10 Steps

Reducing the carbon footprint of **Tasmanian dairy**

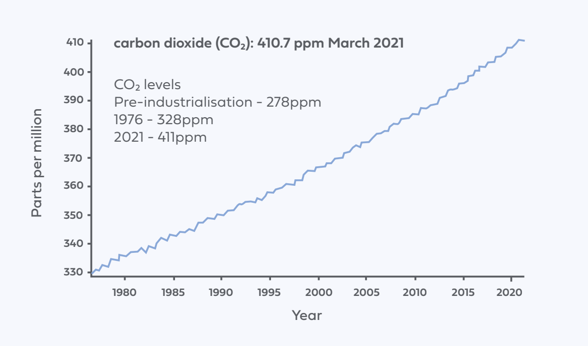
1 Know where emissions come from

Supported by:

DairyTas Dairy Australia LIC Livestock Improvement Tree Alliance Tasmanian Government

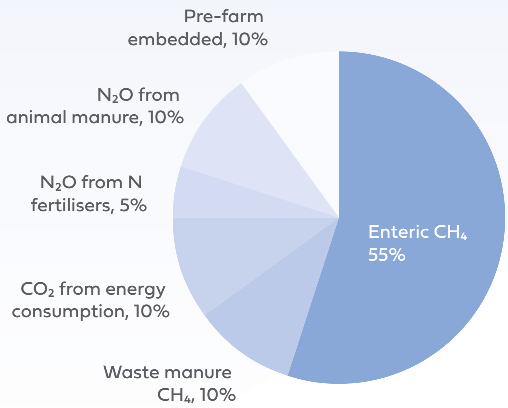
Measurement of greenhouse gases at Cape Grim

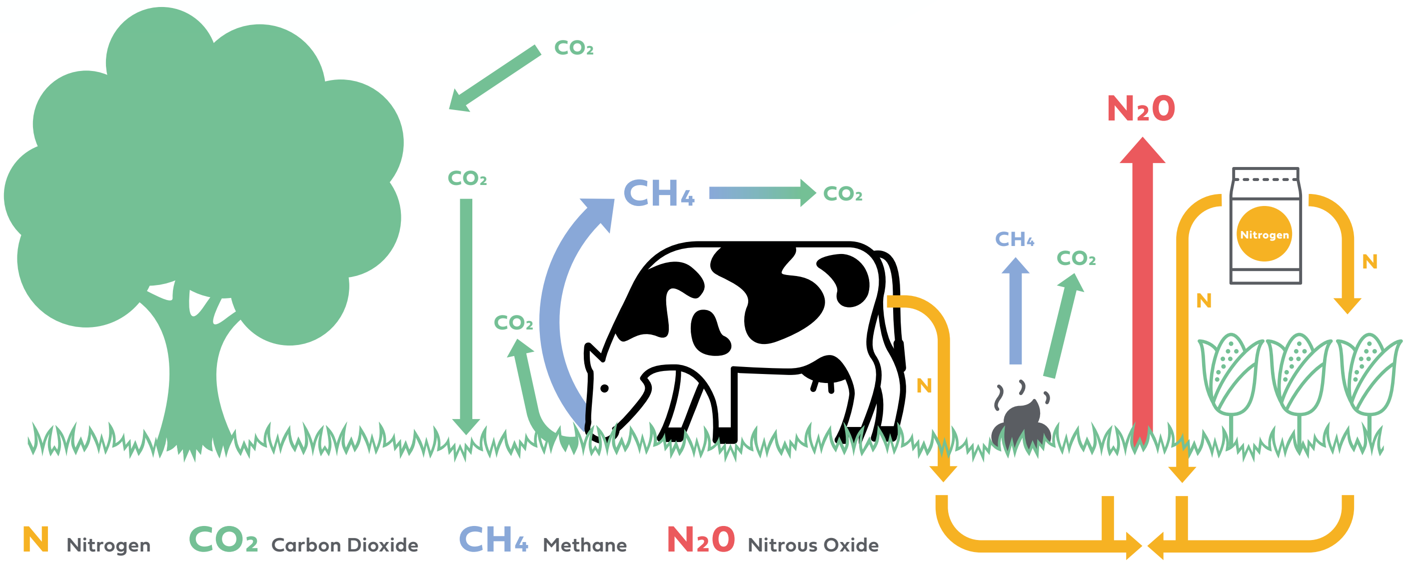
Cape Grim Baseline Air Pollution Monitoring Station was established in 1976 as one of three global baseline monitoring stations for greenhouse gases. Data for all greenhouse gases is updated monthly at capegrim.csiro.au CO_2 data shown right.



Breakdown of emissions sources

Measuring actual emissions on farm is expensive and time consuming so the Australian Dairy Carbon Calculator is used to look at management scenarios and emissions implications. The chart (right) shows a breakdown of emissions for a typical pasture based dairy farm based on the Calculator. It is available at https://www.dairyingfortomorrow.com.au/tools-and-guidelines/dairy-greenhouse-gas-abatement-calculator/





