SP1 – Profitable Dairy Farms – Pre-farm-gate programs

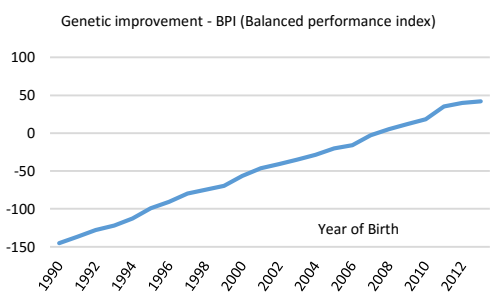
Genetic Herd Improvement

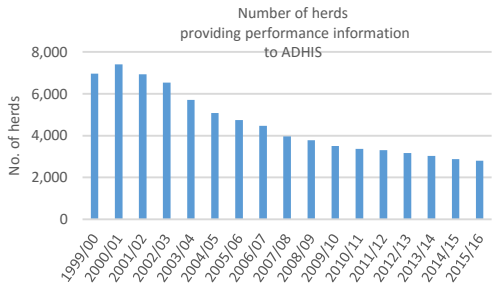
Overview

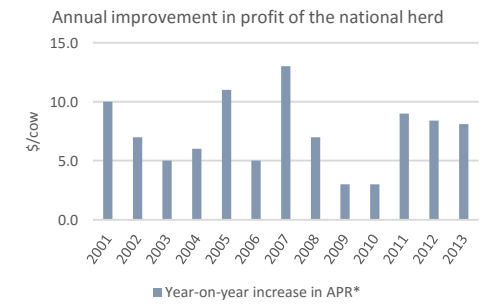
Market Need / Context

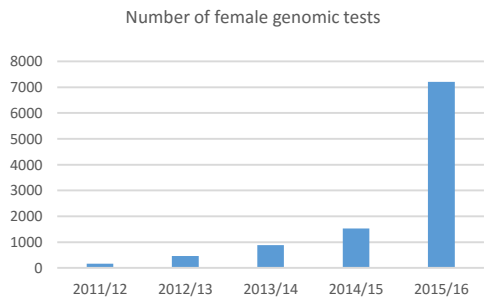
- The Australian dairy industry has an opportunity to realize substantial increases in dairy farm profitability by taking full advantage of the benefits of herd improvement. The potential benefits of addressing issues of market failure in herd improvement could be worth approximately $25 million in gross farm margin per annum due to genetic gain, a figure which may well rise with continuing innovation in genomic technologies.
- The Herd Improvement Industry Strategic Steering Group (HIISSG) was convened by Dairy Australia in January 2014 in recognition that a whole of industry strategy was required to address the issues in the industry that had been impairing progress for the past decade or more. The Herd Improvement Strategy was completed in August 2014 and implementation commenced at that time.
- The target audience is farmers, farm advisors, herd improvement industry service providers, milk processors and financial organisations.

Industry Indicators









Source: ADHIS

Overall Objective/s

- To use animal bioscience to increases farm productivity and profitability.
- To improve the profitability of farms through herd improvement by increasing the rate of genetic gain and improving herd management decisions on farm.

General Approach / Strategy

- Research investment is focused on: continued improvement in the reliability and accuracy of genomic breeding values and much reduced test costs; enhancement of breeding values through incorporation of traits which are of particular importance to Australian producers; and application of genomic approaches to cow herd management. Areas of investment reflect Dairy Moving Forward priorities and incorporate cross-sector and international collaboration where viable.
- Development and implementation investment is focused on continuing to improve the ability of farmers to select for important traits, such as fertility, and develop new traits such as heat tolerance, lameness and heath. Work will also focus on creating new tools for farmers to use to make better decisions on farm, whether through genomic testing or improved use of data.
- The development of a central data repository will enable innovation by service providers and industry through allowing access to data from many sources, also known as single-entry, multi-use data for farmers.
- Extension activities to facilitate practice change will focus on meeting stakeholder requests for technical information and demonstrating the profit impact of herd improvement. Where feasible herd improvement resources and modules will be integrated into other programs, particularly animal health.

Collaboration & Dependencies

- Research investment in herd improvement will continue to benefit from significant collaboration internationally, such as with Teagaesc, Scotch Rural College and others, as well as industry collaboration for common goals. This includes collaboration with organisations such as the National Herd Improvement Association and its member breed societies, bull companies, herd test centres and semen resellers. This collaboration is vital to deliver the intended benefits of herd improvement.
- Similarly, development and extension of herd improvement tools and messages are reliant on collaboration with industry service providers as well as with other industry bodies, such as the Regional Development Projects and the animal health program, for delivery.

Program Detail

Project No. / Title	Project Level Objectives	Focus	2017/18 Changes
P108 Dairy bioscience for forage and animal improvement	Deliver animal improvement innovations that will improve the genetic merit of dairy cattle by $350 per cow per lactation in 2032, which is the cumulative	• Improve reliability of traits measured using genomic methods/selection • Development of new herd management tools that use genomic information; building products and services that meet farmers' needs for rapid analysis and reduced costs	• No change

Genetic Herd Improvement

	value delivered by both the Dairy Futures CRC and DairyBio	• Enhancement of breeding values through incorporation of traits which are of particular importance to Australian producers (e.g. mastitis, lameness, overall health)" could read: Development of new breeding values for traits which are of particular importance to Australian producers (e.g. mastitis, lameness, overall health) • Improve bioscience R&D through activities in development, implementation and maintenance.	
P109 Herd Improvement Strategy 2020	Dairy farmers maximise their profit through a vibrant herd improvement industry offering effective and highly valued services.	• Provide genetic evaluation and support genetic improvement extension. • Rewrite and upgrade the system which calculates breeding values. • Implement an extension, engagement and marketing plan; redesign herd test and genetics reports. • Create a Central Data Repository. • Redesign of genetic improvement governance structures through the creation of a new entity. • Work program including demonstration herds, desk top analysis and other activities. • Implement improved herd test functions; improve breed society efficiency; small projects to improve service delivery. • Develop project for ongoing collection of phenotypic data • Develop industry training program for herd improvement personnel; training and support in conjunction with NCDE.	No change No change No change No change Completed. Continue development of DataGene. Moving into extension and communication phase of Improving Herds Continued collection of phenotypic data

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/ 16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P108 Dairy bioscience – forage & animal improvement	23.71	8.8	1,041,662	1,115,708	1,440,000	1,480,000	1,400,000
P109 Herd Improvement	5.28	6.5	2,453,209	3,611,099	2,977,004	2,531,000	2,100,000
	14.02	**7.7**	**3,494,871**	**4,726,807**	**4,417,004**	**4,011,000**	**3,500,000**
Notes							

