DAIRY AUSTRALIA

CLIMATE CHANGE STRATEGY

2007 – 2010

DAIRY AUSTRALIA

Delivering for the dairy industry

DAIRY AUSTRALIA CLIMATE CHANGE STRATEGY

GOAL

To help individual farmers and milk companies understand what climate variability and climate change means for their farm and for their growth plans at an individual, regional and national scale.

OUTCOME

A profitable and sustainable dairy industry that is able to make decisions in an environment of increased uncertainty and has the confidence to invest for a future

INDUSTRY FOCUS AREAS

1. Understanding
Facilitating better understanding of the potential impacts and consequences of climate change and climate variability for the dairy industry

2. Capability
Increasing industry capability to manage the implications of climate change and climate variability

3. Engagement
Informing and engaging industry stakeholders to improve understanding of climate change issues

4. Mitigation
Facilitating better understanding of the likely impacts and opportunities associated with reducing and/or offsetting emissions

INDUSTRY ACTIONS

- 1.1.1 Implement scenario planning to explore alternative futures for farm and factory systems
- 1.1.2 Utilise farming systems modelling to quantify potential impacts
- 1.1.3 Conduct regional feedbase audit and farming system resilience analysis
- 1.1.4 Review and monitor the global trade implications of climate change
- 1.2.1 Explore and prioritise on-going RD&E opportunities
- 1.2.2 Implement priority RD&E

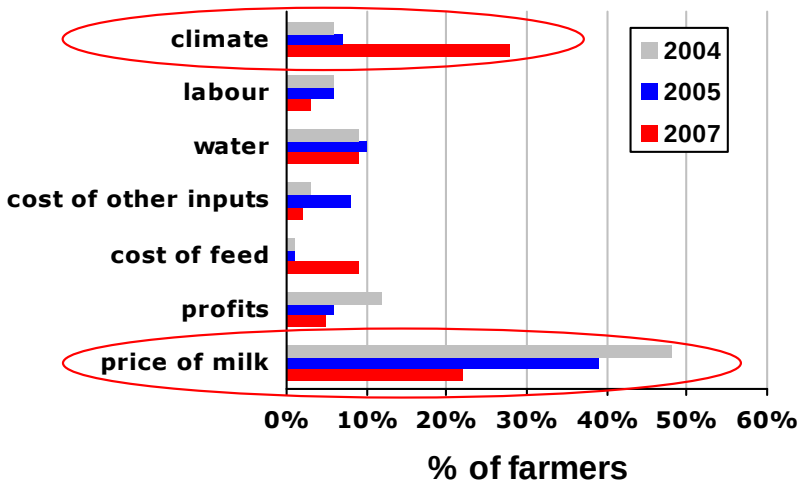
- 2.1.1 Conduct participatory scenario planning workshops to generate local climate variability and climate change management options
- 2.1.2 Design and implement resilience building programs in regions vulnerable to climate shocks
- 2.2.1 Develop and incorporate climate risk and GHG self assessment tools into industry NRM tools and programs
- 2.2.2 Integrate climate management considerations into all DA farm management and NRM programs

- 3.1.1 Develop regional climate change information sheets
- 3.1.2 Capture and disseminate examples of farm and factory innovation
- 3.1.3 Promote the Dairy Innovation Australia energy efficiency program
- 3.2 Incorporate climate risk information into NCDEA training packages

- 4.1 Explore on-going RD&E opportunities for farm and factory greenhouse gas abatement
- 4.2 Develop tools and processes to monitor GHG emissions
- 4.3 Review and monitor farm, factory and market implications of carbon trading

Development of the strategy

The Dairy Australia Climate Change Strategy has been developed in response to increasing industry and community concern about climate change. Climate concerns have now over taken milk price as the number one issue for Australian dairy farmers (National Dairy Farmer Survey, 2007).



In developing the strategy, the key emphasis has been on enabling the dairy industry to address the impacts of climate change and to foster adaptation. It is not about keeping what we have, it is about creating what we need.

Although adaptation and mitigation are not mutually exclusive approaches to dealing with climate change, there is a broad feeling that in the agricultural sector, given limited resources, it is more important and feasible to focus on adaptation.

There is already considerable existing activity in the area of climate change by government and non-government agencies. Dairy Australia is committed to developing delivery partnerships for collaborative effort while ensuring actions initiated by industry do not duplicate work being conducted by other agencies.

The Dairy Australia Climate Change Strategy is aligned with the National Resource Management Ministerial Council National Agriculture and Climate Change Action Plan (2006), and the Dairy Australia Strategic Plan. It reflects the revised Australian Government Rural Research and Development Priorities (2007).

The Dairy Australia Climate Change Strategy is strongly linked to the Dairy Australia Natural Resource Management strategy. The major difference is in the area of accountability. With climate change community accountability is linked to mitigation rather than adaptation.

