Rural and Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates November 2014

Agriculture

Question: 216

Division/Agency: Sustainability and Biosecurity Policy

Topic: Actual programs or projects funded

Proof Hansard page: 116

Senator STERLE asked:

Senator STERLE: Mr Thompson, what programs will be funded by the $1.5 million that has been allocated to New South Wales and the $3.5 million that has been allocated to Queensland this year, which is the only real money or offer around.

Mr THOMPSON: I do not have the exact detail of those programs with me. The payments are being made to the states and the states are delivering the programs. It is work done with local landholders, local government or whoever else is responsible for wild dog management in those states.

Senator STERLE: Is it all wild dog?

Mr THOMPSON: It is wild dogs; it is feral animals in the broad. If someone has a problem with goats or excessive numbers of kangaroos or if foxes are preying on lambs it can be applied to that as well. A lot is going on wild dogs in those states where that is a problem. We are topping up existing state programs and the programs they are focusing in those drought affected areas. I think there are some courses in that as well.

Senator STERLE: Has there been any feedback from farmers?

MR THOMPSON: I have not had direct feedback from farmers, but the feedback we had more generally from the farm community and those involved in it is that they have welcomed these. They have been subscribed very quickly and the programs are rolling out. It has given farmers who are in drought conditions something to do on their property that is a break from hand feeding and those sorts of things. They can go out and try and do some work which will lower the grazing pressure in the long run.

Senator STERLE: It is a serious issue for them. Could you provide the committee on notice with what actual programs or projects this money has funded?

MR THOMPSON: We can do that. We will have to get if from the states.

Question: 216 (continued)

Answer:

Financial assistance for pest animal management has been paid to Queensland, New South Wales and South Australia this calendar year in accordance with the Project Agreement for Assistance for Water Infrastructure and Pest Management under the Intergovernmental Agreement on Federal Financial Relations. The financial assistance from the Australian Government is paid to the state governments for disbursement to on-ground delivery organisations. Payments to states to 26 November 2014 are summarised in the table below.

State	2013–14 Amount paid ($)	2014–15 Total amount committed ($)	2014–15 Amount paid ($)
Queensland	3 500,000	2 100,000	0
New South Wales	1 500 000	900 000	600 000
South Australia	-	200 000	160 000
Unallocated/Uncommitted	-	1 800 000	
TOTAL	5000 000	5 000 000	760 000

The states are responsible for the governance and delivery of pest management projects and are required to provide a final report under the funding agreement which describes the conduct, benefits and outcomes of the projects. At this stage, not all projects have been agreed / commenced. Final reports are not required until 2015 after the completion of the projects and payment of milestones. The following paragraphs provide a general overview of projects in each relevant state.

In New South Wales, a total of up to $2.4 million will be provided by the Australian Government across 2013-14 and 2014-15. Local Land Services (NSW) has requested drought affected regions to express an interest to the NSW Department of Primary Industry in how they could best invest in delivering on-farm pest management programs. The programs being implemented in the drought affected areas target wild dogs, feral pigs and feral camels. These programs are in addition to other planned activities and often expand existing landholder lead programs.

In Queensland, a total of up to $5.6 million will be provided by the Australian Government across 2013-14 and 2014-15. Funding is focussed on wild dogs and feral pigs with some funds allocated for the management of wild rabbits and feral deer. Examples of projects funded (rounded to the nearest $1000) include:

- $600 000 to the Central Western Queensland Remote Area Planning and Development Board for region-wide wild dog control
- $200 000 to the Condamine Alliance project to expand wild dog, feral pig and rabbit control
- $600 000 to the South West NRM project to increase wild dog control

Question: 216 (continued)

- $50 000 to the Charters Towers Regional Council project targeting wild dogs through trapping and baiting, and feral pigs using aerial shooting
- $47 500 to the Central Highlands Regional Resources Use Planning Cooperative project to integrate baiting and aerial shooting of feral pigs
- $600 000 to the Balonne Shire Council representing Balonne, Western Downs, Goondiwindi and Maranoa, the Queensland Murray-Darling Catchments NRM and local wild dog/pest syndicate leaders to increase wild dog trapping through training and mentoring programs, and feral pig control through aerial shooting
- $250 000 to AgForce Queensland to continue coordination of wild dog and feral pig control, and landholder training days.

In South Australia, a total of up to $0.2 million will be provided by the Australian Government across 2013-14 and 2014-15 for wild dog management in the South Australian Arid Lands NRM region. This funding will contribute to activities under South Australia's successful wild dog management program "Biteback". Biosecurity SA is providing guidance, support and technical advice. Control methods will include fresh meat injections, aerial baiting, trap and camera loans, monitoring and evaluation, extension and training.

Rural and Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates November 2014

Agriculture

Question: 217

Division/Agency: Sustainability and Biosecurity Policy Division

Topic: APVMA legislation

Proof Hansard page: 130

Senator BACK asked:

Senator BACK: I know that Senator Leyonhjelm has questions on this, so I will be very quick. When the 1994 code was amended this year, clause 58 of division 2 of part 3, which is the right to compensation, appears to have been totally removed. The clause stated:

… the APVMA may use information obtained by it from any source for the purpose of performing any of its functions …

Can you explain why it was removed, and is it in the context of you coming to the discovery about the anomaly with this particular access?

Ms Arthy: We do not actually control the legislation, so questions on the reasons why it was removed would have to be directed to the department.

Dr Grimes: We would have to see whether there are any officers here who might be able to assist on—

Senator Colbeck: We will take that on notice.

Answer:

The *Agricultural and Veterinary Chemicals Legislation Amendment Act 2013* substantially reorganised parts of the *Agricultural and Veterinary Chemicals Code Act 1994* (the Code Act) to, among other reasons, improve the comprehensibility of the Code Act and to improve efficiency in implementing it.

Section 58 was affected. That section was redrafted according to contemporary practice and is now located in Division 1 of Part 1 at section 6C. The new section 6C is functionally identical to the old section 58.

Section 6C currently reads:

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6C Right of APVMA to use information

(1) The APVMA may use information obtained by it from any source for the purpose of performing any of its functions or exercising any of its powers under this Code.

(2) Subsection (1) has effect subject to this Code.

Rural and Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates November 2014

Agriculture

Question: 218

Division/Agency: Sustainability and Biosecurity Policy Division

Topic: Supertrawler/fishery declaration

Proof Hansard page: Written

Senator WHISH-WILSON asked:

1. Is the Borthwick review still under consideration by this Government or is it being implemented?

    a. If it is being implemented Can you outline, in some detail, what has been directly done to implement the recommendation of the Borthwick Review of Commonwealth Fisheries to set an overarching fisheries framework with a new "third pillar" addressing ecosystem impacts in a fisheries context?

2. In the context of the Small Pelagic Fishery can you inform the committee on exactly when you came to agree on a definition of "localised depletion" and what that definition is?

3. Can you outline in detail what conversations, letters, or emails AFMA / the Department has had with Seafish Tasmania Pty Ltd - or any other companies who operate vessels captured by the Small Pelagic Fishery Declaration 2012 - while the Small Pelagic Fishery Expert panel has been conducting its investigations?

4. Can you detail what assistance, if any, has been provided Seafish Tasmania Pty Ltd - or any other companies who operate vessels captured by the Small Pelagic Fishery Declaration 2012 - while the Small Pelagic Fishery Expert panel has been conducting its investigations?

5. What input did AFMA have into the Report of the Expert Panel on a declared commercial fishery activity: Final (Small Pelagic Fishery) Declaration 2012?

    a. Did AFMA review the text before it was released?

    b. Were AFMA staff involved in conducting research and writing the report? If yes how many and what APS level were they?

    c. Were AFMA staff seconded to the Environment Department to assist in writing and researching the report. If yes how many and what APS level were they and how long were they seconded for?

