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ENABLING SMARTER FARMING FOR A BETTER NEW ZEALAND

ground EFFECT

Autumn 2022
EDITION 14

"We believe in simplicity and accuracy"

Brett Steeghs, Stone Country Dairies Ltd, Taupō

Preserving profits a balancing act

Crunching the numbers on maintaining productivity while reducing on-farm impact

Finding flexibility

How tactical splitting of super and nitrogen is working well for Taranaki dairy farmers

RAKING TIME, STONE COUNTRY DAIRIES, TAUPŌ

Welcome to the 14th edition of Ground Effect®

It's a privilege to write the preface to Ground Effect which continues its focus on the science and stories behind smarter farming. At a time when greenhouse gas emissions, water quality and sustainable production are rightly front and centre, this 14th edition highlights farmer examples, thought leader perspectives and innovative solutions.

Dominating attention at the moment is the He Waka Eke Noa (HWEN) collaborative effort on accounting for and reducing agricultural GHG emissions. At the time of writing, farmers were being introduced to the options and it's fair to say that each comes with its own set of challenges.

We hear from the programme director of HWEN, Beef + Lamb NZ as well as DairyNZ about the seriousness of the issue and the scale of opportunity to demonstrate leadership in managing the sector's impact on climate. Warren Parker, chairman of the Forestry Ministerial Advisory Group outlines the potential for carbon sequestration and offsetting by native and exotic species.

Policy aside, there are real solutions being worked on such as EcoPond, a new system that virtually eliminates all methane from dairy effluent ponds. See page 8 for the newest 'tool in the methane box' developed by Lincoln University scientists and Ravensdown. Phil Journeaux also covers some exciting progress in genetics such as low-methane emitting rams and bulls discussed on page 14.

While there are plenty of medium-and long-term technologies being worked on to mitigate methane, the EcoPond solution is based on robust science and is capable of being installed in the near term. As an aside, it was a real pleasure to see Professors Keith Cameron and Hong Di awarded the highest annual science honour in New Zealand – the Royal Society's Pickering Medal – for their work on ClearTech.

Senior Agri Manager James Livingston discusses how potash super can propel clover yields on pages 20 while Agri Manager Andrée Callaghan outlines the importance of avoiding any molybdenum-deficiency handbrake on clover growth on page 24.

On page 32, Dr Ants Roberts discusses the importance of soil biology and the dangers of misinformation in that area. As rural communities face the strain of multiple challenges, Craig 'Wiggy' Wiggins shares his approach to mental health and wellbeing on pages 25–27.

We hear from two farmers in very different parts of the world but both building a farming legacy with their young families. The Germanns in Southland are an integral part of a local community catchment initiative, while the Steeghs in Taupō focus on a 'pasture first' and 'keep it simple' mentality – to great effect.

Ravensdown has helped both families with Whole Farm Soil Testing to target variability in paddock fertility as well as reducing their nitrogen use.

Having been involved with setting up the first Massey University short courses on nutrient management two decades ago, it's incredibly satisfying to see their new curriculum on farm environment planning. You can read about that and how our customer-facing team is benefitting on page 17.

All in all, anyone interested in smarter farming will be spoilt for choice in this edition. If you are interested in any of the stories or insights in this publication or if you think Ravensdown can help you in any way, I know the team would welcome your call.

Mike Manning
General Manager Innovation and Strategy

MIKE.MANNING@RAVENSDOWN.CO.NZ

Ground Effect® Autumn 2022

This edition

Thought leaders

Science and advice

PHOTO CAPTURED AT CLINTON BY CALLUM MITCHELL, LOWER SOUTH ISLAND AGRONOMIST.

Behind the scenes

Ravensdown is enabling Smarter Farming for a Better New Zealand

Ravensdown Agronomy on Instagram

Our agronomy team is now on Instagram! To stay in touch with what's happening in the field and catch up with them on their travels, follow @ravagronomy.

AGRONOMISTS KRIS BAILEY AND ANDREW AIREY CHECKING UP ON A NEWLY SOWN PASTURE AT A SHAREHOLDER'S PROPERTY NEAR WESTPORT.

Pickering Medal 2021 honours ClearTech scientists

Lincoln University Professor Keith Cameron ONZM FRSNZ and Professor Hong Di ONZM FRSNZ have been awarded New Zealand's highest annual science prize for their work on ClearTech®. Developed in collaboration with Ravensdown, the system is installed between the dairy shed and effluent pond to intercept and treat the farm dairy effluent with a coagulant to settle out the solids. The Pickering Medal is presented for innovative technological work with significant benefits or commercial success.

Dipton Quarry revitalisation

The impressive limestone faces of Dipton quarry will again form a natural habitat with a range of native species planted across 7.2ha to remediate the land, offset Ravensdown's carbon footprint, reduce erosion and improve water quality. Ravensdown has signed a covenant to protect the proposed area. The land is unproductive, weed and erosion prone, so a native planting project has been initiated as a pilot combined rehabilitation and offset project for the lime business, supported by the One Billion Trees programme.

DIPTON QUARRY

Massey University Agriculture Awards

The Massey University Agriculture Awards recognising the year's top-achieving agriculture students was held remotely in October due to Covid-19 restrictions. Third-year student prizes are sponsored by Ravensdown.

The top third-year student was Hope Mauchline (Whanganui). Hope has undertaken her entire agribusiness degree as a full-time distance student. Second prize went to Chelsea Hopkins (Feilding), Bachelor of Agribusiness, majoring in Farm Management. Third prize went to Troy Bosher (Auckland), who is just finishing a Bachelor of Agricultural Science degree.

Overseer update

Ravensdown continues to support OverseerFM as an important planning tool to help New Zealand farmers meet their goals for profitability and environmental responsibility. Following the recent Overseer science review, its owners (MPI, AgResearch and the Fertiliser Association) have committed to working together during the coming year to further develop and refine the tool, while addressing issues raised. Front of mind for Ravensdown is the continued availability of a tool that works for farmers and growers.

Thought leader: Kelly Forster

Keeping greenhouse gas management in our hands

By Kelly Forster, Programme Director at He Waka Eke Noa

KELLY FORSTER, PROGRAMME DIRECTOR AT HE WAKA EKE NOA

He Waka Eke Noa was set up when the sector organisations pitched that Government, Māori and the sector bodies, on behalf of farmers and growers, work together to develop a plan to manage and reduce on-farm greenhouse gas (GHG) emissions.

Collaboration is the right way to design policy, especially with our rural communities. Representatives from the primary industry bodies, government policy, scientists, and farmers and growers, have been deep in discussion and undertaking analysis on some very complex issues around sequestration, farm definitions, reporting and, of course, pricing.

Each industry partner has put forward farmer representatives, who form farmer reference groups. Our farmer reference groups sense-check the direction of travel and point out real-world implications and outcomes of policy approaches.

One size doesn't fit all, and we are also cognisant of all the noise, regulatory change, and public pressures that some of our farmers and growers are under.

World leading approach

He Waka Eke Noa is partnership between Government, Māori and the primary industry bodies of Aotearoa. It's a world-first approach to developing a framework for farmers and growers to measure, manage, and collectively reduce their agricultural GHG emissions.

The partnership is committed to achieving a solution that is practical for the primary sector, rewards efforts to reduce emissions and increase sequestration, and supports the sector's future success.

This includes collaboration on the design of a pricing scheme as an alternative to agriculture facing liabilities for biological emissions under the New Zealand Emissions Trading Scheme (NZ ETS). An alternative pricing system can:

- Recognise and reward on-farm changes that reduce emissions
- Recognise the difference in climate impact between different gases
- Delink the price of biogenic methane from the carbon price in the NZ ETS
- Recognise on-farm sequestration that the NZ ETS does not
- Recycle revenue generated to help reduce emissions in the agricultural sector.

Farmer feedback call

In February 2022, farmers and growers will get to see what the recommended pricing options are and let the He Waka Eke Noa partners know what they think.

DairyNZ and B+LNZ, supported by Federated Farmers, are planning detailed engagement to discuss options with their

farmers. For the latest information, and details on sector workshops in your region, go to the He Waka Eke Noa website[1] or check with your industry representative.

The two options on the table at this stage are a farm-level split-gas levy and a processor-hybrid split-gas model. The third, a default option is the 'backstop' of agriculture being included within the ETS.

Two split-gas levy options

These two options involve setting different levies for short-lived (methane) and long-lived (nitrous oxide and carbon dioxide (CO_2)) gases, with levy rates being set by an independent advisory body.

Methane would be calculated by weight of gas and have a unique levy rate. Long-lived gases (nitrous oxide from livestock and fertiliser and CO_2 from urea) would be calculated in weight of CO_2e. There is an option to link the rate for nitrous oxide and CO_2 to the NZ ETS carbon price or have a unique rate.

Both options seek to recognise on-farm sequestration not currently in the ETS, including riparian planting, shelter belts, perennial cropland and woodlots.

Farms could work as individuals or collectives, and revenue raised would be invested in research and development to support emission reductions.

1

Farm-level split-gas option
A (methane) + B (nitrous oxide & CO_2) - C (sequestration) = $

The farm-level split gas option would apply to farm businesses with one or more of: 550 stock units (sheep, deer, cattle, goats); 50 dairy cattle; 700 swine; 50,000 poultry; apply over 40t of nitrogen through synthetic fertiliser per farm per year.

Farms would calculate their emissions using a single calculator, with actual on-farm emissions being used to determine pricing.

2

Processor-level hybrid
A (methane) + B (nitrous oxide & CO_2) = $

Processors would pay for emissions based on a charge applied to products supplied (meat, milk) or bought (fertiliser), and likely pass on these costs to farmers. There would be separate emissions charges for short-and long-lived gases, set by an independent advisory body. To receive payment for sequestration, farms would develop and sign up to an emissions management contract (EMC). The framework for this is still under development.

ETS backstop

If the partnership is not successful in delivering recommendations on an appropriate pricing system, the default is pricing emissions at the processor level via the NZ ETS.

Under the backstop ETS approach, emissions would be calculated using national average emissions factors for milk, meat and synthetic fertiliser, and then charges would be applied per kilogram of meat or milk or tonne of fertiliser. Methane and nitrous oxide emissions would be priced at the same rate ($/tonne of CO_2 equivalent) and initially, farmers would get a 95% free allocation. This allocation would reduce gradually over time.

More detail in February meetings

As long as Covid-19 restrictions permit, DairyNZ, B+LNZ and Federated Farmers are working together to take face-to-face meetings to the regions. There will also be online webinars. Attendees will have the options explained to them, and will have the opportunity for questions and feedback that will go to the partners working on the policy.

He Waka Eke Noa will make recommendations to Ministers at the end of April 2022. ■

Who is He Waka Eke Noa?

Partners
Beef + Lamb New Zealand
Dairy NZ
Federated Farmers of New Zealand
Horticulture NZ
Federation of Māori Authorities (FOMA)
Ministry for the Environment (MfE)
Ministry for Primary Industries (MPI)
Foundation for Arable Research (FAR)
Dairy Companies Association (DCANZ)
Deer Industry New Zealand (DINZ)
Meat Industry New Zealand (MIA)
Irrigation New Zealand
Apiculture NZ
Supporting organisations
NZAGRC
PGgRc
AgResearch
Department of Conservation
Fertiliser Association of New Zealand
Manaaki Whenua
Scion
More information
www.hewakaekenoa.nz
www.agmatters.nz

(1) see Source Code page 40

Calculator helping red meat farmers understand farm emissions profile

From Beef + Lamb New Zealand

Beef + Lamb New Zealand's Greenhouse Gas (GHG) Calculator[1] is one of the tools that has been developed to help farmers meet the sector's commitment to reducing GHG emissions.

Launched last year, the calculator was developed as a free, user-friendly tool to help farmers measure both their emissions and sequestration. Under He Waka Eke Noa, the primary sector's climate action partnership, every farmer is expected to know their farm's GHG numbers by the end of 2022.

B+LNZ chief executive Sam McIvor says the calculator is not a regulatory tool, rather it will help farmers get an understanding of where they are in terms of emissions. When used in conjunction with B+LNZ's Farm Plan, it can help farmers take steps to manage their emissions and improve efficiencies to drive productivity and profitability.

The information generated through the calculator is the property of the individual farmer and cannot be accessed by anyone but the user.

Sam says knowing and managing farm GHG emissions is critical for New Zealand's future as a trusted provider of sustainable food.

"Front-footing this demonstrates to the New Zealand public and our customers that we are serious about managing our impact on the climate."

About 2,000 farmers used the GHG Calculator in the first three months post-launch, and the strong uptake has continued.

Hawke's Bay farmer and Ravensdown board member Bruce Wills says he found the calculator very straightforward and surprisingly easy to use.

"It's a great first step for farmers to get a feel for their number."

He says it helps to have stock numbers (from your financial statements, Farm Focus (formerly Cash Manager), Xero or other financial management tools or statements) on hand before starting the calculations, along with areas of exotic and indigenous forest and shrubland.

While Bruce had already carried out a stock-take of all the vegetation and wetlands on his farm and had the information available, he believes it is a good idea for farmers to do a vegetation stock-take.

