

INSIDE DAIRY

Your levy in action



Proud

Farmers share biggest achievements of 2021

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// Do cool nights mean cool cows? **16** // What's plantain's true potential? **26**

Dairynz 



OVER THE FENCE...

Just when we thought 2020 was a challenging year, along came 2021.

As Kiwis navigate their way through Covid-19 lockdowns, alert level changes, vaccinations and preparations for the impending traffic light system, farmers continue to play an essential role in the nation's wellbeing and economy.

This issue of *Inside Dairy* shares some of the positive achievements of 2021. We showcase the amazing work you're doing to champion environmental initiatives, foster innovation to increase profitability, and provide healthy, nutritious and sustainable food to the world.

You can also read about the work DairyNZ is doing to build a deep and lasting sense of pride and trust in dairy farming, one of our top priorities. I encourage you to read the article on page 14 about our *Here for the Long Game* initiative, which will tell your dairy stories in fresh and unexpected ways.

While there's certainly a lot to celebrate, including strong milk prices, we must acknowledge that 2021 hasn't come without its challenges for our sector.

DairyNZ and other sector bodies have made it clear to the Government that the increasing number and scale of regulatory changes is putting significant pressure on you, as you're already working hard to improve your environmental footprint. This mounting regulation also comes on the back of significant workforce issues and fatigue in the sector from the pandemic.

There's always a place for rules and regulation; however, it needs to be staggered and coupled with voluntary efforts, which is something we have a track record on. We'll continue to push for the Government to work with farmers on developing practical solutions to achieve the outcomes we all want.

As we head into a new year, you're always welcome to email me at tim.mackle@ceo.dairynz.co.nz to chat about the work we're doing. You can also reach out to our regional teams – contacts are on page 25 and our website.

Have a safe and enjoyable Christmas and New Year, reconnecting with family and friends, and prioritising some much-needed rest and recovery.

Tim Mackle
Chief executive
DairyNZ



On the cover: Blair Drysdale and son Joe after a busy day planting natives on their farm along the upper reaches of the Manawatū River. See their full story on page 9.

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DairyNZ economists have been crunching the numbers to find out what benefits we might see – to the farm, sector and economy – if more farmers adopted plantain.



We appreciate your feedback

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Dairy shines through challenges



Dairy farmers can be rightfully proud of what they've achieved in 2021, despite a challenging and unsettled year, writes DairyNZ chair Jim van der Poel.

Dairy's strong performance has been vital to New Zealand this year, during economically uncertain and challenging times. With a higher milk price, the total economic contribution from dairy was estimated at more than \$40 billion over the past season.

Farmers have continued to do a great job under pressure, while trying to manage with staff shortages worsened by Covid-19.

We at DairyNZ continue to strongly represent your views to Government that regulatory overload is creating too much stress. Our advocacy has focused on ensuring politicians understand the pressure you're facing and working together with you on solutions.

Joint advocacy by farmers, DairyNZ and other primary sector organisations resulted in changes to make winter grazing requirements more practical on-farm. Farmers have also been recognised for achieving real improvements in winter grazing practices.

As we head into 2022, many migrant workers are looking forward to

applying for residency under a new pathway which allows around 4000 dairy workers to become residents. DairyNZ and Federated Farmers worked hard to influence this change. It's great to have the contribution of our migrant workers recognised – farmers can retain experienced staff, and families can now plan their future in New Zealand.

This year, we proudly shared an AgResearch report we commissioned which showed New Zealand dairy is the world's most carbon-efficient. To retain this position and meet growing consumer expectations, we're investing in research to help you continue reducing your environmental footprint while maintaining or improving farm profitability.

We know our global customers and Kiwis have growing expectations around sustainability. Over the past three years, our *Vision is Clear* campaign showcased the stories of 60 dairy farmers and what

they're doing to care for the environment. About 1.7 million Kiwis have seen the campaign, and an estimated 63% feel positively towards dairy farmers. When the campaign started in 2018, only 43% felt that way.

We're also seeing New Zealand getting on top of the *M. bovis* battle, as a result of hard work by farmers and partner organisations. By November 2021, only four farms had active *M. bovis* – down from 34 two years ago.

We should all feel proud of what dairy farmers have achieved this year, and what we've contributed. There is still much to do but I have confidence that, together, we can continue to solve our challenges and look forward with optimism.



West Otago dairy farmer Lloyd McCall gets a helping hand from a young volunteer to plant along the banks of the Pomahaka River.

High-value return from Scott Farm

Two decades of levy-funded research at Scott Farm have made a big difference to New Zealand dairying, recaps DairyNZ's Chris Glassey.

It's been 20 years since Scott Farm was bought by DairyNZ on behalf of dairy farmers, and time has proved the value of that investment.

Just up the road from DairyNZ's Newstead office, Scott Farm's research has added considerable value and knowledge to how dairy farm systems work for both profit and environmental outcomes – and how these interact.

From the outset, our aim was to use Scott Farm specifically for farmlet trial comparisons, mainly to evaluate options for changing home-grown and off-farm feed supply.

In 2001, we immediately established the Resource Efficient Dairy (RED) trial farmlets. These compared seven farm systems for environmental (mainly nitrogen) and profitability outcomes.

Another early farmlet study compared old and new ryegrass cultivars. This led to further testing of novel endophytes in ryegrass.

Subsequently, there have been five further farmlet comparisons. All have included measurement or estimates of nitrogen (N) leaching, pasture growth and feed use, and profitability.

Here are some of the highlights:

- We've measured profit, production and N-leaching outcomes for production systems ranging from 1000 to 2900kg MS/ha.
- A zero-N fertiliser farmlet ran for 10 years and was compared with a farmlet using 180kg N/ha, providing valuable information on the benefits and concerns of reduced N inputs.
- A farm system attempted to produce up to 1750kg MS/ha solely from home-grown feed by integrating crops into the grazing system. It achieved 1480kg MS/ha, about 15% short of target.
- A two-farmlet comparison over five years was able to reduce N leaching per ha by 43%, with production and profit per ha falling by just 4% and 13%, respectively.

Read the full list of relevant research and some key findings from 2001 to 2021 – dairynz.co.nz/scott-farm

What might the next 20 years bring?

Our immediate focus is on completing the farmlet validation of the Forage Value Index for ryegrasses. Future research will likely explore adaptation of pastures and cows in the upper North Island to combat climate change effects – both those already



Farm systems specialist Chris Glassey (right) assessing ryegrass leaf stage with former DairyNZ senior scientist Kevin MacDonald in 2016, as part of the Pastoral 21 farmlet trial at Scott Farm.

SCOTT FARM IN BRIEF

RESEARCH FOCUS	Larger-scale farm systems trials
FARM AREA	115ha effective milking platform
HERD SIZE	330
PASTURE PRODUCTION	Averages 17t DM/ha annually (150kg N/ha/year)
SOIL TYPE + FERTILITY	Peaty loams, sandy loams, silt loams
DAIRY INFRASTRUCTURE	44 bail turn-style, GEA Westfalia milking system



Note: monthly pasture growth figures have been kept since 2001 to examine trends in pasture growth over time. See page 20 for details.

here and those on the way. Any adaptation will need to meet improved animal welfare, environmental and workplace requirements.



Snapped on-farm

Here are some of our favourite photos from social media over the past few months, showing what's been going down on farms around the country. If you'd like your photo to feature, share your snaps by tagging us on social media or using the **#dairynz** hashtag.



Photographer: Blake and Ashleigh Gordon, farm managers in Methven, Canterbury

@ashleighmaree_5

"These mini-farmers are our sons Reeve (2) and Ryder (9 months), who have been busy helping us on-farm during calving."



Photographer: Michelle Voschezang, contract milker in Egmont Village, Taranaki
@the_voskie_clan_

"I took this photo in the evening on November 5. Me and the kids were taking the school pet day lambs over to the old cow shed yard paddocks, and the trailer brought the whole lot of calves running to us. I've worked so extremely hard keeping the calves all healthy, so to see them looking this good a week after weaning was just amazing. I also really just love showing the amazing scenery we have here, and the amazing cows."



