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Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi

New Zealand's Agricultural GHG Emissions

Policies and Approaches

Harry Clark
AgResearch



Outline of talk

- **New Zealand's unique situation**
 - Agriculture in the NZ economy
 - Emissions profile
- **New Zealand approach; policy pre-2007**
 - Flatulence fiasco
 - PGGRC
 - Policy 2004-2007
- **New Zealand approach; policy post-September 2007**
 - Consultation document
 - Emissions trading scheme
 - Sustainable land management & climate change
- **Research priorities**



Agriculture in the New Zealand economy



- **Agriculture 53% of total merchandise exports – unique for a developed country**
- **Agriculture 17% of New Zealand GDP**
- **New Zealand approx 40% of worlds tradeable dairy products, 66% of worlds tradeable lamb products**



New Zealand GHG emissions

Mt CO₂-e

	1990	2005	% Change
Agricultural N₂O emissions	10.1	12.8	26.8
Agricultural CH₄ emissions	22.4	24.9	10.9
Total CO_{2e} emissions	61.9	77.9	24.7
Agriculture as % of total emissions	52.5	48.4	

Source: New Zealand MfE, 2008



New Zealand agricultural GHG emissions in an international context

- Agricultural emissions in many developed countries going down, New Zealand's rising at 1%/annum
- Research into agricultural GHG emissions low priority in many developed nations
- Agricultural emissions high in developing countries (eg South America) but economic development, not reducing GHG emissions, has greater priority
- New Zealand emissions <0.2% of world emissions



Situation pre-2007



The flatulence fiasco (2003)

- Governments general response to GHG emissions was a proposed tax on emissions
- Agricultural sector exempt from any levies on GHG emissions **but obliged to fund research into GHG mitigation (minimum \$8.4m/year)**
- Provoked farmer outrage and strong political opposition
- Popular government in dispute with a sector of the economy which earns \$14 billion per annum in export revenue over an \$8.4 million research levy



2003 political compromise

- Industry agreed to 'voluntarily' fund GHG research and agreed an MOU with the Government
- Pastoral Greenhouse Gas Research Consortium (PGGRC) signed the MOU on behalf of the agricultural industry
- Target research investment achieved by adopting a broad definition of GHG research
- PGGRC became the principal route for funding agricultural GHG research in New Zealand; PGGRC 50% government funded.



