Articulate the value of personal development not just to career but to community and life in general
	Skill needs and qualifications <ul style="list-style-type: none"> > Seek clarity around specific skills and attitude that are required to fill in the void in people on farm in the various roles > Develop targets across the various certificate levels for the industry (similar to NZ). In particular set some appropriate targets for Cert4 – Adv Diploma
	Online delivery <ul style="list-style-type: none"> > Main research question is how to incorporate online delivery more effectively across delivery system
	Celebrating <ul style="list-style-type: none"> > Continued celebration of achievements eg. Graduations etc.

Key cross-program integrations

There is close collaboration between the People and FBM development areas.

Neil Lane is a member of the Farm Transitions Lead and Design Team which is looking at the key areas related to FBM, farm transition and the People element.

Karen Morath, DA's Program Manager for Industry Education, is working with Neil Lane and facilitating a Lead and Design Team for the development of the FBM strategy and development plan.

Community of Interest

The Dairy Industry People Development Council

Member	Organisation
Noel Campbell	ADIC
John Verstedden (Chair)	ADF People PAG
Vacant	ADPF
Ian Halliday	Dairy Australia
Shane Hellwege	DMF People Champion
Karensa Menzies	DEDJTR
Simone Renyard Michael Connor	RDP (Victoria) RDP (Non-Victoria)
John Buchanan (Sydney University) Patten Bridge Pauline Brightling	Independent experts in Workplace Planning and Action (up to three in areas such as Research, Education, Extension)
Mary Harney	The Gardiner Foundation



Land, Water, Carbon

Land, Water, Carbon program overview

Dairy farmers managing animal, land and water resources to minimise environmental impact whilst enhancing profit

Sub-program	Outcomes	Actions and practices	KPIs
Land	<ul style="list-style-type: none"> > Profitable and efficient use of land resources resulting in reduced soil degradation, improved water quality and enhanced biodiversity 	<ul style="list-style-type: none"> > Catchment nutrient modelling > National Fert\$mart implementation > Precision tools for fertiliser management > Understanding soil fertility influences, soil biology and soil carbon and nitrogen cycles > Effluent management 	<ul style="list-style-type: none"> > 80% of Australian dairy farmers implement nutrient management plans by 2020* > 80% of dairy farms managing some land for conservation and biodiversity by 2020* > 90% of waterways on Australian dairy farms fenced by 2020*
Water	<ul style="list-style-type: none"> > Profitable, efficient, and socially responsible use of water 	<ul style="list-style-type: none"> > Optimising DM/ML/KwH > Precision tools for effective water delivery > Cost/benefit analysis of investment in new water use infrastructure and management 	<ul style="list-style-type: none"> > 80% of Australian dairy farmers with irrigation use some form of automation by 2020* > 80% of dairy farmers have practices to recycle water on farm by 2020*
Carbon	<ul style="list-style-type: none"> > Profitable, validated abatement strategies to reduce GHG intensity/unit of milk solids for all Australian dairy farming systems 	<ul style="list-style-type: none"> > Profitable abatement strategies > Understanding nitrous oxide and methane emissions – high level, informed by international RD&E > Emissions intensity reporting – Dairy Monitor > Genetic markers – methane and FCE > Review, capture and communicate the key learnings with respect to mitigation from the Carbon Farming future projects. > Collaboration with international livestock Climate Change adaptation and mitigation programs 	<ul style="list-style-type: none"> > 30% reduction in greenhouse gas emission intensity per unit of product by 2020*
Climate smart	<ul style="list-style-type: none"> > An Australian dairy industry with the capacity and confidence to manage climate risk 	<ul style="list-style-type: none"> > Preparing dairy businesses for future climates – risk mitigation > Preparedness for extremes > Identification of no-regrets climate risk strategies that build business resilience and flexibility for a range of farming systems 	<ul style="list-style-type: none"> > Profitable strategies to mitigate increased climate risk identified for pasture based systems in southeast Australia by 2017 > 75% of farmers have infrastructure in their yards to keep cows cool during heat waves by 2020
Reporting	<ul style="list-style-type: none"> > Sustainability reporting meets farmer, industry and customer expectations 	<ul style="list-style-type: none"> > Understanding market sustainability expectations > Sustainability guidelines/reporting tools relevant to Australian dairy systems > Sustainability reporting > Identifying tools and mechanisms to enable reporting against sustainability framework targets, integrated or aligned with existing industry data collection activities 	<ul style="list-style-type: none"> > Reporting against Australian Dairy Sustainability Framework targets for land, nutrients, water and greenhouse gas emission intensity meets customer expectations (ongoing)

