

# DAIRY AND DRY STOCK: EXPLORING THE BIG LEVERS FOR GHG REDUCTIONS AND IMPLICATIONS FOR WATER QUALITY AND ECONOMICS

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Farmers need practical levers that balance limits on emissions to air and water, and business goals while delivering products to increasingly discerning customers. Agricultural biological GHG emissions are methane (80%), and nitrous oxide (20%), while water quality issues are dominated by nitrates, phosphates and microbes. Opportunity arises from the link between the biological N and carbon cycles that enables levers within farm systems to result in lower emissions to both air and water. Systems changes that reduce feed inputs and stocking rate, decrease replacement rates or include alternate low methane feed [currently limited options] have the biggest impact on GHG footprint, and these may also deliver to water quality.

LUDF has employed enhanced technologies in irrigation and effluent management, e.g. soil moisture monitoring has reduced modelled N loss by 14%, the addition of ClearTech® to increase available effluent storage reduced N loss by a further 2% and initial upgrades of the irrigation infrastructure reduced N loss by another 9%. Additionally, LUDF reduced N fertiliser (from between 250-350 to 178 kg/ha) and feed supplements then matched stocking rate (decreased from 3.9 to 3.4 cows/ha) to feed supply giving a further reduction in both nitrate leaching (18%) and GHG emissions (13%). Potential still exists to further upgrade irrigation infrastructure to provide another 8% reduction in N loss on LUDF, impacts on GHG require further analysis.

Sheep and beef farms face real challenges in reducing GHG footprint [excluding offset potential], since emissions increase as stocking rate increases, which is driven by existing natural and capital assets. Most have few options to change inputs to reduce emissions, but opportunity exists for more product from a similar footprint. Highlands in South Canterbury has increased pasture consumed and product by 30% since 1991 with N leaching less than 20 kg/ha and a 10% increase in GHG emissions/ha, although stocking policies to manage drought resulted in significant reductions in that year. Trees on this farm deliver both offset potential and water quality benefits. A survey of 100 farms with similar emissions to Highlands found animal product per hectare varied from 100 to 350 kg/ha, indicating opportunities across the industry for efficiency gains.

Low input, efficient systems have potential to maintain production while reducing losses to air and water, but this is only the first step, and one many businesses have already adopted. A range of new 'technologies' and management practices will be essential for businesses to have suitable options to drive future reductions in emissions.

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**Editor's note:** *An extended manuscript has not been submitted for this presentation.*

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