Bruce says that when coupled with the Farm Plan, the GHG numbers will help farmers see where they are at in terms of emissions, where they can make improvements and what He Waka Eke Noa might mean for the farm in the future.

"Front-footing this demonstrates to the NZ public and our customers that we are serious about managing our impact on the climate." - Sam McIvor

(1) see Source Code page 40

Dairy farmers cracking on with GHG goals

From DairyNZ

Dairy farmers are making great progress in knowing their numbers – a key first step in reducing on-farm emissions.

Knowing a farm's unique greenhouse gas (GHG) profile means actions can be tailored for best results. This helps farmers get the most out of their investment in climate change solutions, while continuing to run successful businesses.

More than 90% of dairy farms already have a GHG emissions report from their dairy company (more than 9,800 farms). A total of 18% have a GHG farm plan or GHG module in their farm plan (more than 1,950 farms).

In another key achievement, 48% of dairy farms have a Farm Environment Plan (5,254 farmers). All will have a plan by 2025 outlining their emissions footprint, where those emissions are coming from, and what they can do to manage them.

Help is at hand from sector bodies, dairy companies and rural professionals. DairyNZ's Step Change programme has been helping farmers since 2019 to understand mitigation options best suited to their farm, while improving profitability. Around 120 events or discussion groups covering aspects of Step Change have been held, and 22 specifically on knowing your numbers.

Many farmers are already taking steps towards our sector's climate change aspirations and obligations. Many have reduced emissions with fewer but more profitable animals, and tree planting to store carbon. They're also reducing fertiliser use and supplementary feed.

Because New Zealand dairy is already so emissions efficient, there's no silver bullet to even greater efficiency. So, DairyNZ, with many other partners, is investing millions in climate change research for new solutions.

This includes research into a methane vaccine and inhibitors, selective breeding of low-methane animals and forages, genetics research, reducing nitrous oxide and leaching, and technology uptake. We'll help roll out new solutions to farmers when they're proven and become available.

DairyNZ is working alongside Government, industry, Māori and the science sector to develop a shared research and development plan. This will accelerate new mitigations to reduce methane and nitrous oxide emissions.

Some are asking why dairy farmers need to do more when they are already the world's most emissions efficient. Independent research confirms New Zealand has the lowest carbon footprint for on-farm milk production.

"We're confident we'll come up with a pricing mechanism that works for farmers while meeting Government requirements and doing the right thing for the environment."

We need to keep reducing the footprint, in a way that's sustainable for farming businesses, to stay ahead of the competition and meet consumer expectations. This helps keep our nutritious, high-quality products at the top of the shopping list in New Zealand and internationally.

DairyNZ is an active partner in He Waka Eke Noa, the primary sector, Government and Māori climate action partnership designed to help farmers measure, manage and reduce emissions.

The industry-good organisation is working closely with Beef + Lamb New Zealand and Federated Farmers, seeking farmer feedback on a solution for pricing emissions.

The sector needs to move on this because, if we don't come up with an alternative, the Government will put agricultural emissions into the Emissions Trading Scheme (ETS). The ETS comes with its own complications and DairyNZ is not confident any revenue raised would be invested in the sector.

We're confident we'll come up with a pricing mechanism that works for farmers while meeting Government requirements and doing the right thing for the environment.

We encourage all farmers to have a say. To find out how, go to the DairyNZ website[1].

(1) see Source Code page 40

ECOPOND ON THE LINCOLN UNIVERSITY RESEARCH DAIRY FARM.

New EcoPond™ tool a game changer for methane emissions

By Anne Lee

Dairy farmers have a new tool to reduce methane emissions with Ravensdown's EcoPond technology cutting up to 5% of their farm's total methane emissions.

Ravensdown and Lincoln University scientists have developed an effluent treatment system that can mitigate virtually all methane emissions from effluent ponds, cutting a dairy farm's overall methane emissions by 4 to 5%.

The Government has set a target of reducing biogenic methane emissions to 10% below 2017 levels by 2030, but until now the only real options available have been ones that may reduce milk production.

The EcoPond system uses iron sulphate – the same food safety level treatment additive as Ravensdown's ClearTech system – but there's no requirement for tanks. Rather than mixing the additive with effluent in a tank, EcoPond mixes the iron sulphate additive with the effluent in-line as it moves to the effluent storage pond, allowing it to be retrofitted into any existing effluent system.

While that means it doesn't provide the clarified, recycled water ClearTech produces, it does mean it will be priced at about a third to half of the cost while still giving the ClearTech benefits of slashing *E. coli* (Eschericia coli) in treated effluent, reducing ammonia emissions and cutting any phosphate loss to water by up to 90% when applied to effluent areas.

The EcoPond system works to cut methane emissions from effluent by creating an environment that's not favourable for methanogens, stopping them from getting energy from the organic matter in the effluent and therefore reducing the methane emissions.

For those interested in the chemistry, Lincoln University Emeritus Professor Keith Cameron explains that the addition of the iron sulphate boosts the activity of other naturally occurring bacteria – iron-reducing and sulphate-reducing bacteria – in the effluent pond. Both inhibit the growth of methanogens.

The iron sulphate also keeps the redox potential (a measure of the effluent pond's aeration or oxygen status) at a level where the methanogenesis reaction won't occur.

Keith says the discovery that methane emissions could be reduced so dramatically from effluent ponds receiving treated effluent came about during investigations that he and Lincoln University Professor Hong Di were undertaking into the ClearTech system.

> **"What we found was a very big positive outcome – dramatically reducing methane emissions from the treated effluent."**
>
> **Emeritus Professor Keith Cameron**

"We were actually carrying out research during ClearTech's development phase to make sure there were no unintended consequences of the system – looking for any negative outcomes.

"But what we found was a very big positive outcome – dramatically reducing methane emissions from the treated effluent," Keith says.

Sampling of gases collected coming off effluent in experimental set ups of the system showed a 95% reduction in methane.

Di says buoyed by the finding, more work was undertaken on the chemistry to understand what was happening in the effluent, followed by an investment at the Lincoln University Research Dairy Farm into farm-scale studies.

Covered 100,000 litre tanks were installed to capture and allow the testing of gases from the treated effluent.

"Scaling up an experiment like this is often called going into the 'valley of death' because so often what works at a controlled laboratory level doesn't give you the same outcomes at a farm level; but we found the results actually improved," Di says.

"We went from a 95% reduction in methane to 99.5% in the first run of the large-scale trial and 99.9% reduction in the second run."

ClearTech product manager Carl Ahlfeld says the EcoPond system has been developed to give farmers an affordable and effective solution to GHG mitigation.

"The ClearTech system gives the same methane mitigations with the added benefit of providing clarified water to use in yard wash-down and enable big reductions in water use as well as effectively increasing effluent pond storage capability.

"But for those farmers that aren't looking for those water savings, a cheaper option is to install the EcoPond system," Carl says.

A programmable logic controller (PLC) will automatically control the system, adding iron sulphate to the effluent as it flows through to the pond.

It will ensure the right amount of additive is added no matter what the pond size or effluent volume is, no matter how wet or dry the season is, or how the effluent's characteristics might change through the season.

Carl says the company's effluent experience through its work with ClearTech has helped it design the EcoPond system using similar smart technology which remotely monitors and gathers data as well as immediately detects faults.

Two versions of EcoPond will be on offer – one for a typical pumped system and one for a gravity fed system.

Studies have shown the treatments during the milking period remain effective over the winter or seasonal dry-off period while no effluent is being added to the pond.

EcoPond will use similar amounts of the iron sulphate to treat the effluent as the ClearTech system so the annual additive costs will be similar.

A 2,300 litre tank for the iron sulphate storage is supplied as part of the EcoPond system.

The levels of iron sulphate in the tank are monitored using a remote system that alerts the contractor directly that a delivery is required so there's no need for the farmer to monitor or carry out manual ordering.

Two commercial-scale systems are now running in Canterbury.

CLEARTECH PRODUCT MANAGER CARL AHLFELD WITH PROFESSOR HONG DI (LEFT) AND PROFESSOR KEITH CAMERON (RIGHT)

Farming for the future in the deep south

By Victoria Rutherford-O'Sullivan

A shared passion for farming and providing high-quality nutrition to the world is the driving force behind a Southland family's approach to farming. Ravensdown visited shareholders Jolene and Hadleigh Germann's property near Ōtautau to get the low-down on how they have reduced environmental impacts on farm and their involvement in a large-scale catchment group.

THE WAIKOURA STREAM RUNS THROUGH THE FARM, FEEDING THE ŌTAUTAU STREAM AND THE APARIMA RIVER.

Jolene and Hadleigh Germann want to leave a farming legacy behind them in the hope their children will one day get to experience the industry as they have.

Relocating to Southland from the Waikato 10 years ago, the fifth-generation farmers formed an equity partnership four years later on a 200ha property between Ōtautau and Nightcaps, where they peak milk 550 cows as lower-order sharemilkers.

Hadleigh grew up on a dairy farm and Jolene on a sheep and beef property, but their passion for farming is something they've always had in common. Jolene studied chemistry at the University of Waikato, completing her PhD before moving to Southland where she worked as an agri manager for Ravensdown and later as an agribusiness consultant. She sees farming as a great lifestyle for the couple's two small children, Harry (3) and Lucy (1), and they remain strong advocates for the industry, in the hope that one day their children may be encouraged to follow a path on the land.

"I think most family farmers are environmentalists," Jolene says. "We want to leave the farm in a better state than we found it. Everything we do, we think about our children and their children, and what's going to be left behind when we're gone."

Their first year of farming in an equity partnership coincided with the low milk pay-out of $3.90/kgMS which forced them to scrutinise their entire farming system in detail. The farm is slightly terraced and can be wet, so they have adapted to these conditions by running a lower-than-average stocking rate for Southland. The heavy soils mean they are very particular about where, or even if, they choose to cultivate, depending on the conditions.

The Waikoura stream runs through the farm, feeding the Ōtautau stream which then flows into the Aparima River. A great risk on their farm is phosphorus run-off on rolling slopes, so they're careful what paddocks they crop and how they treat them in spring, as well as using best management practice for winter grazing.

"We always identify swales and leave those parts of the paddock uncropped, so they remain in grass," says Jolene. "Then we graze towards the swales so that any nutrient run-off runs into them as a buffer and doesn't go directly into the waterways. We've been doing this for the past few years, and it's made a big difference to the amount of soil entering into the waterways."

Jolene says they have been lucky to have guidance on nutrient management from Ravensdown Senior Agri Manager Dayle Kirby. They are specific about where they place nutrients and have an

JOLENE AND HADLEIGH WITH LUCY (1) AND HARRY (3)

in-depth soil testing regime. They GPS the soil transects so each year they're testing the exact same line, and a Whole Farm Soil Test is done every five years.

"The Whole Farm Soil Testing is really helpful because it looks at the range of nutrient levels that we have. We test every paddock and adjust fertiliser mixes to make sure that we're targeting our lower paddocks and not putting any nutrients on our [higher fertility] paddocks," Jolene says.

"It makes sense, both financially and environmentally. You're not just blanketing the whole farm – Dayle puts a lot of time in to making up mixes that are both practical and help achieve the goals we want for nutrient levels on the farm."

They've used Hawkeye® for the past season and a half and have found it excellent. "It's a pretty fool-proof system," says Jolene. "All the fertiliser recommendations are loaded, and Hadleigh usually goes on and orders what he wants, and it goes straight to the carrier. It also offers proof of placement, which is very important with compliance and making sure that you're getting the right nutrients on your farm."

When it comes to nitrogen (N) use, they use a consultant to create a monthly feed budget while Hadleigh and the team do a weekly farm walk to assess pasture levels. Hadleigh follows the cows with N applications, and they use N-Protect (a urease-inhibited coated fertiliser) to protect against N-loss through volatilisation.

Historically they have used 200 – 210kgN/ha but have dropped back to 190kgN/ha. "We have had a hard look at how we've been using N and made sure we're applying it to get the best response," says Jolene. "Part of that is lowering the volatilisation risk [with N-Protect] so there's more N available for the plant to grow. We want to make sure that everything is available to be taken up by the plant."

Working on water for the future

Water quality and community involvement is also a large part of the couple's farming philosophy.

Jolene completed the Kellogg's rural leadership course in 2016, with her final course project centred on how to help farmers in the environmental and water quality space. This led her to co-start the Mid-Aparima catchment group and, three years ago, a wider project known as the Aparima Community Environment project (ACE) was started with funding from DairyNZ.

The group encourages Good Farming Practice principles on more than 600 properties (of which 218 are dairy farms) in the 207,000ha catchment, aiming to enhance water quality for future generations. ACE encompasses six catchment groups (Pourakino, Lower Aparima, Orepuki, Mid-Aparima, Upper Aparima and Waimatuku) that make up the Aparima Freshwater Management Unit (FMU).

In 2021 ACE received $421,100 of funding from Thriving Southland for project work. The projects are divided into work streams, including a water sampling programme to complement

Environment Southland's work, as well as a stream-walk programme for local landowners and communities to assess the health of local waterways.

