



NewsLetter No: 8 April 2007

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Introduction

Richard Eckard

A number of key events have taken place in the past 6 months which, combined, have increased the profile and importance of our work in the Greenhouse in Agriculture project. These events include the drought (despite no proven link to climate change), the Stern report from the UK, the visit to Australia by Al Gore and the movie "An inconvenient truth", the IPCC 4th Assessment Report, and finally the emergence of Climate Change as a key issue for the next Federal election. Combined these events seem to have also changed the attitude of mainstream media, from one of always presenting both sides to one of even ridiculing dissenting opinion.

With the IPCC 4th assessment report now providing a greater than 90% probability that greenhouse gasses due to human activities have directly contributed to climate change, the importance of providing the agricultural industries with more accurate science on emissions and options for reducing these emissions has become all the more important.

In addition to our methane and nitrous oxide research, the GIA project is also developing a project on Climate Change Adaptation at the request of the Victorian government. This program of work will include a number of modules of work, including research to better understand the needs and adaptive capacity of the farming community and modelling to predict possible impacts and opportunities presented by Climate Change. In future newsletters we will therefore be including updates from this research as well.



Bert Tanner, Campbell Scientific, installing new chambers at Horsham.

**Evaluation - "Who wants to know?" and "what do they want to know?"**

Don Shaw

These are the words of many an evaluator and are "echoed" by Don Shaw from DPI's Practice Change Group, and GIA's evaluation's officer over the past 18 months.

A largely behind the scenes role, GIA's evaluation activities include providing investors with evidence of impact and the team with vital feedback on performance.

A request was recently circulated to GIA investors, collaborators and interested observers within DPI and DSE Victoria seeking feedback

on the impact of GIA's nitrous oxide research.

In summary, the request for information validated that:

- Policy makers highly valued the information provided to them by GIA, with over 80% of respondents recording a high level of confidence in the research.
- Likewise for science quality, over 80% of respondents recorded a high level of confidence in their perception of the quality of the nitrous oxide research.
- Respondents were more cautious as to their perception of the public's interest in the research findings, with responses distributed from a low to medium level. This view is consistent with GIA's approach to integrating research findings into existing adoption mechanisms such as landholder extension activities.

The Best Management Practices (BMP's) developed from the methane and nitrous oxide research, have been picked up by "next users" such as the fertiliser industry, the dairy industry, local government greenhouse programs as well as the Environmental Management Systems Pathways Project developed by DPI Victoria. The BMP's have been well received given they complement many overall farming system practise that aim to benefit both farmers and the environment.

While GIA has concentrated largely on completing research and informing policy, in particular developing accurate emissions figures, in the future, we intend to increase communicating research outcomes with the farming community directly. This move will compliment GIA's new Climate Change Adaptation module.

Wattle they think of next?

Chris Grainger

"Can natural substances in Australian black wattle trees play a role in the fight against global warming".

The GIA Methane team has moved into a new research phase investigating if low cost dietary supplements can be fed to dairy cattle that, in the first instance increase milk production economically, while also reducing methane production. This new phase is a collaboration involving researchers at DPI Ellinbank and Agriculture and Agri-Food Canada.

As reported in the August newsletter a possible option for Victorian dairying systems may be to extract condensed tannin (CT) from black wattle (*Acacia mearnsii*) and fed to cattle. A recent study with sheep reported a 13% reduction in methane emitted when sheep were fed a mimosa extract from *Acacia mearnsii* (Black Wattle) containing 62% CT. Importantly there was no commensurate drop in feed digestibility that has been reported previously to partly account for lower methane emissions. In addition, there was a favourable effect on nitrogen balance within the animal with less nitrogen excreted in urine and this would lead to lower losses of nitrate leaching and nitrous oxide from urine patches.

