



---

## REVIEW OF POPULATION MODELS WITHIN THE NATIONAL METHANE INVENTORY (2010)

---

**Authors:** Andrea Pickering

**Main Purpose:** ☒ Decide ☒ Discuss ☐ Note

### Purpose of Report

1. Seek approval from the Agricultural Inventory Advisory Panel to change parameters in the current population models used in the Methane Inventory programme.
2. Attached to this paper are:
  - a. The report “*Review of Population Models within the National Methane Inventory (2010)*”.
  - b. The review of the above report by RD Thomson.

### Summary

#### *Background*

3. New Zealand has an obligation under the Kyoto Protocol and the Climate Change Convention to report the anthropogenic greenhouse gas emissions emitted by the country on an annual bases. Emissions are reported in the annual submission of the National Inventory Report submitted to the UNFCCC. New Zealand also has a commitment under the Kyoto Protocol to keep these emissions at 1990 levels, and if this is not achieved then New Zealand obtains a liability.
4. The National Inventory Report forms the base of any liability that the country may have under the Kyoto Protocol. Therefore, reported emissions need to be as accurate as possible. New Zealand has a long-standing research program in developing country-specific emission factors to aid in the improvement of reported emissions.
5. As part of this research program, a review of the current assumptions and parameters used in the current Methane Inventory programme was carried out, in order to ensure that the assumptions and parameters used were in line with New Zealand farming practices.

### *Current Inventory assumptions and proposed changes*

6. The Inventory model estimates dry matter intake, based on productivity inputs and population models which assume certain parameters due to the lack of verifiable data. The estimates of methane and nitrogen excretion are then derived from the estimated dry matter intake.
7. Below is a list of the parameters used in the current Inventory model which were reviewed and the proposed change recommended.

#### *Sheep*

- a. Lambing date 1 September – change to 11 September.
- b. One slaughter date for lambs in February – change to two slaughter dates with 84 percent of lambs slaughtered 28 February and the remainder 31 August using the average carcass weight for each month as input values.
- c. Cull ewe slaughter date 31 March – change to 20 January.
- d. Dry ewes are continued to be “farmed” for a further 12 months – change to culling of all dry ewes 31 July.
- e. Death rate of 5 percent for breeding ewes, 2 percent for weaned lambs and hoggets – change to 4.5 percent in weaned lambs, 3.6 percent in hoggets and 5.6 percent in ewes.
- f. Death of ewes evenly dispersed over entire year – change to 40 percent of ewe deaths over August and September. Spread remainder of deaths evenly throughout the remainder of the year.
- g. Dressing out percentage of ewes 43 percent – change to 40 percent.
- h. Linear change in ram numbers from one year to the next – cull rams 28 February.
- i. Ram growth rate 50 g/day – change to 0 g/day.
- j. A linear change in wether numbers from one year to the next to account for change in population between years – change to adjustment of wether numbers on 1 October.

#### *Cattle*

- k. Calving date 1 September – change to 20 September
- l. Beef cow slaughter date end of February – change to 31 March.
- m. Replacement heifers making up 25 percent of beef herd – change to 17 percent.

- n. Cow death rate 2 percent evenly across entire year - change to 2.7 percent with 50 percent occurring in September and the remainder of deaths spread throughout the remainder of the year.
- o. Changes in bull numbers occur evenly across the entire year – change to surplus bulls being culled in January and February, increases in bull numbers to occur through increases in bull calves kept.
- p. Heifers slaughtered at 1 and 2 years old on 1 September – change to slaughter date 31 October so that heifers are still 2 years old once the calving date has been changed (point k).
- q. Bulls slaughtered at 1 and 2 years old on 1 September – change the 2-year-old slaughter age to 18 months.
- r. Steers slaughtered at 12 and 24 months old – change to 12 (1 September) and 28 (1 February) months.

#### *Deer*

- s. Baseline liveweight for hinds currently 110 kg – change to 95 kg.
- t. Calving date 1 December – change to 17 November.

#### *Dairy*

- u. No death rate assumed for dairy cows – change to a death rate of 2.1 percent with half of the deaths occurring in August and the remainder of deaths occurring throughout the year.
- v. No milk accounted for calves on dairy farms or colostrum production – change by adding 107 litres of milk to the first half of each annual lactation.
- w. Calving date 1 August – change to 13 August when running the model nationally and use regional specific data when running the model for each region.
- x. Changes in Bull numbers occur evenly across the entire year – change to surplus bulls being culled in January and February, increases in bull numbers to occur through increases in bull calves kept.

#### *Report*

- 8. The aim of the review was to investigate available data sources and determine if the assumptions within the model could be improved.
- 9. The report also recommended that a closer look at dairy cow growth rates and liveweight profiles using across breed/region data from LIC and other sources should be carried out.

## **Implications to emissions estimates**

10. Currently it is difficult to determine the full implications of these changes to the emissions estimates due to the coding of the inventory model. Work is currently under way to improve the flexibility of the code and therefore the ability to determine how changes to model assumptions will effect the emission estimates.

## **Reviewer comment**

11. The reviewer was generally positive about the report and suggested a few other sources of data that could be looked into in the future.
12. The reviewer did not agree with the following four recommendations;
  - a. Recommendation i) – Ram growth rate 50 g/day – change to 0 g/day.
  - b. Recommendation p) – Changes in bull numbers occur evenly across the entire year – change to surplus bulls being culled in January and February, increases in bull numbers to occur through increases in bull calves kept.
    - i. The reviewer did not comment on recommendation y) as the same arguments apply to this recommendation.
  - c. Recommendation r) – Bulls slaughtered at 1 and 2 years old on 1 September – change the 2-year-old slaughter age to 18 months.
  - d. Recommendation u) – Calving date 1 December – change to 17 November.

## **Response to reviewer comments**

13. Until further information can be gathered it is proposed that only those changes which the reviewer agreed with will be put forward. Therefore the four recommendations above (detailed in paragraph 12) are not put forward for consideration.

## **Strategic Risks**

14. The changes may not be accepted by 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 IPCC default before any penalty would be applied.

## **Strategic Opportunities**

15. New Zealand will be meeting the UNFCCC obligations of continual improvement of the National inventory.
16. Emissions from New Zealand Agricultural Inventory will be calculated more accurately and models will more accurately reflect industry practices.

## Recommendations

It is recommended that the Agricultural Inventory Advisory Panel:

17 **Agree** that the recommendations detailed in paragraph seven for:

*Sheep - points a. to j.,*

*Cattle – points k to r, excluding o., p., and q.,*

*Deer s. – t.,*

*Dairy u. – x.,*

*should be implemented in the National Methane Inventory model in time for the 2012 submission to the UNFCCC*

**Agree / not agreed**

1. **Agree** that the three recommendations that the reviewer did not agree with in paragraph 7 should not be incorporated until further data analysis has been carried out, those being

*Cattle - points o., p., and q.*

**Agree / not agreed**

Andrea Pickering  
Senior Policy Analyst

**Approved/ Not Approved/ Approved as Amended**

Alice Marfell-Jones  
Manager Information and Analysis  
Chair Agricultural Inventory Panel

Date