



Minutes of the 2018 Agricultural Greenhouse Gas Inventory Advisory Panel Meeting

13 November 2018

11.00am – 4.00pm

Meeting room 10.5, Pastoral House, 25 The Terrace, Wellington

Panel members in attendance:

The Agricultural Greenhouse Gas Inventory Advisory Panel ('the Panel') comprises:

Dr Gerald Rys – Principal Science Adviser, MPI – Chair

Dr Harry Clark – Director, New Zealand Agricultural Greenhouse Gas Research Centre

Dr Andy Reisinger – Deputy Director, New Zealand Agricultural Greenhouse Gas Research Centre
(also for The Royal Society of New Zealand)

Dr Keith Lassey - Lassey Research and Education Ltd

Dr Andrea Brandon - Senior Analyst, MfE

Dr Cecile de Klein – Science Impact Leader, AgResearch

Dr Surinder Saggar – Portfolio Leader, Landcare Research

Other attendees:

Phil Wiles – Acting Manager, Domestic Climate Change, MPI

Mike Rollo - AgResearch

Jamie Ash – Policy Analyst, Domestic Climate Change, MPI

Joel Gibbs – Senior Policy Analyst, Domestic Climate Change, MPI

Caroline Read – Chief Executive, Overseer Limited (attended until lunchtime)

The purpose of the meeting was for Panel members to discuss and consider proposed changes to the Agricultural Greenhouse Gas (GHG) Inventory. Changes which the Panel considers are scientifically robust enough to implement are recommended to Penny Nelson, the Deputy Director-General, Policy & Trade.

Opening and Introduction

Gerald Rys introduced the meeting at 11am, and provided health and safety information on the meeting room.

Gerald Rys asked the members to declare any conflicts of interest and proposed that members with conflicts of interest could participate in the discussion, however they could not vote on that change. The panel agreed to this.

The panel members declared areas that were conflicts of interest. Cecile de Klein, Gerald Rys, and Surinder Saggar declared conflicts of interest for the panel paper *Direct N2O emission factors to livestock excreta based on hill slope*.

Harry Clark declared that he had commissioned the draft paper *Proposed changes to the animal metabolisable energy requirements model in Overseer*. The panel did not consider this a conflict of interest.

Review of the 2017 Panel Meeting Minutes

The minutes and actions from the 2017 meeting were tabled and reviewed by the Panel. The actions from last year were reviewed:

Action 1 – 3: Completed

Action 4: Completed. Joel Gibbs, Mike Rollo, and Kumar Vetharaniem have developed a procedure, however they have not shared this with the panel. MPI will share this with the panel.

Action 5/15: Completed.

The panel discussed the need for communication between OVERSEER and the Inventory, and asked that a quarterly meeting be established to discuss findings and updates which are common to both models and agree a process for notifying MPI of OVERSEER changes that affect the Inventory.

Action 6 – 7: Completed

Action 8: Joel Gibbs informed the panel that he had discussed developing a new model with StatsNZ however they had outlined limitations with this. Joel Gibbs explained that MPI would instead be commissioning a review of these assumptions.

Harry Clark noted that the model (and assumptions) had been established in 2003 and a review was sensible given new information and the time that has elapsed since.

Action 9: Crop-burning – Joel reported that additional data on crop burning from the 2017 Agricultural Production Census is currently being compiled and peer-reviewed by Stats NZ

Action 10: Explanation of negative Nex values in the detailed inventory outputs – Joel reported that some notes were being added to the model to explain this, and that current work on liveweight calculations could affect these values in future (i.e. change them to non-negative values). Harry commented that he didn't see this as a big issue.

Action 11: Joel Gibbs discussed the review of growth curves for use in the AIM.

Action 12: Completed.

Action 13: Harry Clark explained that the BERG work had not been released. Philip Wiles agreed that the BERG report could be shared with the panel in confidence.

Action 14 – 16: Completed

The minutes were accepted by the Panel.

ACTION 1: MPI to share procedures for testing code in the AIM with the panel.

ACTION 2: MPI (Inventory team) and OVERSEER to establish quarterly meetings

ACTION 3: MPI (Philip Wiles) to share the BERG report with the panel

Panel Paper: Direct N₂O emission factors to livestock excreta based on hill slope

Gerald passed on to Harry to chair.

Recommendation one: Beef + Lamb NZ data and the Nutrient Transfer Model outlined by Saggar et al (2015) be used to allocate total dung and urine between low, medium, and steep slopes for non-dairy cattle, sheep, and deer.

The panel approved this recommendation.

Recommendation 2: the emission factors for direct nitrous oxide emissions from animal excreta ($EF_{3,PRP}$) be disaggregated based on stock type and hill slope.

Surinder Saggar asked the panel to note that the paper had been published in Agriculture, Ecosystems and Environment (a peer-reviewed journal).