Photographer: Gregor and Lynne Ramsay, 50:50 sharemilkers in Otago

@ramsay_dairies

"We planted these oats as a catch crop after winter cropping to absorb and utilise any residual nutrients left over. To help with the nitrogen absorption, we also plant a Persian clover alongside, which also helps to bulk out the overall feed tonnage, and we make baleage from this in December before deciding what goes in next."

Bright spots

Kiwi dairy farmers are unrivalled when it comes to adapting, innovating, and just plain trucking on when the going gets tough. We asked a handful to tell us what they're most proud of in 2021.



A different approach to pasture management has boosted production and profitability for sharemilkers Genevieve and Virgilio Gamotea.



Converting feed into profit

Since arriving from the Philippines in 2015, Virgilio and Genevieve Gamotea have been steadily working their way towards farm ownership. Meantime, they're 50:50 sharemilkers at Waerenga in the Waikato, where their hard work is paying off.

"Our biggest achievement this year has been a 76% increase in production," says Virgilio. "To achieve this, we talked to our farm owners about improving the pasture. The property has a 100ha milking platform and we milk 260 cows, 70% of which are two- to three-year-olds.

"The farm can be dry in summer and is wet during winter. We identified unproductive paddocks, then discussed what opportunities there were to get more from the system if we used a different strategy for pasture management.

"Last winter, we shut down the platform for a month and moved cows to the 40ha runoff where we fed hay and silage. And over the summer, we bought in 45 tonnes of maize silage as support. We planted 10ha of crops – 8ha chicory, 2ha sorghum – and sowed new ryegrass. This season, we have 12ha of new grass and

we'll continue to gradually rejuvenate the pasture. In three years, we'll have refreshed almost half the farm.

"Based on our experience, quality feed for cows converts into profit. This is paying off for us. Last season, we substantially increased production to 96,923kg MS – a farm record.

"Dairy farming here is very different from the Philippines, so I'm always asking questions, going to DairyNZ discussion groups and studying. I've done a Primary ITO Level 5 course on production management. I've learnt a lot and met a lot of people who've helped me. We have very supportive farm owners.

"My advice to others in a similar situation is to set goals and make a plan. Getting ahead is a lot of hard work and you have to make sacrifices, but I truly believe it pays off. Don't stop dreaming – and aim high."

• **"Don't stop dreaming – and aim high"**

Growing the next generation

Strong mentoring has made all the difference to Anthony Kiff (Ngati Tahu-Ngata Whaoa), and now it's his turn to show the way.

"I left school at 14 but my grandparents, who brought me up, taught me good values and morals," says Anthony. "I really owe my success to them. But I've also been fortunate to have learnt a lot about farming from the people I've worked for, who mentored me and gave me opportunities that helped me grow and progress. I'm now working as a contract milker in Tokoroa for the Tauhara North #2 Trust.

"School isn't for everyone, and I'm working with my iwi to share knowledge and show our rangatahi (young people) what farming has to offer. Sometimes, kids can't see pathways to success, but if they surround themselves with the right people and learn to do the work, they can reap the rewards.

"The Trust, among other assets, has five dairy farms and we're setting up a programme to develop kotahitanga (unity) to support, uplift, mentor and encourage young people into farming. We want to help these young people bridge the gap between school and work and show them what farming has to offer. I want to teach kids how to dream by sharing what I've learnt and how I did it."



"I'm working with my iwi to share knowledge and show our rangatahi what farming has to offer."



Anthony (far right) is currently training up three young farm workers: Romio Reihana-Timoti and Konene Howden-Delamare (back left) and Devaniah Mahanga-Beckham (front left). Also pictured are Anthony's wife Danelle, and children Shila, Ahlia and Zavier.



Billie Drysdale (7) is doing her bit to restore the Manawatū Riverbank.



• **“Taking a more regenerative approach has benefits for us, the land and our animals.”**

Caretakers of the land

Blair and Penelope Drysdale have just completed the third year of a “never-ending” restoration effort on their farm along the upper reaches of the Manawatū River.

They’re also well on the way to achieving organic certification for their 147ha property, Te Miro Farm in Norsewood.

“When we bought the farm in 2018, we saw an opportunity to be the best caretakers we could be. Working with the Te Kāuru Hapū Collective and local community volunteers, we’re reviving and restoring the riverbank to regenerate a thriving ecosystem.

“We’ve retired 15ha on the dairy platform and 8ha along the river boundary. Funding from the Manawatū River Leaders’ Accord has enabled us to plant 20,000 native species to promote water quality. It’s been a massive community effort. Our local primary school, Norsewood & Districts, uses the farm as an outside classroom to learn why pest control, water quality and native bush restoration are important.

“We milk 310 cows once a day and are in the second of a three-year transition to organic certification by 2023. We want to farm using regenerative agriculture, and farming organically works in well with this. It encompasses our values, will future-proof our business, and give us improved financial resilience.

“The lower-cost system gives us increased profits, and we feel that taking a more regenerative approach has benefits for us, the land and our animals.”

Adapting to climate change

Challenges maintaining perennial ryegrass and white clover pastures in summer have led Northland dairy farmer **Allister McCahon** to explore more resilient options.

“In light of predictions of more frequent and intense weather events, we need to ask if we’re growing the right pasture species in New Zealand,” says Allister. “We expect the research we’re doing here will also inform pasture species decisions in other parts of the country. There are so many implications for small towns when things go wrong on-farm, so we need to innovate and adapt.”

“As part of Northland’s Diversified Forages Project, I’ve been involved with a great group of people looking at ryegrass alternatives and their potential for complementing existing Kikuyu management. When my wife Maree and I are making our pasture selection, the Forage Value Index still directs us to ryegrass. We now know ryegrass is prone

to collapse when subject to multiple stressors, such as heat, moisture, insect pressure or soil fertility.

“Our results have confirmed there are multiple solutions that perform as well as or better than ryegrass.

“We think resilient plants like tall fescue and cocksfoot, supported by chicory, plantain, Persian and red and white clovers, could be the basis of a medium-term pasture in summer-dry areas. But we also found a lack of growth from white clover beyond the establishment year, and while red clover has shown great potential to increase yield in the establishment year, it too had persistence problems. We also found the suitability of more persistent legumes, such as



“We need to ask if we’re growing the right pasture species in New Zealand.”

lucerne, is limited to particular soil types.

“This project has sparked our interest in doing further research into the potential of subtropical legumes. I think New Zealanders need to have a discussion about introducing new species with traits that provide for mitigation and adaption to climate change – but that’s a whole other question.”



Photo: SenzTag

“I couldn’t help noticing that everyone was getting tired.”

Wellbeing’s a win-win

With an eye to improving staff wellbeing, West Otago farmers **Mike and Rachael Marshall** decided to make a drastic change to their rosters.

“We have a team of three plus me, and we’d always operated using the more traditional 11:3 (11 days on, three off) roster,” says Mike. “But I couldn’t help noticing that everyone was getting tired and usually spent one of their days off catching up on sleep.

“I thought it would be good if we didn’t work so many days in a row, so in May we decided to trial 4:2 to see how it went. The trial went well and after we’d all talked about it, everyone was keen to carry on.

“We’ve all seen the benefits. The team is fresher, and even though they spend less time at work, they’re more efficient.

“We’ve adjusted their pay too, so nobody loses out.

“I’ve noticed there’s greater attention to detail too. Because people aren’t as tired, they often do extras on the fourth day, taking the time to check on a sick cow before they go home, making sure animals have enough feed at night, and that sort of thing. I’m not part of the roster, so if something pops up, I can pitch in.

“There’s no doubt you can make a lot of mistakes when you’re tired, so being fresh at work and being able to spend more time with family and friends are rewards that we’re all enjoying.”

Emissions pricing coming in 2025

Our dairy sector is committed to playing its part in reducing emissions alongside all New Zealanders, but policy needs to be fair and support positive change on-farm, writes DairyNZ chair Jim van der Poel.