Question: 218 (continued)

Answer:

1. The government has not made a decision to implement the findings of the 2012 Fisheries Management Review ('Borthwick Review'). However the review is informing ongoing policy formulation, including the revision of the harvest strategy policy and bycatch policy and the development of an overarching fisheries policy. On 21 October 2014, Senator the Hon. Richard Colbeck wrote to the Hon. Greg Hunt MP, Minister for the Environment, the Hon. Normal Moore, Chairman of the Australian Fisheries Management Authority (AFMA) and key stakeholders announcing the government is undertaking a number of measures to implement a revised fisheries policy framework.

2. AFMA has not agreed on a definition of localised depletion. The Small Pelagic Fishery Resource Assessment Group developed a working definition of localised depletion at its meeting on 11 and 12 March 2014. That definition is *'For the purpose of managing the Small Pelagic Fishery, localised depletion is defined as: a persistent reduction in fish abundance in a limited area, caused by fishing activity, over spatial and temporal scales that causes a negative impact on predatory species and/or other fisheries.'*

3. Outlined below is a detailed summary of the Department of Agriculture and AFMA's correspondence with Seafish Tasmania. This correspondence is within the timeframe of 11 January 2013 (when the terms of the reference for the panel were published) to 22 October 2014 (when the panel reported to the Minister for the Environment). No company other than Seafish Tasmania has sought to operate vessels captured by the *Final (Small Pelagic Fishery) Declaration 2012*.

   Correspondence with the Department of Agriculture

   The Department of Agriculture has had two meetings with Seafish Tasmania during this period, on 22 May 2014 and 3 September 2014, to discuss future potential fishing operations. Any emails exchanged at this time were in relation to the organisation of the meeting.

   On 13 August 2013, during the caretaker period, Mr Gordon Neil, Assistant Secretary of the Fisheries Branch, responded on behalf of the Hon. Joel Fitzgibbon MP to a letter from Seafish Tasmania regarding the possible purchase of freezer trawler.

   On 25 March 2014, Seafish Tasmania called Mr Neil about a meeting with Senator Colbeck scheduled for the following day.

   On 3 June 2014, Mr Neil responded via email to a letter from Seafish Tasmania, on the topic of the economic opportunities in the Small Pelagic Fishery.

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Correspondence with the Australian Fisheries Management Authority

Seafish Tasmania has had in excess of 100 interactions with individual AFMA officers, through both Mr Gerry Geen's capacity as a member of the South East Management Advisory Committee (SEMAC) and the Small Pelagic Fishery Resource Assessment Group (SPFRAG) and as Director of Seafish Tasmania. Mr Geen has also attended AFMA Commission social functions, emailed and/or called a range of AFMA staff in relation to fishery management, licensing and logbooks, and held a face to face meeting during the period in question.

Interactions as a representative of Seafish Tasmania

The one substantive meeting between Mr Geen in his capacity as a representative of Seafish Tasmania was held on 3 September 2014. The meeting with Dr James Findlay and Mr Steve Shanks was to discuss management issues in the Small Pelagic Fishery (SPF). The discussions included move on rule management arrangements, localised depletion and research in the SPF.

Interactions as an industry member of SEMAC and SPFRAG

Meetings that Mr Geen has attended in his capacity as an industry member on SEMAC or SPFRAG during the period in question include:

- 4 September 2014 — SPFRAG meeting to discuss issues including move on rules to address risk of localised depletion, spatial management to address recreational concerns, and SPF Harvest Strategy advice.
- 18, 20 and 23 June 2014 – SPFRAG teleconference to discuss issues including localised depletion and predator distribution in the SPF.
- 31 March 2014 – SEMAC teleconference to recommend total allowable catches (TACs) for SPF quota species for the 2014-15 season.
- 11 to 12 March 2014 – SPFRAG meeting to discuss issues including research, 2014-15 recommended biological catch (RBC) recommendations for target species, SPF management plan review, definitions for localised depletion and management options.
- 11 November 2013 – SPFRAG meeting to discuss issues including localised depletion, the bycatch and discard workplan, and catch sharing for Australian Sardine.
- 15 to 16 October 2013 – SEMAC meeting to discuss issues including state of the fishery, management arrangements, policy, and research.
- 1 May 2013 – SPFRAG teleconference to discuss issues including SPF conditions for 2013-14, and the bycatch and discard workplan 18 month review.
- 5 April 2013 – SEMAC teleconference to recommend TACs for the SPF quota species for the 2013-14 season.

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- 19 March 2013 – SPFRAG meeting to discuss SPF stock assessments and RBCs for the 2012-13 season.

4. AFMA deferred payment of 2013-14 levies for Seafish Tasmania Pty Ltd. This followed representations from Seafish Tasmania that it had financial difficulties in meeting levy payments because it was unable to catch its quota.

5. AFMA provided responses to questions of the SPF Expert Panel by email and in person.

   a. No.

   b. No.

   c. No.

Rural and Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Budget Estimates November 2014

Agriculture

Question: 219

Division/Agency: Sustainability and Biosecurity Policy Division

Topic: National Biosecurity Committee

Proof Hansard page: written

Senator STERLE asked:

1. Given that the COAG Standing Committee on Primary Industries has been abolished, what arrangements are in place to:

    a. coordinate intergovernmental work on biosecurity such as oversight of the National Biosecurity Committee and the work under the Inter-governmental Agreement on Biosecurity (IGAB).
    b. publicly report on the work mentioned in a) above.

2. In relation to biosecurity, what formal consultation arrangements are there between the environment / community sector and the Federal Government?

Answer:

1. The arrangements are:

    a. Agriculture Ministers and Chief Executives from all jurisdictions meet periodically to discuss portfolio matters of national importance. Ministers and CEOs consider the work of the National Biosecurity Committee and the implementation of the Inter-governmental Agreement on Biosecurity as appropriate.

    b. Where appropriate, the outcomes of each meeting are communicated to the public.

2. The Australian Government supports a range of fora that bring the environmental and community sectors together with the government to consult and work on biosecurity matters. These include:

    a. The National Biosecurity Committee:

    The Australian Government, through the National Biosecurity Committee, is looking to strengthen existing engagement mechanisms and to explore other avenues for engaging with non-production stakeholders, including the environment/community sectors. To support this approach, the sectoral committees (Animal Health Committee (including aquatic health), Invasive Plants and Animals Committee,

Question: 219 (continued)

Marine Pest Sectoral Committee, Plant Health Committee) are preparing a communication and engagement strategy for their sector. Such communication/consultation arrangements are established, as required, to manage specific issues.

Wildlife Health Australia, formally the Australian Wildlife Health Network, is an example of an effective arrangement between government and private organisations to manage biosecurity threats to Australia's wildlife. Wildlife Health Australia creates linkages between stakeholders, facilitating effective communication and more rapid reporting of wildlife disease events to government. This is an important front-line early detection capability for new or introduced diseases. Wildlife Health Australia can engage with private stakeholders that otherwise may be unwilling to share information formally with the government agencies or have no effective pathway to do so.

b. The National Landcare Programme:

The National Landcare Programme includes a number of programmes that contribute to environmental biosecurity outcomes and enable communities to take practical action to improve their local environment. The Australian Government will continue to fund regional natural resource management organisations through the National Landcare Programme and they will be expected to determine regional priorities in consultation with local communities, including biosecurity priories associated with weeds and pest animals.

Other consultative processes are established as required to deal with specific biosecurity matters as they arise. An example of this is the National Bee Pest Surveillance Programme which brings together governments, industry and research providers in a partnership to address biosecurity outcomes for a range of risks with the potential to impact on both the environment and agricultural production.