Key Milestones

Project	Milestone Description	Planned Completion	Status
P108	Improve reliability of traits measured using genomic methods/selection.	June 2021	Start July 2016
	Development of new herd management tools that use genomic information; building products and services that meet farmers' needs for rapid analysis and reduced costs.	June 2021	Start July 2016
	Enhancement of breeding values through incorporation of traits which are of particular importance to Australian producers (e.g. mastitis, lameness, overall health)	June 2021	Start July 2016
	Improve bioscience R&D through activities in development, implementation and maintenance.	June 2021	Start July 2016
P109	Provide genetic evaluation and support genetic improvement extension.	June 2019	Commenced
	Rewrite and upgrade the system which calculates breeding values. Parallel run	Aug 2017	Commenced
	Implement an extension, engagement and marketing plan; redesign herd test and genetics reports.	June 2019	Commenced
	Create a Central Data Repository	Aug 2017	Start July 2016
	Redesign of genetic improvement governance structures. Completed. DataGene established.	Dec 2016	Commenced
	Implement improved herd test functions; improve breed society efficiency; small projects to improve service delivery.	June 2019	Commenced
	Develop project for ongoing collection of phenotypic data, Ginfo Plus	June 2019	Start July 2016
	Develop industry training program for herd improvement personnel; training / support in conjunction with NCDE.	June 2019	Start July 2017
	Work program including demonstration herds, desk top analysis and other activities.	June 2019	Commenced

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	2015/16 Outcome	2016/17 Outcome	2017/18 Target
Increase the rate of genetic gain	The % of farmers using Australian profit metrics	DA research	75%	80%	83
	The $ increase in the main index per year	DataGene	$8.55	$8.87	$10
Farmers use herd analyses to manage their herds	The % of farmers who participate in herd test or use in-line meters	DA research*	56%	71%^	70%
Farmers have easy access to data across multiple systems	The % of farmers who have access to single-entry, multi-use data	DA research	0%	50%	50%
Accurately measure genetic merit	The number of herds contributing information to genetic evaluation	DA research. Actual farms	3,100 herds	2,764 herds	3,100
Use genetic gain as a major productivity driver	The number of females receiving genomic tests	DA research	2,000	7,000	10,000

*Dairy Australia Herd Genetics and Animal Husbandry Survey Oct 2016.

^Believe survey data over-inflated

Pastures & Forages

Overview

Market Need / Context

A cost effective, flexible and adaptive pasture and forage feedbase is fundamental to enhancing Australia's competitive advantage in dairy production.

Perennial pastures are the most desirable feedbase in the less variable climatic zones as they require less disruption through land cultivation and re-establishment of new pastures. Implicit in this disruption is the cost of establishment, the risk of failure of new pastures/forages and environmental costs associated with more frequent pasture renovation.

There are regional variations in how to create an effective perennial forage base, from a traditional focus on perennial ryegrass, to regions with diverse perennial forages (e.g. mixtures of grasses, clover, lucerne and perennial forbs) through regions with a perennial forage base that is effectively cropped and conserved/fed out to cattle.

The south-east dairy industry has traditionally relied on a perennial ryegrass-based diet, but there is a growing recognition that a deliberate decision on each perennial pasture type is required that takes into account the land features (e.g. soil type and fertility, aspect and topography), climate variability, water availability and cost, and risks to perenniality (such as high insect pest populations). The Murray Dairy region now has a diverse forage base that includes a range of grasses such as tall fescue, kikuyu, cocksfoot, phalaris and perennial ryegrass as well as areas growing lucerne and forbs. The Subtropical region has always had significant diversity in its forage base due to its large geographic spread, and there is an ongoing challenge to improve the quality of forages through management and breeding.

One aspect that all regions have in common is the management of complementary forage species, particularly short-lived species. There are significant challenges in both growing and utilising a mixed forage base as well as incorporating this diversity into an effective cattle diet.

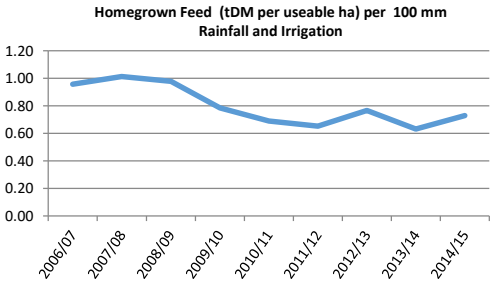
New varieties are based on large and long term ongoing investments in genetic improvement. However, sales of cultivars is not proportionate to yield potential, and there is often a long lag period between the release of a new cultivar and market confidence (as observed through a delayed timeframe to peak sales). Genetic improvement is set to accelerate, particularly for ryegrasses and tall fescue. The core value of this theme, based on making better purchase decisions, is to helps farmers' make confident decisions about selecting a perennial species and cultivar (with an expected life of at least 5 years) and providing feedback for breeding programs.

Pasture typically provides over half of a cows' diet, but pasture intake at individual animal level is not known in a commercial farm environment. This affects both the ability to consistently offer the same allowance each day and manage supplement amount and type. It is expected that there will be accurate sensors to measure pasture nutrient availability produced commercially within a five year period.

In addition, there are no current tools (other than historic data) for forward predicting pasture growth over a 4 to 6 week period. Thus there are no lead indicators for making decisions related to farm management or the purchase and use of supplementary feeds. Early investment in Tasmania suggests that prediction of pasture availability is possible.

There are two genetic improvement work programs; DairyBio and Pastoral Genomics. DairyBio is a based on a joint investment between Agriculture Victoria and Dairy Australia and targets innovations in hybrid breeding, phenomics, genomic selection, genome editing, and endophytes. Perennial ryegrass is the primary target species, with further work in short term ryegrass and tall fescue. Pastoral Genomics is a significant NZ investment in genetic improvement, and includes innovations in genomic selection. White clover is a distinct part of the Pastoral Genomics investment that has no equivalent investment in Australia.

Industry Indicators



Source: DairyBase

Overall Objective/s

To improve the profitability and resilience of Australian dairy farms through more efficient production and management of pastures and forages.

General Approach / Strategy

Investment is focused on five main areas, all within a whole-farm systems context to drive profitability and resilience of the farm business. The Dairy Moving Forward (DMF) Feedbase and Animal Nutrition strategy focuses a comprehensive work program around five key themes:

- Getting the most out of perennial pastures (grazed and conserved)
- Merit-based purchases
- Improved performance through measurement and enhanced prediction of growth rates
- Feedbase and Animal Nutrition extension
- Genetic Improvement

Collaboration & Dependencies

- The Forage Value Index (FVI) relies on a collaboration with Meat and Livestock Australia (MLA) in the Pasture Trial Network (PTN). The PTN will become the primary body conducting cultivar trials across Australia. Collaboration with Dairy NZ is also important in delivery and ongoing development of the FVI.
- Collaboration with the Land Water Carbon program to develop extension components around nutrient and irrigation best practice that will be part of a larger pasture/forage management program,
- Where possible we will use DairyBase in the review of feedbase activities and also for collection of Pasture Consumption data from farms.
- Overall the program relies heavily on research agencies for conduct of key research programs. The key agencies contracted to complete current work are: DEDJTR, TIA, and DAF Q. Though collaborations the University of Melbourne and University of Sydney are also involved in specific projects.

