

Appendix G

Whole-farm systems analysis of Australian dairy farm greenhouse gas emissions

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Abstract. The Australian dairy industry contributes ~1.6% of the nation's greenhouse gas (GHG) emissions, emitting an estimated 9.3 million tonnes of carbon dioxide equivalents (CO₂e) per annum. This study examined 41 contrasting Australian dairy farms for their GHG emissions using the Dairy Greenhouse Gas Abatement Strategies calculator, which incorporates Intergovernmental Panel on Climate Change and Australian inventory methodologies, algorithms and emission factors. Sources of GHG emissions included were pre-farm embedded emissions associated with key farm inputs (i.e. grains and concentrates, forages and fertilisers), CO₂ emissions from electricity and fuel consumption, methane emissions from enteric fermentation and animal waste management, and nitrous oxide emissions from animal waste management and nitrogen fertilisers. The estimated mean (s.d.) GHG emissions intensity was 1.04 ± 0.17 kg CO₂e/kg of fat and protein corrected milk (kgCO₂e/kg FPCM). Enteric methane emissions were found to be approximately half of total farm emissions. Linear regression analysis showed that 95% of the variation in total farm GHG emissions could be explained by annual milk production. While the results of this study suggest that milk production alone could be a suitable surrogate for estimating GHG emissions for national inventory purposes, the GHG emissions intensity of milk production, on an individual farm basis, was shown to vary by over 100% (0.76–1.68 kg CO₂e/kg FPCM). It is clear that using a single emissions factor, such as milk production alone, to estimate any given individual farm's GHG emissions, has the potential to either substantially under- or overestimate individual farms' GHG emissions.

See Christie KM, Gourley CJP, Rawnsley RP, Eckard RJ, Awty IM (2012). Whole farm systems analysis of Australian dairy farms greenhouse gas emissions. *Animal Production Science*, 52, 998–1011. doi.org/10.1071/AN12061