Rural and Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates November 2014

Agriculture

Question: 220

Division/Agency: Sustainability and Biosecurity Policy Division

Topic: Tackling Climate Change

Proof Hansard page: Written

Senator CAMERON asked:

1. Please provide a detailed breakdown of the $56,967,000 expended in 2013-14 on the Clean Energy Future – Creating Opportunities on the Land – extending the benefits of the Carbon Farming Initiative.

2. In relation to the key performance indicator *Filling the Research Gap*, please provide details of all research projects supported in 2013-14 including:

    a. The nature and quantum of the support provided;

    b. The nature of the project and expected research outcomes;

    c. The project proponent and who is conducting the project;

    d. Whether the project has been completed or is ongoing and if ongoing, when it is expected to be completed;

    e. Whether a project report has been produced.

3. In relation to the key performance indicator *Integrated scientific and economic research*, please proved details of all underpinning research, advice, forecasting, projects, products and data services produced under this key performance indicator.

Answer:

1. The 2013–14 expenditure for each of the three programmes managed by the department under the initiative is provided in the Table 1. Further details on the projects funded through the programmes are available from the department's website at: www.agriculture.gov.au/climatechange/carbonfarmingfutures.

Question: 220 (continued)

Table 1. Breakdown of funds expended in 2013-14 on the Clean Energy Future – Creating Opportunities on the Land – extending the benefits of the Carbon Farming Initiative

Programme	Total ($,000)
Filling the Research gap	39,248
Action on the Ground	11,689
Extension and Outreach	6,030
Total	**56,967**

2. See Attachment A.

3. Details of all underpinning research, advice, forecasting, projects, products and data services produced under *Integrated scientific and economic research* key performance indicator.

Deliverable	Description
The Monitor	Maintain and develop online tool that delivers a range of climatic, production, biophysical and economic information for more than 600 regions in Australia and provides users with the ability to explore, report and map various spatial, temporal and point-based datasets across a range of scales.
Briefings related to climate issues	Provide briefing and advice to support evidence-based policy development and decision making to assist portfolio industries to manage greenhouse gas emissions and adapt to the effects of climate change and climate extremes.
Science for climate change adaptation options and strategies	Support policy development and decision making to assist portfolio industries to adapt effectively to future challenges posed by climate change and its interactions with other drivers of change. Provide scientific advice on climate-related risks affecting production and productivity of portfolio industries.
Carbon Farming Initiative	Provide program logic workshops to assist delivery of two grant programs under the Carbon Farming Initiative. Develop a database of land management practices for undertaking 'common practice' assessments. Develop a CFI methodologies under the proposed Emissions Reduction Fund to investigate 'common' and 'not common' land management practices. Provide advice on nitrous oxide, soil carbon and perennial pastures to aid in the development of CFI methodologies.
Drought policy and program support	Provide advice to the department to support the implementation of drought programs and drought policy reform.
Intergovernmental Panel on Climate Change: Fifth Assessment Report	SES officer to attend international author meetings and present reports to the Department of the Environment outlining key activities, outcomes, issues and next steps that emerge from meetings.

