The Parliament of the Commonwealth of Australia

Farming the Future

The role of government in assisting Australian farmers to adapt to the impacts of climate change

House of Representatives
Standing Committee on Primary Industries and Resources

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Canberra

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Foreword

"Where grows? – where grows it not?

If vain our toil – we ought to blame

The culture – not the soil"

Alexander Pope in Epistle IV, Essay on Man 1824

Among Committee members on this inquiry, there exists a broad and divergent range of views on climate change itself; this should not detract from a bipartisan recognition of the need to change farming practices for so many reasons, and recognising that a 'one size fits all' approach is not the most effective appropriate response. So there is a need for research into different farming techniques and processes.

Change in the rural sector has always been difficult; generational change was, up until recently, badly dealt with. Dad handing over at seventy to son, 50, who is sitting with the cheque book at the kitchen table, while 27 year old son waits in the wings impatiently arguing for change. How does he win against this generational culture?

I look at this way. I have lived in this country all my life and I have watched the seasons come and go. I have seen changes in the elements over the last 50 years or so. I guess it has been about 50 years since I started taking notice of climate and changes in the weather.

Growing up in the country, of course, the weather was always a subject of conversation. I have also noted that climate conditions have become more unsettled in the latter part of my time on earth. I do not know enough about the science to say that global warming is occurring, but I do feel that the climate is changing on an irregular basis and there are many reasons for it to do so. There

are some natural reasons for climate change and there are the activities of man and the animals with whom we share the earth.

Man has been able to influence and change some of the natural influences of climate through being able to harness some of our natural resources to make living in our world easier.

In order to have these basics of life, to be able to provide everyone with these commodities and to have a surplus for trade, we have manipulated their production.

If you have, as most people do, a basic understanding of chemistry, then you understand that when you add elements to the atmosphere there will be changes, some of them good and some of them not altogether desirable. With any sort of mass production there is a waste stream—emissions, if you like. That waste stream also has to be dealt with, whether by recycling it, by reusing it in some way or by disposing of it safely. We do those things a lot better than we used to, when we started mass production.

Whatever we do, and however we do it, there is an element of cost. There will always be an element of cost. If, therefore, we are trying to minimise man's effect on the earth, then there is an expense attached to it. We have been aware of that for some time.

There is the cost of dealing with waste. When people live together in high-density environments, the land cannot deal with the waste naturally. We have to intervene—to take it away, to pump it out or do something else to deal with it. This is the same with whatever product or activity we are coping with, whether it is the waste from a cheese factory or the waste from a chicken coop. We have learnt to take some of the waste from our production and turn that into a plus for us as well. This can help mitigate the costs involved with waste disposal and we can even gain from it.

Science has helped in many ways to deal with waste, whether it be by recycling it, reusing it, rendering it inert or carefully destroying it—but, whatever you do, or how careful you are, there is always a bit left over. But it does not mean that it is useless.

So in this report, we have attempted to identify all the positive things that are happening in the rural sector, to hear how people are using waste material (such as carbon) of one industry to enhance another, to work out processes for generational change and to look at government processes and how it can further assist. We looked at what new research needs to be done and how to get that information out to all those who want to improve their practices.

We are also very aware that with change comes casualties and we need to ensure that those who have just had enough can be assisted to move out and allow the younger generations to pick up the old ploughshare and turn it into a more modern tool to move this oldest of industries into the future. So we don't have to blame the culture or the soil.

My colleagues and I would like to thank the many individuals and organisations who contributed to the inquiry, particularly those whose properties we visited and who shared their ideas and aspirations. It has given us great hope for the future.

I would like to thank my Deputy Chair Alby Schultz and the rest of the Committee for their dedication and support on this inquiry, it has been a pleasure to work with them.

Finally the Committee Members and I would also like to thank the Committee Secretariat, Julia Morris, Dr Bill Pender and Dr Deborah King and their administrative support, Kane and Tarran, for their hard work especially over the Christmas period, to produce this report.

The Hon Dick Adams MP
Chair

Membership of the Committee

Chair The Hon Dick Adams MP

Deputy Chair Mr Alby Schultz MP

Members

Mr James Bidgood MP
Mr Nick Champion MP
Mr John Forrest MP
Mr Barry Haase MP
Ms Kirsten Livermore MP
Mr Graham Perrett MP
Mr Sid Sidebottom MP
Mr Tony Windsor MP

Committee Secretariat

Secretary	Ms Julia Morris
Inquiry Secretary	Dr Bill Pender
Research Officer	Dr Deborah King
Administrative Officers	Ms Kane Moir
	Ms Tarran Snape

Terms of reference

The Committee to inquire into and report upon:

- Current and prospective adaptations to the impacts of climate change on agriculture and the potential impacts on downstream processing.

- The role of government in:
  - ⇒ augmenting the shift towards farming practices which promote resilience in the farm sector in the face of climate change;
  - ⇒ promoting research, extension and training which assists the farm sector to better adapt to climate change.