New Zealand farmers face a new era of farming come 2025, when emissions pricing is introduced.

The Government has debated pricing agricultural emissions since 2003. When it became legislation in 2019, our response as a sector was to partner with the Government and Māori to design how this would best work for agriculture. That partnership, He Waka Eke Noa, was a world-first.

It's worth remembering that Kiwi dairy farmers have the world's lowest carbon footprint. This competitive edge is worth defending as the importance of sustainability grows among our consumers here and abroad. To hold this advantage and play our part alongside the rest of New Zealand, agriculture has a role to play in further reducing greenhouse gas emissions. However, the Government's mandate to bring agriculture into the New Zealand Emissions Trading Scheme (NZ ETS) sooner than 2025 if a credible alternative isn't delivered will not achieve the best outcomes at a farm level over the long term.

Through the NZ ETS, farmers face a broad-based tax, are stripped of control, and have fewer options to mitigate emissions. Meanwhile, the only mitigation NZ ETS offers is to reduce production, which will make it incredibly difficult for many to continue farming. What's more, the NZ ETS does not support

long-term investment into agriculture research and development.

He Waka Eke Noa's purpose is to develop an alternative framework which will practically measure, manage and reduce agricultural emissions. This includes a better approach to recognise on-farm sequestration, other potential ways to reduce emissions, and a scientifically robust approach to pricing agricultural emissions from 2025 onwards. As always, DairyNZ's role is to advocate for our farmers to ensure both environmental and commercial sustainability is reached.

He Waka Eke Noa has released two alternative options to the NZ ETS for farmers to consider and give feedback on:

1. **Farm-Level Levy**
2. **Processor-Level Hybrid Levy**

We encourage you to visit our website to learn how each option works, or feel free to contact our team:

dairynz.co.nz/contact-us

Plus, look out for details of our nationwide farmer meetings coming in February 2022, where we'll answer questions and take your feedback.

As always, DairyNZ will continue to support farmers through this process.

He Waka Eke Noa

Primary Sector Climate Action Partnership



Priorities of the alternative pricing options:



CHOICE & CONTROL

Able to recognise a range of emissions reduction strategies as an individual farm or via a collective. Greater control over how the levy rates would be set.



SPLIT-GAS APPROACH

Recognise the different warming impact of biogenic methane, and price it separately to carbon.



CARBON SEQUESTRATION

Recognise a wider range of on-farm carbon capture from vegetation excluded from NZ ETS.



AGRICULTURE INVESTMENT

Recycle revenue generated to help reduce emissions in the agricultural sector.

WHAT YOU TALKED ABOUT IN 2021

Three of DairyNZ's field staff share the main issues farmers raised with them this year, plus a few helpful tips.

Waikato

FARMER CONCERNS

1. Flexible milking
2. Alternative summer crops
3. Greenhouse gas emissions



→ **BRIG RAVERA**, extension partner for Waikato



BRIG'S TIPS:

"The biggest concern farmers have with not milking twice a day is production losses, so the research on how far the milking time gaps can be pushed to make milking times more sociable was of huge interest.

"Because of how dry summers are here, alternative crops to fill the February to April feed gap has also been a major issue. Thanks to some innovative farmers who are trialling alternatives, we've been able to showcase options like kale and swedes for milking cows.

"The last big topic has been greenhouse gas, our farm emissions, and what all the climate regulation means for us on-farm."

- **Flexible milking** – Talk to other farmers using flexible systems. There's a heap of information on the DairyNZ website to help you too.
- **Alternative summer crops** – Use your seed reps! If you're relying on a summer crop, you need to ensure good yields to make it pay, so get your rep's advice on the best possible establishment and growth for your crops.
- **Greenhouse gas emissions** – Don't go out and make major changes just yet! Take the time now to understand what's driving your numbers, and what levers you have within your system.



Lower North Island

FARMER CONCERNS

1. Finding and keeping staff
2. Effluent storage systems
3. High 'empty' rates in heifers



→ **ABBY SCOTT**, senior extension partner

for Lower North Island

"Finding and keeping staff is such a big issue. Many farms are understaffed. The farms I see attracting and keeping good staff do three things well: they're good communicators, regularly catch up with their teams and give clear instructions.

"Another area of discussion has been about making decisions around installing or upgrading dairy effluent systems. It's important to ask the right questions, gather information and take professional advice, even if it costs. Finding the right person for the job is key, so establish your system requirements and make sure you take future plans into account.

"We've also noticed heifer 'empty' rates seem to be increasing on many farms. The farms that can meet target heifer LWT are those with the best reproductive results."



ABBY'S TIPS:

- **Keeping staff** – Pay competitively, have good rosters, offer warm and comfortable accommodation, and ensure your team has time for outside interests.
- **Effluent systems** – There are many options out there, from ponds to clip tanks and bladders, so I'd encourage you to go and look at a few different systems in your area.
- **Heifer in-calf rates** – Weighing heifers regularly and feeding to requirements are two simple but effective ways to achieve heifer weight targets and increase their chances of getting in calf.



Canterbury

FARMER CONCERNS

1. Understaffing
2. National Freshwater regulations and 190kg N cap
3. Wintering



→ **ANNA HALL**, regional partner for Canterbury

"Staffing has been particularly tough this year. Covid, border restrictions, residency and immigration hold-ups, and a low unemployment rate, have meant many farms have been understaffed. The Government's announcement to open a pathway to residency for our valued international workers was a positive step towards relieving the pressure.

"Another key topic has been the Essential Freshwater regulations, specifically the 190kg N/ha/year cap, in effect from July 2021. We've been helping farmers understand their current usage, and where and how changes can be made to meet the cap while remaining profitable and resilient.

"We've also been helping farmers navigate the intensive winter grazing (IWG) rules. The major flooding event in Canterbury this winter highlighted the need to prepare for the worst-case scenario."



ANNA'S TIPS:

- **People** – Consider an alternative milking frequency to the traditional twice-a-day system. Fewer milkings can reduce work hours and pressure on the team.
- **Reducing nitrogen use** – Know your numbers, both current and historic. Consider doing paddock-scale soil tests to ensure other factors aren't limiting growth for a more targeted approach to nitrogen application.
- **Wintering** – Save yourself some time in winter by installing portable water troughs during summer when the soil is drier, and by setting out bales away from waterways, low-lying areas and swales.





Connecting Kiwis to dairying

Telling the dairy story well to the public is becoming increasingly important, and at the same time, more difficult. Here's our plan.

Building a deep and enduring sense of pride and trust in dairy farming is one of DairyNZ's top priorities. It's one of our priorities because it's one of yours – you've told us repeatedly that you're concerned with public perception.

We want dairy farmers to be proud of their occupation, and we want the Kiwi public to be proud of their country's world-class dairy farmers.

Our research tells us the public are not down on dairying – they're simply not connected to it. If we can help everyday Kiwis to understand and appreciate dairying, this will help us attract good people to the sector, influence policy and enhance farmers' pride in their vocation.

We've invested in building public confidence on your behalf for over a decade. In light of the new issues facing our sector – which are becoming more prominent and complex – we've recently refreshed our approach.



Campaign

Leading the charge is our new *Here for the Long Game* initiative, a storytelling campaign designed to reach New Zealanders who



aren't connected to dairy. These people aren't seeking out dairy stories. We're competing with YouTube cat videos for their attention, so our strategy is to entertain our way to likability and favourability. While it might sound flippant to mention cat videos, it's anything but. Our challenge is to connect with Kiwis by literally breaking through the clutter of their everyday lives.

We'll do that with creative storytelling that shows farmers and our urban cousins have shared values and shared desires, and that we're more similar than different. We'll also show the rural-urban divide is more imagined than real.

Here for the Long Game will back the inspiring stories up with real evidence of farmers' good work across a wide range of issues, from water quality and climate change to animal welfare and nutrition. This is the next evolution of our *Vision is Clear* campaign – we'll talk about a wide range of issues Kiwis are concerned about, beyond simply water.

