

dairy tomorrow

The future of New Zealand dairying.



PROTECTING OUR ENVIRONMENT



A COMMITMENT TO NEW ZEALAND BY THE DAIRY SECTOR

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The future of New Zealand dairying.

A new approach to care for our environment

Today, dairy is one of New Zealand's biggest sectors. It plays a critical role in supporting our future prosperity and well-being, as well as caring for our land and environment. With that comes tremendous responsibility. Dairy farmers recognise that the sustainable management and protection of our environment is key to our future.

Dairy occupies 1.7 million hectares of dairy land, employs 50,000 people, and in 2022 is worth \$21.6b to the New Zealand economy. Protecting the environment is also a responsibility farmers, with their close connection to the land and water, care deeply about.

This report, *Dairy Tomorrow - Protecting our Environment* sets out the dairy sector's new goals and actions to improve waterways and reduce greenhouse gas emissions. A focus on delivering continuous improvement through good farming practices and Farm Environment Plans will help improve water quality, and identify where further targeted work is needed. It will also help identify additional support farmers need.

Water Accord

The new programme builds on the *Sustainable Dairying: Water Accord*¹, an unprecedented voluntary commitment adopted by the sector in 2013. The Accord led to widespread changes on many farms throughout New Zealand to improve water quality. We have made significant progress - but we know there is more to do.

Dairy Tomorrow

Following the Water Accord, the dairy sector launched the Dairy Tomorrow strategy. It outlines our commitment to protect and nurture the environment for future generations.

Our focus is on continuous improvement on-farm, through the wide-scale adoption of Farm Environment Plans and good farming practices targeted at the water quality and climate change problems we are working to solve.

As a sector, we will work with others to identify the water quality issues in each dairy catchment and use science to prioritise on-farm actions that will lead to the most significant improvements. On the ground, a number of catchment scale projects, as well as tools and guidance, will support farmers to reduce their environmental footprint.

While changes are happening on-farm, greenhouse gas emissions and water quality in dairy dominated catchments will be tracked to assess if improvements are occurring. We will be able to build up a richer picture of what works, what doesn't and we'll share progress reports on how we're tracking.

We know there is much to do. By improving farming practices, harnessing new technology, tracking our progress and adapting our plans we can improve the environment for our collective future.

Dairy Tomorrow partners supporting this work



¹The Sustainable Dairying Water Accord (2013 to 2018) was a sector initiative led by DCANZ and DairyNZ. It was developed under the oversight of the Dairy Environment Leadership Group (DELG). DELG includes representatives from the dairy farming community including farmers, dairy companies, central government, regional councils and the Federation of Māori Authorities.

Achievements to date



Freshwater Management

6100 Farm Environment Plans in place for dairy farms nationwide.



Effluent management

100% of farms assessed for effluent management practices



Stock exclusion

24,744km of waterways have dairy cattle excluded (98% of 2013 Water Accord waterways)



Riparian plans

52% of dairy farms with waterways have riparian management plans.



Greenhouse Gas Management

- 92% of dairy farmers have a GHG emissions report
 - 26% of dairy farmers have a GHG farm plan module
- A recent independent study found New Zealand milk has the world's lowest carbon footprint – at half the emissions of other international producers.



Nutrient management

- **177 rural professionals** became certified nutrient management advisors, advising farmers on good management practices.
- Nutrient management data collected from **94% of dairy farms**.
- **10,396 nutrient budgets** prepared for farms.



On-farm change is working

An Our Land and Water National Science Challenge study found that significantly more nitrogen (45% more) and phosphorus (98% more) would have entered rivers from dairy-farmed land between 1995 and 2015 if farmers hadn't changed their practices. Losses of **phosphorus were estimated to be 20-25% lower**, but **total nitrogen losses grew by an estimated 25%**, as total dairy land increased by 40%.

► Sustainable Dairying: Water Accord 2013-19 dairynz.co.nz/wateraccord

Where we're heading



Dairy Tomorrow

Our sector strategy includes a commitment to protect and nurture the environment for future generations.



Farm Environment Plans

By 2025, all dairy farmers will have Farm Environment Plans to guide good environmental management practice – we've been ahead of regulation and will continue to lead the way on their implementation.



Delivering on good practice

We will regularly update good farming practice principles and accelerate farmer use through tools, information and on-farm change. We will monitor and report sector progress towards meeting good farming practice.



Supporting Catchments

Continue proactive actions, monitoring and reporting in dairy catchments to help deliver on-farm changes which benefit water quality.



Nutrient use

Continue to support good on-farm nutrient management practices to help reduce nitrate and phosphorus levels in waterways. Our Dairy Tomorrow commitment includes reporting on nitrogen surplus and phosphorus status on farms.



Farm Systems Solutions

Continue to invest in farm systems research to reduce dairy's nitrogen and methane environmental footprint.

► Dairy Tomorrow – dairytomorrow.co.nz

20 years of environmental progress

Highlights from the past two decades

Forages for Reduced Nitrate Leaching (FRNL) starts

The DairyNZ-led FRNL programme has provided science-based forage production options that can lead to a more than 20% reduction of N leaching.

Testing solutions on-farm

Three regional projects kicked off in 2018:

1. Farmers in the Taranua Plantain Project have been incorporating plantain into their systems to reduce N loss.
2. Farms in Selwyn and Hinds catchments have been adapting their practices to reduce N losses, moving towards council targets.
3. Southland farmers have united to tackle water quality issues in the Aparima catchment. The project is supporting all catchment farmers to have an effective Farm Environment Plan. A 2020 survey showed 80% had a plan, up from 23% in 2019.

The future

Dairy Tomorrow - Protecting our Environment is published. The report sets out a new approach to continue delivering on the dairy sector's commitment to protect and nurture the environment for future generations.

2003

The 2003 Dairying and Clean Stream Accord (DCSA)

The DCSA was signed between Fonterra, Ministry for the Environment, Ministry of Agriculture and Forestry, and regional councils. It included targets around excluding cows from waterways and wetlands, effluent compliance and nutrient management.

2013

Improving water quality

The Sustainable Dairying: Water Accord was a voluntary commitment from the dairy sector to improve New Zealand's waterways. Achievements include fencing off 98% of significant waterways, installing bridges and culverts on 100% of dairy crossing points, and assessing 100% of farms for effluent management practices.

2013

2017

Dairy Tomorrow Strategy

This joint sector sustainable dairy strategy is signed. It includes a commitment to protect and nurture the environment for future generations.

2018

Dairy Action for Climate Change

New research has improved sector understanding of how farmers could reduce their GHG footprint.

2019

He Waka Eke Noa

A world first partnership between the primary sector, Māori, and Government to develop a framework to reduce emissions. Every farm will know their numbers and have a plan to manage their emissions by 2025 – and these will be part of Farm Environment Plans.