Linkages between the DA NRM Strategy and the DA Climate Change Strategy

DA NRM SRATEGY			DA CLIMATE CHANGE SRATEGY		
1. Understanding: Knowledge of sustainability issues and management options.	**1.1 Scanning**	→	**1. Understanding:** Knowledge of the potential impacts and consequences of climate change and climate variability for the dairy industry.	**1.1 Analysis**	• Analysis & Scenarios • Global trade implications
	1.2 Research			**1.2 Research**	• Strategic planning • implementation
2. Capability: Ability to profitably apply sustainable practices.	**2.1 Supporting Change**	→	**2. Capability:** Ability to manage the implications of climate change and climate variability	**2.1 Supporting Change**	• Program Planning • Partnerships
	2.2 Tools			**2.2 Tools**	• Risk Assessment
3. Engagement: Positive relationships with key stakeholders.	**3.1 Networks**	→	**3. Engagement:** Informing and engaging stakeholders	**3.1 Communication**	• Targeted information • Industry Networks
	3.2 Leadership			**3.2 Training**	• Development • Delivery
4. Accountability: Respect for dairy's NRM efforts.	**4.1 Communication**	→	**4. Mitigation** Likely impacts and opportunities associated with reducing and/or off setting emissions	**4.1 Research**	• Planning and collaboration • Reporting
	4.2 Policy			**4.2 Policy**	• Investigations • Knowledge management
				4.3 Communication	• Information

Climate change and the Australian dairy industry

Climate change has the potential to impact on the production and sustainability of the dairy industry due to influences from:

- increased CO_2 concentrations;
- higher mean temperatures, with possible increases in extreme high temperatures and reductions in frost period duration;
- changed rainfall patterns (either increased or decreased), with possible increases in rainfall variability and intensity; and
- changed irrigation water availability.

These changes are likely to affect plant growth as well as animal production. Considerable regional variation in impacts is predicted, particularly in rainfall scenarios (see Pittock, 2004[1] and Watson et al., 1997[2]). In some regions, crop and pasture growth will decrease in response to lower water availability, whilst in other regions, production may increase due to higher temperatures and CO_2 concentrations. In certain regions, animal production may decrease due to heat stress, but in others it may increase due to a reduction in the incidence of cold stress.

Impacts on livestock production can be both direct and indirect. In Australia, the direct impacts, such as the impact of heat stress on productivity and reproduction, have been assessed for cattle and intensive industries (piggeries, poultry, etc) but adaptations to offset these impacts have not been described nor assessed in detail. There has been no analysis of the potential for reducing the incidence of cold-related production losses and mortality.

Indirect impacts on livestock production are via feed quantity, quality and reliability. There is a growing capacity to predict the impacts of climate on both temperate and tropical pasture growth in Australia (changes in the quality and quantity of feed), however, a range of data and modelling issues persist. In addition, the effects of elevated CO_2 on pasture species seems to be more variable than expected and this limits predictive capacity. Reliable predictions of pasture growth are also important in relation to assessing the implications of climate change for natural resource management (e.g. ground cover, soil drainage below root systems, etc.).

The basic response by agricultural systems to climatic factors has been the subject of much scientific analysis over decades. Much of this knowledge has been incorporated into various crop and pasture system models, which can assist in assessing the impacts of climate change. However, there is a need to further synthesise available data, consider gaps in available information and to develop research priorities.

In the face of increasing certainty that climate change will become a reality, there are two possible approaches that the dairy industry could adopt to reduce

[1] B. Pittock (ed) (2004) *Climate Change: An Australian Guide to the Science and Potential Impacts*. Australian Greenhouse Office, Canberra, Australia.
[2] R.T.Watson, M.C.Zinyowera, R.H.Moss (Eds) (1997) The Regional Impacts of Climate Change: An Assessment of Vulnerability. A Special Report of the Intergovernmental Panel on Climate Change (IPCC) Working Group II, Cambridge University Press, UK.

the impacts. The first is to facilitate adaptation to the changed climatic conditions and the second is to reduce the industry's contribution to greenhouse gas emissions either through emission reductions or through offsetting emissions by establishing carbon sinks. Both of these approaches have been addressed in this strategy and each of them is discussed in more detail below.

Adaptation

Until recently, dairy industry investment decisions were based on a continuation of past climate patterns. However, the dry seasonal conditions of the past 10 years, and the increased scientific evidence for climate change have significantly raised the level of uncertainty about future climate conditions. If the industry is to maintain current production and grow, farmers and processors will need to know that they can continue to operate in spite of any climate related shocks that might be coming.

