Holbrook Landcare Network

carbon farming and your business

On-farm Greenhouse Gas Emissions Factsheet Series

#03 Modelled cattle enterprise

Holbrook Landcare Network used CSIRO's farm modelling decision tool GrassGro and the University of Melbourne's Greenhouse Accounting Framework (GAF) calculator to model the greenhouse gas (GHG) emissions of two cattle enterprises, over two stocking rates. These were hypothetical properties, representative of cattle enterprises in the Holbrook area of southern NSW. The stocking rate, and therefore dry sheep equivalent (dse) was determine by soil fertility and pasture quality.

The objective was to provide baseline GHG emission information for these enterprises and the mitigation potential in the Holbrook area.

Enterprise 1 - Autumn calving

- Low stocking rate (7.5 dse/ha)
- High stocking rate (15.3 dse/ha)

Enterprise 2 - Spring calving

- Spring calving, low stocking rate (8.7 dse/ha)
- Spring calving, high stocking rate (15.1 dse/ha)

The figures for each enterprise are based on a typical 1000 ha property in the Holbrook region with an annual rainfall >700mm. The enterprises both have self-replacing Angus cattle herds with Phalaris and sub-clover based pastures.

TABLE 1. ANNUAL ON-FARM GHG EMISSIONS PROFILE OF GRASSGRO MODELLED SYSTEMS

System	Gross GHG emissions (t CO_2-e)	GHG emissions intensity (t CO_2-e / t liveweight)	Livestock gross margin / ha
Enterprise 1 - Autumn calving			
Low stocking rate	1164	8.08	$ 49
High stocking rate	2334	7.94	$ 188
Enterprise 2 - Spring calving			
Low stocking rate	1561	9.46	$ 90
High stocking rate	2772	9.49	$ 253

SUMMARY

- Low stocking rate results in lower gross GHG emissions, but lower production.
- High stocking rate results in increased production but higher gross GHG emissions.
- High stocking rate results in higher gross margins, increasing the capacity to invest in mitigation activities.
- Low stocking rate generated a low gross margin per hectare and therefore, a very limited capacity to invest in mitigation activities.
- Spring calving produced a higher gross margin per hectare for a similar stocking rate as the autumn system.

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SUSTAINABLE INTENSIFICATION

Productivity growth is essential for global food security and is referred to as sustainable intensification. This is, the increase in food production from existing farmland while minimising pressure on the environment by optimising inputs. In simple terms, farmers must continually strive to produce more from a given area with more efficient use of resources and for less cost.

Beef farmers in the high rainfall zone around Holbrook are achieving this by:

- increasing stocking rate through improving soil fertility and pasture improvement,
- matching feed supply to feed demand by calving in the spring.

The modelled systems have identified that as beef farmers progress down this path, gross GHG emissions will **increase,** as will emission **intensity**, increasing the requirement for larger mitigation programs.

MITIGATION

In these modelled enterprises, situated in the high rainfall zone (> 700mm) of NSW, it is relatively simple to offset the property's total GHG emissions through revegetation. Table 2 outlines what area (ha) is required to offset each enterprise's total GHG emissions and the costs associated with planting consistently over a 20 year period.

TABLE 2. TOTAL REVEGETATION AND COSTS ASSOCIATED WITH BECOMING A CARBON NEUTRAL PROPERTY OVER 1000 HA.

System	Total GHG emissions (t CO2-e)	Total ha required (% of property)	No. ha per year for 20 years	Cost per year over 20 years[a]
Enterprise 1 - Autumn calving				
Low stocking rate	1164	31 (3.1%)	1.6	$ 8,162
High stocking rate	2334	62 (6.2%)	3.1	$ 16,325
Enterprise 2 - Spring calving				
Low stocking rate	1561	42 (4.2%)	2.1	$ 11,059
High stocking rate	2772	74 (7.4%)	3.7	$ 19,484

[a] based on the estimated cost of $5266/ha for revegetation

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

The GHG emissions 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. These figures only take into account actual on-farm emissions and do not take into account any off-farm GHG emissions.

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