Greenhouse gases on dairy farms

Where do emissions come from?

This fact sheet is part of the Profitable Dairying series - *Good business management reduces greenhouse gas emissions.*

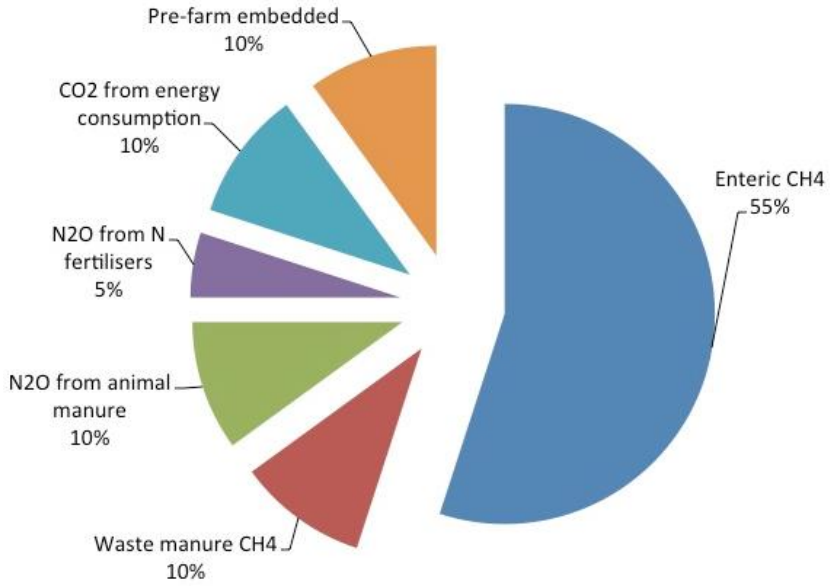
The Australian dairy industry has committed to reducing greenhouse gas emissions intensity (emissions per L milk produced) by 30% by 2020.

Emissions intensity for agriculture is the amount of emissions per unit of product. For the dairy industry, this can be reported several ways such as kg CO_2e per L of milk, per kg of milk solids (MS) or per kg of fat and protein corrected milk (FPCM). Fat and protein corrected milk is used to compare milk with different components.

Greenhouse gas accounting

The Australian dairy industry has developed a greenhouse gas accounting tool known as DGAS. Click here for online DGAS tool. Measuring actual emissions on farm is expensive and time consuming so DGAS is used to look at management scenarios and emissions implications. The chart below shows a breakdown of emissions for a typical pasture based dairy farm based on DGAS.

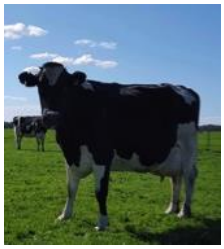
Enteric methane (CH_4) from burping cows is the main source of greenhouse gas emissions on farm. Methane and nitrous oxide (N_2O) from animal manure are the second largest source of emissions. There is carbon dioxide (CO_2) from farm diesel consumption and coal-fired power stations used to generate electricity used on dairy farms. There are also emissions associated with production of grain and fertiliser bought onto the farm (pre-farm embedded emissions).



Emissions across the farm

Around 55% of dairy emissions come from enteric methane produced by methanogen bacteria in the rumen. This methane is burped out by cows as part of the rumination process.

Nitrous oxide is emitted in the breakdown of nitrogen from dung and urine deposited in the paddock and N fertiliser applied to the paddock. Nitrous oxide and methane are also produced from the effluent system.






Cows - 55% | Dung, urine, effluent - 20% | Pre-farm - 10% | Energy - 10% | N fertiliser - 5%

Annual emissions in context

Average emissions for a pasture based, 400-500 cow dairy farm are around 2,500 t CO_2e per annum. This is roughly equivalent to the emissions from a jumbo jet flying Melbourne to London return. To compare farms producing differing amounts of milk, emissions intensity is calculated by dividing total emissions by the amount of fat and protein corrected milk (FPCM; standard of 4.0% fat and 3.3% protein). An average pasture based dairy farm with 400-500 cows has emissions intensity in the order of 1 kg CO_2e/ kg FPCM, which is similar to 1 kg CO_2e/ L milk or 13.5 kg CO_2e/ kg MS.

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Greenhouse Gas	Source on dairy farms	Global warming potential
Carbon dioxide (CO_2)	Electricity for shed and irrigation. Farm vehicles. Pre-farm embedded emissions.	1 (all other greenhouse gases are compared to CO_2 in how effectively they trap heat
Methane (CH_4)	Burping cows (over 50% emissions). Methane from manure and effluent systems.	25 times greater than CO_2
Nitrous oxide (N_2O)	Cow dung, urine patches and N fertiliser through denitrification (direct loss) Nitrogen fertilisers also lost through leaching/runoff and volatilisation (indirect loss).	298 times greater than CO_2

Karen Christie, Tasmanian Institute of Agriculture, co-developer of DGAS. DGAS is the dairy greenhouse gas accounting tool.

Further reading:
Dairy Climate Toollkit
www.piccc.org.au

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