Here for the Long Game will be seen through videos on TV and online, a website, and activities involving farmers that attract positive media attention.



Education

Complementing *Here for the Long Game* is our work with students, teachers, and their influencers to grow understanding of the wonderful opportunities in dairying. It starts with primary-aged children, who are introduced to dairy through our popular cowbassador Rosie, school teaching kits and our school farm visit programme. Meanwhile, those in secondary and tertiary education learn about dairying through initiatives such as career expos, the GoDairy website, our dairy farm intern programme, and teacher education activities.



Media

Our experienced media team are working with journalists, responding to media enquiries, and ensuring the dairy story is told accurately. They're also pitching strong story ideas to news outlets. Examples include primetime coverage of Jane and Roger Hutchings' kiwi conservation work on their Northland farm, and a pa built by Taranaki farmers Damian and Jane Roper to grow native seedlings. Both stories have featured on TVNZ's *Seven Sharp* in recent months and have been very popular with farmers and the public.

Having media tell the dairy story adds independence and credibility. If we had to buy the media coverage our team gains, the bill would run into hundreds of thousands of dollars.



Stakeholder engagement

Building strong relationships with key stakeholders is important because of the huge influence they can have on dairy perceptions and our sector's success. Many of these people work in central and local government. We have a team devoted to understanding what these stakeholders care about and showing that dairy has many objectives aligned with their own.

We're focusing our effort on issues attracting the most media interest and scrutiny. It's no coincidence that these issues – including water quality, climate change and animal welfare – also happen to be the areas in which farmers are investing heavily.



Insights

DairyNZ's insights team ensures our activities are well informed by research and evidence on public perception, to make sure we're spending your levy money well. We do this with both qualitative and quantitative market research to understand public opinion and what's driving their perceptions of dairying. This means our initiatives are well targeted and have the maximum possible impact. This team also measures success, so we can continually refine and improve.



You – farmers

Of course, at the heart of all this work is you, New Zealand's dairy farmers. It's your great stories we're telling. Your adaptability, innovation, progress, care for land, animals and people, and your community contribution, gives us fantastic material to work with.

If you have great stories to share, we'd love to hear about them. Contact amanda.woodbridge@dairynz.co.nz



Cool nights, cool cows?

If nights are cold, even in summer, and the milk production of your herd holds up through summer, does that mean your cows aren't experiencing heat stress? DairyNZ's Jac McGowan investigates.



We all have an ideal body temperature range, within which we feel comfortable and our immune system and organs function properly. Although cows have a higher body temperature than us, they're less comfortable in warm conditions.

Cows generate lots of heat digesting food and producing milk. This is handy during winter but a challenge during summer, when cows absorb more heat and it's harder to maintain an ideal body temperature.

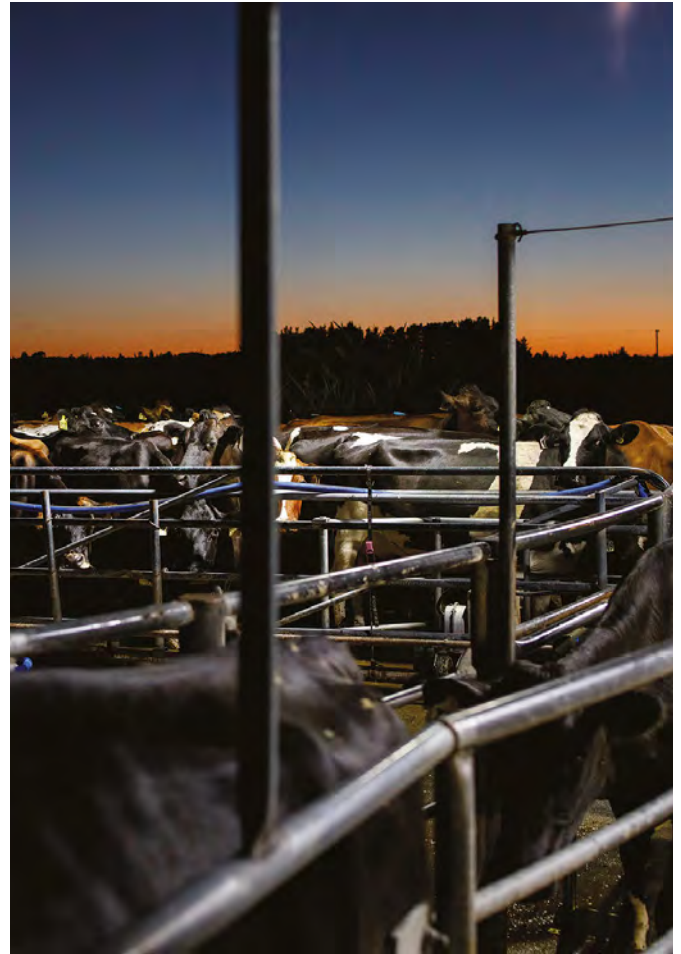
The main way cows get rid of excess heat is by evaporation, which means increased respiration rate, panting, and to a limited extent, sweating. We also see them change their behaviour, standing up more and congregating around troughs or shade. When this isn't enough, they eat less to reduce their heat production, which results in a lower milk yield.

What about cold nights?

Heat stress usually peaks in mid to late afternoon. There's typically some relief at night, when lower temperatures allow the cow to dissipate excess heat. Once her body temperature is back in the normal range, her appetite returns, and she may be able to eat enough overnight to compensate for lower intakes during the day.

Milk production isn't the best indicator of heat stress

Though warm conditions don't always lead to reduced milk production, they can still affect welfare. When animals are uncomfortable, or they can't get what they need, like water when they're thirsty or shade when they're hot, it affects their mental state as well as physical. For example, lack of shade or water results in increased aggression. And 'grumpy' is a common description for cows being milked in a hot shed.



Myth Cool nights eliminate heat stress.



Almost BUSTED



While cool nights may reduce the impact of hot days on milk production, cows may still be experiencing heat stress. The best indicator is the cows themselves. Are they grazing and moving easily? Are they loitering or being bullish around troughs or shade? What is their breathing rate?

Breathing rate

Faster breathing is one of the first things a cow does to get rid of heat. But exactly when and how do you check her breathing rate, and what's normal? Scan this code for a quick guide.



Hold onto your profit

Farms with consistently high profits react less to milk price, explain DairyNZ business specialist Paul Bird and DairyNZ economist Ryan Mills.



As milk prices increased over the past five seasons, top-performing farm businesses spent \$0.23 for every extra dollar they received in milk income, while bottom-performing businesses spent \$0.45.

A key message from this is: don't change your spending practices based on a fluctuating milk price. Instead, develop a high-profit, sustainable system for the 'average' milk price (\$6.50) and don't spend more just because the milk price increases to \$8.00.

Some cost increases over time are unavoidable. Wages are going up and some farm input costs have gone up. However, we have control over the amount of stuff we buy.

This table on the right shows the top-performing farms over a five-year period generated \$2.55/kg MS operating profit, with an operating profit margin of 38%. As well as having more consistent costs over time, the top group can withstand milk price drops and cost increases and still make a profit.

Many companies want more of your \$8.00/kg MS. Unfortunately, achieving all their claims of improved production, reproduction and profit is impossible. Your goal is to retain as much of your milk income as possible.

Farmers who operate highly profitable businesses every season are more sceptical about adding to their costs. Hardly anything gets through. Any new input must have a very high estimated profit margin, or save significant time, e.g. 30-40%+. For these farmers, 10-20% isn't enough because profit margins can easily erode when introduced into a complex farm system.

Profitability of the top, average and bottom-performing farms

Five years 2014/15 - 2019/20	Bottom 25%	Average	Top 25%
Gross farm revenue/kg MS	\$6.45	\$6.59	\$6.74
Operating profit/kg MS	\$0.40	\$1.55	\$2.55
Gross farm revenue/ha	\$6402	\$7759	\$8856
Operating expenses/ha	\$5929	\$5893	\$5501
Operating profit/ha	\$473	\$1866	\$3355
Operating profit margin %	6%	24%	38%

Note: Farms were included in the analysis if they stayed in their respective group for five years

The best time to review costs is when you don't have to

It's much less stressful to analyse your costs now than if/when we have a milk price drop and you're cutting costs to break even.