Another project looks at sediment trap designs and they eventually hope to create a network throughout the catchment, in partnership with Environment Southland. Ravensdown is involved with the third workstream, helping farmers within the project area with their Enhanced Farm Environment Management Plan (FEMP) programme, and the final project explores future farming systems with ultimate outcomes of improving soil health, greenhouse gas emissions quality, freshwater ecosystem health, animal health, as well as maintaining profitability and resilience to change.

Jolene says a really a vital part of ACE has been the partnerships formed. "We really wanted a vibrant community that included farmers and stakeholders. We want our environment to be better, but we want our communities to be strong too. We'd already achieved quite a lot before we got this funding, and we can achieve a lot more together than we can as single farmers or community people."

She says that while personally at times farming and being involved in the project has been a juggle with two small children, part-time work and no family support in Southland, it's a case of busy people achieving lots. "Hadleigh and I are both very, very passionate about ACE and making our environment better, so we're happy to be involved. And when you work with like-minded people on projects like this, everyone's positive, and everyone sees the opportunities as well as the challenges, but they focus on the opportunities. It's just a great partnership to be involved with."

Jolene remains positive about the future of farming.

"Farmers are smart people, they're environmentalists at heart. They want to do the right thing by the environment, and they want to do better and better and keep learning and learning.

"New Zealand farmers are incredible and have made a lot of improvements in the last decade. I think we need to continue to improve and look at getting more from less, while using nutrients wisely. It's about looking after our waterways, looking after our soils, and looking after our people. We have made lots of progress, but there's still lots to be made."

The Aparima Community Environment Project involves six farmer-led catchment groups, Environment Southland, DairyNZ, Beef + Lamb New Zealand, Fonterra, plus support from other industry groups such as Ravensdown.

RAVENSDOWN AGRI MANAGER DAYLE KIRBY'S EXPERTISE IS HIGHLY VALUED BY THE COUPLE.

Thought leader: Phil Journeaux

Preserving profits a balancing act

By Tony Leggett

Intentionally reducing the amount of feed eaten might feel counter-intuitive to most farmers aiming to preserve or grow their farm's profitability.

But when you're dealing with limits on nitrogen fertiliser use and meeting the Government's target of carbon neutrality by 2050, it begins to make sense.

AgFirst consultant Phil Journeaux has been crunching numbers ahead of the next round of consultation with farmers and industry by the primary sector's climate action partnership, He Waka Eke Noa.

The former Ministry for Primary Industries' policy manager has earned praise and respect from the farm consultancy sector for his modelling of different farm scenarios for dairy and sheep-beef farms, aiming to meet the reduction in emissions of methane and nitrous oxide expected from agriculture in the Zero Carbon Act.

Phil's modelling exercise and resulting commentary has been a lifeline for the farm consultancy sector grappling with rising farmer enquiry for advice. He concedes there is a lot of work to be completed before the full road map to carbon neutrality is clear for the farming sector.

Big on He Waka Eke Noa's work list for February will be consulting with farmers on recommendations it tabled last November for pricing farm emissions and recognising on-farm sequestration.

The goal for 2022 remains to get 100% of farmers and growers knowing their individual farm's emissions profile as a starting point for future reductions and completing an individual farm environment plan.

Phil has led various modelling exercises over the past six years to investigate the impact of changes to the three biggest drivers of on-farm greenhouse gas (GHG) emissions – volume of dry matter eaten, the protein content of feed and the use of nitrogen fertiliser in farm systems.

Volume of dry matter eaten is easily the largest influencer of GHG emissions at farm level. Protein content of the feed consumed really only hits dairy farms that have supplemented diets. The higher the protein level in that feed, the more nitrous oxide is produced by the stock.

Nitrogen (N) fertiliser has long been regarded as the cheapest way of growing more pasture if needed, but the national cap on N-use comes into effect at the end of the 2021-22 dairy season, limiting

AGFIRST CONSULTANT PHIL JOURNEAUX

farms to a maximum of 190kg/ha/year of N application. To exceed this cap, farmers will need a resource consent.

Phil encourages farmers to fine tune their feed budgeting skills to make smarter N application decisions and to use precision technology when applying N fertiliser to make sure it's applied in exactly the right place.

Of course, reducing mouths can have unwanted side effects, including the impact on pasture quality and the resulting decreased production of meat, milk and fibre.

"If you want to reduce dry matter eaten, the immediate proxy is to reduce stocking rate. But the modelling shows that if you simply reduce your stocking rate, you have a rather adverse impact on farm profit.

"It varies wildly depending on the intensity of your farm. In our farm modelling exercise, if you drop your stocking rate by 10%, the drop in farm profit might be anything from -5 to -30%."

Fortunately, there are ways to counter the drop in profitability.

Phil's case study work showed when farmers reduced their stock numbers but increased the per animal performance of the remainder of their stock, profits held or improved. What is required is to optimise the balance between per hectare and per animal performance.

He says the key driver here is the skill level of people managing those stock and their diet. Being able to manage pasture to maintain high quality feed with fewer mouths and reduce the requirement to use supplements is vital.

"Of course, the animals also need to have the genetic merit to be able to lift in performance and have to be fed appropriately to achieve it as well," he says.

He's concerned that some farmers will struggle with the skills to deliver the same or higher profits. He notes that data from both DairyNZ and Beef + Lamb New Zealand already shows a big range of profitability across different farm types.

"A big reason for that (range in profitability) is the skill level of farm managers and farm owners."

His modelling work did not include the impact of different pasture or forage options, like plantain or forage rapes, known to reduce GHG emissions from livestock. The difficulty for farmers is how to provide a high percentage of those methane reducing forages in the animals' diet for long periods of the year.

"On the forage side, there's not a lot of practical options. If you're feeding say fodder beet over the winter to your cows and it's 80% of their diet, then you will reduce GHG emissions, but it's only for a short period of time."

He is also concerned at the irony for farm owners who have made early decisions to reduce their carbon footprint because those 'efficient' farmers have fewer proven options to further reduce emissions inside their farm gate.

One likely option already showing promise is breeding low-methane producing rams and bulls for widespread use. Work to date suggests ram breeders will have low-methane rams on the market in two to three years and on average they should drop methane emissions by about 10%.

"Of course, there's a lot of work happening in dairy to do the same thing. It's a matter of when not if, but it could be another five years before we have a good pool of low methane bulls available for widespread use.

"And, we know that the more traits you select for, the slower the progress is in each one. How quickly you select for low methane will depend on the economic value of each trait and those values are not clear at this time."

That aside, Phil says progress in genetics is a positive for the sector. He expects dairy farmers will be quick to add low-methane bulls when artificially inseminating their herds.

"And, once the scientists have identified the genetic marker or markers for low methane, it will happen for beef quickly too."

That said, Phil says it would take a flock or herd owner nine years to get to 15/16ths low emission genetics starting from scratch.

"We don't expect low-methane bulls to be available in good numbers for the dairy sector till 2026 or 2027, so by 2030, you're only just getting started on achieving any reduction."

Trees as an offset to GHG emissions from farm animals is where farmers, particularly sheep-beef farm owners, can make rapid progress towards the goal of carbon neutrality.

He's firm in his view that farmers considering forestry as an offset should get expert advice.

Although more of an option for the sheep-beef sector than dairy, Phil says trees don't have to be planted on a dairy farm – just anywhere in New Zealand – to be eligible as an offset.

He hopes He Waka Eke Noa will succeed in broadening the definition of forests in the Zero Carbon Act to include riparian strips and shelter belts, a welcome boost to farmers balancing their farms' emissions.

A concern is that under the Zero Carbon Act, farmers can only directly offset their nitrous oxide emissions with forestry sequestration. Methane is excluded.

Phil's advice to farmers seeking to balance their methane emissions is to plant trees, sell the credits and use that income to pay the methane tax.

"A lot of farmers won't like that. But it is a solution. I'm not sure that's what government intends either, but the issue for farmers is methane is 80% or more of their total emissions compared with nitrous oxide."

Under current policy, the government intends to introduce an averaging scheme for claiming carbon credits in 2023. This allows farmers to claim half the carbon in the first round of a production forest.

If farmers plant pines, they can claim carbon credits for the first 16 years and they don't have to repay those at harvest if they replant the forest.

"If you do nothing else but plant forestry to offset your carbon emissions, it means every 16 years you have to plant a new forest.

"If you want to reduce DM eaten, the immediate proxy is to reduce stocking rate."

Phil Journeaux

"If you have 50ha on your farm that could go into pines, you'd be better to plant 10ha every five years, so once through first rotation you've got a semi-regular harvest and that does amazing things to your profit and loss account.

"Farmers need to decide if they want to sell the credits for cash now or retain them and use them to offset emissions in the future – given the liability from their farm will increase."

Phil says the current policy also supports moving to permanent forest, rather than a plant and harvest regime.

"But most farmers I talk to about permanent forest would rather plant natives than pines. The big issue there is the cost to establish natives is hideously expensive.

"From a carbon perspective, you get about a quarter of the credits compared with pines, but natives truck on for hundreds of years."

A big unknown is where the price of carbon credits will end up if New Zealand reaches carbon neutrality by 2050. Phil predicts the carbon price will rise further and force a change in emitter behaviour but drop as we get nearer to balancing emissions against sequestration.

He's concerned at the lack of analysis by government agencies from huge areas of the country being planted in pine trees.

"I'm saying trees on farms, not farms into trees," he says.

"Trees have an obvious, important part to play. But they are really a short-term solution, more of a stop gap, while we develop other solutions such as vaccines, feed additives, or consider a role for gene engineering."

Massey University short courses deliver wins

By Tony Leggett

With the increased requirement for robust, professional advice around nutrient management and environmental protection on-farm, Ravensdown has made a commitment to upskilling staff in Farm Environment Plan (FEP) guidance via Massey University's short course offerings.

MASSEY UNIVERSITY LECTURER DAVE WILTSHIRE SHARING AN INSIGHT ON SOIL STRUCTURE WITH COURSE PARTICIPANTS, INCLUDING TARANAKI SENIOR AGRI MANAGER JAMES LIVINGSTON.

Working in close collaboration with Ravensdown, Massey University has developed New Zealand Agricultural Systems and Farm Environmental Planning courses at both intermediate and advanced levels. The courses supply the nutrient management and farm environmental planning skills required to meet the agreed future greenhouse gas emissions and freshwater regulatory requirements.

With increased regulation in the environment space, both the intermediate and advanced FEP modules are proving popular options. They have attracted interest from professionals across the farming sector, including private consultancies, regional and local councils, government, and other fertiliser companies.

Ravensdown's General Manager of Innovation and Strategy, Mike Manning, has collaborated with Massey University on short course delivery since 2002.

"We need all our field team, from graduates right up to our most experienced agri managers, to feel confident they can deliver what is expected for shareholders. These courses help with that – the staff come out knowing they can deliver on the knowledge gained and they've passed an exam which shows they are competent," says Mike

Ravensdown's field team is increasingly being asked to offer advice and assistance to farmers wanting to create auditable FEPs. Work will soon begin on developing freshwater farm modules to get farmers compliant with new regulations emerging in that area.

"Ravensdown sees its scope for advice really being around nutrients. We won't do the traditional financial budgets that a farm consultant would, and we won't get directly involved too much in enteric methane reduction for instance," says Mike.

"But we will get involved with nitrous oxide because that's associated with nitrogen cycling, and we will get involved with nitrate leaching and phosphate movement because these are all important in a nutrient management sense."

Agri Manager Ryan Tate says the Massey University short courses have been ideal for helping him to meet the changing needs of his client base across South Taranaki, Rangitīkei and Manawatū.

He's seen his role at Ravensdown evolve over nearly 14 years, from providing mostly fertiliser advice to now supporting his clients through compliance and management challenges.

"Our clients expect us to know what it takes to complete an FEP, so having a short course tailored to that is ideal for getting upskilled and updated on what's needed," he says.

He's attended several short courses over the past few years, including the Intermediate Farm Environment Planning course recently. He says the quality of the work delivered by the Massey staff is high.

Regional Environmental Specialist Thomas Taylor also recently completed the same farm planning course and found it was a good confidence builder for him when delivering advice to his Hawke's Bay clients.

"The course is designed to give you the confidence to discuss what is required in an FEP and complete a plan.

"It takes you through the influence of geology, impact of types of erosion, the sources of contaminates and pathways to loss, understanding land use classification and land management units and mitigation strategies," Thomas says.

"The final part of the course was to complete a desktop Freshwater Plan to identify the water quality risks on the property and mitigate those risks using maps, supplied farm and regional information, and data."

A total of 68 Ravensdown staff have now undertaken Massey's short courses and total enrollment of industry professionals has now surpassed 4,300.

Forestry offers balancing solution to livestock emissions

WARREN PARKER

Forestry, pastoral livestock farming and their supply chains are complements.

Trees on farm reduce erosion, enhance water quality, biodiversity and aesthetics. Processing plant boilers use wood pellets rather than coal, and product is stored in renewable packaging made from tree fibres. In the future, this will be transported on trucks and ships with bio-blended fuels, thereby contributing to reduced emissions of export products.

