REDUCING THE EMISSIONS INTENSITY OF LIVESTOCK PRODUCTION:

CASE STUDIES OF SUCCESS

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

NEW ZEALAND

Scale: National
System: Pastoral
Sector: Dairy, Sheep, Beef

Reducing the emissions intensity of livestock production on New Zealand farms

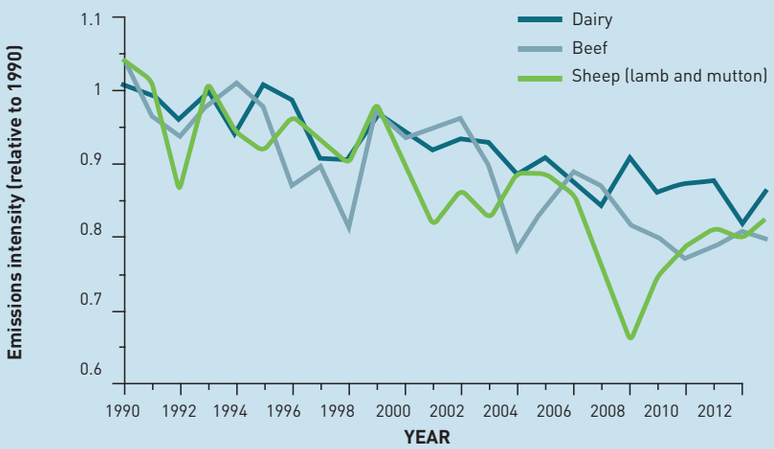
On-farm emissions intensity of livestock production across the New Zealand dairy, sheep and beef sectors has reduced by approximately 1% per annum between 1990 and 2013. The main drivers for this have been increasing productivity per animal (milk yield, lambing percentages, growth rates), more efficient use of nitrogen fertilisers, and reduced breeding overheads.

Background

Pastoral farming is a major contributor to New Zealand's economy with agricultural commodities accounting for around half of all goods exports. New Zealand farmers operate a highly efficient and productive pastoral system focused primarily on dairy, meat and wool, and horticulture destined predominantly for global export markets.

New Zealand is unusual among developed countries with its strong agricultural base and high proportion of its electricity generation coming from renewables. As a result, agriculture is the largest contributing sector to New Zealand's greenhouse gas emissions (48% in 2012). On a global scale, however, New Zealand's total emissions are small – producing less than 0.2% of total global greenhouse gas emissions, and 0.6% of total global agricultural emissions.

New Zealand's agricultural greenhouse gases emissions intensity by agricultural sub-sector including nitrogen fertiliser use (1990-2013).