- The role of rural research and development in assisting farmers to adapt to the impacts of climate change.

List of abbreviations

Acronyms

ACCESS	Australian Community Climate and Earth Systems Simulator
AFF	Australia's Farming Future
AIAST	Australian Institute of Agricultural Science and Technology
AMOS	Australian Meteorological and Oceanographic Society
ANU	Australian National University
APL	Australian Pork Limited
AWI	Australian Wool Innovation
BoM	Bureau of Meteorology
CAAANZ	Conservation Agriculture Alliance of Australia and New Zealand
CAWCR	Centre for Australian Weather and Climate Research
CCRSPI	Climate Change Research Strategy of Primary Industries
CMA	Catchment Management Authority
CORS	Continuously operating reference station
CPRS	Carbon Pollution Reduction Scheme
CRC	Cooperative Research Centre

CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTF	Controlled Traffic Farming
DAFF	Department of Agriculture, Fisheries and Forestry
DCC	Department of Climate Change
DERM	Queensland Department of Environment and Resource Management
EC	Exceptional circumstance
FFI CRC	Future Farm Industries Cooperative Research Centre
GPS	Global positioning satellite
GRDC	Grains Research & Development Corporation
HM	Holistic Management
IPCC	Intergovernmental Panel on Climate Change
MLA	Meat & Livestock Australia
MFS	Monaro Farming Systems
MSF	Mallee Sustainable Farming
NAFI	National Association of Forest Industries
NARP	National Adaptation Research Plans
NCCAR	National Climate Change Adaptation Research
NCCARF	National Climate Change Adaptation Framework
NFF	National Farmers Federation
NRP	National Research Priorities
OAN	Otway Agroforestry Network
PIARN	Primary Industries Adaptation Research Network
PIMC	Primary Industries Ministerial Council

PIRSA	Department of Primary Industries and Resources South Australia
PISC	Primary Industries Standing Committee
POAMA	Predictive Ocean Atmosphere Model for Australia
QCCCE	Queensland Climate Change Centre of Excellence
RDCs	Research and development corporations
RFA	Regional Forest Agreement
RIRDC	Rural Industries Research and Development Corporation
RTK	Real Time Kinematic
SARDI	South Australian Research and Development Institute
SCF	Seasonal Climate Forecasts
SOI	Southern Oscillation Index
SWCCF	South West Climate Change Forum
TCFA	Tasmanian Community Forestry Agreement
TIAR	Tasmanian Institute of Agricultural Research
VFF	Victorian Farmers Federation

Glossary

bio-alcohol	Methanol, ethanol
biochar	Charcoal created by pyrolysis of biomass.
bioenergy	Bioenergy is renewable energy made available from materials derived from biological sources.
biofuel	Fuel made from plant matter rather than fossil fuels.
biomass	Renewable organic matter such as agricultural crops and residue, wood and wood waste, animal waste, aquatic plants and organic components of municipal and industrial wastes.
bio-oil	A liquid fuel produced by the pyrolysis of biomass.
broadacre	An Australian term used to describe land suitable for farms practicing large-scale agricultural operations.
CO_2	Carbon dioxide. A gas present in the atmosphere which plays an important role in the greenhouse effect.[1]
climate	The atmospheric conditions for a long period of time, and generally refers to the normal or mean course of the weather. Includes the future expectation of long term weather, in the order of weeks, months or years ahead.[2]
controlled traffic farming	A farming practice where all machinery used in crop production is restricted to permanently located wheel tracks.
el Niño southern oscillation (ENSO)	'El Niño' used here refers to the warming of the oceans in the equatorial eastern and central Pacific; Southern Oscillation is the changes in atmospheric pressure (and climate systems) associated with this warming (hence 'Southern Oscillation Index' to measure these changes). 'ENSO' is used colloquially to describe the whole suite of changes associated with an 'El Niño' event - to rainfall, oceans, atmospheric pressure etc.[3]

1 http://www.bom.gov.au/lam/glossary/
2 http://www.bom.gov.au/lam/glossary/
3 http://www.bom.gov.au/lam/glossary/

feedstock (bioenergy)	The raw material that is processed to create bioenergy, biochar and other bio products.
greenhouse gases	Components of the atmosphere that contribute to the greenhouse effect. The gasses of particular interest to agriculture include carbon dioxide, methane and nitrous oxide.
holistic management	A framework for on-farm decision making that explicitly considers a set of goals, and a set of tools to achieve these goals. Goals might relate to farm profits, but also to other aspects that enhance the quality of human life. 'Holistic' decision making involves the careful and systematic assessment of the various goals deemed important by a given farmer.
lignite	A form of coal between the development of peat and black coal, brownish-black and woody in appearance with a high moisture content.
lignocellulose	The combination of lignin and cellulose in the structural cells of woody plants.
minimum tillage (min till)	Minimum tillage cropping is a conservation farming system, which may encompass reduced tillage, direct drilling and zero tillage. It minimises soil disturbance and retains crop residues when sowing.[4]
mycorrhizae	The symbiotic association of beneficial fungi with the small roots of some plants. Mycorrhizae may improve the water and nutrient uptake of trees, especially of immobile nutrients such as phosphorus.
nitrous oxide	One of the greenhouse gases. Substantial emissions stem from agriculture and fossil fuel combustion.
no till	One pass seeding with points creating less than 20% soil disturbance.[5]
perennial	A plant which continues to grow year to year.
pyrolysis	The decomposition of organic matter by heating without oxygen.