The future of trees and livestock together, rather than as sector silos, needs to be viewed and planned through a multi-decadal lens.

New Zealand's distinctive greenhouse gas emission (GHG) profile, where agriculture generates almost 50% and comparative advantage in growing high-quality renewable forests relatively quickly, means the forest industry is a key plank in meeting climate targets and adapting to a warmer future.

No surprise then that the Climate Change Commission's 2021 report quantified the large contribution forestry is expected to make to both the Paris21 2030 and net zero 2050 targets.

Forestry plays a dual role. In the short term, it supports the reduction of GHGs and longer term, it helps with adapting to warmer weather and the switch from oil and gas to renewable energy and materials.

National demand for timber, fibre and other tree products in 2050 must therefore be kept front of mind. Because radiata pine planted next winter will be ready to harvest in the late 2040s, decisions on what and how much to plant need to be made within the next five years.

Panel calls for emission reductions

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report published earlier this year called for urgent, sharp reductions in emissions if global warming of 1.5°C and 2°C is not to be exceeded during the 21st century.

An average temperature rise above this threshold will pose big challenges for pastoral farming - more extreme weather and animal welfare problems such as heat stress come to mind.

Due to this urgency, the IPCC also called for "strong, rapid and sustained reductions in CH_4 [methane] emissions..." because it is a much "shorter-lived" GHG than carbon dioxide and nitrous oxide.

Methane emissions from pastorally grazed livestock obviously makes this aspect of the IPCC's advice more challenging for New Zealand than most other economies.

Breeding low methane livestock and adopting management practices to reduce methane output are therefore critically important for the future of pastoral farming. Doing this in the absence of new breeding technologies, such as gene editing, will be both slower and harder than it needs to be.

This is true too for pollen free, sterile pine trees.

New Zealand's own target challenging to beat

Meeting New Zealand's 2030 reduction targets is made more difficult because of deforestation over much of the past 15 years (see Figure 1). Indeed, because of this short-termism, removals of carbon from plantation forests will exceed the carbon they sequester during the 2020s, exacerbating New Zealand's decarbonisation challenge.

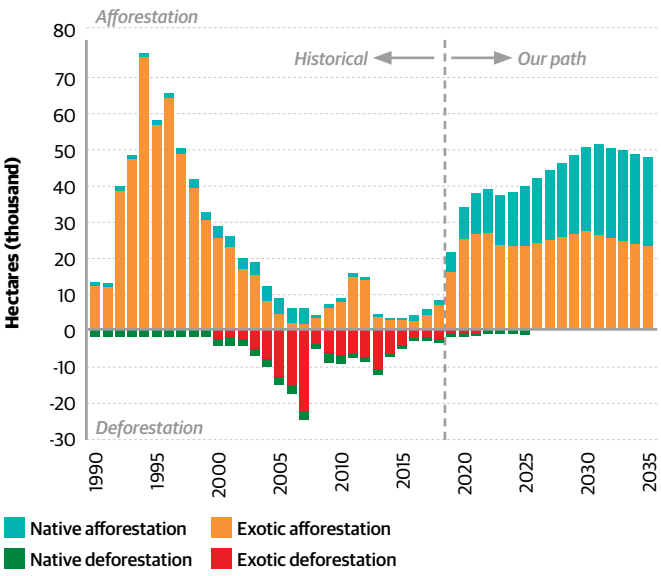


FIGURE 1: NEW ZEALAND AFFORESTATION AND DEFORESTATION RATES FROM 1990-2035[1]

(1,2,3) see Source Code page 40

The Climate Change Commission's advice requires an annual net increase in planting rates through to 2035 of 25,000ha for exotic species plantation and woodlot forests, and around 20,000ha for native species.

These planting rates are higher than recent times and include much larger areas of native forest reversion and new planting.

Natives are three to four times more expensive to establish and sequester carbon much slower than radiata. Nevertheless, they have a role to play and will contribute to biodiversity restoration and other environmental outcomes.

To meet the 2030 targets cost effectively, exotic species with high sequestration rates and straightforward establishment are attractive. Indeed, higher carbon prices may enable planting to be self-funded and add an asset class and liquidity to the farm balance sheet.

It follows, given this operating context and as confirmed by the Climate Change Commission's modelling, that land use change from the present mix toward forestry, horticulture and enterprises with lower emissions than present pastoral livestock systems will be necessary.

Water quality targets may force land use change

In some catchments freshwater reform will also require land use change away from pastoral farming if water quality targets are to be achieved.

The "Our Land" (2021) report[2] from the Ministry for the Environment (MfE) confirmed, especially for high quality soils near urban centres, that land use planning policies and property rights under the Resource Management Act (RMA) have not been effective in managing either cumulative effects or needs for growth (such as infrastructure).

Development has tended to be ad hoc and fragmented, including for forestry. It is improbable that the world class 190,000ha Kaingaroa Forest could be established in today's operating environment.

The RMA Review Panel proposed the system be reformed to take an "outcomes approach" that uses regional spatial planning and combined region plans to ensure national, regional and local needs with respect to land are provided for, through a longer-term lens and in a more deliberate manner than present practice. This is akin to the approaches used in Denmark and the UK.

Forests need to be established in the right place, for the right purpose – and at the right scale to enable internationally competitive fibre and supply chain costs.

The Wood Fibre Futures Phase I report (September 2020)[3] commissioned by Forest Ministerial Advisory Group bluntly highlighted New Zealand's competitive disadvantages in attracting investment into bioeconomy processing plant and infrastructure as: 'logs are relatively expensive and limited in availability [in part because of log exports], price signals to decrease carbon are weak and climate policy is uncertain, local investors are limited in number and scale; and, that global, specialist investors in bioproducts and bioenergy are actively being attracted elsewhere. Further, investors into wood and fibre processing require long-term wood fibre supply security before they contemplate large scale plant investment'.

Addressing these disadvantages and ensuring wood fibre supply at the right location and scale will require a more planned national and regional view of forestry than present policy settings either encourage or enable.

THE FUTURE OF TREES AND LIVESTOCK TOGETHER NEEDS TO BE VIEWED AND PLANNED THROUGH A MULTI-DECADAL LENS.

The ETS is not sufficiently targeted to achieve several more forests at a large scale (>30,000ha) to underpin a 2050's circular bioeconomy rather than the present practice of spatially dispersed woodlots with marginal to uneconomic supply chains.

Piecemeal forest plantings are understandably contributing to anti-forestry sentiment and anxiety about the future rural social services.

However, dampening the ETS for production forestry (as opposed to carbon-only exotic forestry) would dissuade investment into tree planting and increase the likelihood of the livestock sector facing steeper GHG reduction requirements for New Zealand to meet its international climate obligations.

As pointed out by the Climate Change Commission, our GHG reduction targets are modest compared to other developed countries and will come under pressure to be increased.

Commentators scare-mongering on 'forests taking over the country' fail to acknowledge that as the NZU (carbon credit) price increases, so too does the affordability of low carbon technology substitutes for forestry offsets.

Substitutes to trees enable permanent emissions reductions, hence businesses are adopting a carbon 'future' price in their capital investment decisions. Farmers should do this too.

It is increasingly clear, the future for primary production here and offshore is going to be much (even radically) different to the past three generations of deforestation and land-use intensification.

The present mix of policies designed in the context of this 'past' are not fit for the future.

Land and other natural resource planning, carbon pricing and incentives for capital allocation (taxation) all are undergoing reform (as they are in other countries) to achieve the behaviours required for a prosperous primary sector in 2050 and a sustainable planet.

There will be forests and livestock and they will be highly complementary and valued for the respective contributions to New Zealand's economic, environmental and social success.

Author: *Warren Parker is chairman of the Forestry Ministerial Advisory Group, Farm IQ, and State-Owned Enterprise, Pamu.*

Super with nitrogen a proven performer

By Tony Leggett

SENIOR AGRI MANAGER JAMES LIVINGSTON WITH TARANAKI FARMER MIKE GRAYLING.

Superphosphate should be a firm favourite for farmers searching for greater flexibility from their annual fertiliser programme.

Taranaki region Senior Agri Manager James Livingston has always been a fan of superphosphate because it delivers a good combination of key nutrients, especially phosphate (P), sulphur (S) and calcium (Ca).

But it also offers the flexibility to be mixed with other products, particularly nitrogen (N) and potash (K), or trace elements.

"Certainly, super or potash super for dairy farms in Taranaki has always been the premium product for that situation – superphosphate in combination with potash does grow clover well."

He expects more farmers will return to superphosphate with limits like the N-190 cap to manage from the end of this season (2021-22) and the lack of flexibility from fixed-ratio products like di-ammonium phosphate (DAP).

"DAP is a good fertiliser, but if you're applying DAP for P and added K, then it can create a timing issue with the N component," James says.

"Having N in the mix means you need to carefully consider timing of application to get the best response rate for pasture and minimise volatilisation. That requires some forethought in terms of weather conditions and soil temperatures.

"But by splitting the P, K and S applications away from the N applications, farmers get more flexibility to ensure they are using N in the most tactical way possible", James says.

"If you use a fertiliser like DAP, even at a 100kg/ha, you're applying 18 units of N, which is nearly 10% of your annual allocation. With super or potash super, adding Flexi-N at variable rates means that you can have as much N as you'd like from zero to whatever."

When it comes to S it is important to compare the options accurately.

James says the S delivered in superphosphate is immediately available as sulphate-sulphur, important for boosting spring growth. In DAP, there's a tendency to use other slow-release forms of S.

"So, in this sort of country, when you're applying your maintenance P with potash super, you're also applying your maintenance S.

"With potash super and Flexi-N, you can put on a light dressing of nitrogen and a useful dressing of the other nutrients just by varying the mix."

Achieving acceptable accuracy when spreading is less challenging with potash super mixes than a high analysis fertiliser at lower rates of 100-150kg/ha over a large area.

For hill properties using aerial spreading, N on hill country is a double-edged sword. Unless it is managed correctly, it's possible to lose pasture quality on big areas. DAP can be more effective for some farmers who aerial spread – it's got a good concentration of nutrients and has very homogeneous prills.

"In the situation where if you've got a long drive to an aerial bin, DAP has some advantages, especially if you want to add nitrogen to pastures. But equally, if you want to manipulate the amount of N you are putting on, or only put N on some blocks or areas, you can manage this easily with a super/Flexi-N mix.," says James.

"Once you're talking price, you've also got to talk value.

"While it's largely dependent on the individual case, relativity wise, straight DAP might seem cheaper. However, once other nutrients or trace elements are blended into it, such as S, or even more N, then the price relativity changes quickly.

"My personal feeling is that for most farms, super mixes will always turn out to be very competitive."

Easing back on the throttle

When dairy farming in South Taranaki's summer-safe Awatuna district, it's tempting to pump up the volume of N in the annual fertiliser mix.

It's worked well in the past for Mike Grayling who owns two dairy farms mid-way between towering Mount Taranaki and the coastline.

But with one eye on the national N-cap of 190kg/ha/year, Mike is moving to a more tactical approach for applications of N combined with up to three dressings of 30% potassic super across each property.

"We're trying to plan a bit more with our N so we get good results out of it," he says.

"This spring, I have put on less N anyway because we haven't been able to get around the paddocks with the tractor because it's just too wet."

He has also made the call to reduce cow numbers on his home farm this season to 580 after previously calving up to 630 cows each spring.

"We're probably looking at maybe going down to about 550 over the next two to three seasons," he says.

"I just think when we are at over 600, there's a lot of planning involved and lots of supplement coming in. We just want to cut that down. I'm not getting any younger, so I just need to maybe be able to relax and maybe go back to more of a grass-based system," Mike says.

Given the wet spring in 2021, he is also hoping the staged application of the potash super and nitrogen will reduce the risk of nutrient loss into waterways.

"... by unbundling the superphosphate and K from the N applications, farmers get more flexibility to ensure they are using N in the most tactical way possible."

Despite a long-term investment in tile drainage over many years, the combination of above average spring rainfall, wind and cool temperatures have delivered sodden soils, pugging, pasture damage and slower growth.

"Compared to last spring (2020), which was a dream, this one has probably been a bit of a nightmare. As far as grass goes, we're in a reasonably good position, but it's been tough."

SENIOR AGRI MANAGER JAMES LIVINGSTON WITH WILSON (LEFT) AND ROBERT GARGAN

MIKE GRAYLING IS MOVING TO A TACTICAL APPROACH FOR APPLICATIONS OF N COMBINED WITH UP TO THREE DRESSINGS OF 30% POTASSIC SUPER.

SENIOR AGRI MANAGER JAMES LIVINGSTON AND FARM OWNER MIKE GRAYLING.

The productive ash soils in this area have a hidden gift - lots of ironstone rock and logs which emerge when paddocks are cultivated for maize and re-grassing.

Mike grows about 10–14ha of maize each year, selecting his worst performing paddocks for two years of maize, then contouring before returning to pasture. Most of the property has been tile drained but there is ongoing maintenance and upgrades needed each year.

Each paddock going into maize is soil tested and existing drainage is checked to see it's still working as intended.