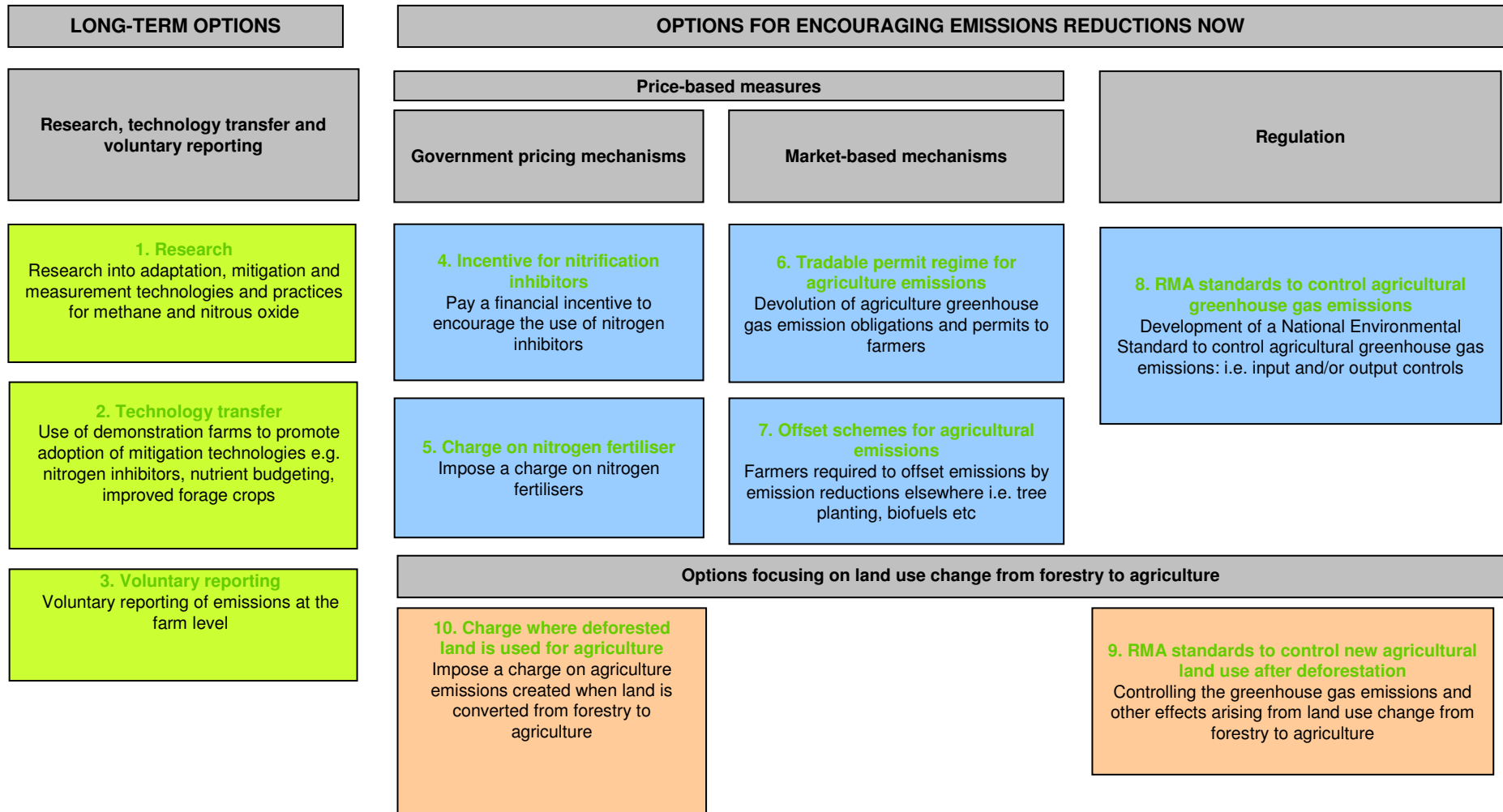
NZ Climate Change Policy 2004-2007



Situation post-2007



Sustainable Land Management & Climate Change



New Zealand's climate change solutions

- Sustainability programme designed for all New Zealanders to act
 - **Emissions Trading Scheme**
 - Energy Strategy and NZEECs
 - Transport: fuel efficiency labelling, biofuels sales obligation , public transport funding
 - **Sustainable Land Management and Climate Change Plan of Action**



Emissions Trading Scheme: Key in-principle decisions

- Economy-wide ETS covering all sectors and all gases
- Sectors' entry into ETS will be staggered – forestry first
- Units of trade will be a New Zealand Unit (NZU)
- NZUs will be convertible to Kyoto Protocol units (with limits)
- Kyoto Protocol units can be used to meet ETS obligations
- Each NZU must be backed by a Kyoto unit
- Key obligation - participants report their emissions (or the emissions that will arise from their activities) and surrender units equal to those emissions
- Absolute emission levels not intensity based



Scheme administration

- All scheme participants will be required to hold an account in the NZ ETS registry
- Participants will get units by:
 - Buying them off other participants
 - Free allocation from government
 - Buying international units
 - Government may auction units if required



Agriculture Emissions

- Covers agriculture gases
 - Methane from enteric fermentation
 - Nitrous oxide from animal urine and dung
 - Nitrous oxide from synthetic fertilisers
- Main sources covered: pastoral agriculture, horticulture, and arable production (~98% of emissions)
- 1 January 2013 entry date to honour the 2003 Memorandum of Understanding and operational challenges
- Sector to monitor and report emissions by 2011



Sequence of events

- **Select Committee May-September 2008**
- **Legislation passed – September 2008**
- ***Technical Advisory Group (TAG)* to develop detail on**
 - **Options for point of obligation**
 - **Methodology for allocation**
 - **Costs associated with implementation**
- **Report to MAF November 2008 – will be made publicly available**
- **MAF to report to Cabinet on agriculture component of Emissions trading – end 2008**
- **Regulations and allocation plan - 2009**



Point of obligation

- Principle to minimise the number of participants in the scheme (reduce transaction costs)
- Initial Government preference for company/processor level point of obligation
 - Meat and dairy processors (N_2O & CH_4)
 - Fertiliser companies (N_2O)
- Farm level option provides better incentives to change behaviour. Feasibility?



Assistance to the sector

- Total quantity of free allocation of NZUs will be 90% of 2005 total emissions from 2013 - 2018
- Allocation to phase-out by 2030
- No decisions made on allocation within the sector (eg. dairy viz-a-viz sheep)
- Government preference is for allocation to benefit farmers



Issues

- **Point of obligation; low transaction cost v reward for individual action**
- **Lack of mitigation potential**
- **Phase out of free allocation**
- **Verification & compliance**
- **Lack of knowledge of wider effects of ETS eg land use dynamics**
- **Food security v reducing emissions**
- **Leakage**



Estimated supply price impacts at \$15/t CO₂-e and 25/t CO₂-e

- Price impacts sensitive to assumptions
- Figures assume:
 - Processor/company level point of obligation
 - Allocation spread evenly across sectors
 - Benefits of free allocation fully reflected in payout
 - No emissions reductions
- Figures based on 2006/07 prices