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Coordination of the National Livestock Methane Program	Meat and Livestock Australia	$608,229.00	This project will coordinate and manage the National Livestock Methane Program. The program will assist livestock producers to reduce methane emissions by conducting research under a nationally agreed collaborative program including nutrition, rumen processes, genetics, modelling focussed on abatement and increased farm productivity that will underpin methodology development for the Carbon Farming Initiative.	1/06/2015	Final report due on completion of project
Measuring methane in the rumen under different production systems as a predictor of methane emissions	Commonwealth Scientific and Industrial Research Organisation	$159,160.00	This project progresses the development of an intra-ruminal capsule developed under the Reducing Emissions from Livestock Research Program (2008–2012) to measure methane in the rumen. This project will validate the use of an intra-ruminal capsule to determine methane yield from the animal under a range of feeding systems. Measurement of methane yield and concentration will show emissions intensity, total emissions and efficiency of rumen fermentation and could provide important data for modelling and methodology development under the Carbon Farming Initiative	1/05/2015	Final report due on completion of project
Development of gas selective membranes (for intra-ruminal capsules)	RMIT University	$378,453.00	This project aims to develop polymeric and/or nanomaterial (gas selective membranes) to improve methane gas measurement. The project will develop membranes to tackle the challenges of sensing systems to: improve the selectivity for specific gases in the methane gas measurement environment, the diffusion rates of specific gases and allow simultaneous sampling for microbial analyses. This project will be undertaken in collaboration with the CSIRO project "Measuring methane in the rumen under different production systems as a predictor of methane emissions".	1/05/2015	Final report due on completion of project
Evaluating and optimising GreenFeed Emission Monitoring units for measuring methane emissions from sheep and cattle	University of New England	$209,501.00	This project will be delivered through international collaboration. It aims to evaluate and optimise the capability of GreenFeed Emission Monitoring (GEM) units to quantify daily methane emissions of grazing sheep and cattle. This capability is required to verify mitigation claims for Carbon Farming Initiative methodologies, to facilitate mitigation research and validate national inventories. GEM emission measures will be compared with respiration chamber measures, the hardware modified for remote use and the design adapted for sheep.	1/05/2015	Final report due on completion of project
Genetic technologies to reduce methane emissions from Australian beef cattle	NSW Department of Primary Industries	$1,229,474.00	This project aims to deliver genetic technologies for breeding cattle with a low methane trait. It will provide new knowledge on genetic variation in methane production and genetic associations with other production traits and will record methane production by animals from the major Australian breeds. It will also cost methane emissions into the breeding values and profit indices used to describe the genetic merit of cattle in the national genetic evaluation system BREEDPLAN.	1/05/2015	Final report due on completion of project
Development of algae based functional foods for reducing enteric methane emissions from cattle	Commonwealth Scientific and Industrial Research Organisation	$225,270.00	This project is focusing on proof of concept for the development of algae based functional foods for reducing enteric methane emissions from cattle. It will evaluate a range of algae for antimethanogenic activity and identify lines of algae which may be trialled in future research.	1/05/2015	Final report due on completion of project
Understanding methane reducing tannins in enteric fermentation using grape marc as a model tannin source	The Australian Wine Institute	$225,270.00	This project aims to reduce methane emissions by identifying and characterising the active ingredients in grape marc responsible for reducing ruminant emissions. Tannins in the grape marc are believed to be the active ingredient. The project will quantify, through understanding tannin chemistry and mechanisms, the potential of using grape marc and other tannin rich food sources as a supplement for reducing ruminant emissions. This project will be done in partnership with the Department of Primary Industries, Victoria project “Enteric methane mitigation strategies through manipulation of feeding systems for ruminant production in southern Australia”.	1/05/2015	Final report due on completion of project
Supplementation with tea saponins and statins to reduce methane emissions from ruminants	Commonwealth Scientific and Industrial Research Organisation	$56,317.50	This project aims to research the suitability of feed additives (tea saponins and statins) to reduce methane emissions from ruminants. Problems that may be associated with some methane reducing additives that prevent their use includes toxicity to microbes and animals, short-lived effects due to microbial Adaptation , expense and failure to meet consumer acceptance. The project will undertake animal studies with varying levels of supplementation to intensively fed ruminants with the tea saponin extract and the yeast Monascus rubber.	1/05/2015	Final report due on completion of project
Practical and sustainable considerations for the mitigation of methane emissions in the northern Australian beef herd using nitrate supplements	Ridley AgriProducts Pty Ltd	$90,108.00	The project will determine if nitrate salts in supplement blocks can safely replace urea when feeding low quality forages and if the nitrate blocks will effectively reduce methane emissions of cattle consuming forages typical of northern Australia. Research will occur in methane chambers, individual pens and in the paddock, where supplement blocks are self-fed. In both studies, cattle will consume low quality tropical forages typical of those used in conjunction with urea supplement blocks.	1/05/2015	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Strategic science to develop dietary nitrate and defaunation as mitigation methodologies for grazing ruminants	University of New England	$180,216.00	This project seeks to develop the science underpinning nitrate supplementation of livestock to ensure these become safe, sure and commercially attractive methane mitigation technologies by June 2015. Intensive study of the modes of action of these supplements in the rumen will be undertaken to optimise their efficacy and safety for ruminants on pasture.	1/05/2015	Final report due on completion of project
Enteric methane mitigation strategies through manipulation of feeding systems for ruminant production in southern Australia	Department of Primary Industries, Victoria	$887,563.00	This project will quantify the mitigation potential of a range of feeds (not currently used as mainstream feeds by the dairy and sheep industry) and feeding strategies both alone and in combination. The project aims to provide new data for national inventories and to form the basis for development of Carbon Farming Initiative offset methodologies.	1/05/2015	Final report due on completion of project
Impacts of Leucaena spp. plantations on greenhouse gas emissions and carbon sequestration in northern Australian cattle production systems	Commonwealth Scientific and Industrial Research Organisation	$337,905.00	This project will build on previous work by CSIRO that demonstrates that Leucaena spp. supplementation to cattle may result in decreased methane emissions. This project will investigate the potential to reduce greenhouse gas emissions through Leucaena spp. cattle-feeding systems in comparison with native pastures by evaluating yearly livestock productivity, herd methane emissions and the sequestration of carbon in the soil. The project will also assess the microbial changes in the rumen that reduce methane to inform research that aims to manipulate the rumen through improved digestive efficiency.	1/05/2015	Final report due on completion of project
Best choice shrub and inter-row species for reducing emissions and emissions intensity	University of Western Australia	$225,270.00	This project will quantify the effects of grazing systems based on shrub and pasture inter-row species that exhibit low methanogenic potential on livestock production and methane emissions in the field. It will use the data to model the whole-farm profitability.	1/05/2015	Final report due on completion of project
The mechanism of antimethanogenic effects of bioactive plants and products on methane production in the rumen	University of Western Australia	$112,635.00	This project aims to deliver information for reducing methane in the rumen. It will determine the compounds and mechanisms that reduce methane production by testing plants and plant products in pure and batch cultures and in an artificial rumen to examine their effects at both the microbial ecology and cellular levels.	1/05/2015	Final report due on completion of project
Efficient Livestock and Low Emissions (ELLE) from southern grazing systems	University of Western Australia	$675,810.00	This project will quantify the genetic diversity in methane reducing and productivity properties of temperate pasture species. Some pasture species have the potential for greater adoption because they reduce methane emissions directly and/or emissions intensity through improved efficiency of livestock production. Using both field and laboratory experimentation the project will generate data required to develop a new Carbon Farming Initiative methodology based on the choice of temperate pasture species to reduce methane and emissions intensity.	1/05/2015	Final report due on completion of project
Culture-independent metagenomic approaches for understanding the functional metabolic potential of methanogen communities in ruminant livestock	Commonwealth Scientific and Industrial Research Organisation	$228,646.00	This project aims to use culture-independent approaches developed by CSIRO scientists to characterise the metabolic capabilities of rumen methanogens in livestock. The outcome of this project will be new information that helps define critical control points to reduce livestock methane emissions.	1/05/2015	Final report due on completion of project
Comparative analyses of rumen microbiomes to mitigate ruminant methane and improve feed utilisation	Commonwealth Scientific and Industrial Research Organisation	$229,269.00	This project aims to increase the understanding of the greater rumen microbial populations in livestock using the datasets produced in Australia and abroad. The project will generate the knowledge required to develop low methane animals, either by animal selection and/or by increasing the metabolic capacity of the microbial community.	1/05/2015	Final report due on completion of project
Coordination of the National Agricultural Manure Management Program	Australian Pork Limited	$83,438.00	This project will coordinate and manage the National Agricultural Manure Management Program. The program will assist the intensive livestock industries to evaluate the agricultural greenhouse gas emissions abatement potential for various manure management systems. Information from the program will underpin the development of Carbon Farming Initiative methodologies.	14/05/2015	Final report due on completion of project
Mitigating the greenhouse gas potential of Australian soils amended with livestock manure	University of Western Australia	$295,357.00	The aim of this project is to evaluate the effectiveness of different mitigation strategies at reducing greenhouse gas emissions following the application of piggery, poultry or feedlot manure to land by measuring carbon dioxide, nitrous oxide and methane fluxes from soils following amendment using laboratory and field studies.	1/05/2015	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Advancing livestock waste as low emission-high efficiency fertilisers	Queensland Department of Agriculture, Fisheries and Forestry	$448,793.00	The project will develop know-how for reducing greenhouse gas emissions from intensive livestock production, increasing emission offsets through innovative managements for land-applied manures, from intensive livestock production (egg, chicken meat, pork, beef), and fertiliser formulations.	1/05/2015	Final report due on completion of project