He will always retain some supplement in the cow diet and the feed pad also gives him scope to reduce the risk of pugging in wet conditions.

"We're reasonably high input now but if we drop our cow numbers, we will drop supplement out of the system as well."

"I probably would never go away from supplement completely because when we've had a wet spring like this, we can bring cows off pasture and put on the feed pad and feed them. So they're always getting fed. That option is quite important to me."

Weather is the ultimate dictator of grazing management, but Mike's plan is to graze paddocks down to a residual of 1,600–1,700kg DM/ha. In spring, the aim is a 28–32 day round.

"When we get a year like we've had, which is very wet, we're probably leaving the paddocks a little bit scruffy because we're trying not to do too much damage," Mike says.

"On days that we can, we do graze down to the residuals and we'll just have to tidy it up with a bit of topping later on.

"I've got 580 cows that are the best toppers on the farm, and that's their job."

The property has averaged about 300,000kg MS/season for the past few years. This year, with 30 fewer cows in the herd, he's hoping to still deliver a similar output but accepts the spring so far could mean it's closer to 290,000kg MS.

Spring flush more manageable after combo fertiliser

Not far from the bush edge of Mount Taranaki, Wilson Gargan is locking in good results from a shift in fertiliser strategy on his 150ha dairy unit.

The property is farmed in partnership with his parents Robert and Coral and receives close to 3,000mm/year of rainfall.

Wilson calves 500 cows in spring and winters 400 on the platform while young stock are grown out on their calf rearing and beef unit nearby. He prefers a grass-based approach for feeding his cows, topped up with baleage and limited in-shed feeding of supplement.

When Wilson made the switch from DAP to 30% potash super and Flexi-N, he noticed an immediate improvement in pasture health and quality, particularly improved clover content.

"For quite a few years, we used DAP in spring but found that we got a massive bulk of grass coming through quite quickly, but then there wasn't a lot of growth afterwards," he says.

"We were having to top up with a bit of N to keep things moving along."

He says pasture production using the combination mix is steadier and more manageable. Being nearer the mountain, pasture growth through winter is often constrained by cold temperatures. But once spring hits, the farm is a reliable performer.

"We have a better growth for a longer period from the Flexi-N. That's all I need to use pretty much for the season.

"We're getting a lot more clover coming through. Better pasture health too. It doesn't yellow off like it used to and I just think the grass is healthier."

The Gargans have two other farms in higher rainfall locations – another dairy farm and a calf-rearing and beef-finishing unit. Potash super and Flexi-N is the first choice there also. The rearing unit fertiliser is flown on and the rate of N is varied depending on the feed situation – easy to do with potash super and Flexi-N.

Wilson and Robert spread all their own fertiliser on the tractor country and say the difference in spreading cost for the combination mix compared with DAP is negligible for their situation.

Wilson always leaned on his Agri Manager James Livingston for advice on cropping options as well as fertiliser. After 15 years advising him, James knows the farm well and is often left on his own to collect soil test samples and check on crop or pasture growth.

"He knows the farm well," says Wilson.

"So I can just let him go off and do what he needs to do. It saves me time which is great."

FOR WILSON AND ROBERT GARGAN, SWITCHING FROM DAP TO 30% POTASH SUPER AND FLEXI-N HAS RESULTED IN IMPROVED PASTURE HEALTH, QUALITY AND CLOVER CONTENT.

Is molybdenum deficiency holding your clover back?

ANDRÉE CALLAGHAN,
RAVENSDOWN AGRI MANAGER

With the current price pressure on fertiliser N and the N-190 restrictions now in play, it's time to ensure your clover growth is not limited by molybdenum deficiency.

Molybdenum (Mo) is a trace element that plays an integral part in ensuring clovers and other legumes can both fix and cycle nitrogen (N) optimally.

It is widely known that molybdenum availability can be closely linked with soil pH. Mo deficiencies can occur in acidic soils (pH lower than 5.5) where the Mo (an anion) is bound more tightly to the soil colloids.

Liming can sometimes overcome Mo deficiency as the availability of Mo to plants increases as soil pH increases. However, if the soil does not naturally contain much Mo, Mo applied as fertiliser will be required.

Some soil types, particularly in the South Island, may have an absolute Mo deficiency and require Mo irrespective of soil pH. For this reason, herbage testing is required to check the Mo status of your soils. Samples should not be collected when soil is very wet or very dry.

Malcolm and Raewyn Menzies farm near Cust in Waimakariri. Working with their agri manager, they collected some mixed pasture and clover-only herbage tests in spring 2020 which indicated that Mo levels in the clover were low and warranted including Mo in the next round of maintenance sulphur super in autumn 2021.

Sourcing their maintenance fertiliser from Christchurch works, Malcolm and Raewyn were able to make use of the Precision Blending Plant (PBP) and apply a Surflex Moly coated sulphur super product. This product is created through the PBP by mixing a molybenum trace element-infused polymer coating with superphosphate or sulphur super products.

Malcolm was really pleased to learn of this product, as it is far superior compared with the alternative of adding a 50 – 60g/ha of sodium molybdate powder into a mix with fertiliser.

Using a Surflex Moly sulphur super ensured he achieved an even spread of Mo across his application area. It also eliminated the risk of the powder ending up concentrated in one area, which could be a possibility with the alternative method and could contribute to copper deficiencies in stock.

Malcolm has been pleased with the results this past spring.

"There is definitely an improvement to the clover across the farm after applying the molybdenum coated sulphur super. It's really obvious. We haven't had clover like this for years.

"We used to do more cropping about 10 years ago and we used to find clover like that after cropping but not since then. The clover is definitely doing really well.

"There was one paddock we missed out applying the molybdenum to in the autumn because it was in rape, but we will catch that one up this coming autumn."

Malcolm had heard the stories regarding the over-use of molybdenum historically, but his recent blood and liver work on his heifers returned good copper results which was reassuring. He stresses that "you need to stick to the recommendations and not apply too much, or too often, just like with selenium".

Where herbage tests indicate that molybdenum application is required, maintenance rates on pasture are 50 - 60g/ha of sodium molybdate equivalent applied every four to five years.

If comparing the cost of a maintenance rate of Surflex Moly sulphur super and the same amount of phosphorus and sulphur via sulphur super without Mo, the additional cost for the Surflex Moly sulphur super is approximately $4/ha.

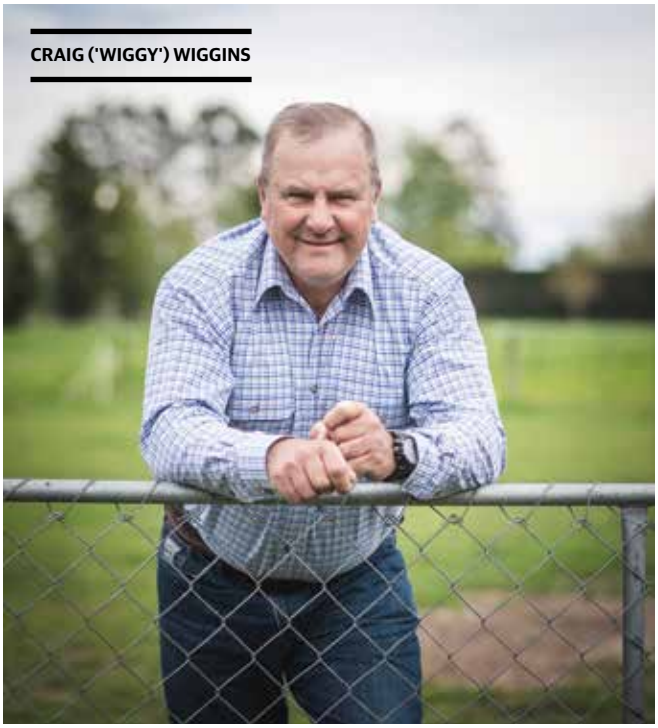
It's important to remember that application of Mo where required is just one tool in the toolbox. It is just as important to ensure that that all of the other macro nutrients (P, K, S, Mg, Ca,) are all within the optimal range in order to provide the conditions for your clover to thrive. ■

Coming to a sale yard near you

By Tony Leggett

Horses and farming have been anchors in Craig Wiggins' life from a very early age, growing up on a family farm near the central North Island town of Raetihi.

Thought leader: Craig Wiggins



CRAIG ('WIGGY') WIGGINS

He developed his passion for communication as a young boy, helping his grandparents with their sound system business at countless events across the central North Island.

As the oldest grandchild, Wiggins traveled with them to many of the regular A & P shows, rodeos and other rural events over several years.

"It fueled my interest in communication and travel. It also gave me a real insight into commentating and being able to read the mood of an audience," he says.

It's a talent that has served him well for the past 35 years.

Now he's itching to crack into a new nationwide initiative to provide mental and physical health checks at sale yards and other rural venues across the country.

Known better in the rural sector as 'Wiggy', he launched the concept of mobile health clinics more than two years ago by taking his horse float and local rural GP Dr Sue Fowlie to the Coalgate sale yards in central Canterbury.

Covid-19 derailed plans to run a national programme of visits to sale yards so the concept was shelved until now. This time, it is backed by a charitable trust supported by the Carr family, owners of the diverse Carrfields Group.

Wiggy is aiming to visit venues nationwide this year and work alongside a local nurse or GP. His job is simple – applying his communication talents to encourage farmers to stop in for a chat and a quick check on their mental and physical wellbeing.

It's an approach he knows works with farmers. The sale provides the excuse for them to shoot into town and there's a bit of humour combined with enough safety in numbers to get them queuing up at the mobile clinic door.

The trust has been in the melting pot for several months and Wiggy says, subject to Covid restrictions, he can't wait to get started.

His natural communication style is open and humble, shaped by his younger years in Raetihi and honed from commentating events like rodeos, shearing and other rural sports competitions.

"It (my style) comes from a place of honesty. I'm just Craig Wiggins. I'm just wanting to see our rural communities a lot healthier.

"I've watched my hometown of Raetihi go through major changes and yet that little community still looks after itself really, really, well.

"We've got to invest in our communities and champion their own heroes, because in every community there is a champion there."

Reinforcing Wiggy's belief in communities looking after their own is his experiences as a five-year judge of the Norwood Rural Sports Awards.

"I'm thinking of people like reinsman Ricky May in my home patch, or footy players like Sarah Goss originally from Kimbolton in Manawatū or Benji Marshall from Tokoroa. And look at the impact the All Blacks captain Sam Kane created for the King Country team when he played a game for them back in October.

"We really need to promote those people who will come back to their communities, to share their stories and show the way."

He also feels a debt of gratitude to his own set of mentors and influencers who have guided him through his life.

"A lot of good people put a lot of work into me when I was growing up. Many of them were not well known outside their own districts, but they instilled a great sense of community values in me as a kid growing up.

"They were people who were working hard and just giving up their time to help me. They weren't doing it for any recognition, they just did it because they believed in the future of their community."

Wiggy says he struggles with what he calls the "personality culture" surrounding mental health.

"For some of the people who have been delivering mental health advice, it's often really good for their own mental health to be out there doing it.

"I've had to work really hard to get myself into a position where I'm starting to get support for what I'm doing without having to take the approach of 'this is my own story'."

Reviving community spirit will be a large focus of Wiggy's future work across New Zealand.

"I really think that local community strength has the biggest influence on the mental and physical health of its people. I often wonder if we're spending too much time and money on big projects and people are falling through the cracks at the community level."

In August last year, he launched an initiative to get rural people talking more. 'Lean on a gate, talk to a mate' evolved from the loss of a mate to suicide. Feedback to Wiggy tells him this simple strategy is working well for many families, struggling with the pressure and stresses created by farming today.

His own mobile phone is rarely idle and he admits he is increasingly fielding calls from people who are concerned about a mate, staff member or their partner.

"Just being able to talk to someone, listen to them and hear what's on their mind is usually the best thing I can do for them."

HOME IS WHERE THE HEART IS. CRAIG AND ANNABELLE WIGGINS, WITH CHILDREN GENEVIEVE AND MILLIE AT THEIR LAURISTON PROPERTY.

"We've got to invest in our communities and champion their own heroes, because in every community there is a champion there."

He is wary of going beyond being a great listener when he's dealing with stressed callers. His aim is to facilitate help from professional services.

"One thing I've learned from my work with horses, whether I'm working with a young horse or commentating a rodeo meeting, is it's about living in the moment.

"I have to avoid soaking up the stress and just focus on the here and now.

"It was Winston Churchill who once said, 'there's something about the outside of a horse that is good for the inside of a man'. That can be any animal really, but for me it's certainly horses and like most things in life, you always get back more than you give."

Reflecting on highlights from 2021, Wiggy says winning the Ravensdown sponsored Agricultural Communicator of the Year Award from a large field of acclaimed communicators across farming and agribusiness is the pinnacle.

He's also immensely proud his regular *Whatever with Wiggy* shows which grew from humble beginnings to become a much anticipated forum for many farmers. Wiggy hasn't been afraid to challenge the rule makers and his Thursday evening Zoom meetings have become essential viewing for many politicians and central and local government officials.

