



Memorandum

Ref:

To: Deborah Roche, Deputy Director-General

Cc: Jarred Mair, Peter Ettema

From: Simon Wear & Nicki Stevens

Date: 2 December 2013

Subject: **APPROVAL SOUGHT TO IMPLEMENT IMPROVEMENTS TO THE AGRICULTURE
GREENHOUSE GAS INVENTORY METHODOLOGY**

Purpose

This paper seeks your approval for proposed changes to the methodology for the agriculture greenhouse gas inventory. These changes arise from the availability of new scientific evidence that has been assessed as fit-for-purpose by the Agriculture Inventory Advisory Panel.

Background

New Zealand's greenhouse gas reporting obligations

New Zealand has an obligation under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol to report national anthropogenic greenhouse gas emissions and removals every year. Emissions are reported in the annual National Inventory Report (NIR) which is submitted to the UNFCCC. The NIR includes a number of sectors, and MPI is responsible for reporting on the agricultural sector.

The NIR forms the basis of any financial cost that New Zealand may have under the Kyoto Protocol. Therefore, reported emissions and removals need to be as accurate as possible.

NIR preparation and compliance is assisted by a set of recommended 'default' methodologies and emission factors¹, which are set out in guidelines provided by the Intergovernmental Panel on Climate Change (IPCC). Individual countries are also encouraged to develop 'country-specific' methodologies and emission factors to take account of national circumstances. Country-specific methods need to be well documented and transparent.

MPI has a long-standing research program to improve the accuracy of reported emissions and removals from the New Zealand agricultural sector over time. There is an established process for implementing these refinements into the NIR. The approval process is shown in a flow chart in Appendix 1.

¹ Emission factors are pre-defined values for calculating the average rate of greenhouse gas emission from a particular source.

Agriculture Inventory Advisory Panel

The Agriculture Inventory Advisory Panel (the Panel) meets annually to assess proposed changes to the agricultural section of the NIR for robustness. The Panel and terms of reference were established in 2009 (attached) so there is an official process for advising the DDG (Policy) on suggested changes to the agriculture inventory, and for documenting these changes. The terms of reference were reviewed and revised slightly in 2012 (attached). New Zealand was the first Annex 1 party to set up such a panel for agriculture, and the model has been copied by other parties such as Australia.

The Panel includes scientists whose expertise covers the UNFCCC process and the latest science underpinning New Zealand's agricultural greenhouse gas emissions calculations. Generally these scientists are members of NZMethanet (a methane emissions expert group), NzOnet (a nitrous oxide emissions expert group) and at least one member represents the Royal Society of New Zealand (a scientific community representative). These Panel members are selected on the basis of their skills and experience, rather than as representatives of particular organisations or sectors. The Panel also includes one Ministry for Primary Industries (MPI) policy nominee (Chair) and one Ministry for the Environment (MfE) nominee.

The 2013 Panel meeting was held on 12 November, and comprised:

- Simon Wear (Chair), Resource Information and Analysis, MPI
- Dr Andrea Brandon, Senior Analyst, MfE
- Dr Harry Clark, New Zealand Agricultural Greenhouse Gas Research Centre (NZMethanet)
- Prof Frank Kelliher, AgResearch (NzOnet)
- Dr Keith Lassey, Lassey Research and Education LTD (NZMethanet)
- Dr Andy Reisinger, New Zealand Agricultural Greenhouse Gas Research Centre (also for the Royal Society of New Zealand)

Other attendees included:

- Peter Ettema – Manager, Resource Information and Analysis, MPI
- Dr Nicki Stevens – Senior Analyst, Resource Information and Analysis, MPI
- Mike Rollo – environmental programmer for the agricultural inventory, AgResearch

2013 Panel recommendations

Two papers were presented to the 2013 Panel² detailing proposed changes to the NIR calculations. The recommendations in these two papers are based on externally peer-reviewed scientific reports.

Paper 1: Urease inhibitors

Summary

Urea fertilisers are a source of emissions because a fraction of the nitrogen contained in the fertiliser is released as ammonia gas after being applied. This is due to a chemical reaction caused by the enzyme urease. Some of this ammonia later breaks down to form nitrous oxide, a greenhouse gas. New Zealand is required to report on these emissions by the UNFCCC.

The current NIR uses a country-specific emission factor related to this process ($Frac_{gasf}$), which calculates the fraction of nitrogen in the fertiliser that is released as ammonia gas. However, scientists have shown that applying urea fertiliser treated with urease inhibitors reduces ammonia release. Urease inhibitors are already in use in New Zealand and this activity should be reported in the NIR.

The paper presented to the 2013 Panel sought agreement to apply a scaling value of 0.55 to $Frac_{gasf}$ when urease inhibitors are applied. This value equates to the expected reduction in nitrogen evaporating as ammonia when urease inhibitors are applied.