Start your review by assuming you spend \$0. Then build up your expenditure, line by line, product by product, ensuring every item adds profit or time freedom. This is called zero budgeting. This will save you more money than the alternative method of budgeting, where you look at each cost item from last season, and assume it will be similar. Zero budgeting takes more time but you'll be well rewarded.

"Money is round,
and it rolls away"

ANCIENT PROVERB





Hot topic

Levy-funded research into the effects of breed on methane emissions has been recognised by one of the world’s most prestigious dairy science research journals.

For two years in a row, a paper authored by DairyNZ research associate Holly Flay and others has made the top 100 most-cited papers in the *Journal of Dairy Science*.

Published in 2019, ‘Selecting cattle for low residual feed intake did not affect daily methane production but increased methane yield’ was part of Holly’s Master’s degree research into greenhouse gases. This was a collaboration between DairyNZ and Massey University, with funding from the DairyNZ levy and the NZ Agricultural Greenhouse Gas Centre.

Holly looked at what would happen to methane emissions if Jersey or Holstein-Friesian cows were selected for improved feed conversion efficiency. She hypothesised that high feed-efficient animals (those with low Residual Feed Intake [RFI]) would emit less methane than lower-efficiency (high-RFI) animals.

The research showed breed did not affect methane production. Both Jersey and Holstein-Friesian cattle released 22g of methane per kg of dry matter intake. Surprisingly, however, selecting animals for improved feed conversion efficiency (low RFI) had no effect on the animals’ daily methane production; but importantly, the low-RFI heifers required less feed for growth.

Dr John Roche, Holly’s Master’s supervisor and former DairyNZ principal scientist, says while it’s a pity we didn’t find a relationship between RFI and methane production per day, it’s important for scientists to investigate all the possibilities.

“We have to look at all the options to help farmers meet their greenhouse gas targets. It appears that animals more efficient at digesting feed in the rumen emit more methane from every kg eaten. Most people assumed the opposite would occur.”

John, now chief science adviser at the Ministry for Primary Industries, has also been inducted into the JDS Club 100 in recognition of his more than 100 papers published in the *Journal of Dairy Science*. He’s the first New Zealand researcher to become a member and one of only 35 people globally.

While delighted with the accolade, John says his work has been very much a team effort.

“I’ve been fortunate to work with a lot of gifted scientists at DairyNZ, as well as at other institutions. This recognition is a team achievement and testimony to the quality of the science undertaken at DairyNZ and with our collaborators in New Zealand and internationally.”

“We have to look at all the options to help farmers meet their greenhouse gas targets.”

— Dr John Roche —



Big changes coming to animal evaluation



Major improvements mean farmers will be able to make better bull selection decisions, writes New Zealand Animal Evaluation's Lutte Thys.

Improving the genetics of our national dairy herd not only delivers better animals, but greater profits to farmers.

Helping our sector to achieve these gains is the job of New Zealand Animal Evaluation Limited (NZAEL), a wholly owned subsidiary of DairyNZ. It aims to identify animals whose progeny will be the most efficient converters of feed into farm profit.

This December, a range of changes to animal evaluation (known as NZAEL 3.0), including new software, will see adjustments to all traits and significant modifications to the evaluation of survival and fertility traits.

These upgrades, the result of a collaboration between NZAEL, DairyNZ, CRV, LIC and other breeding industry stakeholders, will bring the dairy industry a step closer to an independent national genomic evaluation system.

Functional Survival

A new Functional Survival breeding value (BV) will replace the existing Residual Survival trait in the Breeding Worth (BW) index.

This new BV will better account for a cow's ability to survive in the herd and avoid being culled for reasons other than poor fertility or low milk production, which are already included in BW. It reflects cow survival from one lactation to the next. This change allows for prediction of survival at different stages of life.

Because survival information is not available until the end of a cow's first lactation, the Functional Survival BV also makes use of several predictor traits, including straightness of rear legs, udder overall, milking speed and body condition score.

Fertility

A cow's ability to be submitted for breeding, then conceive and calve in a timely manner, is critical under a seasonal, pasture-based system. The current Fertility BV uses mating and calving records to estimate whether offspring will be mated in the first 21 days of the mating period (PM21) and re-calve in the first 42 days of the calving season (CR42).

The new Fertility BV makes greater use of records reflecting the timing of calving. It uses calving season day (CSD) – the number of days between a cow's calving date and the herd's planned start of calving – instead of CR42. This means cows that calve earlier in the 42-day period are rewarded; whereas cows that calve later, are culled for poor fertility, fail to subsequently calve, or are carried over, are penalised.

The new Fertility BV will be more accurate, enabling faster genetic progress in cow fertility.

Learn more at dairynz.co.nz/animal-evaluation



Adapting to the trend



The numbers don't lie: it's more important than ever to be planning for hotter and drier summers, writes DairyNZ's Chris Glassey.

Upper North Island farmers have been saying for quite some time that summers and autumns are becoming drier, warmer, and more variable.

DairyNZ researchers recently found evidence that it's true. NIWA climate data from the last 45 years shows that,

compared with 45 years ago, farmers can expect an extra 30 days on average of soil moisture deficits that restrict pasture growth from November to April.

This adds weight to the importance of planning contingencies for dry summer risk, as outlined below.



Critical steps for summer preparation

1 Run the first six months of lactation well

July to December is the most reliable period of pasture growth and milksolids production. Key elements are an early compact calving, meeting body condition score targets at calving, keeping high pasture quality throughout spring and into summer by achieving target grazing residuals, and early identification and harvesting of surplus pasture.

Transfer adequate amounts of spring pasture or crop forward into summer months, as well-stored high-quality silage, summer crop, and high-quality pasture (by lengthening rotations as summer approaches).

2 Do a pre-summer feed inventory assessment

Have you transferred forward adequate feed? e.g this could be enough feed to supplement for 50 days at 3kg DM/cow. Should you order additional affordable feed? Update your financial budgets as well as feed budgets.

3 Reduce feed demand from the herd

Remove definite culls from the herd early in summer. Reducing the herd by 10% should provide an additional 1-2kg DM/cow/day for remaining cows, at low cost.

Also, plan early pregnancy tests so more culls can be removed later in summer, if necessary.

4 Reduce milking frequency – the earlier in summer the better

Reducing from 14 to 10 milkings per week has minimal impact on production but saves time in weekends and holidays and is a step towards once-a-day (OAD). See dairynz.co.nz/flexible-milking

Long periods of OAD milking in summer and autumn can help preserve body condition score, with an extra 0.25 evident at drying off. In the long term, this saves feed.

Reduced milking frequency also helps the herd and staff to cope better with periods of heat and humidity.

See dairynz.co.nz/heat-stress

A final note: despite the trend towards more frequent dry periods, stay optimistic. Aim to have a core group of cows still in milk in case rainfall events arrive that buck the trend.

» Read more about long-term summer-autumn rainfall and pasture growth trends in Central Waikato at bit.ly/pasture-growth-trends

TAKE 5

Tips for farmers

1.



Setting goals for 2022?

Use DairyNZ's online Farm Gauge tool to reflect on how the season's tracking and identify focus areas that'll set you up to achieve your goals – dairynz.co.nz/farm-gauge

3.

FE prevention

Summer brings the risk of facial eczema. There's no cure, so the best way to protect your herd is through prevention and pasture management. Dose your animals with zinc, monitor spore counts and spray pasture with fungicide. Learn more at dairynz.co.nz/facial-eczema



2.



Cows feeling the heat?

If your cows don't have access to shade or sprinklers between 12pm and 3pm in summer, could you tweak your management? Some farmers send their herd to a barn or tree block. Others bring the herd in for a decent wetting before milking. Tips at dairynz.co.nz/heat-stress

4.



