MAF POLICY
Agricultural Inventory Panel Meeting
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REVIEW OF THE POPULATION MODELS AND EWE AND BEEF COW LIVEWEIGHTS USED IN THE INVENTORY

Authors: Andrea Pickering

Main Purpose: ☐ Decide ☑ Discuss ☑ Note

Purpose of Report

1. The purpose of this paper is to bring to the panel's attention the recent work carried out on estimations of ewe and beef cow weights, and the population models used within the national inventory.

2. Attached are two reports

   a. *Better estimation of national ewe and beef cow liveweights*

   b. *Review of population models within the national methane inventory (2010)*

Summary

3. These reports were commissioned to validate data currently used in the Inventory model used to estimate the greenhouse gas emissions from the agricultural sector in New Zealand.

4. These reports are yet to be reviewed by an independent reviewer. Due to the extensive size of the recommendations it was determined that these should be bought to the attention of panel members before being reviewed so that the intended next steps can be discussed.

5. The recommendations were discussed with Harry Clark, the original developer of the population model, to determine ease of implementation and possible influence on the final emissions estimate. Recommendations were prioritised for work requirements on the inventory model, based on ease and outcome.

6. Many recommendations in the report would be difficult to implement in the Inventory model current set up. The population models are formulae within the Inventory model spreadsheets. The recommended changes are inputs into these formulae that are currently written in. The formulae need to be extracted and coded to become an external model which then feeds into the Inventory model.

National ewe and beef cow live weight

7. National ewe weight is currently estimated using slaughter statistics and a dressing out percentage. This may cause some bias as slaughter ewes tend to be those at the end of their life and are therefore often old and sick, resulting in a lower weight. This would become an input into the coded population model.

8. Beef cow weight is determined using dairy cow weight, cow slaughter statistics and replacement rate in the beef herd.

9. The report suggests that both live weights are currently under accounted in the national inventory. Recommendations are

    a. Changing the dressing out percentage for slaughter ewes from 43% to 40%. This would bring the live weight more in line with published data on breeding herd live weight

    b. The report suggests that beef cow weights have increased more since 1990 than the current weight estimation methodology estimates. Although there appears to be some under estimation of weight in 1990, it is possibly more prominent in 2008. The report suggests increasing the live weights of beef cows in 2007/08 and extrapolating back to 1990 from this 2007/08 figure using a value of 8.5 kg/year.

    c. The workbook used for estimating beef cow weight needs to incorporated into the automated inventory program recently developed.

Population models within the national methane inventory

10. This report extensively assesses the current population model within the Inventory model. It covered lambing/calving dates, slaughter dates and age, death rates, movement of animals between categories, liveweight gains, replacement rates and lactation amount. There are a total of 25 recommendations for sheep, beef, dairy and deer.

11. Lambing and calving dates reported need to be checked to see if they were weighted for region. If these are correct they will become an input into the population model.

12. Splitting of *the* lambing slaughter date into two different dates will be complex. This is because an extra category within the Inventory model needs to be developed. The outcome of this split is uncertain.

13. Changing *the* slaughter date for various livestock categories will become an input into the external population model. However, changes to the slaughter date of many of the livestock categories will not influence the final emissions estimate due to how the model "growths" the populations. However, will be carried out once the population model has been coded to ensure model consistency with industry practices.

14. Death rates are population model inputs and will be implemented when this is coded.

15. Adjusting the movement of animal populations from one age category to another is a population model input and will be implemented when this is coded. In some cases it

will make little difference to the over all inventory value but will be done to insure consistency with industry practices.

16. Ram live weight gains are a population model input and will be implemented when this is coded. A small change.

17. Retaining a set percentage of beef heifers as replacements is a population model input and will be implemented when this is coded.

18. Changing the age of slaughter heifers and bulls is a population model input and will be implemented when data is checked and the model is coded. Changing the age of slaughter steers is more problematic as it requires another livestock age category to be developed.

19. The recommendation in the report on hind live weight needs to be confirmed before any further work is carried out.

20. The addition of extra milk to a cow's annual lactation amount can easily be implemented in the input workbooks. *This results in a small increase in emissions due to the extra energy required to produce the increase in milk production.*

Proposed changes to inventory

High priority

21. Extract inputs such as dressing out percentage from within the model and code as a separate population model which feeds into the inventory model, rather than formulae sitting within spreadsheets.

22. Incorporation of 107 litres of milk to each cow's lactation to allow for milk fed to calves.

Low priority – to be carried out once all other changes have been implemented and if funding allows

23. Splitting slaughter date of lambs into two separate dates.

24. Changing the average age of slaughter steers from 24 months to 28 months.

Proposed changes to initial report and justification

25. The report suggests using a value of 8.5 kg to extrapolate back from an adjusted 2007/08 figure to 1990. This value was only determined from data obtained from 1997/98 to 2008/09. This methodology does not take into account between year variation and it is difficult to determine if this relationship would continue back to 1990. Using the current methodology, if the dressing out percentage is changed to 42.6% as suggested in the report, dairy dressing out percentage is changed to 42% (slightly lower than that of beef) and the cow replacement rate is changed from 24% to 17% as suggested in the report, values of 390 kg for 1990 and 559 kg for 2008/2009, in alignment with figures in the current reported. Using this method changes in weight due to drought etc will be picked up.

26. It is suggested that that the recommendation of killing of all dry ewes at the end of July rather than farming for a year is not carried out. This is because it is a very contentious issue (i.e. may not occur in years where farmers are trying to increase breeding herd size) and also because it will have little affect on the over all Inventory emissions value.

27. The influence of seasonal live weight change on the outcome of the inventory emissions estimate was assessed when the model was originally developed. It was found that taking a yearly average, and using a seasonal live weight change produced the same results. Therefore, due to the complexity of incorporating this into the model, it is suggested that this recommendation not be followed up on.

Response to reviewer comments

28. These reports need to be reviewed before final numbers are presented to panel members scheduled for the panel meeting in 2011.

Strategic Risks

29. 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

30. New Zealand will be meeting the UNFCCC obligations of continual improvement of the National inventory.

31. 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 Panel:

32. **Note** that population model and ewe and beef cow live weight assumption have been assessed and reported on. There are extensive recommendations some of which are difficult to implement and some will have little affect on the final agricultural inventory emissions figure. Once data has been reviewed by an independent reviewer, suggested data inputs will be presented to the panel for assessment *in 2011*.

Noted as amended

Andrea Pickering
Senior Policy Analyst

Approved/ Not Approved/ Approved as Amended

Alice Marfell-Jones
Manager Monitoring and Evaluation
Chair Agricultural Inventory Panel

Date