2022

Step Change launched

DairyNZ launched Step Change in 2019 to deliver options to help farmers achieve environmental goals while increasing profit.



- Understanding our Footprint
- Farm Systems Research
- Edge of Field Mitigations
- Catchment-scale Solutions



- Nutrient and GHG Benchmarking and Reporting
- Good Farming Practices
- Farm Environmental Plans
- Improving Wintering Practices



- Priority Catchment Projects - Aparima, Selwyn-Hinds, Tararua
- Supporting Catchment Groups
- Working in Partnership



- Dairy Environment Leaders/Climate Change Ambassadors
- Evidence-based Policy Solutions
- Sharing our Progress

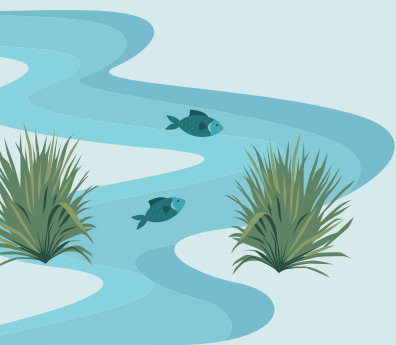


Looking to the future:

a framework to care for our environment

The dairy sector will focus on six goals to deliver and report on our work to protect and nurture the environment for future generations.

- 1.** All farms have Farm Environment Plans to guide good practice by 2025, and are implementing their plans and reporting against them.
- 2.** By 2025, all dairy farms have good farming practice status reports and the sector reports on progress towards all farms meeting good farming practice.
- 3.** By 2025, all farms carefully monitor and report on their nutrient use based on benchmarked purchased nitrogen surplus and soil phosphorus levels relative to agronomic optimum.
- 4.** We support catchment-scale projects to improve water quality in priority areas.
- 5.** We analyse and report on water quality in dairy catchments to track how changes made on farms affect waterways.
- 6.** All farms will have a written plan in place to measure and manage their greenhouse gas emissions.



Successful farming within environmental limits:

understanding our footprint and solutions to drive science-based decision making

Understanding our footprint

Water quality science and catchment modelling

For many years the dairy sector has a wide range of research underway to better understand the state of water quality and ecosystem health in catchments throughout New Zealand. A key goal is understanding dairy's footprint and ensuring decision making and policies are grounded in the best science and consider the impact on rural communities. Our work includes the development of a Catchment Accounting Framework that helps us understand dairy's contribution to contaminant loads at catchment, regional and national levels to prioritise future actions.

GHG reporting

Dairy farmers are set to play their part in addressing climate change. 92 percent of farmers have received a GHG emissions report from their dairy company and 26 percent now have a GHG farm plan. This helps us meet our He Waka Eke Noa (HWEN) milestones and provides farmers with the right information to undertake actions to cut emissions, while remaining the world's most emissions efficient on-farm producer of milk.





Farm System research

Southern dairy systems

A four-year Southern Dairy Hub study is investigating future farm system options to help farmers reduce nitrogen loss by 30 percent. Alongside this, the Participatory Research Project is calculating GHG footprints for each of the farm systems, and looking at other water quality outcomes and how these relate to farm profitability.

Plantain

The national \$22 million Plantain Potency and Practice Programme is focusing on assessing plantain's effectiveness at reducing nitrogen leaching. It aims to give farmers increased confidence to invest in plantain to help manage nitrogen loss.

It uses Ecotain® environmental plantain, and an evaluation system will be developed to assess the environmental benefits of all plantain types. Field trials and partner farms across the country are generating data on production and quality, which will help develop management guidelines.

Low-N Project

DairyNZ is leading a seven-year research programme aimed at better understanding the cumulative nitrogen reductions that can be achieved by combining farm management and technology options. The work is investigating combinations of nitrogen reduction management to determine optimal outcomes for different catchments and regions.

Edge of Field mitigation research

Wetlands, bioreactors and detainment bunds

DairyNZ, NIWA and dairy companies are funding implementation and studies on the effectiveness of a range of “edge of field” mitigation tools, to treat contaminants before they leave the farm. We’re partnering to monitor constructed wetlands throughout the country and supporting a number of bioreactor trials to determine how well they perform. Bioreactors are pits filled with bark that support denitrification – the process by which nitrogen from water is removed by naturally occurring denitrifying bacteria and then converted into harmless atmospheric nitrogen gas as part of their respiration process. DairyNZ is also working with partners to understand how detainment bunds can reduce sediment, phosphorous and bacteria levels.

Our Wai tool

We’re developing a tool to support farmers to identify the most effective on-farm actions to improve water quality. The Our Wai tool identifies and prioritises on-farm actions by contaminant (nitrogen, phosphorus, sediment, and bacteria). Actions are ranked according to effectiveness for reducing contaminant loss as well as mitigation cost-effectiveness – and are based on more than 20 years of robust scientific understanding. The tool also presents a view of the farms’ catchment water quality data so farmers understand catchment context and where the biggest issues sit. Outputs of the tool can feed directly into farmer’s electronic farm environment plan.



Farm Environment Plans: on-farm action plans to improve water quality

Farm Environment Plans are owned by farmers and developed with input from qualified experts.

The plans identify activities which pose a risk to water quality, and actions to avoid, remedy or mitigate adverse effects. They are tailored to reflect farm geography, systems and farmer aspirations, and underpinned by industry agreed minimum criteria that should be met by all farmers.

For example, areas such as uncultivated, bare soil which could be prone to erosion are identified, and actions to reduce the risk of soil and nutrients running off into waterways are included in the plan.

Farm Environment Plans also include actions to protect biodiversity and reduce greenhouse gas emissions, help identify linkages across the farm business and supports continuous improvement through being regularly updated.

What's in a Farm Environment Plan?

- ✓ Maps and key information about the farm (fences, waterways, soil type)
- ✓ Requirements needed to meet Good Farming Practice and a summary of regulatory requirements
- ✓ An assessment of risks to water quality from farming activities for nutrients, waterways, land and soil, effluent and water use/irrigation
- ✓ Time-bound actions to avoid, remedy or mitigate any adverse effects from risks
- ✓ Nutrient budgets and nutrient benchmarking compared to other farms
- ✓ A plan to measure and manage greenhouse gas emissions

Today: 6100 dairy farms have Farm Environment Plans

By 2025: All dairy farms will have a Farm Environment Plan



How Farm Environment Plans are driving better environmental management

A 2020 survey of farmers in Aparima, Southland, shows farms achieve better environmental results when they have Farm Environment Plans.

Six hundred dairy, sheep and beef farmers work together in the Aparima Community Environment Project, which aims to improve the health of waterways.

A survey of 151 Aparima farmers showed 80 percent have Farm Environment Plans – a 23 percent increase from 2019. The survey found that farmers with environment plans are more likely to implement a broader range of good farming practices.