Pork greenhouse gas mitigation	Feedlot Services Australia Pty Ltd (trading as FSA Consulting)	$303,495.00	This project will quantify differences in greenhouse gas from each system over a summer and winter period. Data will be made available to update the PIGBAL model. Quantification of mitigation potential from these systems will enable development of two additional Carbon Farming Initiative methodologies for the pig industry, enabling far broader participation.	1/05/2015	Final report due on completion of project
Poultry greenhouse gas mitigation	Feedlot Services Australia Pty Ltd (trading as FSA Consulting)	$209,239.00	This project will address knowledge gaps in greenhouse gas estimation to allow development of two Carbon Farming Initiative methodologies based on changed feeding (dietary nitrogen) or manure management in the chicken meat and/or egg industries.	1/05/2015	Final report due on completion of project
Managing an integrated, data synthesis and modelling research network for reducing nitrous oxide emissions from Australian soils	Grains Research and Development Corporation	$180,217.00	This project will provide the overall management and reporting linkages between the Department of Agriculture, Fisheries and Forestry and researchers selected through the Filling the Research Gap Program in the delivery of the National Agricultural Nitrous Oxide Research Program.	1/05/2015	Final report due on completion of project
National coordination of an integrated, data synthesis and modelling network for reducing nitrous oxide emissions from Australian soils	Queensland University of Technology	$897,592.00	This project aims to deliver a suite of mitigation strategies to reduce nitrous oxide emissions from Australian agricultural soils which embrace the synergies of the soil carbon and nitrogen cycles, increase nitrogen use efficiency, long-term productivity and profitability. This will be achieved through complementary laboratory and field studies, data integration, synthesis and modelling under the management of the Grains Research and Development Corporation. The project will close research gaps, improve modelling capability and link relevant rural research, demonstration and extension programs.	1/05/2015	Final report due on completion of project
Mitigation of indirect greenhouse gases in intensive agricultural production systems with the use of inhibitors	University of Melbourne	$259,712.00	This project will quantify the mitigation of ammonia volatilisation from nitrogen fertilisers in intensive agricultural production systems (dairy, vegetables) resulting from the use of inhibitors. Micrometeorological techniques will be used to measure ammonia volatilisation. It will also obtain a nitrogen mass balance through the use of stable isotope labelled fertilisers on collaborative field sites, and to provide data to improve the capability of nitrogen models to simulate ammonia volatilisation. The data on the potential mitigation of ammonia volatilisation by inhibitors and nitrogen mass balance are essential for establishing methodologies to reduce indirect nitrous oxide emission.	1/05/2015	Final report due on completion of project
Reducing nitrous oxide emissions from applied nitrogen with nitrification inhibitors: identification of the key drivers of performance	University of Melbourne	$225,270.00	This project aims to quantify reductions in nitrous oxide emissions through use of nitrification inhibitors that have different properties in a variety of climatic conditions and soils. It will determine why the inhibitors work only in some soils and develop algorithms describing inhibitor impact on nitrous oxide emissions for existing models. It will also verify model predictions using field trials. The project will lead to a clear set of soil and environmental factors for determining the potential of nitrification inhibitors for decreasing nitrous oxide emissions across a range of soils and climates while using less nitrogen and maintaining yield.	1/05/2015	Final report due on completion of project
The use of inhibitors to improve nitrogen cycling and reduce nitrous oxide losses from intensively grazed pasture systems	Department of Primary Industries, Victoria	$315,378.00	This project will address both productivity and emission mitigation implications of inhibitor use in dairy systems in south eastern Australia. The project will evaluate the potential of nitrification inhibitors to reduce direct emissions from urine on pasture. It will examine the impact of feeding the inhibitor dicyandiamide to livestock, and evaluate the mitigation potential of inhibitor coated inorganic fertiliser applied to pastures in dairy systems. It will also evaluate the efficacy of inhibitors with re-use of dairy effluent streams on farm. Project outputs will contribute significantly to the development of methodologies for recognition of emission offsets by the use of inhibitors under the Carbon Farming Initiative.	1/05/2015	Final report due on completion of project
Does increasing soil carbon in sandy soils increase soil nitrous oxide emissions from grain production?	University of Western Australia	$318,631.00	The project will investigate if increasing the amount of carbon stored in the soil will alter emissions of nitrous oxide, affect crop production or alter the amount of nitrogen fertiliser needed to produce a profitable crop. Understanding how increasing soil carbon effects soil nitrous oxide emissions and crop production will enable us to assess the suitability of soil carbon sequestration for abating greenhouse gas emissions from land.	1/05/2015	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Quantifying nitrous oxide losses and nitrogen use efficiency in grains cropping systems on clay soils with contrasting soil carbon status and land management	Queensland Alliance for Agriculture and Food Innovation / The University of Queensland	$720,412.00	Declining soil organic matter and mineralisable nitrogen reserves characterise grain cropping soils in Queensland. Management responses include increasing fertiliser nitrogen use or increasing soil organic matter and mineralisable nitrogen with pasture leys, manures and more frequent use of leguminous species. The effectiveness of these strategies on sustainably and efficiently meeting system nitrogen demand, maintaining or improving soil carbon stocks and minimising losses of nitrous oxide have not been determined. This project will quantify the effects of these strategies on fertiliser nitrogen requirement, gaseous nitrogen losses and soil carbon status.	1/05/2015	Final report due on completion of project
An integrated assessment of management practices for reducing nitrous oxide emission and improving nitrogen use efficiency for subtropical dairy systems	Queensland University of Technology	$225,270.00	This project will determine the fate of applied nitrogen fertiliser to a subtropical dairy production system at the paddock and farm scales and examine the effectiveness of methane, nitrous oxide and nitrogen loss mitigation strategies. This study will produce high quality datasets and whole-farm modelling, costs and/or benefits of mitigation, and practical strategies for developing Carbon Farming Initiative offset methodologies to reduce nitrous oxide and methane emissions whilst maintaining productivity.	1/05/2015	Final report due on completion of project
The effect of fertiliser nitrogen breakdown inhibitors and nitrogen rate on greenhouse gas emissions, nitrate leaching and nitrogen use efficiency in intensive dairy pasture systems in hot dry climates	NSW Department of Primary Industries	$329,621.00	This project will quantify the effect of fertiliser nitrogen breakdown inhibitors and nitrogen fertiliser rate on greenhouse gas emissions, nitrate leaching and nitrogen use efficiency. Two field experiments will be undertaken using automated chambers to provide high resolution emission data. The research site at Camden, NSW is representative of the hot-dry climate of a large part of NSW and northern Victorian dairying. This research will generate scientifically defensible data on the effect of inhibitors and applied nitrogen rate on greenhouse gas emissions for hot-dry dairying environments that will contribute to development of offset methodologies for the dairy industry under the Carbon Farming Initiative.	1/05/2015	Final report due on completion of project
Effective management practices to reduce nitrous oxide emissions from sugarcane soils	Department of Science, Information Technology, Innovation and the Arts	$450,540.00	This project will identify best management practices for mitigating nitrous oxide emissions in sugarcane production. The research will use state-of-the-art approaches including automatic gas sampling chambers, big manual chambers, stable isotope tracing and modelling to provide robust scientific data and evidence-based advice. Environmentally effective and economically efficient mitigation strategies for different ecological conditions and management regimes will be identified and communicated to stakeholders through strong government and industry participation. These activities will help promote low-emission farming practices in the sugar industry.	1/05/2015	Final report due on completion of project
Options for reducing nitrous oxide emissions from the NSW dryland grains industry	NSW Department of Primary Industries	$722,382.00	This project will reduce nitrous oxide emissions from dry land grains cropping in northern and southern NSW through improving the nitrogen use efficiency of applied nitrogenous fertiliser, substituting fertiliser nitrogen with legume-derived nitrogen and modification to soil tillage. Treatments will include split application of fertiliser nitrogen, fertiliser containing inhibitors, and tillage by rotation practices. Measurements of nitrous oxide will be field based, primarily using automated greenhouse gas sampling chambers. Results will be modelled to improve capability for predicting nitrous oxide emissions from dry land cropping. Project outputs will contribute to the development of Carbon Farming Initiative methodologies for more efficient nitrogen fertiliser use.	1/05/2015	Final report due on completion of project
Improving nitrous oxide abatement in high rainfall cropping systems	Department of Primary Industries, Victoria	$637,514.00	This project will improve our understanding of the interactions between management, soil carbon and nitrogen and their contribution to productivity and nitrous oxide emissions. Management strategies that manipulate soil carbon to reduce nitrous oxide whilst delivering adequate nitrogen to meet crop demand following pasture will be assessed. Crop response to different nitrogen fertiliser management strategies (including inhibitors) and nitrous oxide emissions will be measured across a range of soils. This knowledge will facilitate the development of new Carbon Farming Initiative offset methodologies that help landholders simultaneously achieve greater nitrogen fertiliser use efficiencies and reduced nitrous oxide emissions in high rainfall environments.	1/05/2015	Final report due on completion of project
Assessing opportunities for mitigating greenhouse gas emissions from irrigated broad-acre cropping systems in the southern Murray-Darling Basin	Commonwealth Scientific and Industrial Research Organisation	$337,905.00	This project will quantify year-round greenhouse gas, water and nutrient fluxes in irrigated, broad-acre cropping systems of the southern Murray-Darling Basin. Current and emerging irrigation, fertiliser and stubble management practices with and without chemical inhibitors to mitigate greenhouse gas emission from these rotations will be investigated. Fluxes will be monitored using automated chambers over crops in weighing lysimeters and manual chambers and eddy covariance methods at field sites. The datasets will be used to calibrate and validate models. The result will be a framework for predicting greenhouse gas emissions in irrigated broad-acre cultivation for use in mitigation strategy development and inventory accounting.	1/05/2015	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Improved carbon and greenhouse gas outcomes through better understanding and management of soils and plant inputs at the farm scale	University of Sydney	$315,378.00	This project will develop methodologies for auditable quantification of carbon-equivalent benefits of management practices. Practices will include tillage and incorporation of legumes in crop rotations and pastures, with emphasis on the effects of management on soil structure and chemistry of soil organic matter. Methodologies include farm- or paddock-scale (flux) measures of carbon dioxide, methane and nitrous oxide as well as soil carbon sequestration. Outcomes of this phase of research will be incorporated into models that include temperature and moisture regimes determined using remote sensing. Final outcomes will be predictive tools that can be applied to the major cropping and grazing regions of NSW.	1/05/2015	Final report due on completion of project