Panel recommendation

The Panel agreed that the emission factor, $Frac_{gasf}$, should be multiplied by a scaling value of 0.55 where fertilisers containing urease inhibitors are applied.

Paper 2: Dung and urine activity data splits

Summary

A large source of nitrous oxide emissions in New Zealand comes from livestock excreta. Calculating emissions from excreta involves working out how the nitrogen excreted from livestock has been apportioned between the urine and dung. This is important because nitrogen is emitted as nitrous oxide at a faster rate for urine than it is for dung.

The current equation that estimates the proportion of nitrogen in excreta was based on early data used in the OVERSEER model, and this split was incorporated in the calculations for the NIR in 2003. The NIR is reviewed annually by the UNFCCC and, during the 2013 review, it was recommended that New Zealand provide a reference for the equation currently being used.

² Other papers were originally planned for the Panel in 2013. However, project delays meant that they were not completed and reviewed in time for deadline (6 weeks before the meeting) for the Panel to consider them. These papers will be presented to the 2014 Panel for inclusion in next year's NIR.

A literature search revealed that a 2010 AgResearch report³ to MAF provided an updated equation for nitrogen apportioning in dung and urine:

Where: $\%N_u$ is percentage of nitrogen excreted in urine
 $N_{\%d}$ is percentage of nitrogen intake by the livestock in the diet

And it then follows that:

Where: $\%N_f$ is percentage of nitrogen excreted in faeces.

A paper was presented to the 2013 Panel recommending that the 2010 updated equation be used in the NIR calculations.

Panel recommendations

The Panel reviewed the report and agreed that the equation above be used in the agriculture NIR. The Panel also noted that further refinement of the methodology to apportion nitrogen excretion in dung and urine is presently underway (Luo, Kelliher, et al., in preparation) and this research may provide separate estimates for individual livestock categories. The Panel recommended that the new research, if published successfully, could be presented to a future meeting of the Agriculture Inventory Advisory Panel.

Next steps

Pending your approval of the Panel’s recommendations:

Key Dates and Actions	Date
Statistics NZ release the provisional Agriculture Production Survey for 2013, and MPI officials begin preparing data for the calculation of agricultural greenhouse gas emissions and removals.	11:45am 16 December 2013
MPI officials advise MfE of the proposed methodological changes recommended by the Agricultural Inventory Advisory Panel (MfE coordinate New Zealand’s submission of the NIR to the UNFCCC).	17 December 2013
MPI officials prepare the Agricultural Inventory (calculations and documentation) undertaken and incorporate the methodological changes.	17 December 2013 to 7 February 2014
The estimated Agricultural Inventory greenhouse gas emissions and the accompanying documentation are signed off by Peter Ettema, (Manager, Resource Information & Analysis).	14 February 2014
The Agricultural Inventory section is submitted to MfE.	14 February 2014
MfE submits the New Zealand National Inventory Report (including agriculture) to the UNFCCC.	11 April 2014 (TBC by MfE) Last possible date of submission is 15 April 2014.

3 Luo and Kelliher (2010) Partitioning of animal excreta N into urine and dung and developing the N2O inventory, Report MAF POL 0910-11528

Strategic risks

All changes proposed in the NIR are subject to approval by an expert review team from the UNFCCC. These reviews occur annually. If the proposed changes are not accepted by the expert review team, there is an extensive process which is followed where New Zealand can either state its case or change back to the original methodology before any penalty is applied by the UNFCCC Compliance Committee (Appendix I).

The worst-case scenario, if the concerns of the UNFCCC about New Zealand's methodological approach are not resolved, is that New Zealand could be suspended from the Kyoto Protocol. However, it is highly unlikely that this would happen as a result of implementing the methodological changes agreed by the 2013 Panel, as both have fairly minor impact and result in improvements to the accuracy of the NIR.

Strategic opportunities

By including these methodological changes, New Zealand will be meeting the UNFCCC obligations of continual improvement of the National Inventory.

The new values will make a slight reduction to the total greenhouse gas emissions estimate for New Zealand, and will be well documented, thereby meeting the UNFCCC requirement for transparency.

Recommendations

It is recommended that you:

Note the attached briefing papers and minutes of the 2013 Agricultural Inventory Advisory Panel meeting.

Noted

Note the briefing papers, minutes and this recommendation to change are posted onto the MPI website under the Agriculture Inventory Advisory Panel.

Noted

Agree that the value of the fraction of nitrogen fertiliser that converts to ammonia ($Frac_{gasf}$) should be multiplied by a scalar of 0.55 when fertilisers containing urease inhibitors are applied.

Agree / not agreed

Agree that the equation for the partitioning of nitrogen between dung and urine (updated by Luo and Kelliher in 2010) be implemented in the 2014 Agriculture Inventory onwards.

Agree / not agreed

Peter Ettema
Manager, Resource Information & Analysis

Date

Deborah Roche
Deputy Director-General

Date:

Appendix 1: Flow Chart for Agriculture Inventory Approval Process