Emission price scenarios: change in average payout relative to business-as-usual scenario - with <i>no</i> reductions in emissions		
Possible Impact in 2013 (90% of 2005 free allocation)	\$15/t CO ₂ -e	\$25/t CO ₂ -e
Dairy	-1.0%	-1.6%
Beef	-0.2%	-0.3%
Sheepmeat	-0.7%	-1.2%
Venison	-0.1%	-0.2%



Sustainable land management and climate change *Plan of Action*

- **ETS the cornerstone of efforts to reduce emissions but not sufficient on its own**
- **ETS won't address challenge for land management sectors to *adapt* to climate change or take advantage of *business opportunities***
- **Government will invest \$175m over next 5 years on an agriculture/forestry Climate Change Plan of Action**
- **Plan will be delivered in close partnership with the sector**



PGGRC Research Priorities

(funding \$5m/annum)

- **Rumen microbial ecology**
- **Rumen microbial genomics**
- **Anti methanogen vaccine**
- **Exploiting animal to animal variation**
- **Low GHG farm systems development**
- **Nitrification inhibitors (DCD)**



Rumen microbial ecology

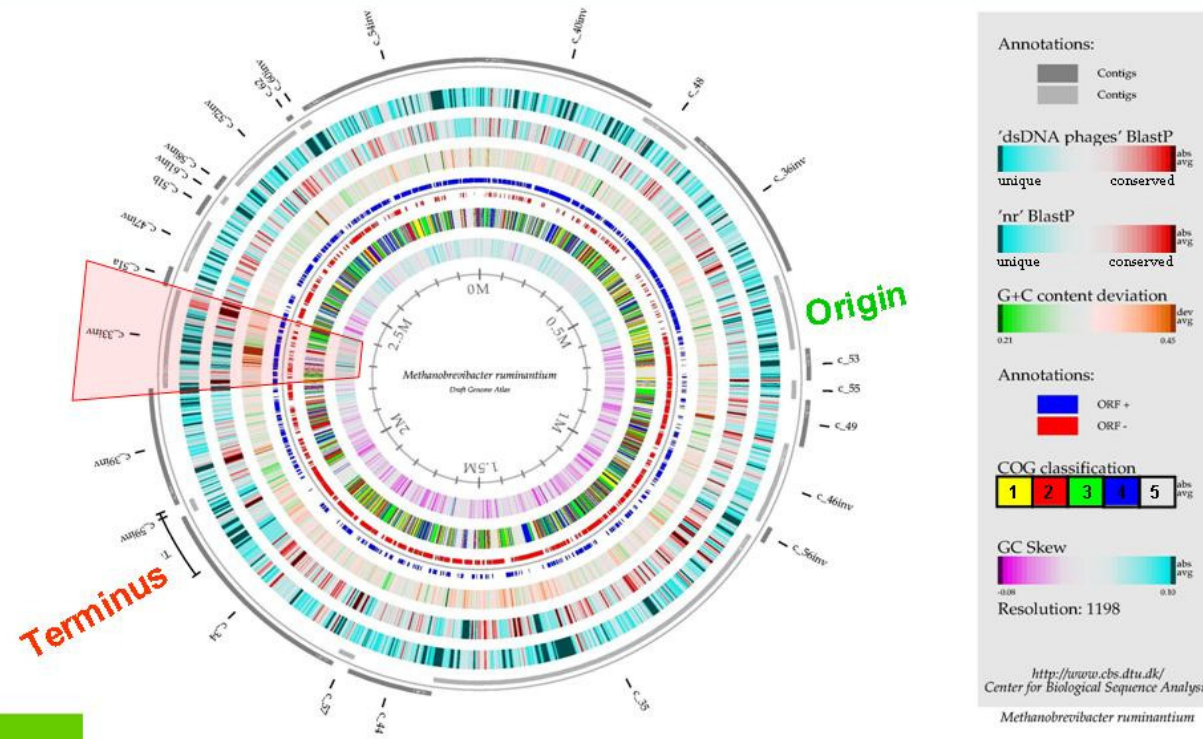


Rumen microbial genomics

Whole genome atlas of *M. ruminantium*

DRAFT

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Anti-methanogen vaccine

- *Efficacy of Australian formulations low, but approach highly attractive.*
- Identify methanogen fraction to induce antibodies that neutralize methanogens.
- Identify specific antigens which are targets for antisera that neutralize methanogens *in vitro*
- Identify adjuvants that stimulate a strong salivary antibody response to methanogen fractions.