* Sustainability Framework Target

Investments and forward priorities

Potential economic benefits

Sub-program	Potential economic benefit	Other benefits
Land	<p>Assumptions:</p> <ul style="list-style-type: none"> > Profitability improvement via cost savings: Based on current fertiliser prices a 10% improvement in fertiliser efficiency would result in an estimated saving of \$3,000 per farm. The estimated uptake is 500 farms/year > Human capability improvement resulting in productivity gains. Existing industry nutrient management extension programs have found a high percentage of farm advisors are providing inaccurate and substandard fertiliser advice resulting in less than optimal productivity outcomes 	<ul style="list-style-type: none"> > Legal and administrative environment: Industry failure to successfully self-regulate with respect to nutrient management could result in regulatory impost in sensitive catchments. An example is the nitrate leaching legislation being introduced in catchments in New Zealand
Water	<p>Assumption:</p> <ul style="list-style-type: none"> > Water savings are estimated at 10% of average entitlements held, giving an average saving of 100ML (1,000 ML per farm). Capital cost of water is estimated at a longer term average of \$1,700 per ML. With an estimated cost of \$75,000 to implement the technology, improved irrigation systems would deliver a net capital gain of \$95,000 per farm, assuming the farmer elects to sell the water saved on the permanent market. Alternatively the water savings could be retained on farm and used for increased production, or traded each year at an average of \$60/ha. It is assumed 1500 farmers will improve their irrigation management practices as a direct result of DMF investment 	<ul style="list-style-type: none"> > Capacity to demonstrate quantitative improvements in water used/tonne of dry matter produced across all dairy regions and dairy farming systems
Carbon	<p>Assumptions:</p> <ul style="list-style-type: none"> > 300 dairy farmers/year will increase profits by \$6,000 year as a direct result of efficiency savings identified through adoption of practices to improve feed quality and/or nitrogen fertiliser management > Energy saving recommendations provided through the on farm energy assessment initiatives will provide estimated cost savings of \$1.4 million annually (\$1000/farm business/year) based on results to date 	<ul style="list-style-type: none"> > Evidenced based information the Australian dairy industry can use to demonstrate a proactive approach to reducing carbon emissions in response to community and market concerns, including progress towards the industry target of 30% reduction in GHG emissions intensity > Emissions Reduction Fund methodologies
Climate smart	<p>Assumption:</p> <ul style="list-style-type: none"> > Increased capacity to manage climate risk will result in increased farm profits through adoption of climate risk strategies such as; increasing fodder reserves in response to adverse seasonal predictions, taking action to minimise the impact of excessive heat loads. The assumed net savings are \$90K over five years (= \$18k p.a.). The assumed adoption rate is 20% adoption over 5 years from 2014. (Assuming only 30% of farmers perceive a need to adapt to increased climate risk) 	<ul style="list-style-type: none"> > Banks are increasingly factoring climate risk into lending considerations and are actively seeking evidence farmers have strategies in place to manage increased climate risk (findings Dairy Businesses for Future Climates)
Reporting	<ul style="list-style-type: none"> > The benefits of sustainability reporting tools and activities are hard to economically quantify in terms of increased farm profit, however companies such as Unilever have stated they are prepared to pay more for product from supply chains deemed 'sustainable' > Key export competitors such as Ireland, US and NZ all have farm level reporting tools and processes and can demonstrate improvement against their respective environmental targets 	<ul style="list-style-type: none"> > Industry sustainability reporting tools and processes are essential to demonstrating industry achievement against the Australian Dairy Industry Sustainability Framework. In addition industry sustainability reporting tools such as DairySAT are highly regarded by natural resource management agencies and assist the industry leverage funding support for on farm activities such as riparian fencing, alternative stock watering points, effluent upgrades and revegetation

