

Actions on Research Collaboration: individual collaborative projects (CP)					
Given the growing number of research projects in direct support of the goals and objectives of the LRG, it is proposed to no longer list each individual project in the LRG work plan. The LRG co-chairs have established a database to keep track of projects that are explicitly aligned to the objectives of the Alliance/LRG and that involve collaboration across Alliance member countries. This database will be made available through the LRG website and is a separate annex of the LRG work plan. Information on the mechanisms to support research collaboration will continue to be listed in the LRG work plan.					Undertake
New Zealand targeted funding to support the objectives of the Alliance					
CP1	Identification of low CH ₄ emitting phenotypes: Optimising genetic, genomic and phenotypic measurement parameters in cattle and sheep through international collaboration	New Zealand, Australia, UK, other interested countries	2014	A postdoctoral fellow has been appointed to help develop common measurement protocols to rank low-emitting animals and to establish trait definitions and breeding objectives to deliver reduced emissions intensity via animal selection and breeding. For more information contact: Natalie.Pickering@agresearch.co.nz	Facilitate, via ASGG network
CP2	Further evaluation and improvement of the C-Lock system for rapid screening of low-emitting animals	Australia, NZ, UK	2015	Further evaluation and improvements of the Greenfeed™ system to measure CH ₄ emissions from individual grazing animals, under different grazing conditions and animal behaviours. Exploration of potential to use the system for sheep. For more information contact: Cesar.Pinares@agresearch.co.nz	Facilitate, via funding by the supporting governments and research organisations
CP3	Feasibility of using predicted soil water status to help mitigate N ₂ O emissions from grazing land	Led by NZ, with potential contributions from Ireland, UK,	2015	Project to explore the feasibility of using information about predicted soil water status to influence grazing and fertiliser management decisions to reduce N ₂ O emissions. NZ government has issued a request for proposals from NZ researchers to coordinate a collaborative project.	Facilitate, via appropriate funding mechanisms
CP4	The development of a rapid, low cost measurement system to identify low methane emitting cattle phenotypes	Led by NZ, with potential contributions from UK, Australia	2015	To develop a fully automated, validated low cost system and protocol for routine high throughput estimation of methane emissions from dairy cattle that reflect emission differences between animals.	Facilitate, via appropriate funding mechanisms
CP5	Disruption of rumen microbial interspecies hydrogen transfer to reduce ruminant methane emissions	New Zealand, Germany	December 2014	This pilot project explores whether disrupting the transfer of hydrogen from bacterial hydrogen producers to methanogens can help reduce methane formation, and whether this could form the basis of a cost effective mitigation approach.	Facilitate, via the New Zealand Partnerships Fund and other participating countries
CP6	Characterising rumen microbial community diversity; utilising the combined resources of the Alliance to underpin mitigation efforts	New Zealand and at least 15 other countries and participating institutions	2014/15	This project will (a) undertake a global survey of rumen microbial diversity, (www.globalrumencensus.org.nz); and (b) a catalogue of 1000 rumen microbial reference genomes via the US Joint Genome Institute (www.hungate1000.org.nz).	Facilitate, via the RMG network

Global Partnerships in Livestock Emissions Research Fund (New Zealand, with co-funding by other countries/institutions)					
CP7	Deep sequencing the rumen microbiome	Led by NZ, Australia, USA, Ireland and France	2015	Collaborative project to deep sequence the rumen microbiome to better understand the processes that contribute to methane formation in sheep and cattle. For more information contact: Graeme.attwood@agresearch.co.nz	Facilitate, via the New Zealand Partnerships Fund and other participating countries
CP8	Accelerated discovery of methanogen-specific inhibitors	Led by NZ, Australia, USA and Japan	2015	The main goal of this project is to develop a high-throughput screening method for rapidly identifying novel anti-methanogen inhibitors, based on the efficient testing of inhibitors against methanogens growing in 96-well culture plates. For more information contact: ron.rominus@agresearch.co.nz	Facilitate, via the New Zealand Partnerships Fund and other participating countries
CP9	Vaccine to reduce methane emissions in ruminants	NZ	2015	A leading New Zealand research team will aim to identify adjuvants (substances that trigger production of antibody responses to the vaccine) to produce a vaccine which targets methanogens in the rumen. For more information contact: neil.wedloack@agresearch.co.nz	Facilitate, via the New Zealand Partnerships Fund and other participating countries
CP10	Animal delivery of DCD in urine by provision in feeds	Led by NZ, Australia and Ireland	2015	A cost-effective nitrous oxide mitigation technique, based on animal delivery of the nitrification inhibitor dicyandiamide (DCD) in urine via provision in feeds, will be evaluated in field plot and grazing system studies across different locations in NZ, Australia and Ireland. For more information contact: stewart.ledgard@agresearch.co.nz	Facilitate, via the New Zealand Partnerships Fund and other participating countries
CP11	Reducing N ₂ O emissions from urine patches through accelerating N ₂ O reduction	New Zealand, Ireland, Norway	June 2016	The aim of this project is to build on recent advances in microbial and molecular techniques to identify the regulators of denitification, specifically those of nitrous oxide reductase (N ₂ OR) at the microbial level, to identify any potential avenues to accelerate the full reduction of nitrate to N ₂ rather than N ₂ O.	Facilitate, via the New Zealand Partnerships Fund and other participating countries
CP12	Fast-tracking development of methanogen-specific inhibitors	New Zealand, US	June 2016	This project aims to develop a small-scale in vitro test to increase throughput for the testing of chemigenomic inhibitors of methanogens, enhance our understanding of the chemical transformation process in the rumen, and discover novel new inhibitors.	Facilitate, via the New Zealand Partnerships Fund and other participating countries

