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No simple matter: Carbon trading and Ag

The agricultural sector contributes around 16% of national greenhouse gas emissions, mainly as methane lost during rumen digestion (enteric methane) and nitrous oxide lost from nitrogen fertilisers, animal excreta and soils (see Figure), both potent greenhouse gases.

In its Green Paper released in July 2008 the Federal Government proposed a Carbon Pollution Reduction Scheme (CPRS) to start in 2010, but suggested delaying the inclusion of the agricultural sector until 2015, with a final decision by 2013. However the Federal Government has indicated that if agriculture was not covered by the CPRS, other policy options will need to be considered if Australia is to achieve its overall targeted emissions reduction of 60% by 2050. The agricultural sector will be expected to play its role in any targeted reductions and intensive research will be required to achieve this while sustaining a viable industry. So what are the options?

Enteric methane is produced by microbes - methanogens - in the fore stomach (rumen) of ruminant animals. It is not only a potent greenhouse gas but represents also a high-energy source. A single beef steer, for example, releases between 50-90 kg/year of methane, enough potential fuel to drive a 6-cylinder LPG car for 450-800 km/year. Instead of ending up in the atmosphere this represents a substantial loss of energy that ideally should support meat or milk production.

Research in Australia and NZ has demonstrated some possible strategies for methane abatement:

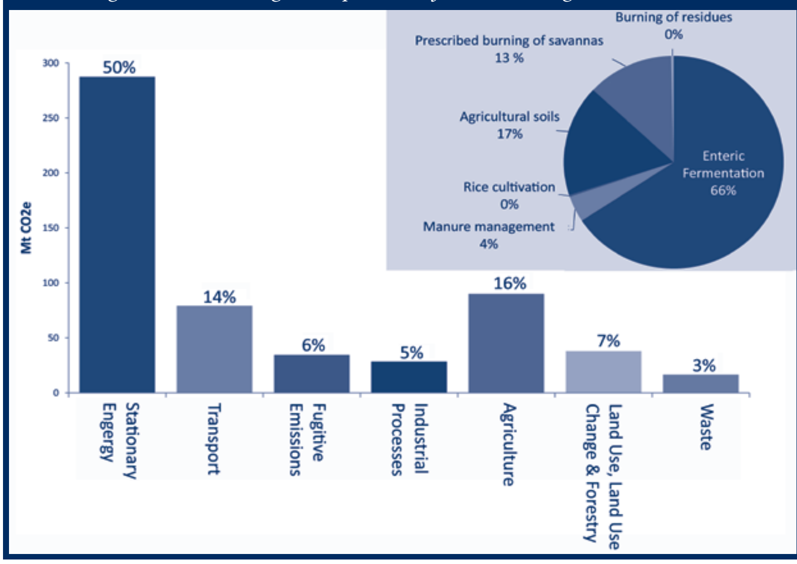
– Individual animals differ in their feed conversion efficiency, thus breeding for more efficient animals, of profit to the industry, can also reduce methane losses.
– Improving feed quality and certain dietary supplements (eg. oils, tannins, enzymes) can reduce methane production, with potential profitable production benefits.
– Minimising the number of unproductive animals on the farm, for example through earlier finishing of beef or extended lactation in dairy cows, effectively reduces the number of animals, improves profitability, and reduces methane produced.
– Finally, altering microbial populations in the rumen can reduce methane production, either through chemical means, or by introducing competitive or predatory microbes or vaccination approaches.

Nitrous oxide (N_2O) accounts for 2.8% of national emissions, but its release has exponentially increased with the increased usage of nitrogen fertilisers in Australia over the past 25 years. Apart from managing the rate, source and timing of fertiliser application, the only commercial N_2O abatement strategy available is to coat the fertiliser with an inhibitor. However, few options exist to manage the large nitrogen losses from animal urine. While commercially available for a number of years, inhibitor products have not seen widespread adoption due primarily to cost. The manufacture of nitrogen fertilisers also requires significant energy, inextricably linking its production cost to fuel prices. The foreseeable impact of the CPRS on the cost of manufacture, plus the liability created when spread on farms, could be a considerable economic challenge for agriculture in the years to come.

The proposal to include agriculture in the CPRS raises a number of significant questions and issues:

– We may accept that there are abatement options for reducing emissions from agriculture but how fair is it to be imposing the purchase of emission permits on the agricultural sector also coping with an extreme and protracted drought? Amid escalating world food prices and food shortages, should we be imposing new costs onto agricultural production when we desperately need more and lower cost food?

Australian national sectoral greenhouse gas emissions (left) and the apportionment of emissions within the agricultural sector (right) (Department of Climate Change 2006)



– There are over 130,000 farms in Australia, each with their own unique production systems and management approaches. In addition, greenhouse gas emissions from these farming systems are biological processes that are inherently variable. While it may be relatively easy to measure emissions from vehicles or power stations, it is far more challenging to measure emissions from millions of hectares of farmland and millions of head of livestock across the country.
– One of the major challenges for the CPRS is, therefore, to identify practical methods for the inclusion of agriculture, and to develop reliable and cost-effective methods of emissions estimation and reporting, that also do not place unrealistic burdens on relatively small farm businesses.
– While the outlined abatement options appear promising, most still require at least 10 to 20 years research and development before commercially available to the farming community.
– Investment in agricultural research has also been in decline for at least 20 years, with a corresponding decline in research graduates, making it difficult in the current environment to fill key research positions.
– Research on greenhouse gas emissions has also not been popular with the agricultural industries until recently and consequently the total number of researchers, with proven capability in methane and nitrous oxide research, are far less than the task at hand.
– On the positive side, reducing methane and nitrous oxide emissions will also plug some of the few large gaps remaining in agricultural efficiency, thus presenting us with potential win-win outcomes which we should use the opportunity to achieve.

In conclusion: there are a number of challenges to achieving abatement from Australian agriculture, and perhaps this provides us with an opportunity to make a long-term commitment to re-building our research capability, not only to reduce emissions, but also build a more efficient and resilient agricultural industry for a more uncertain climate in the future.