Pastures & Forages

Program Detail

Project No. / Title	Project Level Objectives	Focus	2017/18 Changes
P217 Pasture & Forage Improvement	To provide genetic innovations in forages and improved selection processes that underpin future productivity gains	• Projects commenced to deliver new hybrid breeding systems where >80% of plants in new perennial ryegrass varieties are high-performance hybrids. • Projects commenced to increased pasture persistence (three year extension of productive life) and performance through the improved use of endophyte technology	
P252 Improved Pasture & Forage Management	Sustained practice change and best practice management of pasture and forages leading to more profitable and resilient dairy farms	• Deliver a coordinated series of education programs and tools to support Feedbase & Animal Nutrition education and extension across Australia to develop farmer and adviser capability • Define and study new perennial traits that confer greater persistence and medium term performance of cultivars • Demonstrate management impacts on persistence and loss including summer survival management (e.g .over-grazing) and under-grazing damage in spring. • Identify grazing management and agronomy changes that may be required with improved varieties • Comprehensive management guide for using individual pasture intake data to manage HGF decisions such as pasture allocation • Pasture growth measured in a manner relevant for all regions (and land types) to allow for immediate benchmarking of performance • Pasture growth forecasts established for all regions (and land types) to allow forward planning of forage management • Develop new tools for pasture allocation to develop management strategies that best match forage availability and animal requirements.	• Implementation of National Feedbase education & extension program • Delivery of refreshed of current feedbase management programs – Feeding Pastures for Profit and Top Fodder • Development of on line resources to support self-directed learning in base skill areas • Roll out of the Participatory Action research model with TIA's new project – focus on improving home grown feed utilisation • Strategies for lowering feed costs in sub-tropical farming systems
P255 Pasture & Forage Evaluation	Support farmers to make confident decisions about selecting a perennial species and providing feedback for breeding programs	• Strengthen the FVI initiative through additional trial sites and breadth of perennial ryegrass cultivars tested. • Expand the range of species tested in the FVI initiative to include all major species. • Set out a trait-expansion strategy based on the economic impact of new traits. • Focus on the points of key differentiation of performance of perennial species and design innovative tests to differentiate performance.	• Lead a prioritisation approach for pasture species – prioritise both selection of species and key traits for each species. Set an appropriate frequency to repeat this prioritisation exercise.

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/ 16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P218 GM Path to Market	5.32	8.8	58,959	99,077	29,000	-	-
P252 Supporting Practice Change	5.32	6.8	-	682,113	1,438,531	1,400,000	1,450,000
P255 Forage Improvement	5.32	7.4	-	1,558,422	1,558,267	1,776,135	1,548,615
P217 Dairy Bioscience - Forages	5.32	8.8	1,295,604	2,272,252	2,425,000	2,465,000	2,365,000
	5.32	**8.0**	**5,631,254**	**4,611,864**	**5,450,798**	**5,641,135**	**5,363,615**
Notes							

Key Milestones

Milestone Description	Planned Completion	Status
Deliver 1st generation F1 hybrid parental pools to seed company partner	Dec 2018	
Generate 2nd generation F1 hybrid parental pools to seed company partner	Jun 2020	
Deliver (up to 3) novel elite endophytes to seed company partner	Jun 2020	
Prioritisation of both selection of species and key traits for each species for FVI improvement	Jun 2018	
Pastures on PAR delivers an increase in portion of Tasmanian dairy farms achieving 1t/ha/100mm of HGF consumption	Sept 2018	
Feedbase extension and education program rolled out to all regions	July 2018	
New genetic innovations in forages handed over from DairyBio to commercial partners	Jun 2021	

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	2017/18 Target
Increase the consumption of home grown feed	3 year rolling average of consumption of dry matter (DM) per hectare per 100mm of rainfall or irrigation	Dairy Farm Monitor	Increase on 2016/17
Improved profitability through better feedbase and animal nutrition management	Increased proportion of farms with total feed costs less than 40% of total farm income(measured by 5 year rolling average)	Dairy Farm Monitor	Increased proportion

Animal Nutrition & Feeding Systems

Overview

Market Need / Context

Theme 1: More effective nutrition and improved intake in the first 100 days of lactation

The early phase of lactation sets the trajectory for the entire lactation of each cow. Recent research, international breakthroughs and planned studies will be aggregated into management practices that improves farm operating margins by $1 per cow per day (IOFC). Management practices will avoid the current situation where restrictions in intake during the early phase of lactation penalise the herd for the remainder of the lactation through reductions in intake, production and in-calf rates. Improved nutrition in the first 100 days of lactation has the potential to increase intake and milk production by 10% over the lactation (600L/year). If 10% of industry adopts this new technology, it will deliver $36M/annum.

This work builds on current industry knowledge about pre-calving transition cow management, managing cows to calve at an appropriate body condition score and best-practice grazing and pasture management. Over time, the work will also incorporate the latest in pasture species and varieties (e.g. from DairyBio) as the basis for all future studies. These are regarded as pre-requisites for any management advice provided in this theme.

All of the planned work will have a spring focus as this is the most complex season to manage the early phase of lactation and is also the major season for calving. However, this work will be extended to provide advice related to cattle calving in autumn and winter.

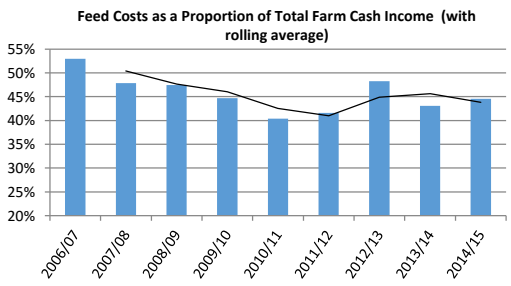
Theme 2: Feeding strategies during periods of hot weather

This theme provides new advice on ration formulation that would be used during hot months/seasons, and sets out to provide diets that enable cows to be more tolerant of heat events and decrease the impact of hot weather on feed intake, milk production, and cow fertility, health and welfare.

Heat events each year in temperate Australia lead to significant negative impacts on intake and milk production. A 4-day heat event, for example has the potential to reduce milk production by 40%, or 8 L/cow per day. If milk loss is reduced by 2 L/cow per day and maintained for the remainder of the lactation (180 days), this is worth $43,000 to each farm. Over the industry, if 10% of farms adopt the technology, this will deliver $21 million per year.

This work builds on current industry knowledge about cow management in hot weather, and expands the nutrition component of cow management with new and/or more specific advice. It is also important to note that DataGene is expected to launch a new breeding value for heat tolerance in 2018, which will allow farmers to select more heat tolerant cattle. It is important to retain the overall context of managing hot weather – which involves three-concurrent approaches: apply best management practices (as described in the Cool Cows project), apply improved nutrition strategies, and breed more heat-tolerant cattle.

Industry Indicators



Source: DairyBase

Overall Objective/s

To improve the profitability and resilience of Australia's dairy farms and enhance the competitive advantage that is gained from a pasture-based diet and access to a wide range of complementary feeds that can be profitably utilised in the cows' diet.

General Approach / Strategy

Investment is focused on two main research themes, all within a whole-farm systems context to drive profitability and resilience of the farm business:

Improving intake in early lactation to improve farm productivity and operating margins - In five years' time, activities from this theme will:

1) Improve the efficacy of supplementary feeding by driving up total feed intake (pasture + supplements), through
   a) New knowledge gained from the past 6 years of supplementary feeding studies informed by cost benefit analysis; and
   b) Further investigations that lead to better understanding of the metabolic factors which influence intake at different phases of lactation, dynamics of site of digestion and supply of energy and protein; and
   c) Providing management approaches that are tailored to the type of feeding facilities and capabilities available (e.g. feed pads, auto drafting gates vs bail feeding) and the desired level of nutrition and production.
2) Deliver new insights and associated management strategies into how differing access to pasture and other feed sources creates groups of cows in the herd with different rate-limiting nutrients and suggest strategies to address these insights, through
   a) Evaluating the merit (production, economic, and environmental) of herd segmentation through differential nutrition management strategies. Segmentation could include factors based on the capacity to respond to changed nutrition, such as days in milk, milk yield, body condition score, parity, genetic merit, history of performance, new technology that allows for cattle to be managed differently, and the quality of the rumen microbiome.
   b) Evaluating the impact of the daily dynamics of cow movement and cow feeding (e.g. differences in time off feed, and access to different feed sources) and devising strategies to profitably minimise any negative effects.
   c) Evaluate strategies that involve the gradual adjustment of rations in response to forward prediction of feed availability (i.e., be more deliberate in planning for changes in rations rather than being responsive to immediate challenges).