Take control of risks

Checking the risk pathways onto your farm is a great way to manage your biosecurity risks, including Covid-19. Check out DairyNZ's Biosecurity Planner to help manage the biggest risks to your farm this summer – dairynz.co.nz/biosecurity

5.

Listen on the go

Checked out our *Talking Dairy* podcast yet? You can listen anytime, anywhere. It's a great way to keep abreast of what's happening in the sector, pick up a few ideas, and hear what other farmers are up to. Join the hundreds of farmers tuning in (we just clocked over 10,000 downloads) by going to dairynz.co.nz/podcast or your favourite podcast platforms.



Tell your dairy story



City kids getting hands-on during an open day at Donald Pearson Farm, Auckland.

Want to give urban Kiwis the chance to visit a farm and see the great work you do?

Open Farms is helping New Zealanders reconnect with the good stuff – our land, animals and each other. Last year, 2700 Kiwis visited 37 Open Farms, and visitors say the experience changed their perceptions of farmers for the better.

Now's your chance to become a host in April 2022. You'll get tonnes of support to plan and deliver your open day, to which you can also invite friends, family or locals.

DairyNZ is a proud supporting partner.

Find out more at openfarms.co.nz/host

DairyNZ Board update

In the recent Board of Directors elections, farmers voted for Jacqueline Rowarth to be reappointed to DairyNZ's Board.

Jacqueline (pictured on the right) has a Bachelors degree in Agricultural Science with honours in Environmental Agriculture, and a PhD in Soil Science from Massey University. She has worked in research, education, management and governance across universities and research organisations.

Jacqueline is also past president of the New Zealand Institute of Agricultural and Horticultural

Science, and of the New Zealand Grassland Association. The Board welcomes Jacqueline back and looks forward to her continued contribution to the future of dairy farming in New Zealand.

Johanna Burton of Paeroa was also elected unopposed to DairyNZ's Directors' Remuneration Committee.

Jo Coughlan recently resigned from DairyNZ's Board, for family reasons and to focus on other commitments. The Board is in the process of recruiting Jo's replacement.



Bringing farming to the classroom

Thousands of Kiwi school students are learning to grow their own pastures, make silage, and explore the stomachs and digestive processes of humans and cows.

It's happening thanks to a new science resource kit called 'Moo To You', created by DairyNZ in partnership with charitable trust House of Science.

The kits will help students to learn about dairy farming through hands-on science activities.

House of Science works with over 300 schools in the North Island, helping more than 8000 students a week to access these learning experiences.

See our full range of resources at dairynzschoools.co.nz



Te Puke Primary School students testing out the new science kits.

Fresh approach to farm plans



A cross-sector project to deliver free workshops on Freshwater Farm Plans is up and running on the Hauraki Plains.

Funding from the Ministry for Primary Industries is enabling a series of guided workshops to be provided to farmers in the Waihou/Piako catchment over the next few years.

Five workshops will be held over a four- to five-month period. They will help farmers to begin creating their own practical and personalised Freshwater Farm Plans (FWFP – formerly known as Farm Environment Plans). The final requirements of the new FWFP and how they will be certified are still being determined by the Government.

P3 Trust is working with DairyNZ, milk supply companies, Waikato Regional Council, Waikato Federated Farmers, the Foundation for Arable Research, and Dairy Training Ltd. Each agency is contributing in-kind funding or practical assistance.

Hauraki Plains dairy farmer Craig Zydenbos, also chair of P3 Trust, says he’s got a lot out of the workshops.

“There are lots of things we take for granted in farming. For example, when the weather was bad, we often held our cows in the race. But we’ve learnt that cows standing in the race make a lot of mess that can be detrimental to soils, so we don’t do that anymore. I also have a better understanding of soil filtration rates and the best times to apply effluent,” says Craig.

“I thought I was reasonably clued up, but the workshops have been an eye-opener, especially getting an understanding of the effect that cultivation on peat soils has on greenhouse gas (GHG)



“I thought I was reasonably clued up, but the workshops have been an eye-opener.”

— Craig Zydenbos —

emissions. It will be interesting to see how much further we can go to improve water quality and GHGs.”

Craig says Waikato Regional Council has been very supportive.

“They created the FWFP template and attend the workshops to help the facilitators. It’s been a positive process working with them.”

The workshops are open to all landowners. If you farm in the Waihou/Piako catchment and would like to register your interest, email mark.speight@dairytraining.co.nz with your name and phone number.

Programme outline

WORKSHOP 1

Understand risk and mitigation on-farm.

WORKSHOP 2

Start your plan by identifying risks. Group discussion on common risks. Complete the FWFP template.

WORKSHOP 3

Continue your FWFP, create actions.

WORKSHOP 4

GHGs – understand your numbers and create a plan.

WORKSHOP 5

Receive an on-farm visit to look at your plan, check progress and see if anything’s missing.

By the numbers

Freshwater Farm Plan Project
 Timeline: May 2021-Feb 2023
 Number of programmes: 20
 Number of workshops per programme: 5
 Number of FWFPs produced: 1200-1500



Feature update

Northland

If you're on Facebook, join us in the Northland DairyNZ closed Facebook group.

This is a safe environment for local discussion about the sector, on-farm concerns or just general updates. We'll also keep you informed of everything we're doing at DairyNZ, including details of events near you.

We encourage you to post questions and concerns in the group to get some discussion flowing. Join now at facebook.com/groups/northlanddairynz

Southland/South Otago

Did you know DairyNZ has a Facebook group specifically for farmers and rural professionals in Southland and South Otago? It's just another way for us to connect with you. We use the page to share relevant information and upcoming events, and to gather regional intel.

There are already 800 people in the group and we'd love to keep it growing. So, if you're not a member yet, jump online and join now at facebook.com/groups/southlanddairynz

Bay of Plenty

Bay of Plenty dairy farmers have learnt to thrive on a wide range of soil and land types. Frequent adverse weather events only add to it being one of the most diverse dairying landscapes in the country.

Check out DairyNZ's *Land management on Bay of Plenty dairy farms* guide. It covers six areas that have the greatest impact on Bay of Plenty land: erosion, crops, pugging, races, waterways and wetlands. You'll find advice on how to manage these areas for the best outcome for your land and the environment.

Get your copy at dairynz.co.nz/publications/environment



Taranaki

Keen to find out about some of the research happening in Taranaki?

The region has long been a centre for dairy science, with research and demonstration farms in Stratford, Hawera and Waimate West.

DairyNZ ensures Taranaki has access to targeted and regionally relevant research by funding and supporting projects led by Dairy Trust Taranaki (DTT).

Find out what's happening at dairynz.co.nz/taranaki



Lower North Island

The Tararua Plantain Project, which began in the 2018-19 season, aims to help local dairy farmers make significant environmental reductions to achieve community objectives and regulatory requirements.

Local monitoring results show yield and quality is maintained when adding plantain to pasture, and in some instances improved (summer/autumn).

Find out more about the project, and read comments from early adopters Brad McNaughton, Mark Diamond and Blair Castles at dairynz.co.nz/tararua

Top of South Island/West Coast

DairyNZ has teamed up with AgResearch, Manaaki Whenua – Landcare Research, NZIER and West Coast farmers to discuss current and future dairy systems that deliver sustainable farming businesses.

The project, funded through MPI's Sustainable Land Management and Climate Change research programme, used data from the West Coast Monitor Farms to investigate the impact of potential mitigations on profitability, greenhouse gases and nitrate leaching. DairyBase has been used to identify commonalities of farm systems with high operating profit and lower environmental footprint.

A workshop in early December will discuss what the results mean for farmers and identify opportunities to support West Coast dairying. Contact dawn.dalley@dairynz.co.nz for more information.



Canterbury/North Otago

DairyNZ has been working alongside a group of Selwyn and Hinds farmers and their trusted advisors to explore the options for reducing environmental footprint (water quality and greenhouse gases), while maintaining profitability.

This is part of a levy-funded initiative called Meeting a Sustainable Future. The project aims to help farmers in the catchments meet their environmental obligations while optimising their farm systems for profit and resilience.