Advanced process level understanding of factors controlling gaseous nitrogen partitioning to reduce nitrous oxide losses from Australian agricultural soils	Queensland University of Technology	$224,712.00	This project will improve the level of understanding of the interaction of the carbon and nitrogen cycles on nitrous oxide emissions, specifically the variation in the nitrous oxide to nitrogen gas ratio during emissions events. The partitioning between nitrous oxide and nitrogen gas emissions is influenced by soil moisture, carbon and nitrogen availability, and is a major area of uncertainty when predicting nitrous oxide emissions in response to management. Models are absolutely critical for the development and verification of practical abatement strategies to reduce nitrous oxide emissions under the Carbon Farming Initiative.	1/05/2015	Final report due on completion of project
Characterising nitrous oxide emissions from nitrification	Commonwealth Scientific and Industrial Research Organisation	$65,057.00	This project will improve understanding and modelling of nitrous oxide emissions from nitrification by measuring potential nitrification rates and nitrous oxide emissions in laboratory incubations of a range of soils from various production systems. The assumption that a constant proportion of nitrified nitrogen is emitted as nitrous oxide will be tested and updated model algorithms will be provided. This will allow improvement of models that in future may underpin the development and assessment of mitigation strategies.	1/05/2015	Final report due on completion of project
Coordination of the National Soil Carbon Program and soil carbon increase through rangeland restoration by facilitating native forest regrowth	Department of Science, Information Technology, Innovation and the Arts	$257,175.00	This project will coordinate and manage the soil carbon projects as a national program.	1/05/2015	Final report due on completion of project
Increasing soil carbon in eastern Australian farming systems: linking management, nitrogen and productivity	Department of Science, Information Technology, Innovation and the Arts	$171,450.00	This project will use standardised sampling and measurement methods in previously cleared Queensland rangelands to quantify increases in carbon and carbon pools in soil and biomass under native forest regrowth up to 50 years old. Through modelling, the project will quantify the optimal soil carbon sequestration and pasture production for rangeland. The project will also contribute to developing a Carbon Farming Initiative methodology for managed forest regrowth for rangelands.	1/05/2015	Final report due on completion of project
Environmental plantings for soil carbon sequestration on farms	Commonwealth Scientific and Industrial Research Organisation	$415,540.00	This national project will support the extension of the Carbon Farming Initiative (CFI) methodology for mixed-species environmental plantings to include carbon in soil. It will target agricultural-environmental planting sites for diverse climates and soil types and study how management of farmland with low opportunity costs affects soil carbon. The project aims to give land managers the required knowledge for CFI reforestation participation on marginal farm land.	1/05/2015	Final report due on completion of project
Native perennial vegetation: building stable soil carbon and farm resilience	Commonwealth Scientific and Industrial Research Organisation	$135,000.00	This project will quantify changes in soil carbon stocks and composition with the re-establishment of native perennial grasslands through adoption of rotational grazing and include measurement of soil carbon and its allocation to major fractions. The project aims to deliver the knowledge and tools needed for these extensive grazing systems to participate in the Carbon Farming Initiative.	1/05/2015	Final report due on completion of project
Soil carbon benefits through reforestation in sub-tropical and tropical Australia	Queensland Department of Agriculture, Fisheries and Forestry	$635,840.00	This project will assess soil carbon sequestration under reforestation to enable accounting of full mitigation benefits (biomass and soil) and assist land managers to participate in Carbon Farming Initiative reforestation projects with increased confidence. It also will collect soil and biomass carbon data across hardwood, softwood, savannah and rainforest ecosystems in sub-tropical and tropical Australia to develop relationships of changes in soil carbon pools over time following reforestation of agricultural land. Finally, it will refine sampling protocols for improved measurement of soil carbon, develop a decision support calculator and provide economic case studies, enabling land managers to determine the feasibility of carbon farming through reforestation.	1/05/2015	Final report due on completion of project
EverCrop® Carbon Plus: perennial forage plants in cropping systems to manage soil carbon	Future Farm Industries Cooperative Research Centre / NSW Department of Primary Industries	$415,540.00	This project will assess the role of perennial forage plants in improving the management of soil carbon in major cropping regions of southern Australia, provide data to improve soil carbon models and enhance farmers' decision making. It will use existing EverCrop® farming system and long term perennial forage trials to research if including deep rooted perennial forages into cropping systems can sustain or increase soil organic carbon relative to current annual based cropping systems.	1/05/2015	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Compost and biochar amendments for increased carbon sequestration, increased soil resilience and decreased greenhouse gas fluxes in tropical agricultural soils	James Cook University	$303,177.00	This project will trial compost, biochar and COMBI-mix (biochar mixed with organic waste prior to composting) soil amendments to north Queensland tropical agricultural soils. The trials will consist of business as usual, compost alone, biochar alone, COMBI-mix and mature compost mixed with biochar at a number of field sites. From the trials, the project will determine the impact of each on carbon sequestration, greenhouse gas fluxes and crop performance.	1/05/2015	Final report due on completion of project
An assessment of the carbon sequestration potential of organic soil amendments	Commonwealth Scientific and Industrial Research Organisation	$291,692.00	This project will quantify the relationship between the chemical composition of organic carbon and how it decomposes in a variety of potential soil organic amendments. Spectroscopic techniques will be used to measure carbon chemistry and long-term incubation experiments will quantify degradation dynamics. The data generated will be used to define the relationship between chemical composition and potential longevity and/or stability of different types of organic amendments in soil. The results of this analysis will be used within FullCAM (the model used to construct Australia's national greenhouse gas emissions account for the land sector) to provide consistency with Australia's national inventory and Carbon Farming Initiative methodologies.	1/05/2015	Final report due on completion of project
Quantifying temporal variability of soil carbon	Commonwealth Scientific and Industrial Research Organisation	$415,540.00	This project will re-sample soil from 60 sites within the NSW Monitoring, Evaluation and Reporting (MER) program. Samples will also be collected from selected National Agricultural Nitrous Oxide Research Program field experiments to quantify the influence of applied management treatments on soil carbon stocks. Statistical analyses will quantify the magnitude and certainty of measured soil carbon stock changes. This project will support development of robust Carbon Farming Initiative methodologies.	1/05/2015	Final report due on completion of project
Increasing soil carbon in eastern Australian farming systems: linking management, nitrogen and productivity	Department of Primary Industries, Victoria	$1,058,232.00	This project will determine the effectiveness of a range of management practices for increasing soil carbon in cropping and pasture systems across eastern Australia, focusing on enhancing carbon input and permanence in key soil types and climatic zones. Soil carbon will be measured in farm paddocks and field trials. Simulation models, validated with measurement data will be used to extend experimental findings across eastern Australia. The project will support development of Carbon Farming Initiative methodologies to help landholders increase soil carbon and reduce greenhouse gas emissions.This project will determine the effectiveness of a range of management practices for increasing soil carbon in cropping and pasture systems across eastern Australia, focusing on enhancing carbon input and permanence in key soil types and climatic zones. Soil carbon will be measured in farm paddocks and field trials. Simulation models, validated with measurement data will be used to extend experimental findings across eastern Australia. The project will support development of Carbon Farming Initiative methodologies to help landholders increase soil carbon and reduce greenhouse gas emissions.	1/05/2015	Final report due on completion of project
Maintenance of soil organic carbon levels supporting grain production systems: the influence of management and environment on carbon and nitrogen turnover	Department of Agriculture and Food, Western Australia	$416,993.00	This project will investigate the stability of soil carbon under variable climate and management practices. Established research sites with different (or altered) soil organic carbon contents will be used to determine maximum soil carbon storage, the influence of carbon on critical soil functions and long-term viability of sequestering carbon as an emissions management practice. This evidence based approach combines field-based research with database analysis to provide information to landholders on beneficial and/or perverse outcomes associated with changing soil carbon levels in grain production systems. This will enable landowners to determine the profitability and risk of managing carbon from a sequestration versus production perspective.	1/05/2015	Final report due on completion of project
Increasing carbon storage in alkaline sodic soils through improved productivity and greater organic carbon retention	University of Adelaide	$426,186.00	This project will increase the present understanding of organic carbon accumulation in alkaline soils and improve farmers' capacity to store organic carbon. The project will identify options to increase storage of organic carbon in alkaline soils by studying the soil chemistry, surveying soil organic carbon on alkaline soils and conducting field experiments to ameliorate alkalinity to improve carbon storage.	1/05/2015	Final report due on completion of project
Understanding the influence of grazing pressure changes on soil organic carbon in the semi-arid rangelands of western NSW	NSW Department of Primary Industries	$112,535.00	This project will compare the carbon sink potential of alternative management activities in the southern semi-arid rangelands of southern Australia. A series of economic analyses of alternative grazing management strategies will be used to examine the relationships between agricultural productivity and profitability; soil organic carbon; and natural resource change. With the cooperation of innovative landholders, case studies will provide a benchmark comparison for soil organic carbon by contrasting the impacts of current best management practice against alternative (traditional) management practice. Current best management practice will be considered in terms of total grazing pressure, fencing and rotational grazing, while traditional management practice will be considered in terms of biodiversity, landscape function and grazing intensity.	1/05/2015	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
The fate of aboveground carbon inputs: a key process that is poorly understood	Queensland University of Technology	$139,376.00	This project aims to increase present understanding of surface carbon movement into the soil, improve soil carbon/nitrogen simulation models and work directly with soil carbon and nitrous oxide network modellers to provide greater certainty on the potential for reducing emissions. It will include site-based experimentation that complements other research on how management and climate affect carbon sequestration, nitrogen inputs to the soil and nitrous oxide emissions.	1/05/2015	Final report due on completion of project