Knowledge gaps and future priorities for investment

Sub-program	Key gaps (in priority order within the sub-program)	Priorities (Time frames: immediate, medium, on-going)
Water	<p>Research</p> <ul style="list-style-type: none"> > Delivery modifications to improve border check and pressurised irrigation systems <p>Development</p> <ul style="list-style-type: none"> > Value proposition for emerging nutrient/soil moisture sensing technologies > Value proposition for VRI systems > Cost benefit analysis of investment in new water use infrastructure and management (including ongoing costs e.g. energy) > Cost effective automation <p>Extension</p> <ul style="list-style-type: none"> > Irrigation/energy efficiency focus farms in key regions 	<ul style="list-style-type: none"> > Irrigation water management – optimising DM/ML/ KWH (on-going) > Precision technologies for effective delivery of water (medium term) > Better understanding of the cost/benefits of using pressurised irrigation in relation to energy costs (short – medium term)
	<p>General comments</p> <p>Reduced water availability in some regions as a result of government policies and increased climate variability is generating interest in new technologies and practices that can better match water application to plant needs. There is limited farmer and service provider understanding about the business case for these precision technologies and a significant gap in information available to support the business case (including the potential of models such as Water Tracker). There is potential to conduct some cross industry RD&E in this area but D&E may be more appropriate at an industry level. Both the Ag SOC process and the proposed Water CRC offer opportunities to facilitate cross industry research investment in this area.</p>	
Land	<p>Research</p> <ul style="list-style-type: none"> > Better understanding of the link between soil carbon and nitrogen cycles with a focus on irrigated dairy farms and/or sub-tropical systems > Data sets/ modelling to inform catchment and sub-catchment water quality plans in high risk catchments > Cost effective effluent management for flat and/or high water table landscapes. <p>Development</p> <ul style="list-style-type: none"> > Value proposition for emerging nutrient/soil moisture sensing technologies > Data management and decision support services > Understanding of nutrient movement through Australian soils by industry stakeholders and NRM agency staff > Linking industry models, e.g. DairyMod to data streams to inform real time decision making <p>Extension</p> <ul style="list-style-type: none"> > Fert\$mart implementation to service providers > Cost effective effluent design 	<ul style="list-style-type: none"> > Data sets/ modelling to inform catchment and sub-catchment water quality plans in high risk catchments (immediate) > Fert\$mart implementation (on-going) > Value proposition for emerging nutrient/soil moisture sensing technologies (medium) > Better understanding of the link between soil carbon and nitrogen cycles with a focus on irrigated dairy farms and/or sub-tropical systems. (Preliminary results from the National Nitrous Oxide Research Program suggest dairy systems are potentially losing significant amounts of nitrogen as a result of high soil carbon levels)
	<p>General comments</p> <p>An emerging issue is increasing dairy intensification and expansion in high value catchments. Whilst the current regulatory environment is relatively benign, a better understanding of the likely impact of increased dairy expansion/intensification will assist the industry target high risk areas and provide evidence based information into planning processes.</p> <p>Better understanding of nutrient movement through Australian soils by industry stakeholders and NRM agency staff is important to ensuring effective and appropriate nutrient management policy is developed. Improvements in on farm practice in nutrient management through greater adoption of Fert\$mart is a priority if the industry is to maintain a self-regulated approach to nutrient management.</p>	

Sub-program	Key gaps (in priority order within the sub-program)	Priorities (Time frames: immediate, medium, on-going)
Reporting	<p>Market research</p> <ul style="list-style-type: none"> > Linkages to international, national and regional NRM agencies and NGOs to ensure non industry environmental reporting indicators are not diverging from the Australian dairy industry sustainability framework targets. <p>Development and extension</p> <ul style="list-style-type: none"> > Tools and mechanisms to enable reporting against the sustainability frameworks targets (including integrating with DairyBase) > Sustainability reporting systems based on GPS supported precision technologies > Input into the design and development of the environmental indicators used by multinational companies, NGOs and international policy organisations (e.g. FAO) to ensure they are both practical and evidence based. > Increased level of engagement with corporations and financial institutions to ensure planned corporate sustainability criteria drive appropriate change. 	<ul style="list-style-type: none"> > Tools and mechanisms to enable reporting against the sustainability frameworks targets (including integrating with DairyBase) (immediate) > Input into the design and development of the environmental indicators used by multinational companies, NGOs and international policy organisations (on-going)
Carbon	<p>Research and development</p> <ul style="list-style-type: none"> > Understanding nitrous oxide and methane emissions from manure and manure management > Understanding the role of soil carbon and the nitrogen cycle > Understanding of the heritability of reduced methane emission rates including any associated impacts on milk composition <p>Development and extension</p> <ul style="list-style-type: none"> > Review, capture and communicate the key learnings from the Carbon Farming Future projects (focus on identifying the most prospective). > Linkages with international livestock climate change programs e.g. the EU Animal Change Programme > Emissions intensity reporting > On farm energy efficiency – including value proposition of stand-alone renewable energy systems <p>General comments</p> <p>Funding allocated under the Carbon Farming Future program enabled the industry to address significant knowledge gaps with respect to GHG emissions from Australian dairy systems. The cost of measuring GHG emissions is a significant barrier to future industry funded research in this priority. One option is to strengthen linkages with international research programs targeting GHG emissions, including consideration of co-funded research particularly in the areas of selective breeding and improving efficiency of feed use. Where possible investment in both GHG modelling and mitigation extension should be maintained to support the industry commitment to a 30% reduction in GHG emissions intensity by 2020.</p>	<ul style="list-style-type: none"> > Evaluation and communication of the key learnings from industry investment in the Carbon Farming Future projects (immediate) > Linkages with international livestock climate change programs e.g. the EU Animal Change Programme (on going) > Emissions intensity reporting (on-going) > Understanding the role of soil carbon and the nitrogen cycle (medium)
Climate smart	<p>Research</p> <ul style="list-style-type: none"> > Integration of climate risk considerations into other RD&E sub programs with a focus on identifying practical 'no regrets' strategies > Profitable strategies to mitigate climate risk > Improved seasonal forecasts <p>Development and extension</p> <ul style="list-style-type: none"> > Climate change: communicating effectively > Cool Cows 2 – improving existing resources and communication <p>General comments</p> <p>Funding allocated under Australian Government climate change adaptation programs enabled the industry to address significant knowledge gaps with respect to climate variability and climate change risk for Australian dairy systems. This funding will not be available in the near future and the recommended action is to integrate climate risk considerations into other DMF RD&E sub programs.</p>	<ul style="list-style-type: none"> > Integration of climate risk considerations into other RD&E DMF sub programs with a focus on identifying practical 'no regrets' strategies (on-going) > Cool Cows 2 – improving existing resources and communication (immediate)