A short-term study was conducted at DPI Ellinbank in spring 2006 to determine the effects of CT on methane emissions and nitrogen utilization in dairy cows under Australian grazing conditions (pasture with grain supplementation). The study used 60 lactating cows (3 groups with 20 cows per group) grazing ryegrass pasture and a supplement of 5 kg cracked triticale grain per cow and dosed with different levels of condensed tannin extract for 5 weeks (September/October 2006). Mimosa extract was supplied at: 0 (Control), 1.5%



The tannin used in the research is extracted from the bark of black wattle tree.

(Tannin 1) and 2.45% (Tannin 2) of the estimated dry matter of the cows. Measurements included milk yield and composition, live weight change, and methane emissions.

Methane emissions were significantly reduced by dietary supplementation with tannin and the reduction in emissions was larger with the higher level of supplementation (29% for Tannin 2 compared to 14% for Tannin 1). Reductions in methane emissions due to tannin supplementation were similar in weeks 2 and week 5 implying that the effect was not diminishing over time.

This effect on reducing methane emissions is very encouraging, but unfortunately milk production also decreased with tannin supplementation of the diet. Unlike the study with the sheep there appeared to be a drop in feed digestibility with the lactating dairy cows, perhaps due to the way the tannin was fed, and this probably explains the decreased milk production.

Future work will attempt to retain the desirable decrease in methane emissions, but also gain an increase in milk production.



The Hamilton chambers set up & operating.

GIA Mixed Farming System Project

John Graham

The GIA Mixed Farming Systems project has commenced with the site at Hamilton being established and the set up of the Horsham site under way. The project funded by DPI/DSE, the Australian Greenhouse Office and GRDC will measure greenhouse gas emissions from pasture and crop legume rotation system at Hamilton, and cropping systems at Horsham.

The Hamilton site situated on a long term phosphate experiment is up and running. The automated chambers have been put in place as well as the automatic weather station and soil moisture and temperature loggers. All systems have been tested and gas measurements commenced. The chambers have been set up on a high fertility and low fertility paddocks, with the aim of measuring differences in greenhouse gas emissions, as well as examining emissions when a long-term pasture is converted into a crop-legume rotation.

In late February the GIA team met with Klaus Buttebach-Bahl from the Institute for Meteorology and Climate Research in Germany at the Horsham site to examine one of the new chambers being specially built for the project. The GIA team has enjoyed a long relationship with Klaus who developed the original automated gas collection chambers that have been used at many research sites across Australia. Klaus was very interested the improved design of his chambers being used at the Horsham site which have been locally constructed in Warragul.

Unlike the aluminium chambers originally designed by Klaus, the Horsham chambers are made of stainless steel, with a newly designed lid opening mechanism. Hopefully the design by the team will set a new improved standard for others to follow.

After visiting the Horsham site the GIA team enjoyed a seminar by Klaus at the Grains Innovation Park on the "Effects of Grazing on Matter Fluxes in Grassland of Inner Mongolia".

WA Team Report: 2006 dry, but results are in

Louise Barton

The 2006 growing season at Cunderdin proved to be very different to the previous year. The start to the season was late, and very weak, plus the amount of rain over the growing season (139 mm) was lower than average. Not surprisingly, yields (at 1.8 t ha⁻¹) were also less than that recorded in 2005.

Daily N₂O emissions from the Cunderdin site continue to remain relatively small throughout the 2006 growing season. To date, greatest losses have once again occurred while the site has been fallow, and following summer rainfall events.

Increased N₂O emissions in response to the summer rainfall events may seem surprising as high soil temperatures during summer, coupled with low soil water contents are often associated with low microbial activity in semi-arid soils. However in southern Australia, summer rainfall events often lead to mineralisation of organic matter and increases in mineral nitrogen. In the absence of active plant growth, this freshly mineralised nitrogen is at risk of being subjected to those loss processes (denitrification and nitrification) responsible for the production of N₂O.

Findings from the study were presented at 2007 Agribusiness Crop Updates in Perth on the 15th February.



Louise Barton catching up with data integration in between bus tours from the annual Cunderdin Agricultural College Open Day (September 2006).