Potential soil carbon sequestration in Australian grain regions and its impact on soil productivity and greenhouse gas emissions	Commonwealth Scientific and Industrial Research Organisation	$288,022.00	This project will define soil organic carbon (SOC) sequestration potential and identify management practices that benefit both productivity and SOC stocks. It will use the farming systems model APSIM (Agricultural Production Systems sIMulator), together with measurements to identify agricultural practices that increase SOC, quantify SOC sequestration potential across Australian grain regions, assess the vulnerability of sequestered carbon to subsequent changes in management and climate, and investigate the impacts of SOC change on carbon-nitrogen cycling, productivity and greenhouse gas emissions.	1/05/2015	Final report due on completion of project
Facilitation of improvement in systems modelling capacity for Carbon Farming Futures	Commonwealth Scientific and Industrial Research Organisation	$283,757.00	This project aims to eliminate any inconsistencies in modelling activities across Filling the Research Gap (FtRG). It will ensure that models are developed and applied consistently in FtRG, and that they embody the best scientific understanding of methane, nitrous oxide and soil carbon fluxes. A series of workshops and comparative studies will result in more robust and consistent abatement predictions and increased human capacity for modelling.	1/05/2015	Final report due on completion of project
Whole farm systems analysis of greenhouse gas abatement options for the southern Australian grazing industries	University of Melbourne	$242,347.00	This project will conduct whole farm systems analysis of a range of nitrogen, carbon and energy efficiency and greenhouse gas abatement strategies for the dairy, sheep and southern beef industries. Each strategy will be analysed in a whole farm systems context, considering methane, nitrous oxide, soil carbon, productivity and their interactions. The outcomes from the project will be evaluated options for: reducing emissions intensity, improving farm profitability and/or further development into Carbon Farming Initiative offset methods.	1/05/2015	Final report due on completion of project
Importance of 'deep' soil carbon to long-term carbon storage	The University of New England	$351,536.00	This project is considering the impacts of different management practices on soil carbon. It will improve the understanding of the effect of contemporary management practices on the amount, form and stability of soil carbon. Findings will help identify opportunities for long-term carbon storage through targeted management practices and/or specific land use and soil type combinations.	1/05/2016	Final report due on completion of project
Host control of methane emissions from sheep	University of Western Australia	$739,787.00	This project is studying the interaction between animal hosts and rumen microbial populations to provide insights into the fundamental biology of rumen function and methane emissions in sheep. It will underpin the discovery of new tools for breeding low methane emitting sheep	1/05/2016	Final report due on completion of project
Innovative livestock systems to adapt to climate change and reduce emissions	University of Western Australia	$646,533.00	This project is quantifying productivity of legume pastures with lower potential for methane production in the rumen. Modelling will determine impacts of a range of sheep and pasture management strategies on whole farm profit, risk and methane emissions for different environments and climate change scenarios.	1/05/2016	Final report due on completion of project
Crop traits for productivity in a high CO2 world under drought and heat	University of Melbourne	$621,350.00	This project is studying cereal, pulse and oilseed crops for resilience to heat and drought stress under elevated carbon dioxide conditions. It is providing real world, validated measurements of crop water, nitrogen use and plant carbon allocation under elevated carbon dioxide conditions in interaction with climate variability factors.	1/05/2016	Final report due on completion of project
Genetics to reduce methane emissions from Australian sheep	The University of New England	$419,574.00	This project is developing a robust standard operating procedure for measuring methane emissions from sheep. Outcomes will enable industry breeding values for methane emissions to be developed and will provide a pathway to participation in the Carbon Farming Initiative.	1/05/2016	Final report due on completion of project
Nitrate and sulphate rich shrubs to reduce methane and increase productivity	CSIRO	$562,870.00	This project is investigating nitrate and sulphate rich shrubs to develop practical, plant-based technologies and new grazing systems to help reduce methane emissions from livestock systems. Findings could increase agricultural productivity and sustainability without increasing greenhouse gas emissions.	1/05/2016	Final report due on completion of project
Farm scale assessment of SOC from disaggregated national/regional scale models	University of Sydney	$154,218.00	This project is developing and validating tools that will enable farm-scale estimates of baseline soil organic carbon to be derived from nationally and/or regionally calibrated models. This research will be conducted in collaboration with Landcare Research New Zealand.	1/05/2016	Final report due on completion of project
Novel business structures for Adaptation to a changing climate	University of Western Australia	$117,105.00	This project is examining how novel business structures can allow farm businesses to better adapt to a changing climate. The merits and feasibility of innovation in farm business structure will be assessed and widely communicated to farmer and investor forums to show the role and value of business structure innovation in facilitating farm adaptation to a changing climate.	1/06/2016	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
International Coordination of the Ruminant Pangenome Project	University of Western Australia	$172,560.00	This international collaboration brings together scientific expertise to coordinate livestock systems research focused on reduction and/or abatement of greenhouse gas emissions. Outcomes of coordination will instil confidence in research findings about genetic control of livestock methane emissions and will inform policy development.	1/06/2016	Final report due on completion of project
Evaluating transformative Adaptation options for Australian extensive farming	CSIRO	$828,468.00	This project is assisting cereal–livestock and pastoral zones to adapt to a changing climate by identifying and assessing innovative and adoptable practice change. In consultation with landholders, the project will evaluate practices beyond business as usual and will identify opportunities to transfer adaptation practices across climatic zones.	1/05/2016	Final report due on completion of project
An innovative solution for accurate and affordable estimates of soil carbon	CSIRO	$635,598.00	This project is developing a proof-of-concept prototype system for measuring soil condition into a field-deployable system. This will assist land managers to effectively measure and detect changes in soil organic carbon stores and will provide reliable data to improve decision making and management.	1/05/2016	Final report due on completion of project
Dairy intensification and CC Adaptation , impacts on profit, risk and people	Dairy Australia Limited	$602,282.00	This project is combining biophysical and economic modelling, social research and farmer engagement to identify farm management responses and/or innovations that maintain profitability while building resilience under a more variable and challenging future. The project is examining the impact of challenging future climates on farm development scenarios including intensification and de-intensification.	1/05/2016	Final report due on completion of project
Maximising energy-yielding rumen pathways in response to methane inhibition	CSIRO	$223,107.00	This project is investigating ways of maximising rumen digestion efficiency in response to methane inhibition. Findings will identify dietary supplements and/or microbial treatments that can reduce methane production (while increasing productivity) and outcomes will establish a safe target for methane reduction using commercial diets.	1/05/2016	Final report due on completion of project
Impacts of CFI methodologies on whole-farm systems	The University of New England	$275,783.00	Assisted through international collaboration of researchers from the United States of America and New Zealand, this project is filling knowledge gaps about manipulation of methane production in the rumen. The project is quantifying emissions under different forage and nutritional regimes and is estimating changes in enterprise productivity resulting from potential rumen-based methodologies for the Carbon Farming Initiative.	1/05/2016	Final report due on completion of project
Managing biological, physical and chemical constraints to soil carbon storage	University of Western Australia	$629,836.00	This project is assessing the stability of soil carbon under a variety of management practices, including emerging management practices that may increase soil carbon at depth. The project will assess how soil carbon stability will be affected by changing climate predictions.	1/05/2016	Final report due on completion of project
Can advances in mid-term weather forecasts reduce emissions from N fertiliser?	Queensland University of Technology	$337,675.00	This project is investigating whether advances in mid-term weather forecasts can better inform farm management practices that will reduce emissions from nitrogen fertiliser. The project is also assessing how different fertiliser regimes can be used to mitigate nitrous oxide emissions under forecast scenarios.	1/05/2016	Final report due on completion of project
Indirect emissions of nitrous oxide from broad-acre irrigated agriculture	Cotton Research & Development Corporation	$351,003.00	This project is measuring the indirect emissions of nitrous oxide, methane and carbon dioxide from the surface waters of each of the major water supply components of an irrigated cotton farm. The project will consider the effects of water management and nitrogen application rates on emissions and will also investigate indirect nitrous oxide losses to deep groundwater.	1/05/2016	Final report due on completion of project
Reducing nitrous oxide emissions in key perennial tree crop industries	University of Tasmania	$317,387.00	This project is investigating ways of reducing nitrous oxide emissions in key perennial tree crop industries in cool and temperate climates of southern Australia. Products and practices most likely to reduce nitrous oxide losses will be identified, and findings will allow horticultural producers to establish baseline data for greenhouse gas emissions and improve data on emissions factors.	1/05/2016	Final report due on completion of project
Mitigation of N2O Emissions in the National Vegetable Industry	La Trobe University	$937,909.00	This project is investigating options to mitigate nitrous oxide emissions in the national vegetable industry by assessing new fertiliser technologies and management strategies which have potential to increase nitrogen use efficiency. Comparisons will be made with benchmark values measured on current vegetable cropping systems.	1/05/2016	Final report due on completion of project
Achieving least cost GHG abatement–opportunities in Australian grains farms	CSIRO	$541,905.00	This project is modelling scenarios to estimate mitigation benefits of various management practices applicable to Australian grain farms. The project will establish case-studies with farmer groups currently involved in the Action on the Ground program and other Grains Research and Development Corporation projects in major grain growing regions.	1/05/2016	Final report due on completion of project
Sugarcane for future climates	CSIRO	$305,498.00	This project is developing sugarcane adapted to drier and higher carbon dioxide future climate scenarios. It will identify sugarcane best suited to breeding programs and develop practical, low cost selection methods for ongoing implementation in industry breeding programs.	1/05/2016	Final report due on completion of project