Animal Nutrition & Feeding Systems

	3) Investigate strategies for offsetting the lower fat composition of milk that can occur when feeding cattle to meet their requirements for early lactation and deliver decision support frameworks for managing low fat test. 4) Investigate opportunities to use fat supplements for metabolic signalling or as high-value fuel sources. **Managing nutrition in hot summer periods to minimise losses from reduced feed intake and milk production** - In five years' time, activities from this theme will: 1. Provide advice on the major diet components of starch and fibre the possible use of supplementary fats, and how they can be managed to reduce the heat produced from rumen fermentation. 2. Establish clearer guidelines regarding mineral requirements to offset the loss of minerals that is exacerbated by hot weather. 3. Test feed additives and pasture additives that could reduce the heat produced from rumen fermentation. 4. Understand the interaction between heat-affected pastures / forages and ration formulation that might reduce the impact of a heat tolerant diet.
Collaboration & Dependencies	• Overall the program relies heavily on research agencies for conduct of key research programs. The key agencies contracted to complete current work are Agriculture Victoria with collaborations with the University of Melbourne and University of Sydney involved in specific projects. • Dairy Australia is developing collaborative agreements with appropriate R&D institutions in the US on future research projects.

Program Detail

Project No. / Title	Project Level Objectives	Focus	2017/18 Changes
P254 Animal Nutrition & Feed Systems	Provide farmers with the know how to improve the integration and strategic use of supplements in farm systems	• More effective nutrition and improved intake in the first 100 days of lactation • Improve the efficacy of supplementary feeding by driving up total feed intake • Deliver new insights and associated management strategies into how differing access to pasture and other feed sources creates groups of cows in the herd with different rate-limiting nutrients • Evaluate strategies that involve the gradual adjustment of rations in response to forward prediction of feed availability • Investigate strategies for offsetting the lower fat composition of milk • Investigate opportunities to use fat-based additives for metabolic signalling or as high-value fuel sources • Provide new advice on ration formulation that could be used during hot months/seasons, and define diets that enable cows to be more heat tolerant of heat events and profitably decrease the impact of hot weather on feed intake and milk production	Planned investment in the draft Dairy21 strategy. Dairy21 provides the opportunity for Agriculture Victoria and Dairy Australia, through a strategic partnership to co-develop, co-design and co-deliver an innovative research and development program with high impact and value.

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/ 16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P253 Integrated Feedbase R,D&E	11.67	8.8	-	1,337,873			
P254 Animal Nutrition & Feed Systems	5.32	7.1	-	1,020,000	2,385,000	2,375,000	2,250,000
	5.32	**7.8**	**-**	**2,357,873**	**2,385,000**	**2,375,000**	**2,250,000**

Notes	Increase in 2017/18 and beyond reflects planned investment in the draft Dairy21 strategy. Dairy21 provides the opportunity for Agriculture Victoria and Dairy Australia, through a strategic partnership to co-develop, co-design and co-deliver an innovative research and development program with high impact and value.

Key Milestones

Milestone Description	Planned Completion	Status
Synthesise knowledge gained from the past 6 years of supplementary feeding studies informed by cost benefit analysis to improve the efficacy of supplementary feeding	Dec 2018	
Commence investigations that lead to better understanding of the dynamics of site of digestion and supply of energy and protein	Jun 2018	
Evaluate the merit (production and economic) of herd segmentation through differential nutrition management strategies	Jun 2019	
Define strategies for offsetting the lower fat composition of milk	Jun 2019	
Provide preliminary advice on the major diet components of starch and fibre and how they can be managed to reduce the heat produced from rumen fermentation	Jun 2019	
Deliver a coordinated series of education programs and tools to support Animal Nutrition education and extension	Jun 2018	

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	2017/18 Target
Improved profitability through better feedbase and animal nutrition management	Increased proportion of farms with total feed costs less than 40% of total farm income(measured by 5 year rolling average)	Dairy Farm Monitor	Increased proportion
Farmers achieving improved nutritional management	Increased proportion of farms achieving 1 kg milk solids production per kg live weight	Dairy Farm Monitor	Increase on 2016/17

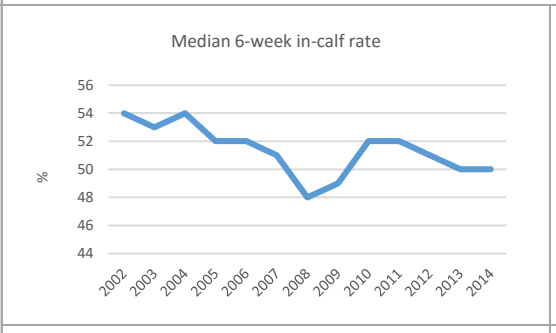
Animal Health & Fertility

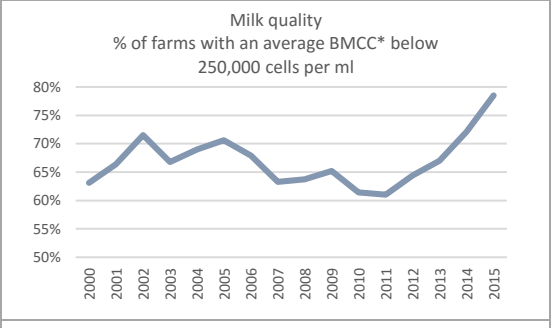
Overview

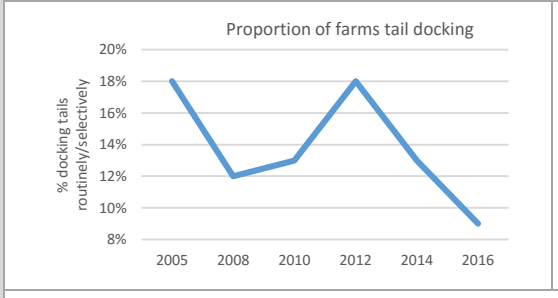
Market Need / Context

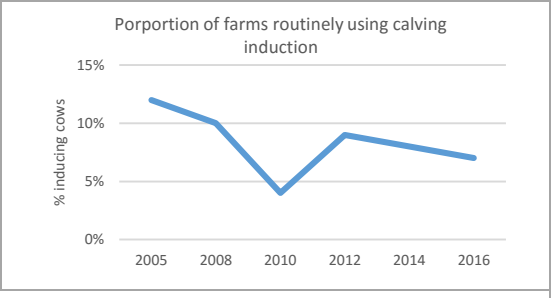
- Reproductive performance of the Australian dairy herd is limiting farm profitability and business resilience. Meeting market requirements for raw milk quality requires continual improvement in on-farm practices. Animal husbandry practices are under growing scrutiny from consumers and customers.
- Target audiences include dairy farm owners, managers and workers, and service providers such as milk company field officers, dairy veterinarians, animal genetics and herd improvement organisation employees, livestock agents and transporters

Industry Indicators









Sources: NatSCAN report (ADHIS 2014); Australian Milk Quality Awards (2015); Animal Husbandry Survey (Dairy Australia 2014)

Overall Objective/s

- To improve national herd fertility and on-farm reproductive performance.
- To protect and improve industry profitability through improved milk quality.
- To promote best practices in on-farm animal husbandry and biosecurity.