Exploiting animal to animal variation

	Min	Max	Mean	St. Dev	Lower Quartile	Upper Quartile
CH ₄ g/day	213.9	478.8	332.1	38.1	285.6	381.0
CH ₄ kg/ DMI	11.0	31.1	19.3	2.9	16.1	23.1



Methane emissions from a herd of 302 Friesian x Jersey dairy cows measured between January 12th and February 6th 2004.

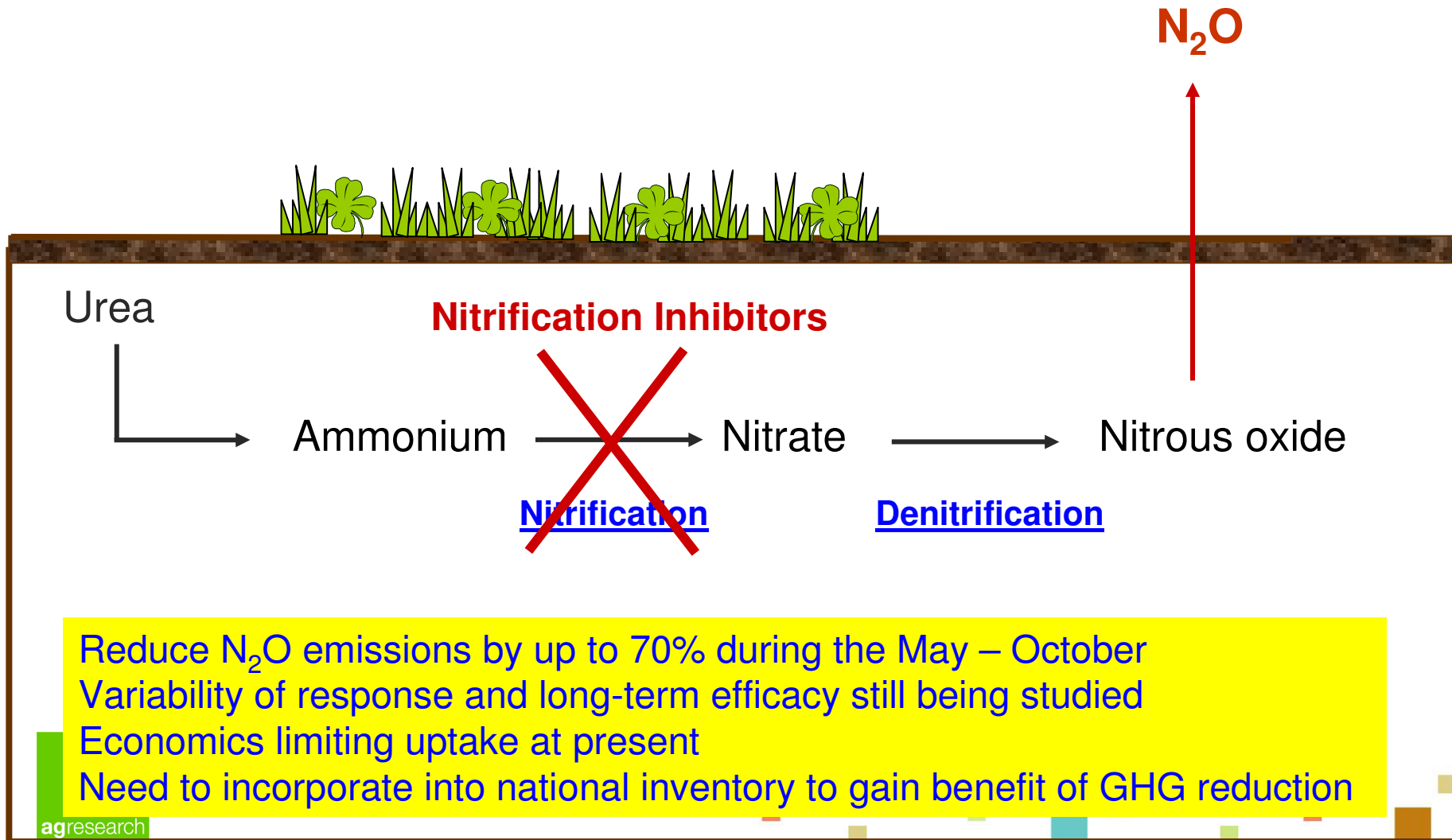


Low GHG emitting farm systems

- Nutrition – defining targets for plant breeders + identifying low CH₄ emitting forages
- Low N loss systems (herd homes, maize silage, stand-off pads)
- Systems modelling



Nitrification inhibitors



Reduce N_2O emissions by up to 70% during the May – October
Variability of response and long-term efficacy still being studied
Economics limiting uptake at present
Need to incorporate into national inventory to gain benefit of GHG reduction