Plans must include actions to reduce farm sediment and nutrient loss, outline how wintering rules will be implemented, and where riparian planting and fencing is undertaken.

The Aparima Community Environment Project is led by farmers and supported by DairyNZ, Beef + Lamb New Zealand, Environment Southland, Thriving Southland, Fonterra and Open Country Dairy.

How farmers are caring for the environment: survey highlights



87 percent use nitrogen fertiliser strategically – (using amounts only as needed to maximise pasture uptake and only on certain parts of the farm).



78 percent leave ungrazed buffers around critical source areas – (this involves protecting low-lying parts of farms, such as gullies and swales where runoff accumulates).



74 percent do paddock scale **soil testing**.



35 percent had **restored, recreated or enhanced wetlands**.

82% of those surveyed were dairy farmers.



Aparima landscape (photo: Edwin Mabonga)



Read more about Farm Environment Plans at dairynz.co.nz/fep

Good farming practices

To support farmers in their environmental work, the dairy sector has developed a Good Farming Practice (GFP) framework. It's designed to help farmers identify and take the environmental actions that will bring the best outcomes through their Farm Environmental Plans, while enabling them to continue running successful businesses. It gives farmers clarity on how they're performing, where more work is needed, and how they are tracking.

How it works for farmers

The (GFP) framework sets out clear requirements farmers need to achieve to meet good farming practice. It links farmers to guidance and advice and helps us understand how the sector is tracking towards meeting GFP. It's ambitious – we don't expect all farmers to be at GFP immediately. GFPs focus on 10 key areas for environmental management. Dairy companies, DairyNZ and farm advisers will work with farmers to support them on this journey.

Annual sector update helps guide action

Dairy companies and DairyNZ will collect and analyse data, and report on progress towards meeting GFP at catchment and regional levels. An annual report will provide a snapshot of how we're tracking. By linking current catchment water quality to GFP status in the upstream catchment, the approach will support prioritising the right actions for their catchment context.

New targets to reduce surplus nitrogen from the farm system

The dairy sector has set itself a new target to reduce the amount of surplus nitrogen in the farm system and reduce the risk of nitrogen loss to the environment.

Purchased Nitrogen Surplus (PNS) is a simple equation farmers can relate to. It's the sum of the nitrogen inputs used for production on-farm (e.g., fertiliser, imported feed), minus the nitrogen removed from the farm as products (e.g., milk, meat, crops, supplements sold).

The difference, or surplus, is excess to requirements; the greater the surplus, greater amount of nitrogen there is to be lost to the environment, so we want to reduce that.

The dairy sector has adopted a voluntary purchased nitrogen surplus target – farmers with a surplus that is higher than the 75th percentile (based on a 2019-20 to 2021-22 national benchmark), will need to reduce their surplus back to this level.

Annual report supports farmer actions

While nitrogen is just one aspect that needs to be considered when managing water quality and GHG emissions, it is important. So all dairy farmers will receive an annual PNS figure from their dairy companies benchmarked against 2019-20 to 2021-22 national data. They'll see where they sit compared to the rest of the sector and be able to track their progress and improvements.

We'll work with farmers who need be supported to reduce their surplus through a range of nutrient management approaches, actioned through their Farm Environment Plan.



How good farming practices are helping Taranaki streams to thrive

A Taranaki project started in 1996 is paying dividends now

A joint effort between farmers and Taranaki Regional Council has seen the region's waterways improve and the fish return to south Taranaki's Waiokura Stream.

The restoration programme started in 1996, and was guided by two local water accords.

By 2020, 99.5 percent of Taranaki's 1600 dairy farms had riparian planting plans. Stock have been excluded from 87% of the catchment's streams through 14,000 km of fencing.

Nearly 9,000km of streambanks were planted with 5.6 million natives to act as buffer zones to trap sediment and reduce nutrient run-off into rivers and provide aquatic habitat.

Improved water quality

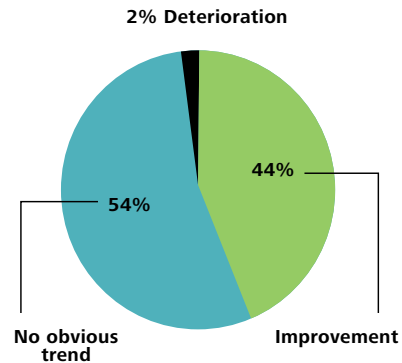
As changes rolled out on farms from 2001 to 2008, the Waiokura Stream showed a marked improvement in several water quality measures, including a 25-40 percent reduction in phosphorus and suspended sediment. *E. coli* and nitrogen levels also reduced significantly.

Macroinvertebrate invertebrate health has improved over the past 15 years. This community of critters act as excellent indicators for stream health and water quality.

This stream is just one example of wider ecological change occurring in the region's waterways. Forty four percent of rivers

Taranaki river ecology trends 1995-2019

When Taranaki farmers carried out fencing and riparian planting, many waterways in the region improved.



improved between 1995 and 2019, while just two percent of waterways deteriorated.

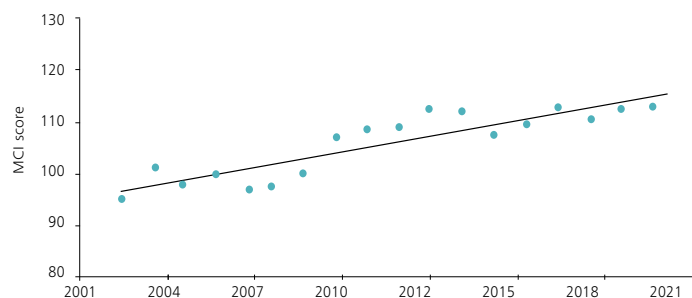
On-farm activities including excluding stock from waterways, planting of riparian buffer zones and an increase in effluent applications to land rather than waterways all contributed to these improvements.

Similar good farming practices are being adopted across New Zealand as farmers develop and implement Farm Environment Plans.



The Waiokura Stream (photo: Taranaki Regional Council)

How farmer action helped improve Waiokura Stream (Skeet Road) measured by the Macroinvertebrate Community Index (MCI) score



How MCI is used to assess water quality

The Macroinvertebrate Community Index is widely used as an integrated measure of stream health. An MCI score of 110-130 is rated good. 90-110 is fair and 90 or less is considered poor.

Improving local waterways together: how farmers and the community are improving waterways

Dairy companies, DairyNZ and local communities are all working together to improve water quality

DairyNZ is supporting farmers to reduce their environmental footprint with tools and resources nationwide. Three catchment specific projects are underway to support farmers to adopt new farming practices, and the lessons learnt are being extended to farmers nationwide.

Dairy companies leading change

Living Water is a 10-year partnership between Fonterra and the Department of Conservation, running from 2013-2023. In 2020, the partnership covered 35,000ha and 65 percent of Fonterra farmers engaged with the Living Water programme.