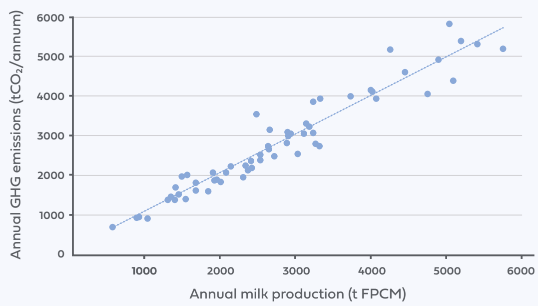
Methane from the rumen

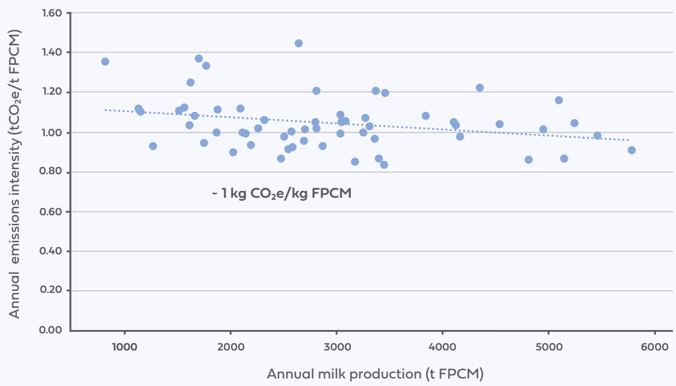
Ruminants have an evolutionary advantage by being able to digest relatively fibrous plant material. The function of the rumen is as a fermentation vat and the presence of certain bacteria promote the development of gases, mostly methane (CH_4) and carbon dioxide (CO_2). Enteric methane produced by methanogen bacteria in the rumen is the largest source of greenhouse gas emissions from dairy farms - around 55%. Approximately 6-10% of energy consumed by cows is converted to methane and released by belching.

Greenhouse Gas	Source on dairy farms	Global warming potential (IPCC, AR4, 2007)
Carbon dioxide (CO_2)	Electricity for shed and irrigation. Farm vehicles. Pre-farm embedded emissions Lime & Cultivation	1 (all other greenhouse gases are compared to CO_2 in how effectively they trap heat
Methane (CH_4)	Belching 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/run-off and volatilisation (indirect loss)	298 times greater than CO_2

How to calculate the emissions for your farm?

- Using the Australian Dairy Carbon Calculator, available at **www.dairyingfortomorrow.com.au/tools-and-guidelines/dairy-greenhouse-gas-abatement-calculator/**
- Using the Dairy Greenhouse Gas Accounting Framework calculator, available at **http://www.piccc.org.au/resources/Tools**
- Participating in Dairy Farm Monitor project, which is linked to the Australian Dairy Carbon Calculator, so you can get an emissions report.
- The carbon calculators all require a reasonable amount of data entry. If you want a very rough estimate, the broad rules of thumb for Tasmanian farms are:
- 1 L milk = 1 kg FPCM (fat protein corrected milk) = 1 kg CO_2e (e = equivalent global warming potential, standard reporting for methane, nitrous oxide and carbon dioxide to be expressed in same units).
- The annual L of milk produced on your farm is approximately your annual emissions in kg CO_2e.
- For example, if your farm produces 3.6 million L of milk, emissions are around 3.6 million kg CO_2e, which is 3,600 t CO_2e.
- Typically, emissions are around 1,000 t CO_2e per million L milk, ranging up to 1,200 t CO_2e per million L milk. The lower limit is around 800 t CO_2e per million L milk for the most efficient Tasmanian farms (milk production, herd management, feed quality).





Rules of thumb and graphs are from TasMilk 60 data (Christie at al, 2011).

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. 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.

How do we rate globally?

The Australian dairy industry has voluntarily committed to reducing greenhouse gas emissions intensity by 30% by 2030. 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.

The graph (right) shows emissions intensity of milk production from different countries. Australia ranks 7th out of global dairying regions. (AgResearch, 2021)

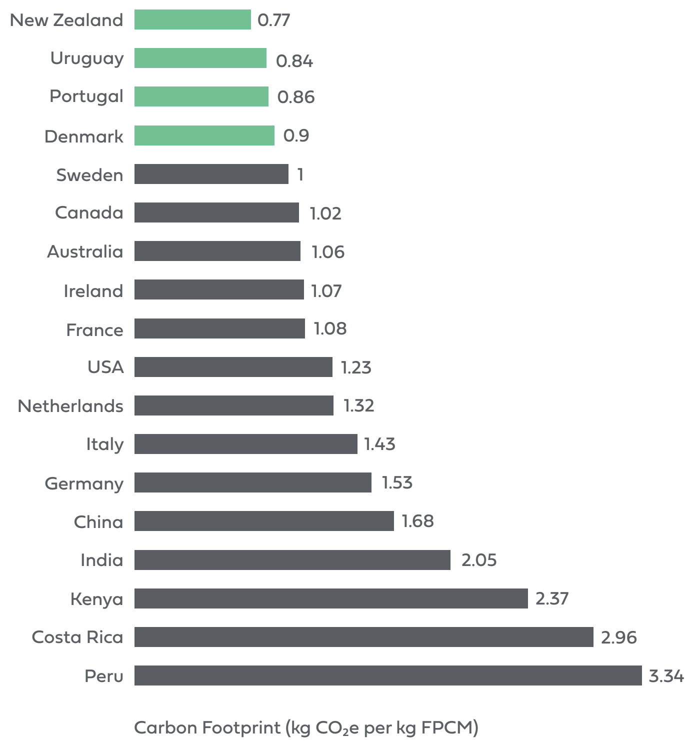
NZ has legislated to reduce gross biogenic methane emissions below 2017 level by:

- 10% by 2030
- 24-47% by 2050

All other Greenhouse gases to net zero by 2050.

NZ targets are significantly more ambitious than Australia, so looking to NZ and learning makes sense, because NZ has strong market drivers for change and innovation.

New Zealand leads the world with the lowest carbon footprint for dairy milk production.



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Contact

DairyTas Office
admin@dairytas.net.au
03 6432 2233

www.dairyaustralia.com.au/dairytas-10steps