Find out what's involved, what success looks like and how you can participate at dairynz.co.nz/selwynhinds

DairyNZ contacts

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Northland

Regional leader	Alison Whiteford	021 809 569
Extension partner	Hamish Matthews	021 242 5719
Senior extension partner	Mike Bramley	027 486 4344
Recruiting more support for you in this region.		

Waikato North

Regional leader	Wilma Foster	021 246 2147
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Regional partner	Andrew Allen	027 1800 3025
Extension partner	Jaimee Morgan	021 245 8055
Extension partner	Brig Ravera	027 288 1244
Recruiting more support for you in this region.		

Waikato South

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Senior extension partner	Frank Portegys	027 807 9685
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Recruiting more support for you in this region.		

Bay of Plenty

Acting regional leader	Rob Brazendale	021 683 139
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Extension partner	Ian Burmeister	027 593 4122

Taranaki

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Recruiting more support for you in this region.		

Lower North Island

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Extension partner	Hugh Jackson	027 513 7200
Extension partner	Vanessa Bates	027 626 3394
Extension partner	Heather Donaldson	027 593 4124
Extension partner	Alice Reilly	027 379 8069

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Regional partner	Stuart Evans	027 393 0114
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Mary-Anne Macleod	021 923 332



From weed to wonder plant



Dr Graeme Doole
Principal economist, DairyNZ

Plantain has emerged as a leading candidate to help New Zealand dairy farmers achieve cost-effective reductions in nitrate leaching. If more farmers adopted this herb into their pasture mix, what benefits would we see to the farm, sector and national economy? Researchers have been crunching the numbers.

The dairy sector is working hard to reduce its environmental footprint while increasing the profitability of its businesses and maintaining the sector's global competitive advantage.

The Pastoral 21 programme (2011 to 2017) showed reductions in nitrate leaching of up to 40% could be achieved by reducing nitrogen (N) fertiliser and supplement inputs and keeping cows off-paddock¹. These mitigations, while effective, came at a cost. Research, therefore, turned towards finding effective mitigation options that would also maintain or improve profit.

The Forages for Reduced Nitrate Leaching programme (FRNL)² targeted the problem of excess dietary N by either reducing the N content of pasture/feed or

Key points

- DairyNZ researchers have been exploring the potential benefits of greater plantain adoption on NZ dairy farms in anticipation of the Essential Freshwater proposals being implemented.
- Modelling shows greater plantain uptake would result in greater N leaching reductions, minimal impact on total dairy profit, and enhanced benefits to the regional and national economies.
- There are still barriers preventing farmers from using plantain, which a new research project will tackle.

increasing plant N uptake before the excess N excreted in urine leaches below the root zone. Field trials, lysimeter studies and animal trials were used to identify viable options. Collaboration with 10 FRNL monitor farms ensured the research outcomes were applicable and adoptable.

Fodder beet, catch crops and plantain emerged as the most promising mitigations. This article describes the next stage in the research, which is focusing on the potential of narrow-leaved plantain (*Plantago lanceolata*) to play a leading role in helping farmers reduce nitrate leaching without compromising profit.

The plantain ledger: benefits and drawbacks

FRNL, and a parallel programme called Greener Pastures led by PGW Seeds/Agricom, showed that, in comparison to perennial ryegrass/clover, growing and feeding plantain (specifically Ecotain™) reduced the N concentration of urine, the total amount of N excreted in urine, and the rate N is converted in the soil to nitrate, which is easily leached.

For example:

1. Urinary N concentration was 20% less for cows fed diets containing 30% Ecotain™ and 41% less for cows fed diets with 45% Ecotain™, compared with cows fed ryegrass/white clover pasture only³.
2. In a lysimeter study, N leaching from urine patches applied to a perennial ryegrass/white clover/Ecotain™ mixed sward was 74-82% lower than from standard perennial ryegrass/white clover pasture⁴. Note that paddock-scale reductions will be much lower because only part of the paddock will be covered by urine patches.
3. The activity of ammonia-oxidising bacteria in soil was significantly lower under pasture containing Ecotain™, reducing the conversion of ammonia to nitrate (nitrification). This lowers the risk of N leaching because ammonia is held more strongly by the soil than nitrate^{4,5,6}, allowing more time for plants to capture the N.

FRNL and Greener Pastures identified that Ecotain™ also has several other inherent advantages. These include:

- The 'entry cost' associated with additional pasture establishment expenses is low⁷.
- The impact on milk production is minimal^{3,8}.
- It is highly compatible with a range of dairy systems.

The research also identified some implementation challenges,

particularly around plantain persistence. Plantain is a short-lived perennial, meaning its plant density declines within a few years of sowing. Therefore, it's less able to compete with other species in the mixture^{9,10}.

This research was mainly carried out at a small scale, so the question remained: what impact could plantain have if adopted at scale?

Scaling up the potential of plantain

DairyNZ economists used bio-economic models to explore the benefits that would be derived from the broadscale adoption of plantain once freshwater quality standards outlined in the Essential Freshwater (EF) proposals¹¹ were implemented. To meet the dissolved inorganic N (DIN) limit of 1mg N/litre initially proposed in EF, around 40% of all New Zealand dairy farms (4500 farms total) would be required to make N leaching reductions, with an average reduction of 42%¹².

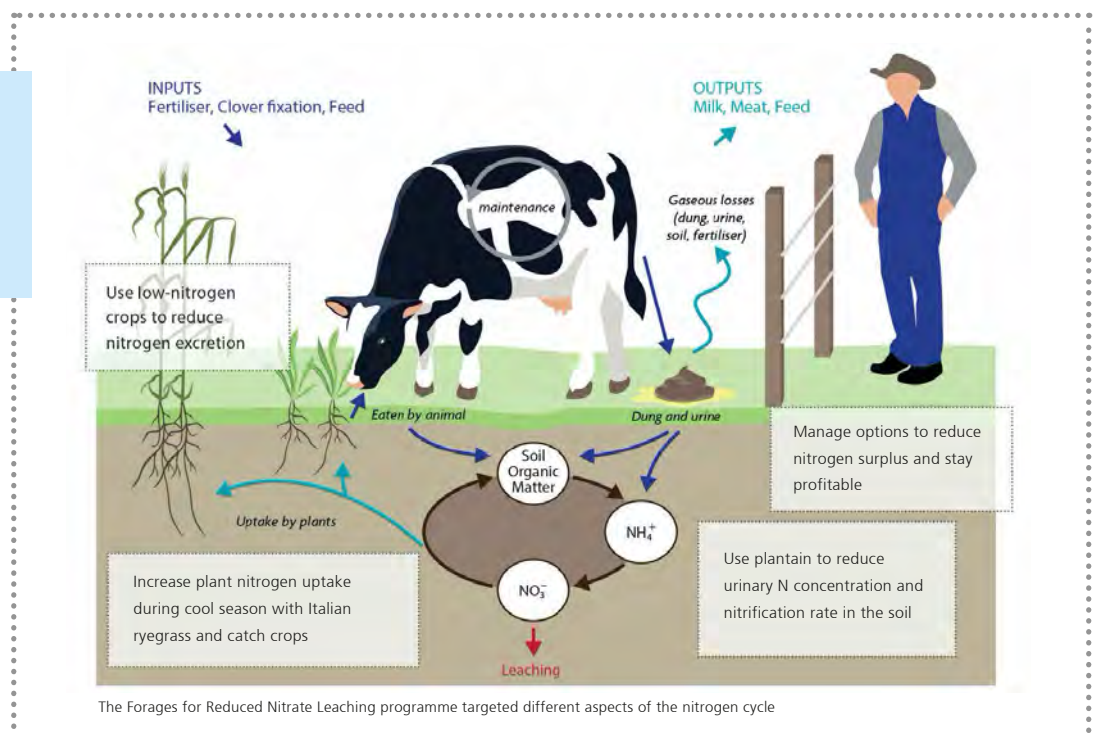
Researchers calculated the farm, sector and national economic implications of different levels of plantain adoption.