Beyond the five Living Water catchments, Fonterra is using the lessons learned to support farmer and community action in other catchments across New Zealand. Working alongside local stakeholders such as regional councils, the Department of Conservation, iwi, farming leaders and other organisations across New Zealand, the aim is to build on existing community efforts and help achieve local priorities.

Dairy companies across New Zealand have an important role in helping farmers prepare and improve their Farm Environment Plans which help protect waterways and reduce greenhouse gas emissions through good farming practices.

As part of its Whakapūwai programme, Synlait has established an industrial scale nursery to propagate native plants. Through this work, Synlait is helping to restore and regenerate native ecosystems, waterways and wetlands, flora and fauna.

Synlait staff work with farmers to regenerate native plantings. Community plantings are planned into the future, with involvement from local Rūnanga, schools and community groups.

Improving Lake Brunner

In 2009-10, the river flowing into Lake Brunner on the West Coast was very poor quality as the result of run off from land development and increasing stock numbers. In response a catchment plan was developed and farmers made changes to the way they farmed.

Many farmers renewed effluent systems, increased effluent storage and sealed effluent ponds or installed tanks. Permanent streams were bridged or had culverts installed, and were fenced. In many cases riparian planting was completed to trap sediment, filter nutrients, and improve habitat.

Uptake of the catchment plan picked up pace as farmers saw the progress neighbours were making, and the positive impacts on water quality. As a consequence of the collective catchment effort, water quality targets set for 2020-21 were achieved by 2015-16, five years ahead of schedule.

The project was supported by the Lake Brunner Community Catchment Care Group, the West Coast Regional Council, Westland Milk Products, DairyNZ, AgResearch, NZ Landcare Trust, and NIWA.



Peak run off structures being installed as part of a Living Water project in Awarua- Waituna

Catchment based projects to care for our waterways

Below are some of the many examples of work underway by the dairy sector and partners to monitor and improve water quality

01. Northland – Wairua River (Living Water)

Living Water and local hapū are sampling local water quality, and building capacity to grow this work.

02. Hauraki – Pūkoro-Miranda (Living Water)

Together with a local catchment group, Living Water is reducing sediment loss to improve bird habitat.

03. Waikato – Peat Lakes – Lake Areare, Ruatuna, Rotomānuka (Living Water)

DOC community workers are planting, weeding and building tracks at Lake Ruatana.

04. Waikato – Waiomou

A joint pest plant removal and replanting project between Living Water, the regional council and Jobs for Nature.

05. Taranaki – Kaupokonui (Living Water)

Living Water is funding a fish ladder at a historic dam to help fish passage.

06. Hawke's Bay – Tukipo

A dairy farm wetland is showcasing affordable wetland options which remove contaminants.

07. Manawatū-Whanganui-Tararua

Tararua farmers and DairyNZ are testing how plantain can reduce nitrogen losses and improve local waterways.

08. Canterbury – Waikirikiri (Lower Selwyn)

A joint project with Landcare Trust to restore wetland biodiversity and show the value of farm wetlands.

09. Canterbury – Ararira-LII River (Living Water)

A range of work is improving freshwater habitats.

10. Canterbury – Selwyn-Hinds

DairyNZ and over 400 farmers are working together to reduce their farm environmental footprint. (See page 16.)

11. Canterbury, Auckland, Waikato and Bay of Plenty

Through Synlait's Whakapuāwai programme their team is propagating and planting native plants on supplier farms nationwide.

12. Otago – Waipori (Taieri)

A joint project with iwi to build knowledge about mahinga kai and research water quality, plant and bird life conservation.

13. Southland – Awarua-Waituna (Living Water)

This is testing the value of structures to slow water flow and reduce sediment and nutrient runoff into waterways.



14. Southland - Aparima

Local farmers are developing Farm Environment Plans to guide good farming practices to benefit the environment.

15. West Coast

A multi-partner project (see page 14) supporting the development of a catchment plan and resulting on-the-ground action.

Widespread change underway on Canterbury farms

Farmers in the Selwyn and Hinds catchments are making extensive changes to reduce their environmental footprint.

DairyNZ is three years into a project working with partner farms in Selwyn and Hinds to trial options to reduce nitrogen losses, and then share knowledge across all local farms through field days and events.

Highlights to date:

- 100 percent of 235 dairy farms assessed in the catchments reported changing their practices to reduce nitrogen losses.
- 81 percent of farmers reported improving their irrigation systems or irrigation management.
- Over 50 percent changed how they use fertiliser, and improved effluent management or effluent systems.
- Farmers also took a number of other actions, including using plantain or changing their stocking rates.
- All of these changes help reduce nitrogen losses.

Farm Environment Plans are a key tool farmers use to record their planned actions and monitor progress.

Farms in both catchments need to make significant reductions in nitrogen losses under Environment Canterbury rules, to help reduce nitrogen levels in local waterways and groundwater. In Selwyn, farmers need to reduce nitrogen losses by 30 percent by 2022, and in Hinds, farmers have to meet a series of staged targets and ultimately reduce nitrogen losses by 36 percent by 2035. Many farmers will also need to reduce their nitrogen fertiliser use by 2022 to meet a new national cap.

Dairy farmers progress to reduce their environmental footprint in Selwyn-Hinds

452 dairy farms in Selwyn-Hinds



Together with DairyNZ, **45 partner farms** are leading change by trialling options to **reduce N and greenhouse gas losses**

All farms have a **Farm Environment Plan** to guide good farming practices



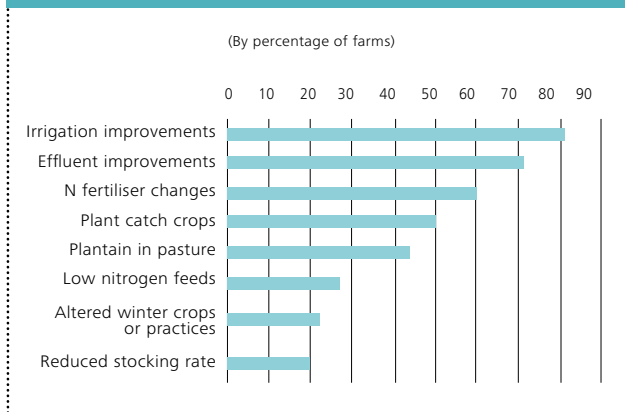
23 farmer events held to share knowledge

100% of 235 farms assessed in Selwyn and Hinds report they have made changes to reduce their nitrogen losses. Most farms are making multiple changes



A number of the partner farms in the project are already ahead of the regulatory requirements.

Selwyn and Hinds farmers are making common changes



A Selwyn Hinds farmer field day.

■ Transparency, openness and working together: supporting our leaders and owning our challenges

Dairy leading the way

Dairy Environment Leaders and Climate Change Ambassadors

Dairy Environment Leaders and Climate Change Ambassadors are leading farmers who work with other farmers, their communities and decision makers to demonstrate and promote sustainable dairy farming. They are supported by experts and specialists to understand environmental science and work at grassroots level plus advocate at national level to influence change that works for farmers and New Zealand.