General Approach / Strategy

- The industry's 10 year strategy to lift herd fertility developed by the DMF Reproduction Steering Group requires improvements across a raft of on-farm practices underpinned by better genetics for cow fertility. Adoption will be principally driven through the InCalf initiative and ADHIS activities working with a range of collaborators (below).
- Success in the milk quality area requires daily application of best practices on-farm. The Countdown initiative already offers an excellent range of training, tools and resources. Closer partnerships with the milk processors will increase the reach and uptake of these industry assets.
- Animal health and welfare priorities can be influenced by region, season, animal activism, regulatory and trade issues. A nimble and tailored approach to RDE&E is required to effectively address these issues across the industry.

Collaboration & Dependencies

- Fertility training and extension will involve other DA programs such as NCDE, ADHIS, Communications and the RDPs, NHIA, DA trained Repro Right advisers, private veterinarians and other animal breeding service providers.
- Milk quality extension will be principally delivered through the Countdown initiative working with the NCDE, milk processors, DA Communications and the RDPs, veterinarians and other service providers.
- Activities to improve dairy animal health and husbandry will be developed in consultation with the ADF Animal Health & Welfare Policy Advisory Group, with oversight from the DMF Animal Husbandry Steering Group. Delivery will occur via RDP extension, accredited training offered by the NCDE and indirectly through private and government veterinarians and other service providers.

Program Detail

Project No. / Title	Project Level Objectives	Focus	2017/18 Changes
P106 Managing milk quality	To protect and improve industry profitability through improved milk quality	• Maintenance of Countdown (Milk quality) delivery – MQ adviser training, dry off consultation, Cups On Cups Off farmer courses • Milk microbial quality ('Better Hygiene Better Milk) initiative	• Lower Countdown budget due to reduction in development activities • Dairy Hygiene Helper online tool will be launched to address microbial quality issues in raw milk
P107 Improving Reproductive Performance	To improve national herd fertility and on-farm reproductive performance.	• InCalf (Fertility) – promotion of 2nd edition of InCalf Book • Adviser training & support (Repro Right 5) • Extension support for phase out of calving induction	• Ongoing support and engagement of Repro Right trained advisers • Redesign of the InCharge farmer workshops to include year round calving herds

Animal Health & Fertility

		• Improve usage of the Fertility Focus Report	• Integration of Fertility Focus report with DataGene dashboard
P213 Animal Health & Welfare On-farm Change Management	To promote best practices in animal husbandry on-farm.	• Awareness of new Cattle Standards and Guidelines • Adoption of on-farm Biosecurity plans • Promotion of 2nd edition of Rearing Healthy Calves manual • Continued support for post graduate dairy veterinary residencies • A seasonal risk monitoring service for Facial Eczema	• Ensure on-farm practices are aligned with the new Cattle Standards • Research on digital dermatitis • Support extension capability in dairy beef production • Support new industry bobby calf issues management approach • Biosecurity planning tool development transferred over from P233

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P106 Managing Milk Quality	3.29	6.2	542,194	571,418	335,000	393,000	265,000
P107 Improving Reproductive Performance	3.95	6.3	748,593	470,002	450,000	420,000	420,000
P213 Animal Health & Welfare - On-farm Change Management	4.53	7.4	655,256	467,687	419,500	409,500	409,500
	3.66	**6.6**	**1,946,043**	**1,509,107**	**1,204,500**	**1,222,500**	**1,094,500**
Notes							

Key Milestones

Project	Milestone Description	Planned Completion	Status
P107	Distribution of 1000 copies of 2nd edition of InCalf book for farmers	30 June 2018	
	InCalf reproduction symposium	31 October 2017	
P106	Completion of Australian Milk Quality awards	30 June 2018	
	Delivery of first Countdown MQ Course	30 November 2017	
P213	Distribution of 1000 copies of 2nd edition of Rearing Healthy Calves manual	30 September 2017	

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	Target 2017/18	Target 2019/20
P107 Improve median 6-week in-calf rate	National herd reproductive performance (as measured in previous calendar year)	ADHIS NATSCAN dataset	>50%	>55%
P106 Annual average BMCC	% Herds below 400,000 cells/ml	Dairy Australia AMQA dataset	>97%	>99%
	% Herds below 250,000 cells/ml	Dairy Australia AMQA dataset	>75%	>80%
	Milk pick ups downgraded due to high Bactoscan or thermoduric counts	Dairy processor QA data		50% reduction compared with 2016/17
P213 Timely advice on Facial Eczema risk provided to farmers	Fortnightly spore counts received from sentinel farms across Gippsland	GippsDairy monitoring program	26 sentinel farms	26 sentinel farms
P213 Farmer implement good on-farm biosecurity practices	% Dairy farmers with a written on-farm biosecurity plan	Dairy Australia online biosecurity tool usage	>20%	>50%

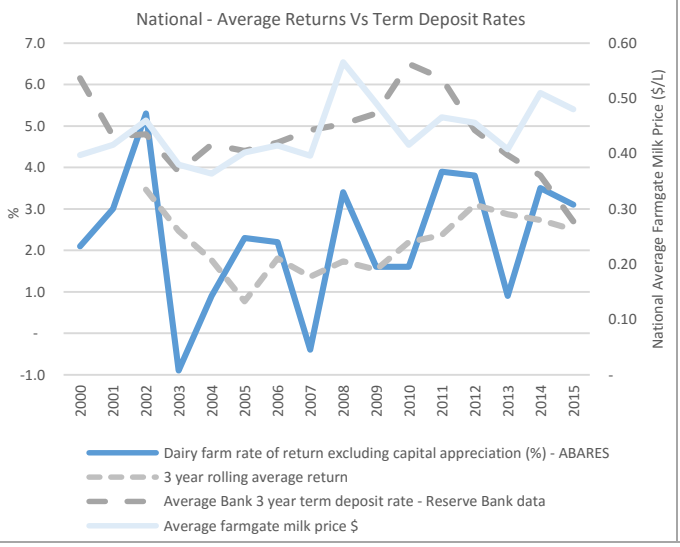
Farm Business Management

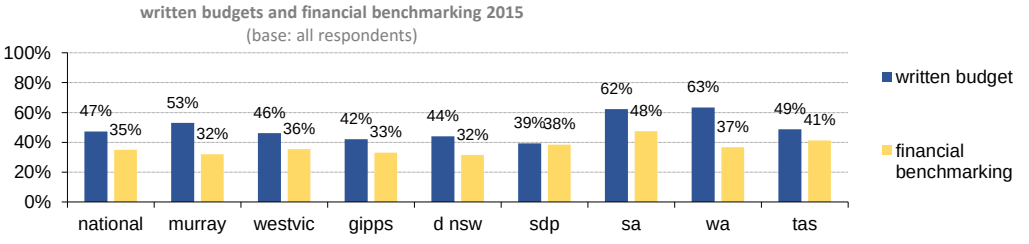
Overview

Market Need / Context

Australian dairy farms face many challenges to profit though better performing dairy farms and to generate long-term wealth creation. To improve profitability and manage risk farmers require a range of farm business management skills and ability to monitor farm business performance. The Farm Business Management program will build capability and drive the adoption and use of DairyBase to assist farm business decision making, leading to increased profit while managing risk. The target audience is farmers and service providers with a focus on profitability.