The first step was to generate a robust description of the national farm population of 11,372 dairy farm businesses. This ensured the diversity present in regional and national populations of dairy farms was accurately represented in the model.

The N leaching limit faced under the EF proposal was worked out for each farm. We then determined practices that could be adopted by the farmer to help the business meet this limit. Available options were: improved effluent management, improved fertiliser management, improved pasture management, low-N supplement, reductions in N fertiliser, reductions in supplement, improved effluent infrastructure, improved irrigation management (in Canterbury), and the use of stand-off pads in autumn and winter to reduce the number

Figure 1.

Overview of nitrogen cycle and options to reduce nitrate leaching



As a farmer, what should I do next?

- Understand your regional policy context. If you're in a region where you need to make change, you may consider plantain.
- Also, make sure your farm system is optimised in line with the Pastoral 21 findings: stocking rate is matched with pasture production, and limited use of N fertiliser and supplementary feeds.
- Learn from other farmers – keep informed of the research underway.
- Refer to dairynz.co.nz/feed/crops/plantain for management guidelines, technical information and farmer experience of using plantain.



leaching achieved through this strategy. This meant fewer of the costlier mitigations were required to meet the EF target, which saved money.

What effect on farm, sector and nation?

Farm level: Figure 2 shows total N leaching predictions across time for the 4500 most-affected farms, as mitigations were implemented to meet the targets imposed by the EF regulations. Higher levels of plantain led to greater reductions in N leaching on these farms.

Farm profit changed little, despite the dramatic decreases in N leaching. By 2040, average operating profit was 3% higher when 45% of pasture intake comprised plantain (PL45), compared to the use of a lot of mitigation practices on top of the current level of plantain use. Both scenarios were meeting the stringent N limits proposed in the EF package, but N leaching was 16% lower for PL45 than PL5.

Sector level: Total dairy profit was higher each year by 1.0%, 1.6%, 2.5% and 4.3% under the EF policy if 10%, 20%, 30% and 45% of pasture intake by dairy cows comprised plantain, compared with PL5.

National level: National economic output increased by \$277m, \$396m, \$526m and \$979m if 10%, 20%, 30% and 45% of pasture intake comprised plantain, compared with PL5.

These are significant potential benefits for regional and national economic activity and jobs, and the vitality of regional communities.

of urine patches that increase N leaching risk. Additionally, stocking rate reductions were implemented as N fertiliser or supplementary feed inputs were removed.

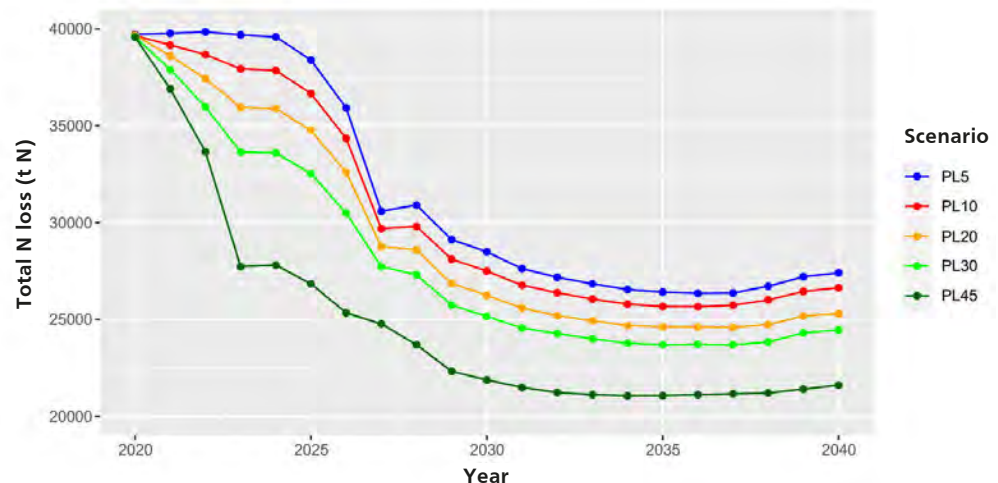
The use of mitigations was sequenced with simpler, cheaper and more effective choices used first. Different mitigations were adopted until the specific N limit was reached for each farm. Plantain use in the model meant farmers didn't need to adopt as many mitigation options.

Initially, the mitigation protocol was implemented with only a small amount of plantain included. This was dubbed the PL5 scenario, which assumed 10% of all dairy farms used some plantain, supplying 5% of total pasture eaten on those farms. The use of plantain on farms was then sequentially increased to supply 10%, 20%, 30% and 45% of total feed eaten by New Zealand dairy cows (PL10, PL20, PL30 and PL45 scenarios).

The higher the level of plantain, the greater the reduction in N

Figure 2.

Aggregate change in N leaching for regulated farms in the NZ dairy sector, with different proportions of plantain present in the grazed component of the cows' diet



Locking in the benefits

It is important to note that achieving 30-45% of the national pasture intake of cows from plantain is very optimistic. There are many technical and management challenges to overcome.

That's why new research will look at how to achieve and maintain a high proportion of Ecotain™ in the cows' diet, and making sure there are no product quality concerns when adopted at scale. This is a focus of the newly announced Sustainable Food and Fibre Futures (SFFF) Plantain Programme*.

This programme aims to:

1. quantify the effects of Ecotain™ on N leaching and productivity at scale under full grazing pressure in farm systems (validating previous studies that have mainly used lysimeters and short-term animal trials)
2. understand Ecotain™'s effect on soil carbon and N cycling, and to what extent this leads to further reduction of N leaching compared with just the animal effects
3. check for impacts on milk products, meat products and animal health and welfare
4. support adoption of plantain, optimise its management to achieve persistence and production, and demonstrate its benefits.

The SFFF Plantain Programme is using Ecotain™ in its trial work because it already has proven environmental effectiveness. The programme is developing an evaluation system to determine the environmental effectiveness of other cultivars.

This programme brings together some of the most experienced scientists from multiple organisations.

Many farmers have already implemented plantain. Their experiences⁹, and those of the farmers who collaborated with us in FRNL and the Tararua Plantain Project (dairynz.co.nz/tararua), shaped the questions addressed in the programme.

Our ultimate goal is to provide farmers and the wider sector with confidence to accelerate the adoption of this promising technology.

Acknowledgements

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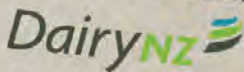
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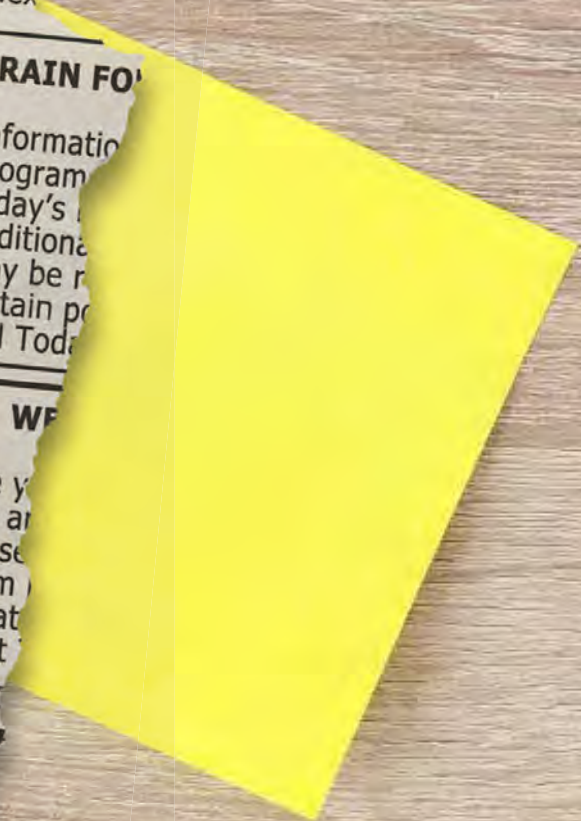
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