The panel discussed issues with how the studies had been grouped. Keith Lassey found the findings misleading as they did not make recommendations for animals on flat land (other than for dairy cattle, for which they used the default $EF_{3,PRP}$). Harry Clark raised concerns about systematic biases in the emissions factors from excluding animals on flat land in the analysis.

Joel Gibbs explained that this point had been raised with Tony van der Weerden, Tony had explained that there was evidence that the $EF_{3,PRP}$ for dairy cattle on sloped land were not significantly different to $EF_{3,PRP}$ for dairy cattle on flat land.

Surinder Saggar explained that including livestock classes from flatland in the study introduced bias due to large amounts of flat land data (in comparison to other land types).

Gerald Rys raised the point that dairy cattle could graze on sloped land, the panel agreed that activity data for dairy cattle grazing sloped land in New Zealand did not exist.

The panel saw the benefit of including the change in the 2019 submission of the Inventory and were in agreement that there was a difference between hill slopes and flat land. However, the panel was not convinced that there was enough statistical justification for applying different emissions factors to low, medium, and high slopes.

The panel agreed that the meta-analysis paper findings should be published in a peer-reviewed journal.

The panel had no concerns using the average of the sheep and beef emission factors to calculate the emission factors for deer.

MPI was given the option of running the analysis run again, including flat land observations for all animal types. MPI could then provide the panel with more information including the p-values and confidence intervals of the proposed $EF_{3,PRP}$ values.

ACTION 4: AgResearch to revisit how flat land is integrated with the slope and provide new emission factors for sheep, beef, deer and dairy which combine the flat land and low-slope values. AgResearch will also provide p-values from the *Tukey multiple comparison of means* for the revised results.

ACTION 5: MPI to provide the panel via email with the new results from action 4:

ACTION 6: The panel to decide (using the information from actions 4 and 5) whether there is enough statistical justification to include hill country $EF_{3,PRP}$ values in AIM (before the 2019 Inventory submission). Specifically, the panel will consider:

Whether the emission factors re-calculated for low slopes (which combine flatland and low slope data) are appropriate for sheep, beef and deer, and whether they should be adopted for the inventory

Whether the calculated emission factors for dairy cattle on flatland are appropriate and should be adopted in the inventory

Based on the p-values from action 4, whether method one or method three should be used to determine the emission factors

ACTION 7: MPI/AgResearch to publish the meta-analysis paper in a peer-reviewed journal

Panel Paper: A revised methodology for splitting nitrogen between livestock dung and urine

Gerald Rys introduced the paper and outlined the recommendations.

The panel discussed the size of the change, Gerald Rys noted that the change make very little difference to emissions estimates and questioned whether there was any point in making the change.

Harry Clark noted that the method was more justified and robust which makes the agricultural Inventory more defensible.

Cecile de Klein questioned whether there was a good reason for why the split of excreta N would be different in sheep than for why dairy cattle, beef cattle and deer. The equation is quadratic, and could the inventory produce erroneous values if the inventory data sat outside the range of the study.

The panel discussed whether the studies underlying data was representative, where the data was from, and the relative robustness of data collected from dung vs that collected from urine. The panel noted (as did the reviewer) that the greater source of uncertainty in AIM is the variability due to N content in diet.

MPI informed the panel that the changes could be easily implemented in the AIM.

The panel approved the recommendations but noted some corrections to be made to the panel paper document and asked that the paper be published in a peer-reviewed journal.

ACTION 8: MPI to make corrections to bullet point 23, and include units in the panel paper *A revised methodology for splitting nitrogen between livestock dung and urine*.

ACTION 9: MPI/AgResearch to look at publishing the paper

Panel Paper: Use of revised activity data on dairy effluent management

Gerald Rys gave an overview of this paper, and explained that the purpose was to reflect changes in effluent management practices that have occurred over time

Mike Rollo explained how the model worked and how it was implemented in AIM.

The panel discussed the activity data that could be used for this work, and what sources were available at present.

Caroline Read explained that OVERSEER that while theoretically you could get a profile of actual manure management use, there was not currently enough farms in OVERSEER to get a good national representative. Joel Gibbs explained the different data sources that could be used and the current limitations of them, and the new data sources (such as the Agricultural Production Census) that could be used in future years for data on manure management systems. Joel also discussed the current research on manure management contracted through the GHG inventory fund, and the workshop planned for next year

The panel discussed that this was just changing the data, and whether the panel needed to be consulted when MPI updates activity data. MPI explained that they did not think that this was necessary, however since this was a change from a static parameter to a variable one that they believed they needed to inform the panel.

The panel noted that table 2 in the report *Trends in dairy effluent management* was very confusing and asked that it be changed.