Evidence-based policy solutions

DairyNZ and dairy company specialists (e.g., policy advisors, farm systems specialists, water quality scientists and economists) support and present evidenced-based policy solutions to councils and central government on behalf of farmers. These solutions aim to achieve local catchment environmental outcomes while supporting resilient farm businesses and thriving communities. We work to ensure regulations are fair and practical to implement, and drive the environmental outcomes they seek to achieve.





He Waka Eke Noa: a Primary Sector Climate Action Partnership

He Waka Eke Noa will equip farmers and growers with the information, tools and support to reduce emissions and build resilience to climate change.

The partners are working together to implement a framework by 2025 to reduce agricultural greenhouse gas emissions and build the sector’s resilience to climate change.

Through this framework farmers and growers will be supported to:

- Measure, manage and reduce on-farm emissions.
- Recognise, maintain or increase integrated sequestration on farms.
- Adapt to a changing climate.

The framework will include incentivising farmers and growers to take action through an appropriate pricing mechanism by 2025, in line with legislation.

Dairy farms already ahead of the game

The dairy sector is already ahead of agreed targets under He Waka Eke Noa, with 92 percent of dairy farms an emissions report and 26 percent having a GHG plan in 2021.

9,844 New Zealand dairy farmers received emissions reports in 2020. The reports mainly focus on biological emissions and include total farm, per hectare, and per kg milksolids emission metrics.

Progress under He Waka Eke Noa

Key achievements by He Waka Eke Noa include:

- Developing two information sources to help industry bodies and farmers understand their agricultural greenhouse gas emissions: *Greenhouse Gases: Farm Planning Guidance* and *The Greenhouse Gases Model Assessment Report*. DairyNZ is working with milk processor companies and rural professionals to ensure the new guidance is incorporated into existing Farm Environment Plans.
- Holding a series of workshops to scope the programme. These involved over 150 participants across the agriculture sector, Māori agribusiness, the science community and government.
- Establishing workstreams to achieve partnership goals.
- Carrying out an initial investigation of options to recognise and reward on farm sequestration and options for an appropriate farm level pricing mechanism.
- Recommending the Government introduce a farm-level split-gas levy with built-in incentives to reduce emissions and sequester carbon: *Recommendations - He Waka Eke Noa*. (www.hewakaekenoa.nz/report)

He Waka Eke Noa is a partnership between 13 partners representing primary sector organisations, including DairyNZ and DCANZ (Dairy Companies Association of New Zealand), the Federation of Māori Authorities, Federated Farmers, the Ministry for Primary Industries and the Ministry for the Environment.

Key outcomes under He Waka Eke Noa



Our waterways:

An overview of water quality

LAWA data from sites across New Zealand tells us about the state of our waterways based on common measures of water quality

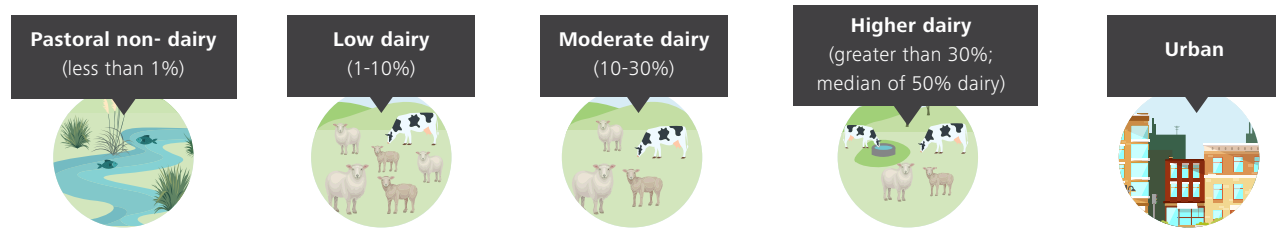
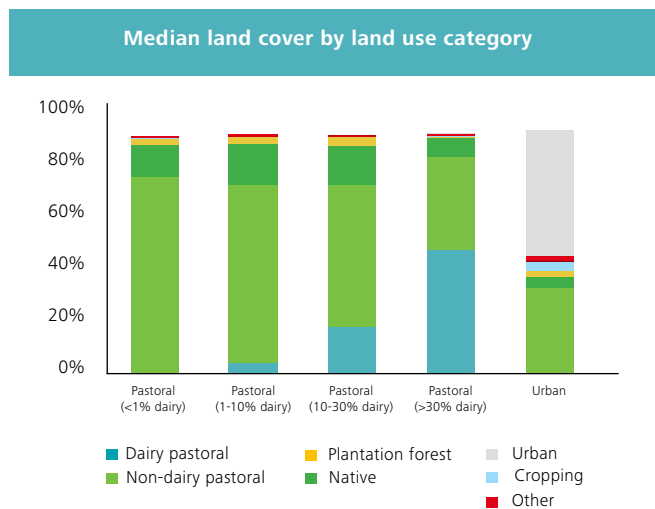
The data tells us that increases in the proportion of dairy in catchments generally increases the amount of nitrate, *E. coli* and phosphorus in waterways. However, water clarity and ecosystem health indicators such as the Macroinvertebrate Community Index (MCI) and periphyton are usually similar across land use categories as the proportion of dairy land increases. Farmers are continuing to reduce their impact on water quality for future generations and implement good management practices to improve our waterways.

Land use categories

The data shown is for catchments where Land and Water Aotearoa water quality data is available. These categories show varying levels of dairy land use in the catchment.

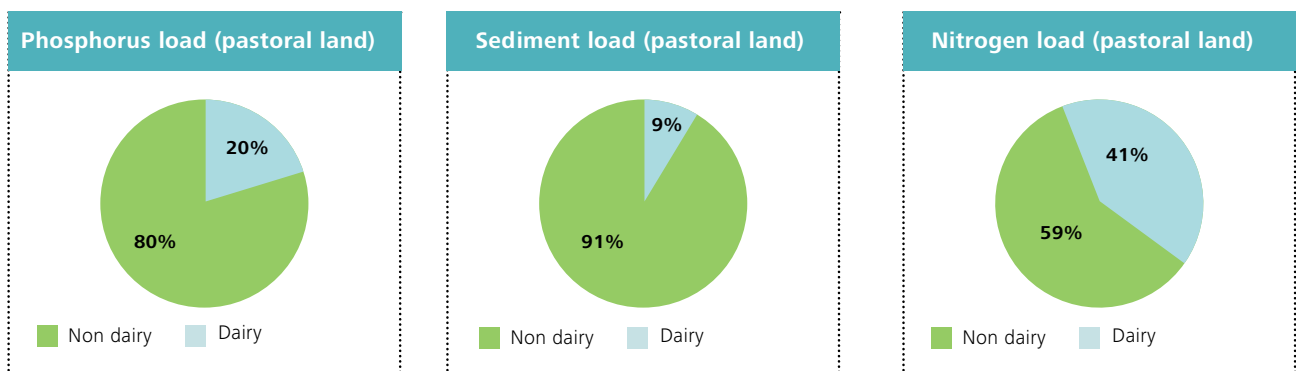
A similar number of sites are included in each category, for statistical purposes. The data is drawn from over 800 sites, with approximately 200 in each pastoral group. For all graphs shown, LAWA water quality data is from 2015-20.