Building industry capability to manage climate risk will involve tactical as well as strategic responses. Tactical responses include changing fertiliser and irrigation applications to improve water use efficiency, changing feedbase systems and increasing shade and watering points for animals to offset temperature increases. Strategic responses include the development of: new cultivars or breeds; new agricultural and husbandry practices; or alternative water supplies, to enable plant and animal systems that are better suited to the changed climate.

Areas of production of traditional products (e.g. wheat) may also change as a result of climate change impacts and there may be increased competition for grain. Changes in infrastructure (e.g. transportation and storage) might accompany any shifts in production. Adaptation will need to be deliberate and follow a process of identifying and prioritising vulnerability and possible strategies[3].

The DA climate change strategy has been written to enable:

- the development of understanding about the nature and scale of the potential impacts that climate change may have on the dairy industry;
- an analysis of the dairy industry's adaptive capacity in regard to climate change; and
- the identification of adaptation options for the dairy industry (including new agricultural practices, processes or products), and of how to address the requirements of, and obstacles to, their effective adoption.

The strategy recommends a range of actions to address the impacts of climate change and to foster adaptation. Collectively these actions will develop:

- a detailed understanding of the impacts that climate change will have on the dairy industry within different regions;
- an ability to compare and validate existing climate change impact measuring techniques;
- a detailed understanding of the capacity that the dairy industry within different regions possesses to adapt to the impacts of climate change, and of what measures might improve such capacity; and
- adaptation options for the dairy industry (including new agricultural practices, processes or products) and identify how to address the requirements of, and obstacles to their effective adoption.

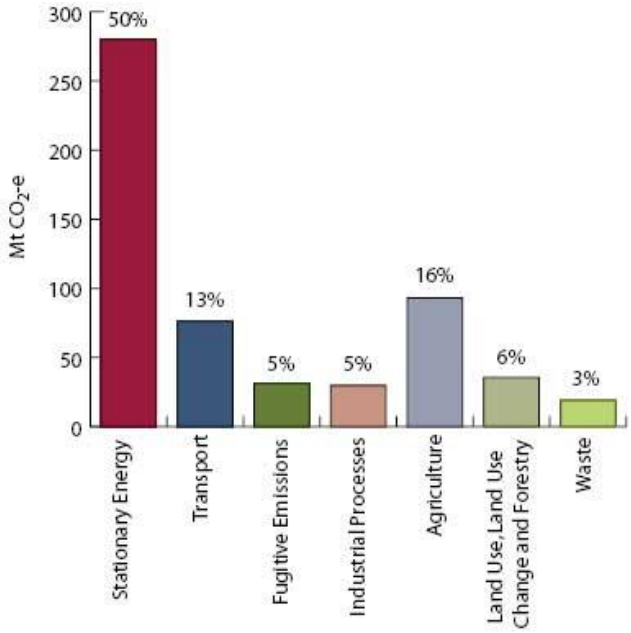
We need to think differently to capture opportunity and prepare for the future.

[3] http://www.greenhouse.gov.au/impacts/adaptation.html

Mitigation

Australia's emissions of carbon dioxide equivalents rose by 2.2 percent from 1990 to 2004. Agriculture is the second largest emitter of greenhouse gases in Australia, at 16% of emissions in 2004, based on the emission of carbon dioxide equivalents, as indicated in Figure 1. The stationary energy sector is the largest emitter and the transport sector the third largest behind agriculture.

Figure 1 Equivalent carbon dioxide emissions by sector[4]



Agriculture, however, is the largest source of emissions of methane and nitrous oxide due to emissions from:

- methane produced by livestock;
- nitrogen use on agricultural production land;
- methane and nitrous oxide from burning off; and
- manure, rice cultivation and stubble burning.

The Australian National Greenhouse Gas Inventory estimates that dairy farming activities contribute 2% of overall greenhouse gas emissions, and that 70-75% of a dairy farm's greenhouse gas emissions are methane.

As part of an overall approach that has been designed to enable Australia to meet its future emissions targets, investigations are currently underway into potential ways of reducing greenhouse gas emissions. Since the stationary energy sector is the major contributor of greenhouse gas emissions, efforts to date have focussed on reducing emissions from this sector. However the focus is now starting to turn to potential emission reductions that could be made in other sectors and as a result, communities will increasingly expect the dairy industry to demonstrate improved management and reduction of their greenhouse gas emissions.

[4] Source AGO 2004 National Greenhouse Gas Inventory

As with the stationary energy sector, there are two possible approaches to reducing the emissions profile of the industry. The first is for strategies to be put into place that reduce the amount of greenhouse gases emitted, whilst the second is to enable the establishment of carbon sinks as a mechanism to offset some of the emissions.

Carbon sinks have the potential to provide additional NRM benefits over and above carbon sequestration. For example an area planted as a forest sink can also provide salinity benefits, biodiversity benefits and production benefits in the form of increased shelter for stock.

