

## “Trevenna” sheep production demonstration site of methane emissions on the northern Tablelands of NSW

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**Abstract:** *A demonstration site investigating two production systems for crossbred lambs is currently being evaluated for methane emissions at “Trevenna” Armidale, NSW. The site will give producers and researchers a practical insight into the carbon cycle, in particular methane. The replicated study over two years compares animal productivity and emissions from a low fertility and low stocking rate (hills) with a high fertility and higher stocking rate (flats) treatment. Initial set up characterised the two sites and allowed for equivalent areas to be subdivided. Extensive measurements of the pastures and livestock are being made. Other measurements being recorded, include soil water, nitrous oxide and weather data. Analysis of the systems will be investigated using four decision support tools. The site will also enhance knowledge of methane dynamics in terms of farm carbon and productivity to northern Tablelands producers and researchers.*

**Key words:** on-farm emissions, life cycle measurements, whole-farm system models, mitigation

### Introduction

A 36 ha demonstration site based at the University of New England’s “Trevenna” property, on the northern Tablelands of New South Wales (NSW, 30° 28’57.28”S; 151°38’2.47”E) has been established. It is one of four national sites across Australia that has been established in collaboration with Meat & Livestock Australia and the Australian Government’s Climate Change Research Program to demonstrate potential mitigation strategies for enteric greenhouse gas emissions from ruminants. It is a joint project between the Department of Primary Industries and the University of New England.

The “Trevenna” project will equip northern Tablelands producers and researchers with knowledge and tools for understanding on-farm sheep production and methane emissions. It will demonstrate the lifecycle of greenhouse gas emissions in sheep grazing enterprises, contrast two sheep grazing systems in different landscapes, and show different methods of predicting and measuring on-farm methane production. Decision support tools will also be used to estimate methane emissions from the site. The site will also be a training facility

for undergraduate and postgraduate students learning about on-farm emissions, life cycle measurements and whole-farm system models.

### Methods

The “Trevenna” demonstration site has a summer dominant rainfall and varies in elevation from 1068 to 1022 m asl. The site has two different landscapes: hills and flats. The hill country is dominated by summer-growing native species, interspersed with yearlong green native grasses and naturalised cool-season introduced species. The flats are dominated by perennial introduced species with a large percentage of legumes.

An initial EM38 survey and soil samples stratified the landscapes and paddocks for the demonstration. Additional subdivision occurred to block each landscape into three classes and three paddocks within each class. Botanical composition will be examined each season within the two landscapes. Fertiliser has been applied at a rate of 20 kg/ha of phosphorus, 25 kg/ha of sulfur and 70 kg/ha of nitrogen to the flats that has assisted in delineating the differences between the two landscapes.

Stocking densities were determined using PRO Plus<sup>TM</sup> (McPhee *et al.* 2000). Fodder budgets indicated a stocking rate of 3.7 dry sheep equivalents (DSE)/ha on the hills and 6.7 DSE/

ha on the flats. Merino ewes were sourced from the UNE Merino research flock and were joined to Border Leicester rams in April 2010. Allocation of the pregnant ewes was randomised and lambing occurred in September 2010.

Monthly pasture (green herbage mass, legume percentage and quality) are recorded and regular animal production data (liveweight, condition score, fecundity, wool and carcass weights at slaughter) are being collected. In addition, pasture scans of the paddocks are made by the Crop Circle (Holland Scientific equipment model ACS210) to determine its correlation with measured herbage mass each month. Water holding capacity and nitrous oxide measurements are also being recorded from the site. The design of the demonstration site, including the replication, animals and pasture measurements have been described by McPhee *et al.* (2010).

## Results and discussion

Data collected will be important in our understanding of whole-farm sheep production systems on the northern Tablelands of NSW. Information will be used in models such as AusFarm and EcoMod, and inventory models such as FarmGas and OVERSEER. At the end of the second year (2012), a detailed analysis will examine the differences between the two landscapes. A lifecycle analysis and economic study will also be conducted at the conclusion of the project.

On ground demonstration sites, such as “Trevenna”, are important for improving producers’ and researchers’ knowledge concerning methane emissions. Such sites will enable better decisions on methane mitigation options and will help inform advisors and policy makers. It will also increase the understanding, awareness and adoption regarding methane emissions in farm carbon. The validation of farm system models will be valuable for assessing the whole-farm system consequences and enable the testing of a broader range of mitigation options in the context of the northern Tablelands environment.

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