The panel noted that New Zealand had been criticised on the values it had used for dairy excreta entering manure management systems and that it was reassuring to see that the use of them was not vastly different to what had previously been in the model.

The panel agreed that that future updates on data are carried out by MPI and do not need to be brought to the attention of the Panel. However the panel should be notified of anything that was likely to become an issue.

The panel approved the recommendations.

ACTION 10: MPI to speak to AgResearch about correcting table 2 in the report *Trends in dairy effluent management*

Panel Paper: Improvements and corrections to inventory model

Correction to calculation of metabolisable energy requirements

Joel explained that the model includes the metabolisable energy for conception in the metabolisable energy for production term, which leads to metabolisable energy being multiplied by 1.1 which is incorrect.

Mike Rollo explained that this is a technical error that is present in every version of the model that he has access to. The panel agreed that it was a technical error that should never have occurred. The panel approved the change.

Harry noted that the report by David Wheeler was a draft, and should be treated as a confidential until it is finalised.

The panel discussed the OVERSEER paper that identified the error, Caroline Read noted that this describes very well the differences between AIM and OVERSEER. Harry Clark committed to consider what parts of the report apply to AIM.

ACTION 11: Harry Clark to identify what parts of the OVERSEER report apply to AIM and to notify MPI of these.

Improvement to agricultural inventory model to operate at a daily time step

Joel Gibbs outlined the improvements that MPI has planned. Mike Rollo explained how the AIM currently works to the panel.

The panel agreed that this was a very useful modification to AIM, and noted that this could relate to mitigation strategies.

The panel took a break for lunch at 1.00 pm and the meeting resumed at 1.30 pm

Overview of the Greenhouse Gas Inventory Fund strategy and four year research plan

Status of current research

MPI talked the panel through the 2018/19 Greenhouse Gas Inventory fund (GHGI fund) procurement plan.

Pasture quality data collection: Joel Gibbs explained that this project is underway, that it was largely in hill country, year long, and samples were being collected each month. Mostly from sheep and beef farms, with a few dairy farms.

Understanding cattle methane yields: Joel Gibbs informed the panel that MPI should get results of this project in 2019.

Meta-analysis for emissions factors from nitrous oxide emissions from livestock on hill country: Complete

Understanding nitrous oxide emissions (projects 4 and 5): Joel Gibbs explained that these are similar projects.

Support for 2019 refinement to the 2006 IPCC guidelines: Gerald Rys commented that this was going to be important and asked if there was going to be a coordinated government response for commenting on the refinement.

Land-use modelling network: Jamie Ash gave an overview of the papers produced from this work. Gerald Rys mentioned that it was topical at present, and Andrea Brandon asked if the LUCAS team from MfE had been involved in any of the work. Jamie Ash explained that members of MfE had attended workshops in April/May 2018. Members of the Panel noted that there would be increasing public scrutiny of GHG projections as they could (among other things) be used to determine emissions budgets.

Review of weight calculations in agricultural inventory model: There were no comments on this review however the Panel discussed a new version of New Zealand's Agricultural Greenhouse Gas Inventory document. Joel Gibbs explained that the methodology document will be published on the

website in approximately a month. Gerald Rys noted that the issue is ensuring that there is methodology document is ready and updated so it was not out of date for the in-country review in 2019.

Gerald Rys asked the panel if there were any further comments on the existing projects. There were no further comments on existing projects.

Refinement of feed use estimates in the dairy industry: Joel Gibbs explained that this is a revision of some work that was done several years ago to make it more fit for purpose for use in the Inventory.

Manure management inventory network: Joel explained the purpose of this project and its scope to the panel.

Estimates of methane via inverse modelling: Jamie Ash explained that this project was building on an earlier project by NIWA. Harry Clark raised concerns about the earlier work, which make the assumption that there is no seasonal variation in methane. MPI have made NIWA aware of this, and they are working more to ensure this is addressed in this project.

Development of an advanced livestock monthly population model: Joel Gibbs explained that his work had stalled due to data limitations, instead MPI is proposing to review the current AIM to investigate how it could be improved.

Review of animal walking distances: Joel explained that this would consider how far all livestock types were walking. The panel discussed whether this was likely to have a large effect on the Inventory and agreed that it was important information.

Programming support for agricultural emissions modelling: The panel discussed moving the Inventory model to a daily time step. There were concerns that this would slow down the model, Mike Rollo did not think that it would considerably slow down the processing speed of the model.

Updating and improving the goat inventory: Joel Gibbs explained that MPI had commissioned this work due to numbers of dairy goats being unknown. Mike Rollo asked if there was likely to be enough data for a Tier 2 model. Joel Gibbs explained that it was not clear at present and would depend on the recommendations. The panel wondered if there was any justification in doing work on dairy sheep.