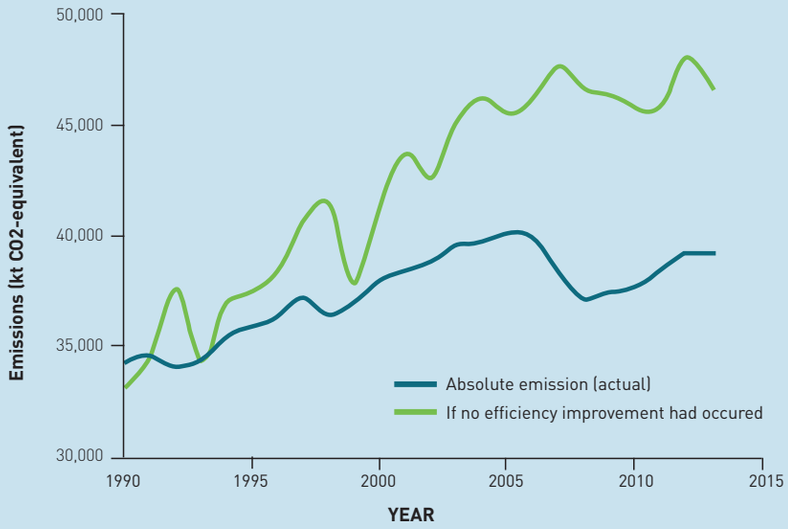


Key actions & their effects on productivity, income & food security

The New Zealand agricultural sector has been fully exposed to the international markets since subsidies, tax concessions and price supports were removed in the 1980s, forcing the entire sector to shift towards better practices that improved productivity per animal and increased resource use efficiency. Key practices include, for example, increasing genetic merit of animals, improved grazing land management, enhanced use of supplementary feed to balance diets (dairy), increased lambing percentages and faster growth rates for lambs, improved animal health, and consolidating herds and changes to herd structure with fewer breeding and more finishing animals, greater use of dairy cattle for beef production, and switching to breeds that reflect market demand (for example producing leaner milk). Pesticide use declined by 50% and soil erosion, land clearing and overstocking also declined. As a result, the value of farm output in New Zealand has soared 40% in constant dollar terms since the mid-1980s and productivity has averaged 6% growth annually, compared with just 1% pre-reform. As examples, the average dairy cow produced 33% more milk-fat in 2004 than in 1987, and although the total sheep population has declined by almost 50% since 1990 almost the same amount of lamb meat is produced.

Absolute GHG emissions from New Zealand agriculture.

The green line shows hypothetical emissions if food production had increased without efficiency and productivity gains.



Effect of actions on emissions intensity of livestock production

As a result of increasing per animal production and increased efficiency of fertiliser use per animal, New Zealand farmers have steadily reduced the amount of greenhouse gas emissions per unit of product by about 1% per year (across the dairy, sheep and beef sectors) for at least the last 20 years. This is because more of the feed consumed by animals is used for production than for animal maintenance; also fertiliser use per cow has dropped since 2004 while production per cow has continued to increase.

Reductions in on-farm emissions intensity are based on the national annual GHG inventory. The inventory is a Tier 2+ system that uses regional, monthly activity data for animal classes and sub-classes, country-specific emission factors and equations that estimate emissions per animal based on its energy consumption, taking into account the age, weight and productivity of the animal (which have changed significantly over time).

Co-benefits and trade-offs

Subsidy reforms came at an initial substantial cost to farmers (who were forced to transition their businesses), but brought longstanding economic benefit at the national level. Efficiency and productivity gains were driven largely by direct economic interests of farmers, although local environmental constraints (water quality) are playing an increasing role in efficient use of nitrogen fertilisers and spreading of manure, as is a growing appreciation of greenhouse gas emissions. Exposure to international markets has New Zealand farmers well placed to respond to consumer demand for food that is sustainably produced.

There have been some negative consequences of intensification and expansion of the dairy sector, mainly with regard to water quality in some catchments. These trade-offs are being managed by voluntary standards, mandatory use of nutrient budgeting tools through the private sector, and in some places, nitrogen caps that limit further land conversions.

Implications for adaptation

The emphasis on productivity means that farmers are already familiar with incorporating multiple signals (e.g. pasture growth, animal weight gain, soil moisture) into their tactical decision-making, adopting new/improved technologies and changing their management practices accordingly. Responding to a variable climate has long been a part of this process because of the impact of weather on pastoral systems. Key productivity measures such as irrigation and supplementary feeding can also help increase resilience against climate variability, in particular droughts, which are projected to increase with climate change.

Challenges to implementation and adoption

Reductions in on-farm emissions intensity came about as a result of the open market conditions that New Zealand farmers operate in and their need to increase productivity on an ongoing basis. Emissions intensity is expected continue to decline further as a result of competitive pressures, environmental constraints, and growing awareness of climate change implications (noting that farmers are already operating highly efficient systems so the ability for continuous improvement becomes more challenging). However, increases in overall production resulting from intensification have outpaced efficiency gains historically, resulting in a net increase in absolute emissions. Close interaction between farmers, government and research programmes focusing on productivity and on GHG emissions monitoring and mitigation will continue to be critical in achieving further efficiency gains and reductions in emissions intensity on-farm. This includes solutions focused on feed and nutrition, genetics and breeding, rumen modification, manure and fertiliser management, animal health and increasing the carbon content of soils.

Further information

New Zealand's Greenhouse Gas Inventory 1990-2013

http://www.mfe.govt.nz/publications/climate-change/new-zealands-greenhouse-gas-inventory-1990-2013

Ministry for Primary Industries climate change web pages

http://archive.mpi.govt.nz/environment-natural-resources/climate-change

NZAGRC fact sheets

http://www.nzagrc.org.nz/fact-sheets.html

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