

Reducing methane from ruminants: the next steps forward

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Cattle being measured for methane

Agriculture's greenhouse gases

Agriculture generates 16 per cent of the greenhouse gases (GHG) associated with human activity in Australia. This makes agriculture the second largest emission source after the energy sector (Fig. 1). The majority of agricultural emissions are from livestock (74%), with methane liberated from digestion in the gut and from manures, and nitrous oxide liberated from manures and nitrogen fertilisers in the soil. Pigs and poultry are very minor sources of GHGs.

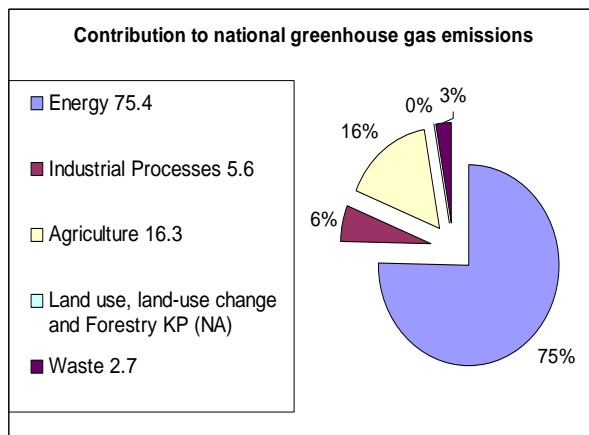
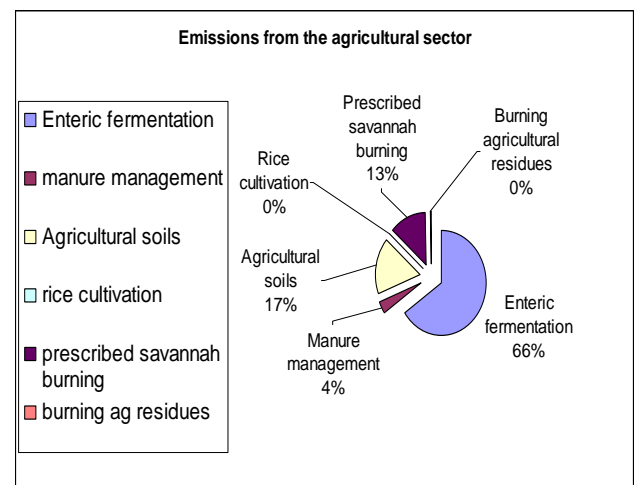


Figure 1. Contribution of agriculture to national greenhouse gas emissions (above) and the contribution of individual industries to the sector emission from agriculture (next column)



Enteric (gut) methane is the single largest agricultural emission (65% of all agricultural emissions) with 58 Mt being produced annually, principally from beef cattle (39Mt), dairy cattle (6Mt) and sheep (12 Mt). On average, Australia's cattle produce 220g of methane per day, representing approximately 6 per cent of the total energy consumed by the animal. The quantity of methane produced is largely determined by the quantity and quality of the feed consumed.

Management practices and greenhouse gas

Management practices that increase the proportion of feed utilised for productive purposes (milk, meat or wool), rather than simply being used to maintain the animal, all reduce the amount of methane per unit of animal product produced (called reducing emissions intensity). These practices include providing feed of high quality and availability, use of high performance animal genetics and reducing impediments to animal performance such as parasites or nutrient deficiencies. These higher levels of animal productivity, enable the producers to generate the same amount of animal product with less GHG emissions by running fewer animals more intensively on a smaller area of land. This

more intensive production therefore gives flexibility to control emissions, improve profitability and making areas of the farm available for other uses.

Managing for nitrous oxide emissions

High nitrogen levels and wet (anaerobic) conditions are the two key factors driving loss of the GHG nitrous oxide from manures and nitrogen fertilisers on paddocks. To minimise these losses, appropriate forms and levels of nitrogen fertiliser should be selected and application should be timed to avoid applying excess nitrogen to the soil when it is water-logged.

Nutritional effects on methane emissions

Ruminants being lot-fed on diets rich in cereal grains such as barley, maize or wheat generally have lower daily methane output relative to grazing animals, reflecting the low fibre content of these diets and the high load of fermentable energy. Apart from grain feeding, there are few ways of reducing the daily methane output of a ruminant without compromising animal performance. Diet supplementation with oils or feeding high oil feedstuffs (such as cottonseed) is one **effective** strategy. Feed additives that work at low doses are being investigated but none have yet proved effective. There is considerable effort underway to capitalise on tannins in pastures which may reduce enteric methane, and to select for cattle with a greater genetic propensity for higher feed-**use** efficiency.

New projects

Industry and Investment NSW, along with partners Meat and Livestock Australia, University of New England and the Sheep and Beef CRCs have recently been funded by Department of Agriculture Fisheries and Forestry to undertake research programs to identify options to reduce methane emissions from livestock. Questions being answered include:

- Is breeding for low methane sheep and cattle technically possible and economically sensible?
- Can control of selected rumen organisms reduce methane emissions and increase productivity of cattle?
- Are there simple dietary additives that can reduce methane emissions from livestock?

A series of Australian and New Zealand projects are also evaluating new tools to reduce nitrous oxide loss from pastures, including additives that inhibit production of this GHG.

Useful websites

Managing for methane

http://www.climatechange.gov.au/agriculture/publications/pubs/methane_emissions.pdf

Managing for Nitrous oxide

<http://www.greenhouse.unimelb.edu.au/site/Tols.htm>

National agriculture emissions data

<http://ageis.climatechange.gov.au/>

Agriculture & carbon trading

http://www.nswfarmers.org.au/__data/assets/pdf_file/0003/47163/Climate_Change_Information_Kit_0508.pdf

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