

#01 Whole-farm greenhouse gas modelling

Australia has a target to reduce its total greenhouse gas emissions (GHG) emissions by **5%** by 2020, compared with the levels in the year 2000¹. Agriculture produces **16%** of Australia's total GHG emissions on an annual basis² (this is on-farm emissions only and does not include pre- or post- farm emissions).

GHGs are emitted in the normal course of agricultural production including through livestock enteric fermentation, wastes, diesel machinery and fertilisers. The most significant gases produced as a result of agricultural production are carbon dioxide, methane and nitrous oxide. Importantly the amount produced is influenced by farm management decisions.

Everyone can make a contribution to reducing GHG emissions through the management choices they make. For individual farm businesses there is a two-stage process involved when embarking on an assessment of a farm's carbon footprint:

1. Estimate what your emissions are (it is recommended you use a GHG emissions calculator).
2. Investigate opportunities to reduce and/or offset those emissions.

WHY USE MODELS

Modelling is a way for farmers to test different scenarios and their effect on a complex farming system, without going to any on-ground expense. The Holbrook Landcare Network (HLN) has modelled virtual farms and developed real-farm case studies. This was carried out as part of the 'Carbon Farming and your business' project to create local awareness of the various sources of GHG emissions on farms and look at the ways landholders in the Holbrook region can reduce or offset their GHG emissions.

The magnitude and source of GHGs were predicted using the Greenhouse Accounting Framework (GAF) tools developed by the University of Melbourne and found at www.greenhouse.unimelb.edu.au/Tools.



WHAT WE DID

Four virtual livestock farms, representative to the Holbrook region, were modelled using CSIRO's whole-farm modelling support tool GrassGro found at: <http://www.hzn.com.au/grassgo.php>.

Using GrassGro modelling, in conjunction with the GAF tool, enabled HLN to predict the total GHG emissions from these enterprises (see *On-farm Greenhouse Gas Emissions Factsheets Series*, factsheets 3 and 4).

The aim was to:

- determine the effect of time of lambing/calving on GHG emissions,
- determine the effect of stocking rate on GHG emissions,
- calculate the mitigation required for each systems,
- demonstrate the difference in gross margin between systems.

In addition, eight real-farm enterprises were also audited for their GHG profile (see *On-farm Greenhouse Gas Emissions Case Study Series* at www.holbrooklandcare.org.au/carbon/).



On-farm Greenhouse Gas Emissions Factsheet Series

This factsheet has been developed by Holbrook Landcare Network as part of the 'Carbon Farming and your business' project. This factsheet can be accessed on the Holbrook Landcare Network website www.holbrooklandcare.org.au/carbon.

Factsheets in this series:

- #01 - Whole farm greenhouse gas modelling
- #02 - Revegetation to offset greenhouse gas emissions
- #03 - Modelled cattle enterprise
- #04 - Modelled sheep enterprise

REFERENCES

1. Department of the Environment. (n.d). Australia's emissions reduction targets. Australian Government. Retrieved from www.climatechange.gov.au/climate-change/greenhouse-gas-measurement-and-reporting/australias-emissions-projections/australias
2. National Greenhouse Gas Inventory. (2012). National greenhouse gas inventory—Kyoto Protocol Accounting Framework. Retrieved from <http://www.ipcc.ch/report/ar5/wg3/>

The GHG emissions in this factsheet series have been calculated by inputting figures modelled in GrassGro, available at <http://www.hzn.com.au/grassgro.php>, into the Greenhouse Accounting Framework (GAF) calculators from www.greenhouse.unimelb.edu.au/Tools.htm. Holbrook Landcare Network and its employees do not guarantee that the modelled information is without flaw or assumption. Holbrook Landcare Network recognize that the options presented are not all viable or realistic options for every business. These figures only take into account actual on-farm emissions and do not take into account any off-farm GHG emissions.

This project is supported by funding from the Australian Government.