How to enhance soil carbon reporting: Joel Gibbs explained that MPI was not actually looking to do anything on, trying to co-ordinate with NZAGRC. Harry Clark gave an update on the progress of that work and will keep MPI informed.

Projections of agricultural emissions: Joel Gibbs gave an overview of this research and explained that it was a requirement for MPI to produce projections for national communications and biennial reports. The panel discussed how to co-ordinate this work with others across government and the high level of scrutiny they might receive. MPI agreed to co-ordinate with other agencies.

Forestry projects: Andrea discussed these projects with the panel, as this work is commissioned by a different part of MPI. Gerald Rys noted that there needed to be a balance of money spent on agriculture and forestry in the GHGI fund.

A list of projects listed in the procurement plan as standby were briefly discussed, including nitrous oxide hotspots, background emission factors, and understanding the effect of nitrogen deposition rates, volume and concentration on emissions

ACTION 12: Harry Clark to keep MPI informed on the progress of NZAGRC soil carbon research

ACTION 13: MPI to co-ordinate with other agencies and policy makers on the agricultural emissions projections project.

ACTION 14: MPI to keep other agencies informed of the results of the agricultural emissions projections project.

Prioritisation of future research

The panel discussed the priority levels of the remaining projects. Areas that were identified as a priority were pasture quality and work that focussed on incorporating mitigation options. MPI will continue to consider how mitigation options could be incorporated in the Inventory when commissioning research out of the GHGI fund.

ACTION 15: MPI to consider how mitigation options could be incorporated in the Inventory when commissioning research out of the GHGI fund.

Other Business

The panel noted that it would be useful to be notified of any review dates. MPI agreed to notify the panel of review dates.

The panel discussed how any change to the Inventory (particularly the new $EF_{3,PRP}$ values) would be communicated to the public and to other agencies. Andrea Brandon explained that the Inventory submission had a communication strategy and that this was co-ordinated by the Ministry for the Environment (MfE).

The panel also discussed the importance of the panel being informed before the panel papers and minutes were published. MPI have agreed that they will publish the panel papers and minutes at the same time as the inventory (11 April 2019).

MPI discussed dates for the 2019 Agricultural Greenhouse Gas Inventory conference with the panel, the option of combining with the NZAGRC conference in Palmerston North in April was discussed. MPI and NZAGRC agreed to discuss this further, NZAGRC to let MPI know the dates for their conference.

Andrea Brandon informed the panel of the dates for government review of IPCC guidelines. These were between the 28 January and 24 March. There is likely to be a submission process co-ordinated by MfE. MfE will be in contact with MPI regarding the government review of IPCC guidelines at a later date.

ACTION 16: MPI to work with MfE to ensure there is a robust communications plan for the 2019 submission.

ACTION 17: MPI to inform the panel when they publish the panel papers and minutes, this will be at the same time as the inventory (11 April 2019).

ACTION 18: Harry Clark to send dates of NZAGRC conference to MPI

ACTION 19: MfE to contact MPI regarding the government review of IPCC guidelines

ACTION 20: MPI to inform the Panel about inventory review dates when they become aware of them

Gerald closed the meeting at 3.20pm

Summary of Actions

- ACTION 1: MPI to share procedures for testing code in the AIM with the panel.
- ACTION 2: MPI (Inventory team) and OVERSEER to establish quarterly meetings
- ACTION 3: MPI (Philip Wiles) to share the BERG report with the panel
- ACTION 4: AgResearch to revisit how flat land is integrated with the slope
- ACTION 5: MPI to provide the panel via email with the new results including p-values and confidence intervals for the propose $EF_{3,PRP}$ values.
- ACTION 6: The panel to decide whether there is enough statistical justification to include hill country $EF_{3,PRP}$ values in AIM (before the 2019 Inventory submission).
- ACTION 7: MPI/AgResearch to publish the meta-analysis paper in a peer-reviewed journal
- ACTION 8: MPI to make corrections to bullet point 23, and include units in the panel paper A revised methodology for splitting nitrogen between livestock dung and urine.
- ACTION 9: MPI/AgResearch to look at publishing the paper
- ACTION 10: MPI to speak to AgResearch about correcting table 2 in the report *Trends in dairy effluent management*
- ACTION 11: Harry Clark to identify what parts of the OVERSEER report apply to AIM and to notify MPI of these.
- ACTION 12: Harry Clark to keep MPI informed on the progress of NZAGRC soil carbon research
- ACTION 13: MPI to co-ordinate with other agencies and policy makers as this work progresses
- ACTION 14: MPI to keep other agencies informed of the results of this project
- ACTION 15: MPI to consider how mitigation options could be incorporated in the Inventory when commissioning research out of the GHGI fund.
- ACTION 16: MPI to work with MfE to ensure there is a robust communications plan for the 2019 submission.
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