Filling the Research Gap project title	Grantee	2013-14 expenditure	Project information and outcomes	Expected completion date	Project reporting
Low-emission nitrogen fertilizers based on clay-modified activated charcoal	The University of Newcastle	$478,981.00	This project is investigating the low emission potential of nitrogen fertilisers based on clay-modified activated charcoal. It is focusing on reducing emissions of nitrous oxide from fertiliser application in high-emission agro-climatic zones by developing new fertiliser technology and practices. It is also examining the important relationship between nitrogen and carbon in the production of nitrous oxide.	1/05/2016	Final report due on completion of project
Novel strategies to breed dairy cattle for Adaptation & reduced methane emissions	Dairy Futures Limited	$1,009,695.00	This project is developing novel strategies for the dairy industry to adapt to a changing climate and reduce methane emissions. Outcomes will allow dairy farmers to select breeding animals with reduced methane emissions (per litre of milk produced) and improved heat tolerance.	1/05/2016	Final report due on completion of project
Crossing the threshold: Adaptation tipping points for Australian fruit trees	University of Melbourne	$486,172.00	This project is focusing on the Australian fruit tree industry (specifically stone fruit and cherry) to investigate Adaptation lead times to critical tipping points for winter chilling, spring frost risk, extreme heat exposure and yield potential. The project will collect field data across Australia and will evaluate effectiveness of adaptation options.	1/05/2016	Final report due on completion of project
Improving resilience against heat stress in dairy cows and pigs	University of Melbourne	$535,598.00	Building on previous work that examined heat stress in sheep, this project is validating the use of dietary additives to reduce the impact of heat stress on lactating dairy cows and lactating and growing pigs. The project is informing genetic selection to handle heat, making particular use of extensively genotyped dairy cows.	1/05/2016	Final report due on completion of project
Anaerobic treatment for emissions reduction from solid manure residues	The University of Queensland	$140,853.00	This project is quantifying methane emissions from conventional storage and processing of solid manure residues and will develop a processing technology to stabilise solid residues by anaerobic digestion. Outcomes will prevent volatilisation during collection, storage and land application of the manure product.	1/05/2016	Final report due on completion of project
The trade-off between feed efficiency, methane and reproduction in sheep	Murdoch University	$343,106.00	This project is investigating the trade-off between feed efficiency, methane and reproduction in sheep. A whole-farm analysis will be used to understand the profitability trade-off between animal selection for increased feed efficiency versus reduced methane production.	1/05/2016	Final report due on completion of project
Composting as a means of minimising GHG emissions from the manure supply chain	Queensland University of Technology	$351,397.00	This project is investigating manure composting as a practice for minimising greenhouse gas emissions from intensive livestock industries and the manure supply chain. The project is comparing composting and stockpiling of manures to quantify reduction of methane and nitrous oxide emissions. It will provide emission factors that could be used to improve Australia's National Greenhouse Gas Inventory. The project will also determine the potential to reduce nitrous oxide emissions through the application of composted instead of raw manures.	1/05/2016	Final report due on completion of project
Cost-effective viticultural strategies to adapt to a warmer, drier climate	Grape & Wine R & D Corporation	$310,351.00	This project is building on results from the Climate Change Research Program to produce a toolbox of viticultural adaptation management options for a hotter and drier vineyard environment. It is also identifying innovative viticultural strategies to mitigate the effects of climate change.	1/05/2016	Final report due on completion of project
Adaptive value chain approaches	CSIRO	$306,194.00	This project is answering critical questions such as: how are value chains impacted by climate change and variability; how can value chains effectively respond through Adaptation and mitigation strategies; and what are the impacts of these strategies on value creation and competitive advantages in value chains?	1/05/2016	Final report due on completion of project
A simple indicator of potential N2O loss from agricultural soils	Queensland University of Technology	$251,606.00	The project is quantifying the relationship between active carbon and potential nitrous oxide loss in a laboratory situation. A rapid in-field soil test will be developed to assess the suitability of soil type for nitrous oxide reducing practices in the field	1/05/2016	Final report due on completion of project