Potential solutions to the major greenhouse gas issues facing Australasian dairy farming

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Abstract. The Australasian dairy industry is facing the dual challenges of increasing productivity while also reducing its emissions of the greenhouse gases (GHG) methane and nitrous oxide. Following the COP21 Paris Agreement all sectors of the economy will be expected to contribute to GHG abatement. Enteric methane is the major source of GHG emissions from dairy production systems (>70%), followed by nitrous oxide (13%) and methane (12%) from animal waste, with nitrogen (N) fertiliser use contributing around 3.5% of total on-farm non-CO₂e emissions. Research on reducing methane emissions from dairy cattle has focused on feeding dietary supplements (e.g. tannins, dietary oils and wheat), rumen modification (e.g. vaccine, inhibitors), breeding and animal management. Research on reducing nitrous oxide emissions has focused on improving N fertiliser efficiency and reducing urinary N loss. Profitable options for significant abatement on-farm are still limited, with the industry focusing instead on improving production efficiency, while reducing emissions intensity (t CO₂e/t product). Absolute emissions reduction will become an imperative as the world moves towards carbon neutrality by 2050 and thus a priority for research. However, even with implementation of best practice abatement, it is likely that some residual emissions will remain in the foreseeable future. The soil organic carbon content of dairy soils under well-fertiliser high rainfall or irrigated permanent pastures are already high, therefore limiting the potential for further soil carbon sequestration as an offset against these residual emissions. The Australasian dairy industry will therefore need to also consider how these residual emissions will be offset through carbon sequestration mainly in trees and, to a more limited extent, increasing soil organic carbon.