The strategy recommends actions that focus on achieving greenhouse gas abatement and productivity benefits across the value chain, and exploring the implications of carbon trading schemes.

Summary of current and proposed Dairy Australia initiatives around climate change and climate variability

Black: underway
Blue: some action but could be expanded
Red: funding gap

1.	**Understanding:** Facilitating better understanding of the potential impacts and consequences of climate change and climate variability for the dairy industry	
	Planned activities	**Existing partners**
1.1.1	Scenario planning to explore alternative futures for farm and factory systems	DCC, DA, DPIV, CSIRO
1.1.2	Farming systems modelling utilising WFSAT and the Future Farming Systems analysis to quantify potential impacts	DA, MLA, Uni of Melbourne, DPIV, AgResearch
1.1.3	Regional resilience analysis (adaptive capacity index)	DA, DCC, CSIRO
1.1.3.1.	Resilience analysis of different farming systems	DA, CSIRO
1.1.3.2	Management skills and labour implications	DA
1.1.3.2	Regional feedbase audit	DA
1.1.4	Review of the global trade implications of climate change for the Australian dairy industry	DA, DCC
1.1.4.1	Regional implications	
1.1.4.2	Review likely impacts of global ethanol industry development on feed grain market and livestock industries in Australia	DA, GRDC, MLA, APL
1.2.1	Climate change R&D business plan	DA
1.2.2	Plant breeding research (abiotic stress and DM digestibility)	DA, DPIV, MLA, Gardiner Foundation
1.2.2.1	Feedbase: research and development initiatives to increase the adaptive capacity of dairy farming pasture/forage systems	DA, DPIV, Uni of Melbourne, Uni of Sydney, DPI NSW
1.2.2.2	Grains to milk	DA, DPIV,
1.2.2.3	Feed grain supply and demand model	DA, MLA, APL, GRDC
1.2.2.4	Water use efficiency: innovative research to achieve improved water use efficiency (e.g. SSD)	DA, DPIV, DSE (VIC)
1.2.2.5	Improved seasonal forecasting: Managing Climate Variability Programme	DA, MLA, LWA, GRDC, SRDC, RIRDC, DAFF
1.2.2.6	Pests and weeds	
1.2.2.7	Biosecurity	

2.	**Capability:** Increasing industry capability to manage the implications of climate change and climate variability	
	Planned activities	**Existing partners**
2.1.1	Participatory scenario planning workshops to generate local climate variability and climate change management options	DA, CSIRO
2.1.1.1	Service provider workshops	DA, DAFF (NHT EMS)
2.1.1.2	Farmer workshops on climate change	DA, DAFF, DCC
2.1.2	Industry resilience building programs (e.g., water use efficiency initiatives) in regions vulnerable to climate shocks	RDPs, DA
2.2.1	Upgrade DairySAT to include GHG self assessment tools	DA, AGO, DPIV, DAFF (NHT EMS)
2.2.2	Integrate climate risk considerations into all DA farm management and NRM programs	DA, DAFF (NHT EMS)

3	**Engagement:** Informing and engaging industry stakeholders to improve understanding of climate change issues	
	Planned activities	**Existing partners**
3.1.1	Regional climate change information sheets	DA, DCC
3.1.1.1	Regional climate risk workshops	DA, DCC, CSIRO
3.1.2	Case studies of farm and factory innovation (climate risk and GHG abatement	DA, DCC, CSIRO
3.1.3	Dairy Innovation Australia energy efficiency program	DA, Milk processors
3.2.1.1	Incorporate climate risk information into NCDEA training modules	
3.2.1.2	Develop climate change NCDEA training modules	

4. **Mitigation:** Facilitating better understanding of the likely impacts and opportunities associated with reducing and/or offsetting emissions	
4.1.1 RD&E greenhouse gas abatement plan	DA
4.1.1 2 Methane capture from wastes (M2M)	DA, DAFF, NLP, DPIV
4.1.1.3 Nitrous oxide emissions	DA, DPIV, Uni of Melbourne
4.1.1.4 Fertiliser management	Accounting for Nutrients project (multiple stakeholders)
4.1.1.5 Energy efficiency (farm and factory)	DCC, DAFF(NLP), DA
4.1.1.6 Feed conversion efficiency	DPIV, DA
4.1.1.7 Rumen modification	DPIV, DA
4.2.1 Identify and develop tools and processes to monitor GHG emissions	DAFF (NCCAP), DA
4.2.2 Analysis of GHG emissions at a systems level	DAFF (NCCAP), DA
4.3.1 Review farm, factory and market implications of carbon trading	DA
4.3.2 Monitor on-going policy developments	DA
4.3.3 Identify relevant transaction and abatement costs	DA