The percentage of dairy land use for each land use category is shown below whereas medians for each is shown to the right. We acknowledge that total urban footprint is small compared to pastoral, but also that everyone has a part to play in improving environmental outcomes.



Nutrient and sediment footprint for pastoral land nationwide

Human activities have increased nitrogen, phosphorus and sediment in waterways. This can increase algal growth and sediment and affect water quality. To significantly improve water quality, all land use types must reduce their footprint.



Macroinvertebrate Community Index (MCI)



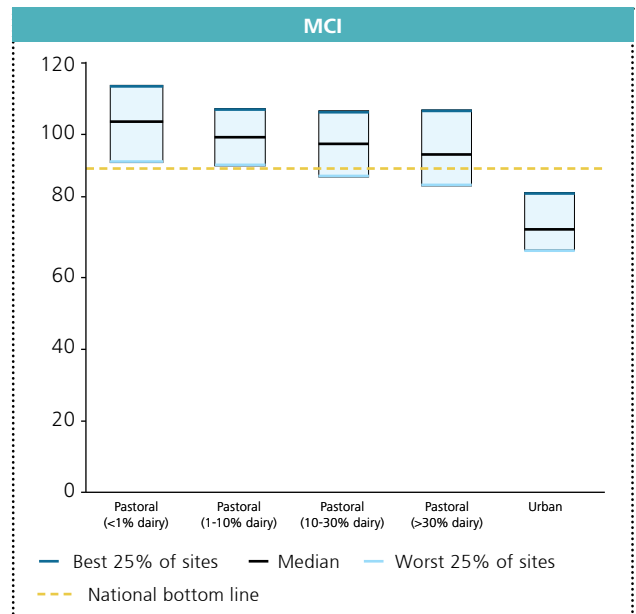
What the data tells us

- The majority of sites in pastoral catchments are rated as fair or good for MCI.
- More dairy in a pastoral catchment does not lead to marked changes in the MCI score.

What is MCI?

MCI is a measure of aquatic health that reflects water quality, water quantity and aquatic habitat quality. Macroinvertebrates are aquatic invertebrates and this measure is widely used as an integrated measure of stream health.

An MCI score over 130 rated as excellent, 110-130 is good, 90-110 is fair and 90 or less is poor.



What are farmers doing to improve ecosystem health?

- ✓ Excluding stock from waterways through installing fencing and crossings.
- ✓ Carrying out riparian planting to provide habitat and shade that lowers water temperature, therefore helping increase the number and diversity of aquatic species, and reduce periphyton growth.

Clarity

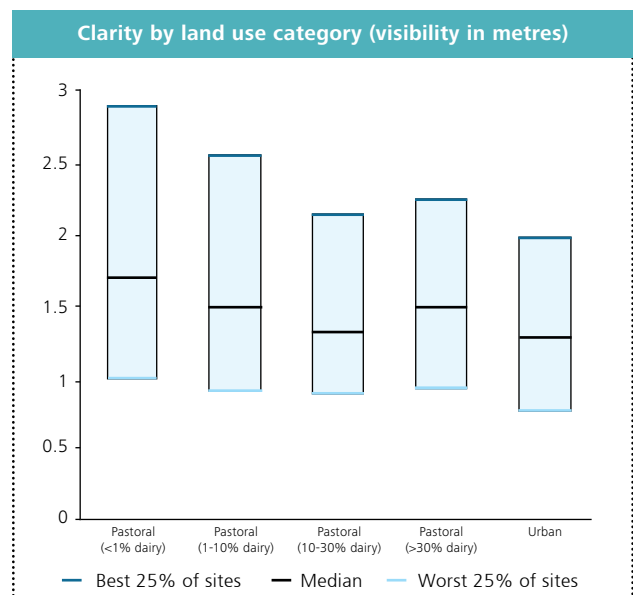


What the data tells us

- More dairy in a pastoral catchment does not markedly decrease visual water clarity relative to other land uses.

How clarity affects water quality

Clarity is a measure of light transmission through water. As the amount of suspended sediment increases, visual clarity is reduced. Suspended sediment impacts ecosystem health.



On-farm actions to address water clarity

- ✓ Keeping stock out of streams is important to improve water clarity. Over 24,700km of waterways have already been fenced by dairy farmers.
- ✓ 99.8% of dairy farms with stock crossing points have installed bridges or culverts over Water Accord waterways.
- ✓ Significant improvements in effluent management practices.
- ✓ Riparian and critical source management are key parts of Farm Environment Plans which can help address water clarity issues. All farms will have a plan by 2025.

E. coli



What the data tells us

- More dairy in a pastoral catchment leads to increasing levels of *E. coli* and more work is needed to reduce faecal microbes entering waterways.
- Urban catchments also have high levels of *E. coli*.

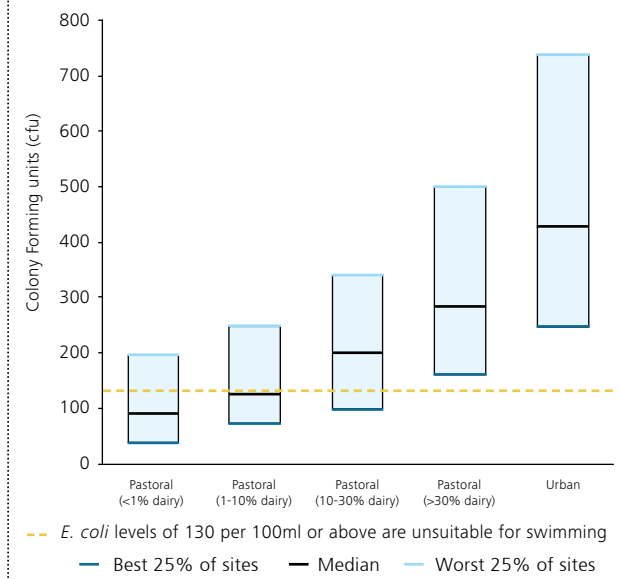
How *E. coli* affects water quality

E. coli is an indicator bacteria for more harmful pathogens. In high concentrations *E. coli* indicates a health risk from microbial pathogens like campylobacter. Common sources of *E. coli* are sewerage, animal or bird effluent and stormwater run-off.

