



MPI POLICY
Agricultural Inventory Advisory Panel Meeting
12 November 2013

DUNG AND URINE ACTIVITY DATA SPLIT

Authors: Simon Wear & Nicki Stevens

Main Purpose: ☒ Decide ☒ Discuss ☒ Note

Purpose of Report

1. Seek approval from the Agricultural Inventory Advisory Panel on the recommendations to change the Partitioning of nitrogen between dung and urine for cattle, sheep and deer.

2. Attached to this paper are:

Luo and Kelliher (2010) Partitioning of animal excreta N into urine and dung and developing the N₂O inventory, *Report MAF POL 0910-11528 09-03, and a review of the report by Mike Bown, Beverley Thomson and Paul Muir (On-Farm Research).*

Pickering & Wear (2013) Detailed methodologies for agricultural greenhouse gas emission calculation, version 2, *MPI Technical Paper no.: 2013/27 – equation 33*

The change approval form completed by the reviewers Mike Bown, Beverley Thomson and Paul Muir (On-Farm Research Ltd).

Summary

Background

3. New Zealand has an obligation under United Nations Framework Convention on Climate Change (UNFCCC) to report anthropogenic greenhouse gas emissions and removals every year. Emissions are reported in the annual submission of the National Inventory Report submitted to the UNFCCC. New Zealand also has a responsibility under the Kyoto Protocol to reduce emissions growth and if not successful will incur a financial cost.

Policy Branch

Policy directorate

4. The National Inventory Report forms the basis of any financial cost that the country may have under the Kyoto Protocol. Therefore reported emissions and removals need to be as accurate as possible. New Zealand has a long-standing research program in estimating country-specific emission factors to aid in the improvement of reported emissions and removals from the land-based sectors.
5. Changes beyond the default methodology and emission factors in the Revised 1996 IPCC Guidelines and the 2000 IPCC Good Practice Guidance to take account of national circumstances are encouraged and need to be well documented and transparent.
6. Under the UNFCCC, national greenhouse gas inventory reports are reviewed by Expert Review Teams (ERTs) following agreed review guidelines (FCCC 22/CMP.1 *Guidelines for review under Article 8 of the Kyoto Protocol*). The ERT provisional recommendation (September 2013) from the review of New Zealand's 2013 annual inventory submission is that the text of the National Inventory Report, or the detailed methodology document, should provide a direct reference to the source information, as it is a key value in deriving the estimate of direct emissions from excreta on pasture range and paddock.

Current Inventory Calculation

7. The inventory currently uses the following equation to partition excreted nitrogen into nitrogen from urine and nitrogen from dung (from Pickering & Wear, 2013, equation 33):

Where: $\%N_u$ is percentage of excretal N in the form of urine

$N_{\%d}$ is percentage of nitrogen in the diet

And:

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

Report: Proposed Changes to the Current Inventory Calculation

8. A refinement of the method to predict the partitioning of nitrogen excreted in urine and dung was published by Luo and Kelliher (2010), which included an assessment of the impact on the national greenhouse gas (N_2O) inventory.
9. Luo & Kelliher (2010) found that the relationship between components of excreted nitrogen can be expressed as:
10. Luo & Kelliher (2010) was reviewed by Paul Muir and colleagues (On-Farm Research Ltd).
11. A more recent analysis is underway (Luo, Kelliher *et al.*, in prep) which includes an updated dataset including additional data for sheep, and a comparison of cattle and sheep results with international findings. In this paper, further refinement to the calculation is likely and estimates may be available for the individual livestock category.

Effect of changes

12. The table below compares nitrogen partitioning in urine using the current and proposed methodology, and the effect on emission estimates. With the proposal, a slightly lower proportion of nitrogen would go to urine, resulting in a small reduction in estimated emissions due to urine having a higher emission factor than dung. The values for deer change over time because in the 2013 submission the apportioning of deer to land classes changed, with deer being grazed on lower producing land classes from 1990 to 2011.

Table: Comparison of N₂O emissions between current and proposed partitioning of nitrogen between dung and urine for 2011

	% N in diet	% of N in excreta as urine	% of N in excreta as urine	Emissions Gg N ₂ O	Emissions Gg N ₂ O	Emissions Gg N ₂ O	Emissions Gg N ₂ O
		Current	Proposed	Current Urine	Current Dung	Proposed Urine	Proposed Dung
Dairy	3.7	73.6	73.3	13.49	1.21	13.42	1.23
Beef	3.0	66.1	65.9	2.53	0.32	2.53	0.33
Sheep	3.0	66.1	65.9	2.92	0.37	2.92	0.38
Deer 1990	3.32	69.5	69.3				
Deer 2011	3.07	66.8	66.6	0.20	0.02	0.20	0.03

The percentage of N in pasture for deer is estimated using the share of the deer population grazed on dairy, and sheep/beef pasture each year.

Reviewers' comments

13. The reviewers, Mike Bown, Beverley Thomson and Paul Muir, were generally positive about the report noting that it uses the best, most relevant data for New Zealand pasture-fed ruminants at the time (up to 2010).
14. The reviewers note that a potential bias in the dataset due to a predominance of values derived from lactating cows was addressed adequately. They recommend that further work using additional data from nitrogen balance studies would "improve confidence in the equation and its applicability to all species", noting particularly the lack of hard evidence to support the use of the equation for deer.

Strategic Risks

15. The changes may not be accepted by an expert review team of the *United Nations Framework Convention on Climate Change* (UNFCCC) reviewers. However, if this is the case there is an extensive process which is followed in which New Zealand can state its case or change back to the original IPCC defaults before any penalty would be applied.

Strategic Opportunities

16. New Zealand will be meeting the UNFCCC obligations of continual improvement of the national inventory

17. The new values will make a negligible difference to the total emissions estimate for New Zealand, and will now be well documented, therefore meeting the UNFCCC requirement for transparency.
18. The change also prepares New Zealand to meet updated reporting requirements agreed in Durban during the Seventeenth Conference of the Parties (COP17) under the UNFCCC. Decision 15/CP.17 *Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention* decides that from 2015 Parties to the UNFCCC will report using the 2006 IPCC Guidelines and Global Warming Potentials from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

Recommendations

It is recommended that the Agricultural Inventory Advisory Panel:

19. **Agree** that the equation presented in paragraph 9 and published in Luo and Kelliher (2010) is used in the calculation to apportion nitrogen excretion from dung and urine.

Agree / not agreed

20. **Note** that a further refinement of the methodology to apportion nitrogen excretion in dung and urine is presently underway (Luo, Kelliher, et al., in prep) and may provide separate estimates for individual livestock category. The revised paper will be presented to a subsequent meeting of the Agriculture Inventory Advisory Panel.

Agree / not agreed

Simon Wear

Senior Policy Analyst

Approved/ Not Approved/ Approved as Amended

Peter Ettema

Resource Information and Analysis Manager

Chair Agricultural Inventory Panel

Date