Industry Indicators





Source: ABARES, DA research

Overall Objective/s

- To continue to build farm business management capability for dairy farmers, advisers and the research sector.
- To increase the adoption and use of Dairy Australia's FBM tools, particularly DairyBase, and industry standard farm business management practices.
- To measure and analyse farm business performance at a national, regional and farm level

General Approach / Strategy

- Dairy Australia will continue to lead the development of a nationally consistent approach to dairy farm business management, including terminology and metrics, and will embed DairyBase as a key industry tool used for the measurement and analysis of farm business performance at a farm, region and national level.
- The completion of an industry owned FBM education and extension program will provide a clear and well understood offering to farmers, and will leverage the delivery capability of RDPs, the NCDE and the private sector. Implementation of the strategy will involve the segmentation of target audiences and provision of targeted messages, information and opportunities for dairy farmers and their advisers.
- Achievement of the outcomes identified will build a more positive farm business management culture in the Australian dairy industry and Dairy Australia will play a significant role in working with farmers and the wider industry to shape the beliefs and assumptions held about dairy FBM.

Collaboration & Dependencies

- Dairy Australia will collaborate with a number of partners and organisations including, RDPs, NCDE partners, AgVic (research and DFMP), private providers, DPI NSW, QDAF, DairyNZ.
- There is dependency on RDPs, NCDE partners and the private sector for the delivery of FBM education and extension programs.

Program Detail

Project No. / Title	Project Level Objectives	Focus	2017/18 Focus / Changes
P240 Farm Business Information	• To ensure the industry has the high quality farm performance data needed to provide national, regional and farm level analysis • Using DairyBase increase farmers understanding of their own farm business performance	• Increase dairy farmer and adviser uptake and use of DairyBase • Integration of DairyBase and Dairy Farm Monitor Project (DFMP) • Enhanced analysis and reporting of farm performance data • Embed standard FBM terminology across the dairy industry	• Maintain and enhance DairyBase; • Provide support to DairyBase users; • Drive efficiencies in the collection and reporting of high quality farm performance data; • Build in house capability to validate and analyse farm data;

Farm Business Management

		• Measurement and analysis focuses on profitability and whole farm business performance	• Provide meaningful reports and commentary.

P241 Farm Business Management Capability	• FBM capability is increased across the dairy industry
	• More dairy farmers are able to confidently respond to opportunities and challenges and increase profitability through better informed decision making based on appropriate analysis and tools;
	• To improve the advisory capability available to farmers to improve decision making
		• Development and roll out of farm business management education and extension programs
		  • FBM Fundamentals
		  • Making Sense of Farm Business – Dairy Farm Business Analysis
		  • FBM extension offerings – flexible and responsive to regional demand
		• Develop farmer and adviser capability
			• Increased focus on delivery of FBM education and extension programs
			• Increased participation by farmers and advisers in FBM programs
			• Increased adoption and use of DairyBase
			• Increased awareness and use the Standard Chart of Accounts
			• Development of further training resources related to risk and planning

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P240 Farm Business Information	4.8	6.7	544,896	574,660	460,000	400,000	400,000
P241 Farm Business Management Capability	5.4	6.4	469,759	329,506	400,000	400,000	400,000
	2.86	**5.5**	**1,014,655**	904,166	860,000	800,000	800,000
Notes	Decreased funding will require more efficient delivery of FBM program.						

Key Milestones

Project	Milestone Description	Planned Completion	Status
P241 Farm Business Management Capability	FBM Capability Program - completion of FBM Fundamentals modules and delivery in all regions.	June 2018	Currently piloted in four regions
	FBM Capability Program –completion of Making Sense of Farm Business modules, to be delivered in all regions in 2018.	June 2018	Commenced July 2017
	FBM professional development delivered to >100 advisers and service providers annually.	June 2018	Commenced
P240 Farm Business Information	Completion of the Dairy Farm Monitor Project in Victoria, New South Wales, South Australia and Tasmania and Western Australia using the Dairy Farm Monitor data collection and analysis models.	Oct 2017	Start Jul 2017
	Create a mapping process and import historical farm data into DairyBase from at least 5 farm business consultants.	June 2018	Start Jul 2017
	Half of all Discussion Groups participating in DairyBase extension program.	Jul 2020	Commenced
	Development of process to streamline capture of Dairy Farm Monitor Project data to drive efficiency.	Jul 2017	Commenced

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	2016/17	2017/18
Dairy farmers increase profitability by improved decision making based on appropriate analysis and tools.	High quality and comprehensive core dataset available in DairyBase for industry averages.	DairyBase, Dairy in Farm Monitor	>250 DFMP datasets >250 consultant farm datasets using the DB tool	>250 DFMP datasets >250 consultant farm datasets using the DB tool
Increased adoption of DairyBase	Number of farmers registered on DairyBase	Salesforce	>1500 DairyBase users (includes >1,000 farmers)	>1500 farmers registered on DairyBase (2020 target is 2,750)
Increased participation in FBM education and extension	Number of participants, broken down by participants, repeat participation, region, farm size	Salesforce	550	>1,100

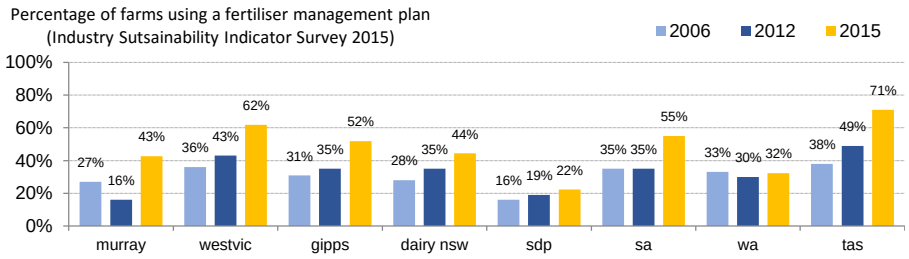
Land, Water, Carbon

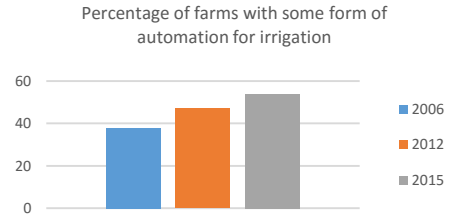
Overview

Market Need / Context

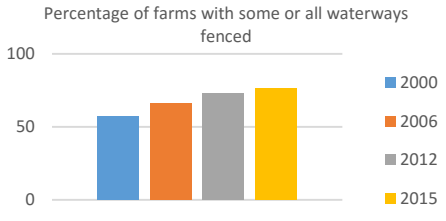
- Consumer interest in the sustainability credentials of the food they purchase and investors' concerns about the long term viability of their investment are driving milk processors and financial institutions to take a greater interest in the management practices their suppliers/clients. Both groups are increasingly requiring evidence that farmers are managing their natural capital and climate risk and this driver is impacting on the direction and focus of Land, Water and Carbon investment.
- The breadth of natural capital issues makes it difficult to address all and RD&E activities are focused on areas where there are both profit and environmental drivers. These are soil and nutrient management, water use efficiency and climate risk. The estimated impact of climate change on annual productivity of dairy farms in southern Australia between now and 2040 is 0.6%/year. Predominately public issues such as biodiversity will be addressed through resources, tools and e-learning.
- The target audience is farmers, farm advisors, milk processors, financial institutions, and government and NGO organisations with an interest in land, water and climate risk management.