Aside from his family, horse work provides a balance to Wiggy's public life. He's clerk of the course at several race meetings around the greater Canterbury region and still manages to commentate at several rodeo meetings each season.

Home for the past nearly 16 years is their small farm near Lauriston where he lives with wife Annabelle and children Genevieve and Millie.

First principles: the passion behind the pasture

By Gareth Richards

Brett and Ruth Steeghs are building a 100-year company while raising a young family on their Central Plateau dairy farm. They share their passion and 'pasture first' insights with Ravensdown.

BRETT AND RUTH STEEGHS WITH SON GENE

"I'd like what you're giving them." Agri Manager Eva Brakenrig has lost count of the times she's been asked for this after her client Stone Country Dairies was profiled in the Pasture Summit – a collaboration between the New Zealand and Irish dairy sectors.

The Steeghs farm on pumice soils northwest of Taupō on 170ha effective area with 460 peak cows generating production of 973kgMS/ha. The Pasture Summit visit to their farm gave them a chance to share their passion for pasture and how they are making progress across their farm business.

"I'm a curious type and always thinking of how to improve," says co-owner Brett Steeghs.

"It starts with questioning and realising you're not the expert. The good news is that New Zealand farming benefits from access to experts from a variety of co-operatives like Ravensdown.

"We tend to chip away doing our own thing, but seeing that comparative performance is ideal for those who want to learn. That kind of benchmarking with those around us means you're not missing something somewhere.

"It might also confirm what you were wondering and you may not need to change either. It seems like that's a rare thing in the world and a huge asset for the dairy sector," adds Brett.

Pasture focus for a family farm

With their young family, work-life balance is plainly a factor.

"Our kids are growing up on and around the farm – it's important to us that we have the time and flexibility to ensure they enjoy it. We're proudly a family farm and we need to keep things simple so staff can take over when we want to do the things that other families can do, like go to the beach.

"We believe in simplicity and accuracy. You've got to work at stripping decisions out because every decision is a chance to get it wrong. For example, more production doesn't mean more profit and can mean more complexity, and cost finds a way of creeping in."

Cow condition is monitored closely. "We move to once-a-day (OAD) if they are starting to look on the light side.

"We tend to go for Kiwi-cross which is the 'Hilux of cows' – they are great hill-climbing grass-harvesters and we're after a lower replacement rate," says Brett.

Farm-grown feed comprises 97% of the herd's dietary needs. "We're strict on supplements, using it only to bridge lactation in the event of a dry summer. But you've got to watch for that substitution effect.

"Working back from the fact that February and March can be increasingly dry, we focus on calving as early as possible, and maximising production during the days-in-milk before Christmas. The autumn slowdown kicks in fast, so it's all about growing grass when we can.

"It's a constant battle to reduce our environmental footprint. We've been slowly pulling our nitrogen (N) back and supplementing with a bit more potassium (K)," says Brett.

Assessing nutrient needs

Applied N was reduced from 188kg/ha to 145kg/ha last year and, according to Brett, timing is everything.

"We keep a close eye on the weather because risk of losses of N to the air are pretty high as temperatures climb. Another way to help lower our N applications is to focus on clover in the sward. On their recommendation, Ravensdown supplies us with the K we need to feed that clover and we've seen big clover responses to that K and sulphur (S). It's really taking off which is good to see."

STONE COUNTRY DAIRIES, TAUPŌ

"We're on a volcanic plateau up here. In its unfarmed state, we'd be looking at low levels of P, K and S as well as magnesium (Mg) and calcium (Ca). We've got to stay on top of that by testing each paddock for nutrient status and things like pH. We turn to Ravensdown for the suite of nutrients, based on the right testing and good advice from our specialist agri manager. Eva helps explain the soil tests and recommends what to do."

Ammo is popular in this part of the world explains Eva, especially as rain over volcanic soils means the S doesn't always stay plant available as long. "The soil can be a bit like a sieve below that topsoil and organic matter that's built up over the years," says Eva.

"Because of the soil testing, the variability has been managed down. They have invested in P applications in the past, so they can now ease back on the P in the next two to three years," she says.

"Herbage testing (sourced from Ravensdown's laboratory ARL) can also be important so we can correct for trace elements."

BRETT WITH RAVENSDOWN AGRI MANAGER EVA BRAKENRIG

Reducing paddock variability

Brett takes a low-input approach with a focus on pasture and grazing management. His aim is always to maximise the amount of feed harvested per hectare. This farm was converted 25 years ago and has produced plenty of nutritious milk in that time, but total pasture production is not the primary focus.

"The ball we keep our eye on is the pasture harvested, which has a strong positive correlation with profit/ha," says Brett.

A close eye is kept on covers and the residual level is paramount. "We manage any surplus by cutting silage and banking that feed. We start with quite a long round at the start of calving – we'd be on around 100+ days and the fastest we'd get up to is 21 days at balance date.

"Then at Christmas, we start pushing the round length out which can be tricky because we often have a lot of grass, but you know that pinch is coming.

"There's good organic matter and carbon in the soil. Our land profile is rolling and our soil is volcanic so the variability in fertility creeps in over time. If we don't keep track of that, our blocks aren't working as hard as they could and we're putting costly fertiliser on when it could be better used elsewhere."

The previous owner committed to Whole Farm Soil Testing six years ago and it was repeated six months ago. "We've seen reduced variability which is really satisfying. One paddock had low P and low pH and, after we targeted P and lime applications, that is now in line with all the others."

Brett self-applies his fertiliser and says the mixes need to be flexible to work with freight and on-farm storage issues. For example, they have now removed salt from their spring mixes as it doesn't store well in the bin in the mix and can make spreading challenging.

WELLBEING IS AN IMPORTANT FOCUS FOR THE COUPLE.

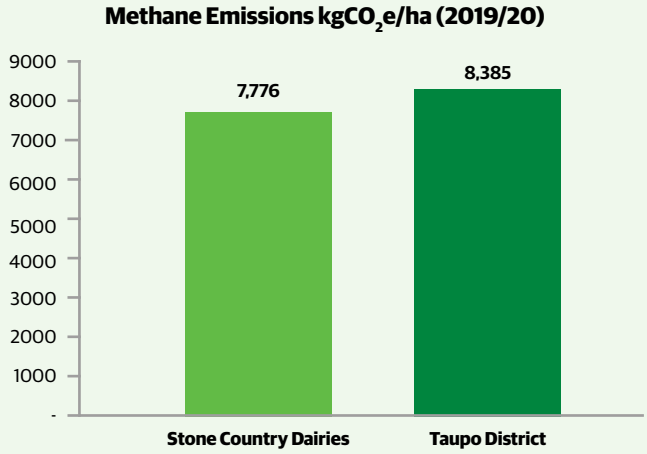
"I'm running variable rate (application) and the soil test results tell me what to avoid beyond the no-brainers like the camping spots. We tend to follow the cows through the spring - little and often is the key."

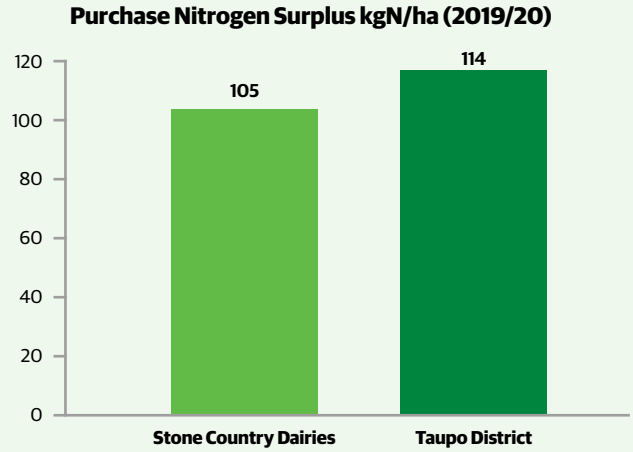
With another child on the way, both Brett and Ruth have their hands full. This drives the desire for a simple approach but Brett says it runs deeper than that.

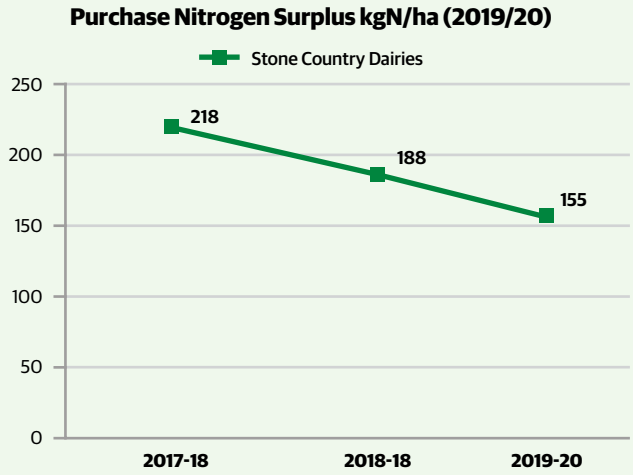
"Our generation perhaps notices the wellbeing aspects a bit more. We've seen people burnout after achieving their dream. We're trying to build a 100-year company. As a family, we're in this for the long haul so will be trying to take care of business by taking care of ourselves."

If that's the case, over the years to come there will be many more passers-by who glance across the fence and want a slice of what the Steeghs are having.

Building a 100-year company at Stone Country Dairies







Keeping it simple: three KPIs

1. Pasture harvested
2. Farm working expenses
3. Operating profit

Optimising management of farmed soils

By Dr Ants Roberts

DR ANTS ROBERTS, RAVENSDOWN CHIEF SCIENTIFIC OFFICER

Most holistic soil scientists understand that in terms of its substance and function, soil is a complex interaction of physical, biological and chemical properties and processes interacting with climate and human management.

Even if a soil scientist specialises in a particular discipline around these processes, e.g. soil chemistry, it does not preclude their ability to understand, interpret and communicate known robust science about areas outside their subject area.

The rhetoric around soil biology has unfortunately always been a rich hunting ground for the 'alternative' farming and growing system champions and their advisors, suppliers and adherents.

Soil biology is arguably the least studied and understood discipline in soil science but advances in instrumentation and study techniques have resulted in a very large renaissance of discovery by credible global academic and government sponsored research and development agencies.

To put it crudely, many researchers are now trying to understand the soil microbiome in terms of who is there, what do they do and how can they be utilised for the benefit of food production and the environment.

Soil scientists are often accused of ignoring soil biology. Nothing could be further from the truth, as you would discover if you went back in history and read some of the soil textbooks which date back 50-100 years.

Soil scientists have always been acutely aware of the important role of soil microbes and their big cousins such as earthworms. Darwin himself studied and wrote about them over 100 years ago.

Their role is vital. They live on and hence break down the organic matter that returns to the soil via dung, urine and plant residues.

The more of these residues added to the soil, the more soil microbes. These residues are nutrient rich and the microbes enrich it further. When they die, they release these nutrients so that plants have access to them again.

"Conventional science-based soil scientists have perhaps been guilty of not communicating well enough about the important ecosystem services provided by soil biology to farmers, growers and the public at large."

Conventional science-based soil scientists have perhaps been guilty of not communicating well enough about the important ecosystem services provided by soil biology to farmers, growers and the public at large and others have stepped in to fill the void.

The commentators may well be driven by good intention but there is a plethora of misdirection, manipulation and untruth which has muddied understanding.

Ravensdown's business is providing nutrients to support food production systems but is often thought of both internally and externally as a fertiliser company.