On-farm actions to address *E. coli*

- ✓ Over 24,700km of waterways were fenced by dairy farmers by 2019.
- ✓ 99.8% of dairy farms with stock crossing points installed bridges or culverts over significant waterways.
- ✓ Significant improvements in effluent management practices have also occurred.
- ✓ Critical source area management is a key part of Farm Environment Plans. All farms will have plans by 2025.

E. coli levels by land use category (in colony forming units)



Periphyton



What the data tells us

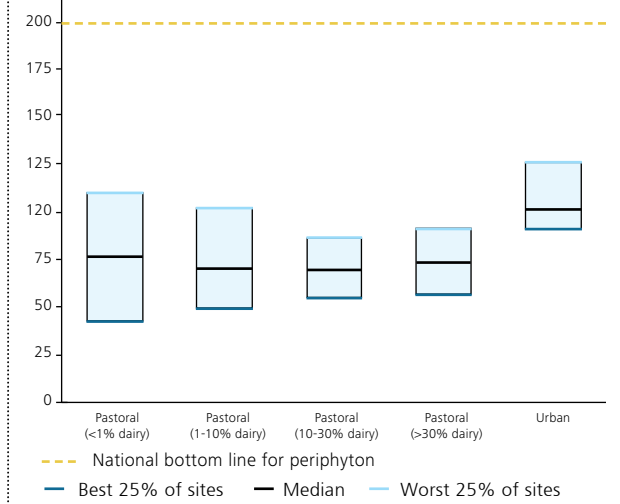
- More dairy land in a pastoral catchment does not lead to marked increases in periphyton biomass.

What is periphyton biomass?

Periphyton is a mix of algae, fungi and bacteria that grow on the beds of rivers, lakes and streams.

While periphyton can provide a food source for aquatic insects, too much can lead to riverbeds becoming smothered, reducing the availability of food for fish, and changing oxygen levels in waterways.

Periphyton biomass by land use category (modelled 92nd percentile (mg chlorophyll per m²))



What are farmers doing to manage periphyton biomass?

- ✓ Improving farm practices to reduce nutrient runoff, which fuels periphyton growth.
- ✓ Undertaking riparian planting to provide shade that reduces periphyton growth.

Nitrate and Phosphorus



What the data tells us

- Increasing levels of nitrate are found in pastoral catchments with more dairy land use.
- All pastoral land use contributes to in-stream phosphorus. Phosphorus increases are seen in moderate to high dairy pastoral catchments.

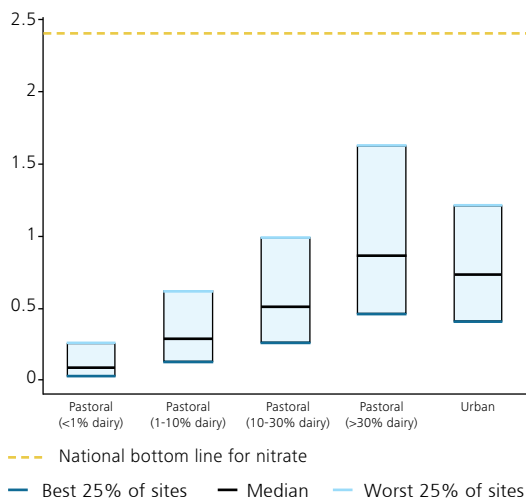
How nitrate affects water quality

Most nitrogen is lost to waterways by leaching through soils. Higher nitrate levels can cause excessive plant and algae growth. At very high levels, nitrate can be toxic to aquatic life.

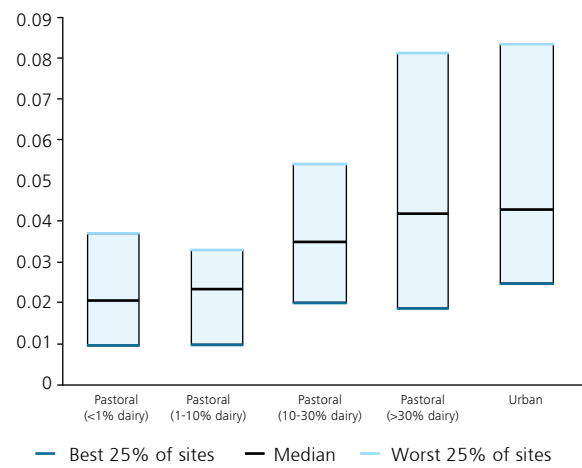
How phosphorus affects water quality

Phosphorus binds with soil and dissolves slowly in water over time. It can enter waterways through erosion or farm runoff. Phosphorus in waterways can encourage weed and algae growth, which affects stream ecosystems.

Nitrate levels by land use category (grams per m³)



Total phosphorus by land use category (grams per m³)



On farm action to address nitrate, phosphorus and periphyton

- ✓ Farmers are reducing fertiliser use.
- ✓ Over 10,000 nutrient budgets for dairy farms were completed by 2019. By 2025, all farmers will use soil testing to further improve the accuracy of fertiliser applications.
- ✓ Farm Environment Plans are now widely used and all dairy farms will have a plan by 2025. Good practices that monitor and match nutrient applications to plant needs are key to these plans.
- ✓ Careful riparian management, fencing and critical source area management help reduce nutrient runoff into waterways. The purchased nitrogen surplus target adopted by the sector will reduce the amount of nitrogen lost to the environment.
- ✓ Farmers are reducing nutrient losses through a number of catchment-scale projects to improve water quality.





Reducing emissions: protecting our environment for future generations

New Zealand dairy - our place in a changing world

New Zealand dairy farmers are world leaders in the production and export of sustainable, nutritious dairy products. Our farmers are proud to work with the land, work with animals, and produce the milk we share with the world.

Our pasture-based dairy farming is unique and provides an outdoor lifestyle for animals as well as contributing to milk with the world's lowest level of carbon emissions.

We have an industry-wide commitment in the Dairy Tomorrow strategy to build on these foundations; farming in a way that cares for our cows, our people, our environment, and communities.

Under He Waka Eke Noa, the sector has committed to reduce greenhouse gases.

We have a proud history of transformation. The dairy sector has continuously refined our practices, developed new technologies and driven efficiencies to give our pasture-based farmers a competitive advantage over our global competitors – all without subsidies.

Domestically and internationally, consumer expectations are growing – and we too want to continue to raise the bar.

We want all New Zealanders to be as proud of our dairy sector as we are and for our farmers to continue to lead the world in sustainable dairy farming for years to come.



New Zealand milk: produced with the world's lowest carbon footprint

Recent research shows New Zealand milk has the world's lowest carbon footprint – at half the emissions of other international producers.

Recent AgResearch analysis shows New Zealand milk has an on-farm carbon footprint 48 percent less than the average of 18 countries studied.