JPI FACCE (Eleven European FACCE member countries, USA, Canada, New Zealand)					
CP13	Development of a biofilter system to mitigate methane emissions from small manure ponds	Led by NZ, with Canada, UK, potentially other countries	2015	NZ researchers have developed a prototype bio cover, in which methanotroph bacteria could at very low cost reduce or eliminate methane emissions from small manure ponds where capture for energy generation is not cost effective. Funding is now being sought to extend its applicability and take a prototype towards commercialisation.	Facilitate, via funding by the supporting governments and potentially MMG
CP14	Scoping of research project on barriers to adoption of no-cost mitigation actions	Led by NZ, with UK and France	2015	Project would seek to understand why some options that the scientific literature identifies as bringing net economic benefits to farmers remain un-adopted in practice. Funding is now being sought for a collaborative project to address these questions.	Facilitate, via appropriate funding mechanisms
Filling the Research Gap (Australia, with co-funding by other countries)					
CP15	A rumen sub-model to capture system productivity benefits of methane mitigation	Led by Australia, with NZ, and USA	June 2016	The project will use a pre-existing rumen model and link it to animal production by: <ul style="list-style-type: none"> • Flow-charting the existing model; • Add in hydrogen pathways associated with mitigation of methane to the model; • Conducting sensitivity analysis of the rumen sub model; • Integrate the emerging sub model into the AusFARM software using APSIM protocols; • Refine the sub model to accommodate new parameters and ensure it works; • Embed the rumen sub model into AusFARM program and verify the functionality. 	Facilitate, via the Filling the Research Gap Fund and other participating countries
CP16	Achieving least cost GHG abatement–opportunities in Australian grains farms	Led by Australia, with NZ, and USA	June 2016	The project will estimate net, whole farm mitigation benefit of various management practices applicable to Australian grains farms. The project will establish case study farms with farmer groups in major grain growing regions. The biophysical and socioeconomic characteristics of the farms will be determined to underpin the modelling of mitigation benefits and profitability of a wide range of management scenarios. The representation on soil organic matter on soil function and productivity will be improved in APSIM to ensure a more comprehensive assessment of the benefits of soil carbon.	Facilitate, via the Filling the Research Gap Fund and other participating countries

CP17	An innovative solution for accurate and affordable estimates of soil organic carbon	Led by Australia, with NZ,	<i>June 2016</i>	The project will develop innovative solutions for accurate and affordable estimates of soil carbon. This will be achieved by delivering a field-deployable system that can quantify spatial and temporal changes in organic carbon, carbon fractions and bulk density – and soil organic carbon stores (SOCS) – in the top 1m of soil.	Facilitate, via the Filling the Research Gap Fund and other participating countries
CP18	Farm scale assessment of SOC from disaggregated national/regional scale models	Led by Australia, with NZ,	<i>June 2016</i>	The project will develop a method to disaggregate nationally calibrated carbon models for local (farm-scale) management. It will then test the quality of baseline estimates of soil organic carbon (SOC) derived from downscaling, via validation, and use the baseline information as guiding information to estimate current levels of SOC storage at the farm-scale.	Facilitate, via the Filling the Research Gap Fund and other participating countries