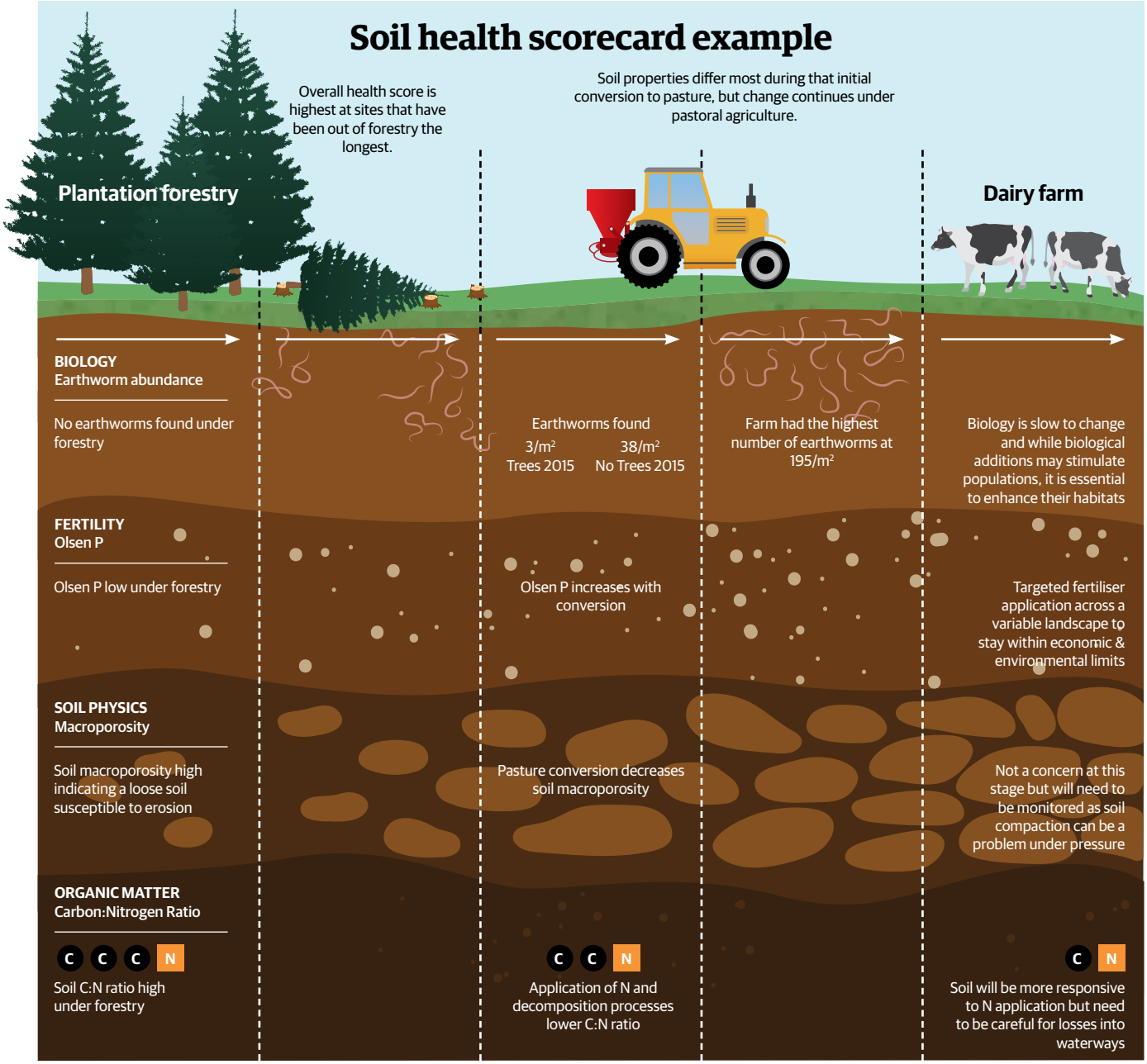
Ravensdown needs to transform this definition and be thought of as a nutrient management company that understands how soils, plants and animals all interconnect within the context of individual farms.

We need to talk to our shareholders and customers knowledgably about soils in all their aspects, not just about nutrients and soil tests. The agri manager team is the crucial link in this chain and we must give them more of the tools to assist them in their conversations with interested farmers.

Resources that already exist are:

1. Several technotes covering soil biology and physics.
2. Articles that have been written for Ravensdown newsletters and latterly Ground Effect.
3. Inhouse and external training opportunities including field trips to utilise tools such as Visual Soil Assessment.
4. Products such as Express gibberellic acid, nitrification inhibitors and research into both fungi and bacteria with forthcoming products possible, are ways the company is expanding the tools for farmers to enhance soil function.
5. On-going development of science based measures of soil health, such as an example co-developed with AgResearch scientists (see graphic) with interpretable criteria covering chemistry, physics and biology aspects.

Soils are the living mantle covering our terrestrial environment and we rely on their life-supporting functions and ecosystem services for our existence. Farming soils well requires that we are cognisant of the complex interplay between soil chemistry (and biochemistry), physics and biology and manage them accordingly. ■



Source: AgResearch

Intense selection sifts out best varieties

By Michael Begley, Cropmark Seeds

Terms like 'high performance liquid chromatography, PCR testing and monoclonal anti-body immunoblot assays' are not normally associated with the breeding of forage grasses and crops.

They refer to a range of scientific, laboratory-based tools that Cropmark Seeds undertakes as part of its plant breeding-related research and development.

Historically, plant breeding was primarily undertaken in the field or in glass houses, but with scientific and technology advances over recent years, the focus has now shifted to the leading-edge lab-based science technology to fast-track development of varieties.

Today, it is not just about the plant breeding itself, but also the endophyte embedded into the plant.

Endophytes are natural fungi which have evolved within the cells of plants over millennia to provide the plant with protection against insect pests. At the same time, these endophytes deter grazing by animals as a survival mechanism through decreasing palatability or creating heat stress and grass staggers.

Plant scientists have the task of removing the existing 'toxic' endophyte from the grass and replacing it via inoculation with a more animal-benign one, which has the beneficial traits of insect pest resistance and therefore improved plant persistence.

This is what the terms above actually refer to. The compounds within or produced by the endophyte need to be evaluated before inoculating into the grass and once inoculated the grass needs to be tested to ensure that the endophyte is present and viable within the plant.

Plant breeding is not a short-term exercise. A high-performance forage grass variety is usually the culmination of well over a decade of research and development, millions of dollars investment, and hundreds of thousands of hours of work.

The numbers within the company's research and development are huge, by any standard.

Each year up to 200,000 individual plants are sown into root trainers to select from; a total of 35,000 plants are selected each winter from that number and sown into single-plant nurseries for further evaluation, and over 100,000 endophyte tests are conducted on varieties.

The selection pressure is huge. From all of this, each year the company will identify the very best 100 or more grass varieties which it will enter into company run trials at locations across New Zealand and Australia to ensure that the grass that farmers buy lifts on-farm productivity.

These trials are all run as fully replicated plot trials on commercial farms and include 'cut and weigh' trials as well as grazed trials where they are evaluated for several years. Factors such as seasonal growth performance, dry matter yield production, metabolisable energy, digestibility, grazing preference, disease and insect pest tolerance and persistence are all measured during that time.

And following that, any endophyte-containing grasses then enter into Animal Ethics Committee approved animal safety trials where they are tested for their effect on animal health and performance, before eventually being commercialised if they meet the grade.

Each year, only one or two varieties reach this outcome at the end of this very stringent programme.

Cropmark Seeds has its plant breeding programme based in Canterbury, and exports forage grass seed to the world. It is New Zealand's sole remaining locally owned forage grass and crop plant breeding and supply company, and also Ravensdown's commercial partner in forage seeds supply.

Together with Cropmark Seeds, Ravensdown can supply farmers with a full range of forage grass, clovers, brassicas and forage herbs requirements, including forage mixes, delivered to nearest local Ravensdown stores, or direct to farm.

Its experienced agronomy staff will provide expert pasture and crop husbandry advice.

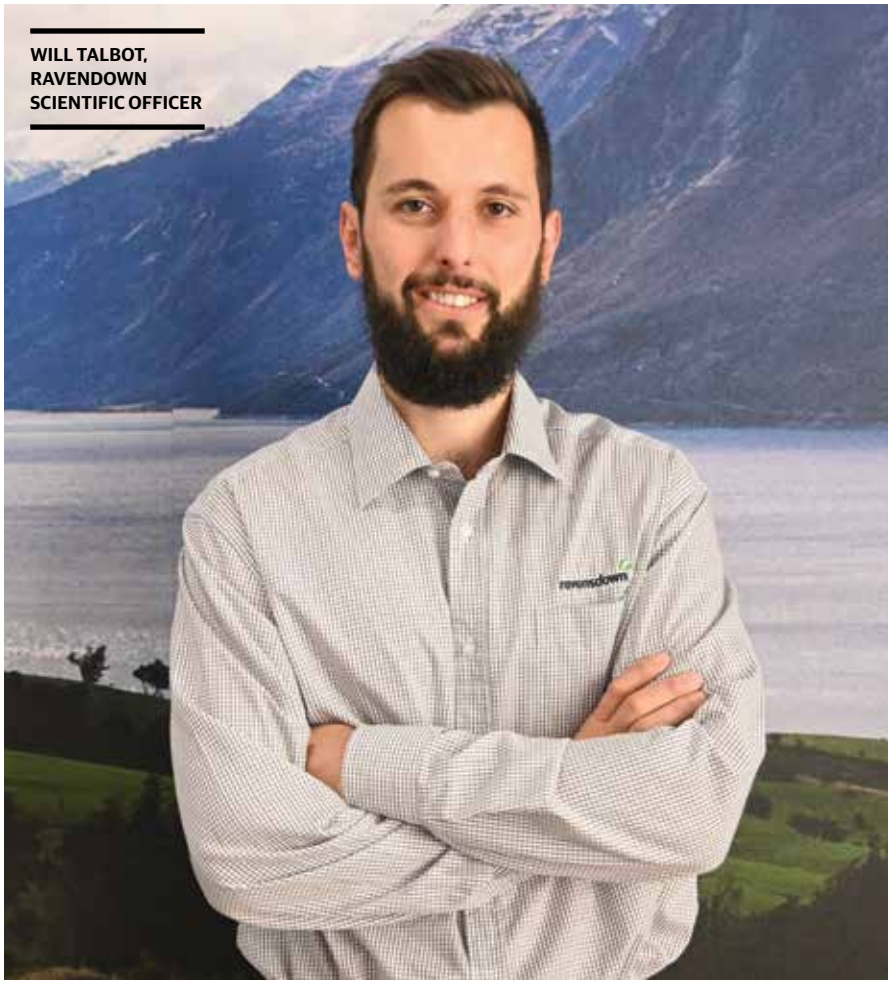
Call the customer centre on 0800 800 123 to get in touch with your local Ravensdown Agronomy representative.

THE FOCUS FOR PLANT BREEDING HAS NOW SHIFTED TO THE LAB.

New tool to measure soil mineralisable nitrogen

By Dr Will Talbot, Ravensdown Scientific Officer

The Potential Mineralisable Nitrogen (PMN) test and N mineralisation calculator are new tools to help farmers to reduce nitrogen (N) losses, save on fertiliser costs and maintain productivity.



WILL TALBOT, RAVENDOWN SCIENTIFIC OFFICER

There is increasing pressure for farmers to reduce their N inputs and outputs; and matching your soil N supply and N fertiliser with your crop N demand is more important than ever.

Your soil supplies N through two main forms: mineral N (nitrate and ammonium) and mineralisable N (N released from organic matter throughout the season). We're already very good at measuring mineral N and we use that knowledge when developing N fertiliser recommendations. However, the soil can also supply significant amounts (40–300kgN/ha) of mineralisable N.

Until recently, our ability to accurately measure and predict how much mineralisable N the soil will supply has been limited. The old Anaerobic Mineralisable Nitrogen (AMN) test was less accurate and the results were hard to interpret. For these reasons, Ravensdown partnered with Plant and Food Research (PFR) to develop a new method to measure mineralisable N and to interpret these results into the real world.

PFR has done some great work, identifying the Potentially Mineralisable Nitrogen (PMN) test as a faster and more accurate method of measuring N mineralisation. This test is a significant improvement on the old AMN test.

PFR has also conducted a series of in-field mineralisation trials around the country, allowing the development of the N mineralisation calculator.

The N mineralisation calculator allows the PMN value to be more accurately interpreted into the real world. The N mineralisation calculator uses the PMN value and inputs 'reality' (local climate data and soil order) to provide a farm-specific month by month release of mineralisable N.

The calculator is available for the main soil orders in the cropping areas: Canterbury, Tasman/Marlborough, Manawatū-Whanganui, Hawke's Bay, Gisborne, Waikato and Auckland.

Outside of the calculator-available areas PFR has also developed general guidelines that allow interpretation of the PMN test. Your local agri manager can provide expert advice and guidance on the PMN test and N mineralisable calculator.

Through having a more accurate soil mineralisable N test and better interpretation of the results, we can more accurately match soil N supply + fertiliser N with crop N demand. This is improving N fertiliser recommendations, ensuring optimal:

- Productivity – there is adequate N to meet your crop demand
- Profitability – you get the most bang for your fertiliser buck
- Environmental outcomes – avoid over applying N, reducing N losses.

If you're growing a crop and you want to improve your N fertiliser recommendations (improving profitability and environmental outcomes, while maintaining productivity) talk to your local agri manager about the PMN test and the N mineralisation calculator today.

A formidable combo: Liquid N and gibberellic acid

By George Kerse, Ravensdown Product Manager Agrochemical

When the timing is right, combining GA with your N fertiliser application is a smart way to improve the efficiency of nitrogen applications and stimulate pasture growth.

Gibberellic acid (GA) can be used to stimulate extra pasture production during 'shoulder' periods in spring and autumn when cool temperatures are limiting pasture growth rates.

Nitrogen is commonly applied to boost pasture growth at these times, and this is also when the naturally occurring plant hormone GA can provide benefits for pasture growth.

The optimum soil temperature range for a GA response is around 7–16°C so once temperatures warm up in spring, pasture growth rates naturally increase and the advantage from GA can be less significant, as the pasture plants start producing their own GA. Applying GA at any time of year is not recommended for this reason.

How does GA work?

Gibberellic acid is involved in breaking dormancy and mobilising plant reserves. It helps plants start regrowing soon after grazing and accelerates growth rates for a limited time. Best responses occur in healthy pastures that are not under stress and have adequate moisture and nutrition to support the extra growth.

GA needs to be applied 1–5 days after grazing when GA levels are low, and the extra growth captured by grazing again 3–4 weeks later. This timing requirement fits in nicely with rotational grazing practices.