Industry Indicators





Industry Sustainability Indicator Survey 2015



Industry Sustainability Indicator Survey 2015

Overall Objective/s

- To build industry capability to manage land, water and energy resources to minimize environmental impact whilst enhancing profit.
- Improved industry capacity to mitigate climate risk.

General Approach / Strategy

- Research investment is focused on building knowledge and understanding in the areas of nitrogen use efficiency, nutrient loss pathways, enteric methane technologies, heat stress management strategies, nutrient management for intensive systems, seasonal forecasting reliability, climate resilient strategies; and cost effective irrigation bay design, scheduling and automation. Areas of investment reflect Dairy Moving Forward priorities and incorporate cross-sector and international collaboration where practical.
- Development investment is focused on Fert$mart Nitrogen, strategies to optimise irrigation (What is my yield gap?), sustainability framework reporting tools and data collation processes, precision technologies to enable resource use efficiency and monitoring, and managing climate risk. Where feasible Land Water and Carbon resources and extension modules will be integrated into Feedbase programs.
- Dairy Australia Land Water and Carbon regional support will focus on building the capability of RDPs to meet regional stakeholder requests for technical information as well as encouraging them to form delivery partnerships with milk companies, NRM agencies and other relevant stakeholders to facilitate increased adoption of the industry Sustainability Framework environment targets.
- National extension activities to facilitate practice change include Fert$mart professional development and group delivery, irrigation efficiency, effluent management, Cool Cows, biodiversity and riparian management, professional development for milk company sustainability officers and other relevant stakeholders and responding to stakeholder requests for technical information.

Collaboration & Dependencies

- Research investment in the areas of irrigation delivery, scheduling and automation and nitrogen use efficiency relies on collaborative partnerships between the cotton, rice, horticulture and sugar industries. Investment in innovative effluent management technologies will be through partnerships with other intensive industries (pork, chicken meat and meat feedlots).
- Development and extension of nutrient and irrigation best practice will be in collaboration with Feedbase pasture/forage management programs.
- Industry data sets such as DairyBase will inform sustainability reporting where feasible, an example being the capacity for DairyBase data sets to be imported into the Australian Dairy Carbon Calculator allowing farmers to quickly measure their emissions intensity/kg milk solids.
- Partnerships with milk processors and other key stakeholders will be essential to achieving industry sustainability framework targets, particularly in areas with a high level public good such as riparian, effluent and biodiversity management.

Program Detail

Project No. / Title	Project Level Objectives	Focus	2017/18 Focus
P128 Improving soil and nutrient management	80% of dairy farmers report using industry nutrient management good practice by 2020.	• Fert$mart maintenance and delivery, including Fert$mart professional development. • Nutrient loss hot spots and effective strategies to mitigate. • Effective nitrogen management practices at a field & whole farm scale, development of Fert$martN • Improved nitrogen/carbon cycle modelling capacity of Australian dairy systems • Tools and resources to better manage and utilise dairy effluent. • Fertiliser, soils and water extension modules integrated into Feedbase programs	• Fert$mart delivery / capability building • RRD4P More Profit from Nitrogen project – dairy • Effluent management capability building

Land, Water, Carbon

P130 Natural Capital Risk and Climate Change	90% of relevant financial institutions, multinational food and drink corporations, and milk processors use/accept industry sustainability assessment tools/guidelines (ongoing). Climate risk considerations incorporated into relevant FPI RD&E initiatives by 2018. RDPs facilitate delivery partnerships to deliver Land, Water and Carbon on farm change programs.	• Improved seasonal forecasting • Maintaining and developing industry relevant Sustainability Framework monitoring and reporting tools • Monitoring and addressing international dairy sustainability reporting trends/requirements. • Technologies to reduce enteric methane • Identification of strategies to mitigate heat stress, information tools and resources to manage heat stress including Cool Cows. • Sustainable pasture systems under a more variable climate. • Building the capacity of RDPs to address regional Land, Water and Carbon issues. • Assessment of emerging sensor technologies and associated data management systems to assist efficiency of resource use.	• Building RDP capacity to address LW&C issues • Updated Cool Cows resources • Climate resilient strategies • Maintaining and developing industry relevant Sustainability Framework monitoring and reporting tools
P132 Improving Water Use Efficiency	Reduction in water used per kg/milk solids produced from home grown feed.	• Improved irrigation bay designs • Practical, reliable irrigation scheduling technologies • Low cost automated irrigation control systems • Guidelines and extension modules for good practice water management. • Development of an effective irrigation extension/demonstration program	• RRD4P Smarter Irrigation for Profit project – dairy

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P128 On Farm Soils & Nutrient Management	3.04	5.9	365,327	774,086	686,109	610,000	650,000
P130 Climate Change Support	5.45	7.4	368,529	649,026	790,000	840,000	850,000
P132 Improving Water Use Efficiency	2.05	5.4	506,250	686,766	496,679	500,000	500,000
P125 On Farm Emissions Mitigation			174,463				
P126 On Farm Emissions Mitigation			548,951				
Total	**2.19**	6.20	**1,963,520**	**2,120,939**	**1,972,788**	**1,950,000**	**2,000,000**
Notes							

Key Milestones

Project	Milestone Description	Planned Completion	Status
P128	Fert$mart group delivery program developed and piloted	March 2017	Achieved
	RRD4P More profit from Nitrogen dairy project milestones accepted by the Australian Government	May 2017	
	Dairy Australia Effluent and Composting technical advisors appointed	August 2017	
	Unilever Pilot Progress report accepted	December 2017	
	Industry agreed reporting mechanisms in place for Sustainability Framework environment targets.	June 2018	
	RRD4P Smarter Irrigation for Profit dairy project milestones accepted by the Australian Government	May 2017	

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	Target for 2017/18
80% of dairy farmers report using industry nutrient management good practice by 2020.	Fert$mart delivery.	Relevant RDP LW&C reports Fert$mart database	Six regions deliver Fert$mart
80% of dairy farmers report using industry nutrient management good practice by 2020.	More profit from Nitrogen (RRD4P) commenced and demonstration sites established	Progress Reports	3 demonstration sites
Reduction in water used per kg/milk solids produced from home grown feed.	Smarter irrigation for profit dairy demonstration site field days/workshops	Progress reports	150 farmers &service providers
RDPs facilitate delivery partnerships to deliver Land, Water and Carbon on farm change programs.	Multi-stakeholder NRM delivery partnerships	RDP LW&C Progress reports	Six major partnerships
90% of relevant financial institutions, multinational food and drink corporations, and milk processors use/accept industry sustainability assessment tools/guidelines (ongoing).	Industry relevant LW&C sustainability reporting tools and resources	Fert$mart, Cool Cows, and Climate Toolkit website statistics	Web site traffic increased 10% from 16/17 levels