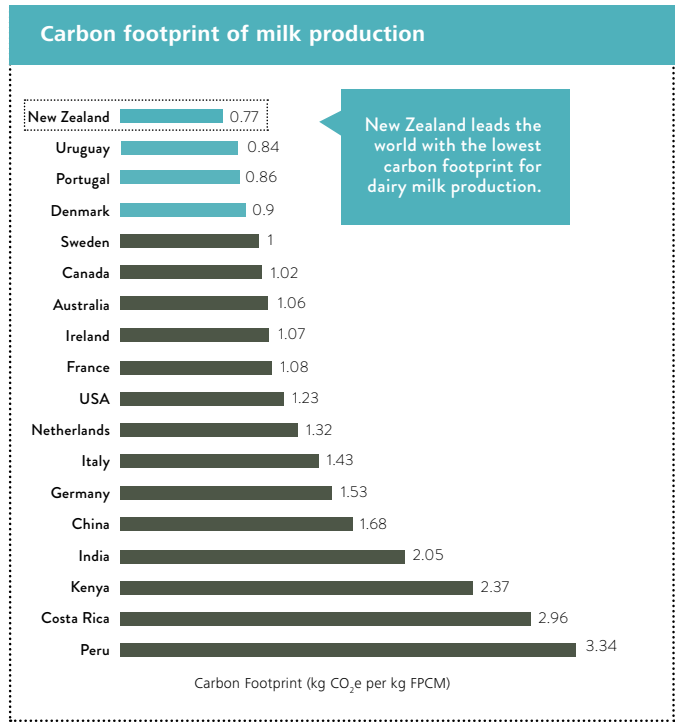
Commissioned by DairyNZ, the study was independently produced by AgResearch and peer-reviewed by an international specialist in Ireland.

The research analysed 55 percent of global milk production, including major milk producing countries.

New Zealand is the most efficient producer at 0.77 kg CO₂e per kg FPCM (fat and protein corrected milk) – which is 48 percent less than the average of the countries studied. The global average is far more than this at 1.47 kg CO₂e per kg FPCM.

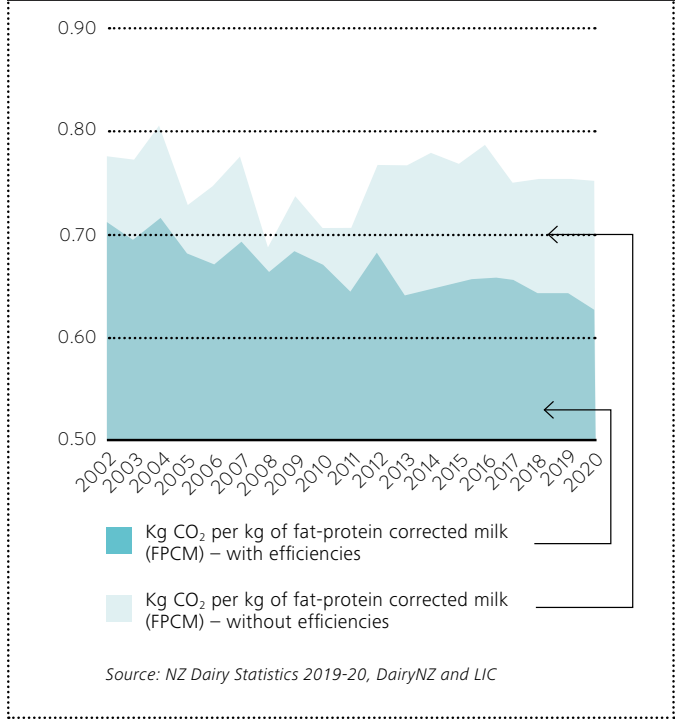
With an increasing global focus on reducing emissions, New Zealand's dairy sector is committed to remaining the most efficient producer of low emissions milk in the world.

Under He Waka Eke Noa, there is a significant amount of work underway to support farmers to further reduce emissions.



In 2020 our farmers produced 20% less emissions per KG of Fat-Protein Corrected Milk (FPCM) thanks to continued investment in R&D, science, and efficiencies.

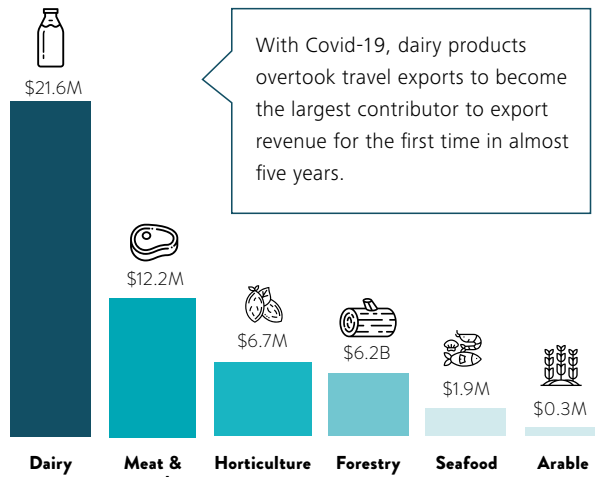
The difference in number compared to the above graph (0.63 compared to 0.77) reflects that the AgResearch work also considered 'upstream' emissions (e.g., non-enteric methane).



Dairy's Contribution to New Zealand

Top merchandise trade exports

Data is for the year to June 2022



With Covid-19, dairy products overtook travel exports to become the largest contributor to export revenue for the first time in almost five years.

*Source: Situation and Outlook for Primary Industries, June 2022 (www.mpi.govt.nz)



50,000

Kiwis work in the dairy sector*

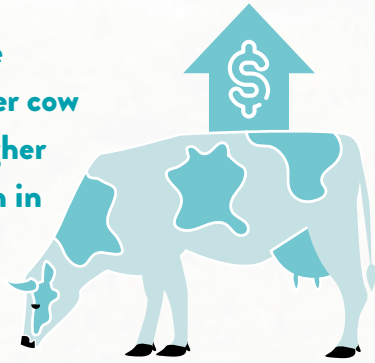
Dairy is a major employer in many New Zealand districts, accounting for 1/3rd of all jobs in Waimate, more than 1 in every 4 jobs in South Taranaki and Otorohanga, 1 out of 5 jobs in Southland, and more than 1 in every 10 jobs in the Westland, Matamata-Piako, South Waikato, Clutha, Tararua and Ashburton districts.**

*Source: Situation and Outlook for Primary Industries, June 2022 (www.mpi.govt.nz)

**Source: www.dairynz.co.nz/economic-contribution-summary

Export value generated per cow was 50% higher in 2019 than in 2009

Source: www.dairynz.co.nz/economic-contribution-summary



Dairy contributes more than 10% of regional GDP

in Waikato, Taranaki, West Coast and Southland and more than 5% in Northland, Manawatū-Whanganui, Canterbury and Otago

Source: www.dairynz.co.nz/economic-contribution-factsheet





dairy
tomorrow

The future of New Zealand dairying.