4 http://www.vicnotill.com.au/notilldefinition.htm

5 http://www.vicnotill.com.au/notilldefinition.htm

soil carbon	The generic name for carbon held within the soil.
southern oscillation index	The Southern Oscillation Index (SOI) is calculated from the monthly or seasonal fluctuations in the air pressure difference between Tahiti and Darwin.
weather	A description of conditions over a short period of time - a 'snap shot' of the atmosphere at a particular time.[6]
zero till	One pass sowing system using discs for minimal soil disturbance.[7]

6 http://www.bom.gov.au/lam/glossary/

7 http://www.vicnotill.com.au/notilldefinition.htm

List of recommendations

2 Making Decisions On-farm

Recommendation 1

The Committee recommends that the Australian Government support rural counselling and support groups, such as Rural Alive and Well, and place funding for such groups on a permanent and regular basis.

Recommendation 2

The Committee recommends that the Australian Government, as part of its overall response to issues affecting agriculture and climate change, take more effective account of the needs and decision making processes of farmers and ensure that the delivery of adaptation programs is flexible and responsive to the needs of farmers and rural communities.

3 Current and Prospective Adaptations

Recommendation 3

The Committee recommends that the Australian Government, as part of its overall response to issues affecting agriculture and climate change, invest research funding in the following high priority areas:

- Soil carbon sequestration;
- Soil stabilisation and pasture improvements using methods such as perennial pastures, pasture cropping, rotational grazing, biodynamic farming, minimum/no till cultivation and controlled traffic farming;
- Soil water retention strategies and water use efficiency;
- Landscape planning and natural resource management; and
- Risk management.

Recommendation 4

The Committee recommends that the Australian Government, in conjunction with State and Territory Governments, establish a national Continuously Operating Reference Station network across Australia and regulate for signal compatibility between different GPS systems.

Recommendation 5

The Committee recommends that the Australian Government support further research efforts into the mitigation of greenhouse gas emissions from agriculture.

4 Energy on farms

Recommendation 6

The Committee recommends that the Australian Government, as part of its overall response to issues affecting agriculture and climate change, increase its investment and support for research into energy efficiency in the agriculture sector and the development of alternative energy and alternative fuels on-farm, particularly in regard to:

- Biofuels;
- Biomass from agricultural waste; and
- Biochar.

5 Climate modelling and weather forecasting

Recommendation 7

The Committee recommends that the Australian Government increase funding for research into improving the consistency and accuracy of weather and climate forecasting, especially at a seasonal and regional level.

Recommendation 8

The Committee recommends that the Australian Government develop an education and training scheme for farmers in the understanding and use of weather and climate information.

6 Research and extension

Recommendation 9

The Committee recommends that the Australian Government maintain its commitment to climate change research pertaining to Australia's agricultural industries, ensuring that the funding is committed, sustained and pays due attention to regional as well as national needs and priorities. Climate change research must reflect the changes affecting different regions, soils and topography—as all have an impact on changes in farming practices to deal with them.

Recommendation 10

The Committee recommends that the Australian Government, as part of its ongoing strategy development to issues affecting agriculture and climate change, develop a strategy to capture, evaluate and disseminate the range of farmer driven innovations that have a significant capacity to increase the resilience and productivity of farm enterprises.

Recommendation 11

The Committee recommends that the Australian Government ensures that there is an overall body to receive and analyse research and co-ordinate research across the nation in relation to climate change adaptation in agriculture, and that said body is given the necessary resources of staff and funds to carry out its role.

Recommendation 12

The Committee recommends that the Australian Government give greater consideration to better integration of local and regional organisations into its overall response to the issues affecting agriculture and climate change, and provide additional funding to support the management role of these local and regional organisations.

7 Role of Government

Recommendation 13

The Committee recommends that the Australian Government give further consideration to the analysis of government policy and outcomes in the submission to the current inquiry made by the Future Farm Industries CRC, with a view to ensuring the better coordination of research and extension efforts and the delivery of effective policy outcomes.

Recommendation 14

The Committee recommends that the Australian Government, as part of its overall response to issues affecting agriculture and climate change, explore further opportunities to facilitate adaptation to climate variability and climate change through the use of targeted, industry and issue specific, incentives.

Recommendation 15

The Committee recommends that the Australian Government place funding for local and community organisations engaged in the work of supporting farmers in adapting to climate variability and climate change upon a permanent and regular basis.