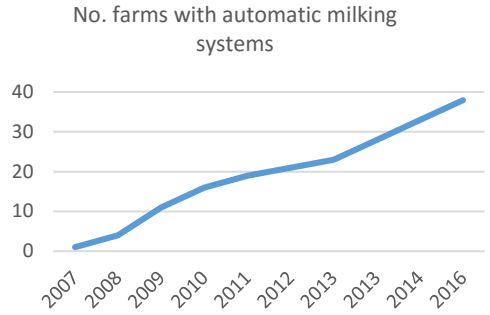
Advanced Management Technologies

Overview

Market Need / Context

- Agriculture and dairying are entering a new phase of technological change, including developments in digital technologies and lower cost sensors, robotics and autonomous vehicles. As a result, individual dairy farm businesses will generate increasing amounts of data and information each day. This next phase of technological change poses both challenges and opportunities for dairy farmers and their advisors.
- There is scope for DA to continue investments in advanced management technologies including partnering with other organisations and industries to leverage the substantial government and commercial funding being spent in this area. There is also scope to increase the utilisation of the tools and models available to address key industry research questions through the use of whole farm modelling. There is also a need to enhance the effectiveness with which the modelling framework operates, build capacity and future proof this capability, and expand the model user base by making models more accessible to consultants and farm advisers.
- Whole farm systems modelling has proven a highly valuable tool to assess the efficacy of management interventions on-farm. Over a series of projects, the dairy industry has built significant systems analysis capability, capacity and a suite of tools to conduct these analyses. A suite of tools and models are available, from complex biophysical, mechanistic models (e.g. DairyMod, UDDER) to more empirical farm management models (e.g., Farmax Dairy Pro, Dairy Predict etc.), economic and risk analysis (e.g. @Risk,) and industry calculators (e.g. DairyBase, Dairy Greenhouse Gas Abatement Strategies Calculator (DGAS)).

Industry Indicators



Overall Objective/s

Support integration and effective use of new technologies on-farm:

- Provide impartial information and demonstration opportunities to enable dairy farmers and their service providers to assess and evaluate technologies, including defining the benefits and on-farm value of different technologies.
- R&D to inform development of guidelines and resources that support integration and effective use of technology
- Develop learning and training initiatives for farmers and service providers in technology management and integration.
- Key industry research questions and pre-experimental modelling and prioritisation addressed through the use of whole farm modelling.
- Ongoing enhancement, validation and refinement of farm system modelling tools and a framework to incorporate new models.

General Approach / Strategy

- There are significant external and cross-sector investments in 'precision agriculture' which provides an opportunity for DA to leverage off via small-scale strategic funding. Where possible, DA aims to partner with other organisations and industries to leverage the substantial government and commercial funding being spent in this area. There is strong commercial interest and activity in precision agriculture by major technology companies.
- Formalise "Precision Dairy" as a separate and specific theme within Dairy Moving Forward with a Community of Interest and revised strategy in this area. The previous strategy "RD&E Gaps and Investment Priorities" was finalised in May 2013 and potential gaps in either research, development or extension require review.
- The strategy is for whole farm modelling to move from DA fully funding specific dairy model (DairyMod) development and maintenance to an open source and distributed development approach, with appropriate version control and assessment of the scientific merit of model developments. This also enables considerable effort into promotion of the model and new user training to grow the user base and consequently the development of the model.

Collaboration & Dependencies

- Key collaborations in the advanced management technology area are cross-RDC collaboration focused on 'transformative technologies' under Rural R&D for Profit (Precision Agriculture to Decision Agriculture), the Data to Decisions CRC, the Food Agility CRC and the Research & Innovation Network for Precision Agriculture Systems (RINPAS).
- The Future Dairy collaboration (DA, University of Sydney & De Laval) will continue with DA taking a more active lead in the development of extension, education and training activities. DA will continue leading the cross-RDC collaboration focused on virtual herding technology.
- In the modelling area, a "community of practice" will drive collaboration comprising representatives from DA, DairyNZ CSIRO, TIA, University of Melbourne, University of Southern Queensland, AgResearch, DEDJTR, DAFQ, Teagasc, DAFWA and MLA.

Advanced Management Technologies

Program Detail

Project No. / Title	Project Level Objectives	Focus
P110 Advanced Management Technologies	• Provide impartial information (e.g. defined benefits) and demonstration opportunities to enable dairy farmers and their service providers to assess and evaluate technologies • Develop decision support tools and other resources that are not dependent on proprietary data or information • R&D to inform development of guidelines and resources that support integration and effective use of technologies on-farm • Develop learning and training initiatives for farmers and service providers in technology management and integration • Mitigate constraints to adoption of automatic milking and improved route to market • Develop new knowledge on performance and best management of farm systems, and enable faster adoption of R&D outputs to regional needs	• Continue to develop information resources and case studies, including economic assessments, for current and emerging technologies • Contribute to research investigating use of virtual herding technology in pasture-based dairy systems • Increase successful AMS adoption decision making through the implementation of a well-coordinated national extension and training strategy • Develop a comprehensive, sound and realistic economic narrative on the key drivers of success of productivity, efficiency and profit on commercial AMS farms • Investigating simpler robust systems to broaden the audience and enhance successful adoption of AMS • Integration of models and tools (DairyMod, APSIM) and increased capacity in farm systems modelling

Evaluation & Budget

Project	Evaluation		Expenditure Planning				
	Planned BCR	Investment Attractive-ness	2015/ 16 Actual	2016/17 Forecast	2017/18 Plan	2018/19 Plan	2019/20 Plan
P110 Advanced Management Technologies	**1.59**	4.1	**782,778**	**877,504**	**458,854**	**446,606**	**426,232**
Notes	• Future Dairy 4 ends in June 2017 and will shift in focus to more extension and adoption, but will retain some R&D component with reduced expenditure compared to previous years.						

Key Milestones

Project	Milestone Description	Planned Completion	Status
P110 Advanced Management Technologies	Quantification and demonstration of how Virtual Fencing can be applied to increase pasture utilisation through regular stock movement and other tactics	30 June 2019	
	Development of an Interpretive Management Model (IMM): development of a modelling tool that will allow macro evaluation of new and simpler automatic milking systems	30 June 2019	
	Development of an industry-driven national extension and training program for automatic milking systems	30 June 2018	
	Publication of Australian data on productivity, efficiency and profitability of automatic milking systems	30 June 2019	
	Delivery of pasture growth forecasting services and tools	30 June 2018	
	Model forage and feeding systems that deal with climate extremes and limited water availability	30 June 2019	
	Pre-project whole farm systems modelling protocol embedded in feedbase related project submission development	30 June 2019	

Key Performance Indicators (KPIs)

Target Outcome	Measure	Source of data	2017/18 Target
Mitigate constraints to adoption of automatic milking and improved route to market	Proportion of farms (cows) with automatic milking technology	Future Dairy	>0.6%
	Level of decommissioning of automatic milking system installations	Future Dairy	< 10%
Guidelines and recommendations on how to apply VF technology in dairy farming systems	Proof of concept of virtual fencing application in on-farm studies	TIA	POC demonstrated