Cross sector R&D

1. Precision agriculture – satellite assisted soil moisture monitoring and soil nutrient monitoring linked to weather forecasts to assist decisions around irrigation scheduling and fertiliser applications.
2. Building farmer and service provider skills in assessing the applicability of precision application technologies to their business.
3. New generation fertilisers.

International and private sector collaboration

Increased emphasis on information and knowledge exchange between industry organisations and innovative R&D companies, particularly in the areas where fundamental research is expensive, e.g. off farm nutrient loss pathways management and climate change. Research generated elsewhere can, and does assist the Australian dairy industry provide evidence based input into environmental policy development as well build external stakeholder understanding about what is feasible in terms of reduced environmental impacts. Milk companies will increasingly become the main delivery agencies for fertiliser programs, riparian management and sustainability assessment in line with international trends in sustainability reporting.

Key cross-program integrations

Feedbase

- > Whole farm nitrogen use efficiency – research in this area has both profit and environmental considerations. To ensure KPIs are met, projects with NUE as a key outcome will be designed as collaborative projects involving the relevant representatives from both sub-program areas.
- > Fertiliser (Fert\$mart) extension – this is generally funded and delivered by NRM agencies and milk companies. Research to inform Fert\$mart BMPs will be delivered through both Feedbase and LW&C projects. As with NUE, project development will involve representatives from both Col.
- > Water – RD&E under LW&C is focused on irrigation management and delivery and includes agronomic and economic considerations. This can be managed as it has been successfully in the past by including Farm Business Management and Feedbase Col members on the project planning and steering committees.

Farm Business Management

- > Climate change adaptation – The recommended strategy to build capacity to manage climate risk is to build farm business management skills. Current RD&E in Climate Change Adaptation has an integrated approach with a strong emphasis on economics and the DA Program Manager for FBM is a member of relevant steering committees.
- > Sustainability framework reporting – Dairy Monitor will inform reporting against the GHG emissions intensity target.

Animal Performance

- > Cool Cows – DA Program manager is a member of the Cool cows working group
- > Methane emissions – regular communication between the DA Animal Performance and LW&C program managers

Community of Interest

Member	Organisation
Cathy Phelps (Program Champion)	Dairy Australia
Richard Eckard	DEDJTR/UniMelb (PICCC)
Alice Melland	USQ
Richard Rawnsley	TIA
Graeme Nichol	Farmer
John Keely	Farmer – ADF
Scott McDonald	DEDJTR
Richard Romano	Dairy Australia

The Col will be supported by the following working groups:

- > Dairy Australia LW&C Technical Specialists
- > Dairy Effluent Working Group
- > Dairy Businesses for Future Climates reference groups
- > Fert\$mart Implementation Group
- > Dairy Greenhouse Gas Emissions working group (to be established)
- > Cool Cows working group
- > Regional NRM Dairy Reference groups – Murray Dairy, WestVic Dairy, DairyTas, GippsDairy