It is important to use the correct dose of gibberellic acid – 8g/ha of active ingredient – for Express GA this equates to 20g of product/ha. In early trials much higher rates were used, leading to some negative effects such as a lag in regrowth after GA use.

What happens when we combine GA and N?

GA and N have an additive effect on pasture growth. N tends to increase grass tillering and GA causes cell expansion.

Availability of N at the time of application has been shown to improve pasture response to GA, and this is a result of increases in both tiller size and tiller density[1].

GA and liquid N (Flowfert N) application

Tank mixing Express Gibberellic Acid with Flowfert N or dissolved urea is an effective and efficient way of applying both to pasture. But there are some key things to remember:

- GA needs to be taken up by the foliage, root uptake is not an efficient mode of uptake. That is the reason fertiliser isn't coated with GA or broadcast with fertiliser.
- When applying GA with Flowfert N, avoid spraying in the rain. The Express GA label states not to apply if rainfall is expected within two hours to allow time for leaf uptake of the GA.
- Flowfert N can be applied in the rain as the N will be taken up predominately by the roots of the plant.

There are some other factors driving interest in GA at present.

The N-190 cap: the additive effect of GA and N means that when you apply N at times that you will get a good GA response, there is potential to reduce the rate of N slightly and still maintain similar pasture production by applying GA with the N application. Rather than replacing an N application with GA, there are more gains to be had when they are used together.

Clover stimulation: With the negative press around fertiliser N, people are re-discovering the value of clover in pastures. Clover responds possibly even better than ryegrass to GA, so you often see an increase in clover in treated pastures.

Cost factors: The cost of urea and fertiliser prices in general are rising. GA is relatively cheap, so prudent farmers are working out they can reduce the cost of increasing pasture production by strategic use of GA with N. ■

Table 1[1]: Pasture response to GA and Nitrogen applications in spring

Treatment	Rate	Mean Dry Matter Yield Kg/ha	Mean extra Dry Matter Kg/ha	Kg extra DM/ unit of N applied
Control	-	781	-	-
Urea	20Kg N/ha	1015	234	11.7
Gibberellic Acid	Express 20g/Ha + Widespread 1000 25ml/100L	1040	259	-
Urea + Gibberellic Acid	20Kg N/ha + Express 20g/ha + Widespread 1000 25ml/100L	1285	504	25.2

(1) see Source Code page 40

AGRI MANAGER MARY TURNER WITH LUDF FARM MANAGER PETER HANCOX

Early spring feed gap overcome

By Victoria Rutherford-O'Sullivan

Combining Gibberellic Acid (GA) with liquid nitrogen (Flowfert N) helps bridge the feed gap in early spring for the Lincoln University Dairy Farm (LUDF) herd in Canterbury.

Manager Peter Hancox has been using GA and Flowfert N for about three years on the 160ha (effective) dairy platform, milking 588 cows. He says it continues to give them good results in the transitional period when pasture growth is slower.

"We use it to get the extra grass in that cooler spring period ... It's a cheaper form of feed for us instead of feeding expensive supplements."

Average N use across the farm is 133kg/ha a year. Cost saving is a big focus, so combining GA and N in a single pass also works with their philosophy by eliminating separate application costs.

Timing is everything when it comes to ensuring the best response from GA and N. The first grazing round length when they use liquid N and GA is about 55 days, moving to 24 days in mid-September.

"Normally we wouldn't start any N until we get warmer soil temperatures which is generally about the first week of September," Peter says.

"Because we have a limited amount of N to use, we are trying to use it when we get the best response.

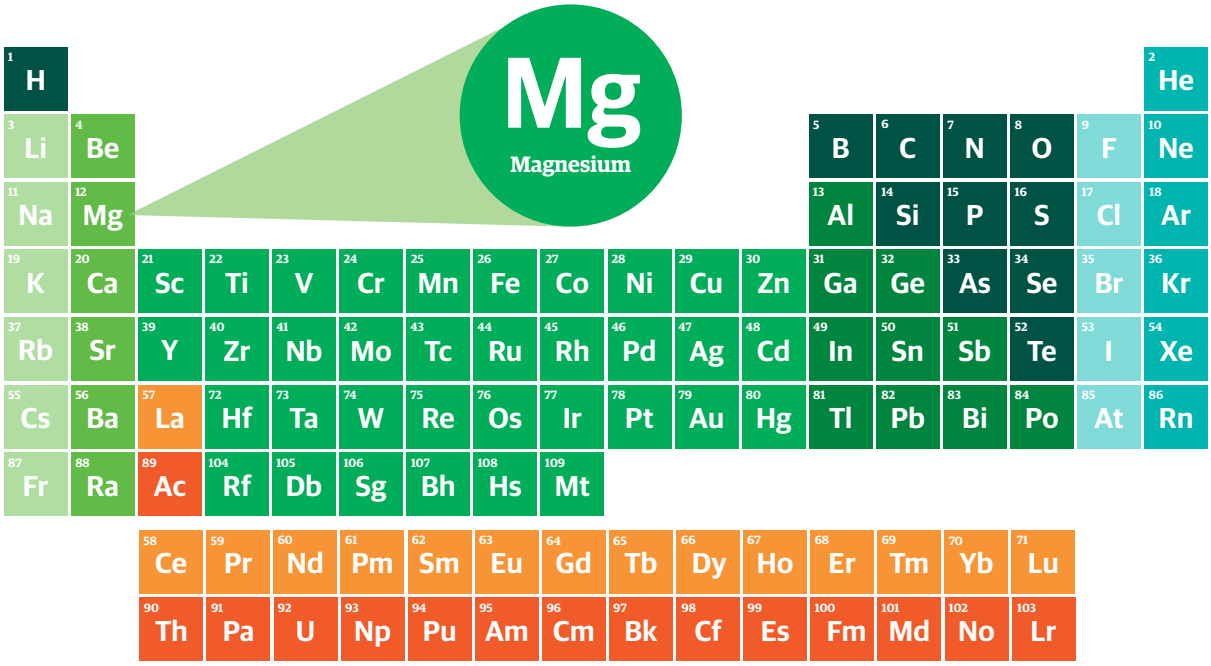
"The sooner we can get it on after grazing then the better the response we get. We had an incident this year where three paddocks got missed because of a wet and windy period. The ones that did get it on were applied later but grazed earlier – so they definitely do jump ahead."

Gavin Palmer from Spreading Canterbury says he has seen a marked increase in the use of Flowfert N as well as GA this season and he is expecting demand to keep rising. They have started out with one spreader unit but will be adding capacity for the autumn season.

"It's taken off so much – there have been farms that have previously put gibberellic acid on with the local spray contractor, but this year they've been able to get their N on at the same time as well. One pass, get the lot."

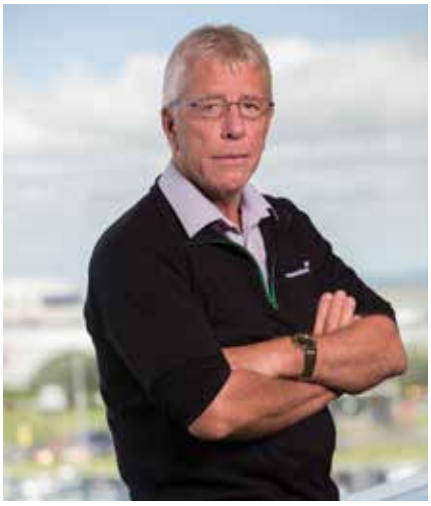
He has seen some impressive visual responses with pasture, which has him excited. He tested a spray unit in a grazed paddock five days after cows had been moved off the pasture, leaving a 50m area in the paddock unsprayed. The growth differences were obvious (pictured below) a week after spraying and almost two weeks after grazing.

"You go back 10 days to two weeks later after spreading and the growth is just unbelievable," he says. "And probably the biggest thing for farmers is being able to do both N and GA passes together and the cost and time saving that brings."



Elementary essentials #5: Magnesium (Mg)

By Dr Ants Roberts



DR ANTS ROBERTS, RAVENSDOWN CHIEF SCIENTIFIC OFFICER

The alkaline earth metal, magnesium (Mg) is the 12th element in the periodic table and is one of the 19 elements essential for life in all higher plants and animals on Earth.

Magnesium is formed in aging stars – celestial bodies not celebrities – by the sequential addition of three helium nuclei with a carbon nucleus.

When the star goes supernova i.e. explodes, much of the Mg is expelled into interstellar space where it may recycle into new stars. Magnesium is the eighth most abundant element in the Earth's crust and makes up 13% of the planet's mass. It is the third most abundant element dissolved in seawater, after sodium and chlorine.

Discovery of Mg

The name magnesium originates from the Magnetes tribe who lived in an area of Ancient Greece called Magnesia and allegedly took part in the Trojan war.

In 1618, a farmer in Epsom, England attempted to give his cows water from a well. The cows refused to drink because of the water's bitter taste, but the farmer noticed that the water seemed to heal scratches and rashes. The substance became known as Epsom salts and was eventually recognised as hydrated magnesium sulphate.

The metal itself was first isolated in 1808 by Sir Humphry Davy in England. He used electrolysis on a mixture of magnesia and mercuric oxide. However, Mg only occurs naturally as a compound in association with other elements.

Why is Mg essential?

The important interaction between phosphate and Mg ions makes it essential to the nucleic acid chemistry of all cells of all living organisms. More than 300 enzymes require Mg to function, including all enzymes using or synthesizing adenosine triphosphate (ATP) which helps transport and release energy in plants and animals. It is also essential for other nucleotides to make RNA and DNA. About 60% of the Mg is in the skeleton of animals associated with phosphate and calcium. The rest is inside cells of the body.

In plants, the key functions for Mg, which they extract from the soil they grow in, are:

- Photosynthesis – Mg is the central core of chlorophyll
- Enzyme function
- Metabolism of carbohydrates
- Cell membrane stabilisation.

In animals, the key functions for Mg are:

- Bone formation
- Nerve impulse transmission (stress) and muscle contraction
- Hormone regulation
- Cell replication
- Fertility
- Resistance to infection (immune system, vitamin E).

The vital role of Mg in agriculture

In soil, Mg weathers from minerals such as magnesite, dolomite, carnallite, brucite and olivine and provides the plant-available pool of Mg for uptake.

In New Zealand, the parent materials of most soils have sufficient Mg containing minerals to fully supply plant requirements for pastures and most annual crops. The exceptions are the volcanic soils formed from pumice, as pumice has few Mg-containing minerals, and when developing these soils fertiliser Mg additions are always required.

However, it is likely that sometime in the future, continual removal of Mg from soils in product sold off farm, transfer of Mg to non-productive areas of the farm and by soil loss processes will result in increased requirement to apply maintenance Mg on farms where this is not done at present.

The most obvious sign of Mg deficiency in plants is yellowing of leaves between the veins and on the leaf edges of, initially, older leaves. If not corrected, then eventually the plant will die.

In animals, hypomagnesaemia or 'grass staggers' is a metabolic condition caused by low intake and dietary absorption of Mg.

There are many contributory factors to this condition other than the absolute amount of Mg in the soil or plant and can be prevalent before and after calving or lambing. Direct supplementation of extra Mg is commonly used to prevent the incidence of grass staggers.

Fertiliser Mg comes in slow-release forms such as magnesium oxide, dolomite (calcium and magnesium carbonate), serpentine super or water-soluble kieserite. Magnesium sulphate and magnesium chloride can also be used as drinking water treatments to reduce hypomagnesaemia risk.

Environmental impacts

As a divalent cation, Mg^{2+} is relatively strongly bound to the negative charge on soil colloids and not very mobile.

Some Mg does leach as a counterion to balance the electrical charges in soil as nitrate and sulphate anions leach in drainage water. While there are no known environmental issues with Mg, the principles of the 4Rs (right place, time, rate, and form) for Mg fertiliser application should still be followed.

MAGNESIUM IS ESSENTIAL FOR BOTH PLANT AND ANIMAL HEALTH.

Source Code

In case you would like to learn more, we have collated this list of sources cited in our articles. Most of these are available online. If you'd like more information, or you'd like to discuss an article written in Ground Effect by any Ravensdown specialist, give the Customer Centre a call on 0800 100 123 to arrange a chat.

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The Last Word

We hope you enjoyed the autumn edition of Ravensdown's Ground Effect®, which is all about enabling smarter farming for a better New Zealand.

Got an idea? We'd love to hear from you! For other comments, thoughts and general chat about Ground Effect, get in touch via the details below.

Tel: 0800 100 123
Email: newsletter@ravensdown.co.nz
Twitter: @RavensdownNZ
Facebook: www.facebook.com/Ravensdown
Instagram: @ravensdown

On behalf of Ravensdown, we'd like to thank you, our shareholders and customers, for your contribution to New Zealand and our food and fibre industry. We continue to invest in and develop our agri-science, technology and innovations for the good of your business and the country. Keep up the good work of smarter farming for a better New Zealand.

Contributors

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Victoria Rutherford-O'Sullivan and Tony Leggett
Co-Editors

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Agronomy

Will Waddell
National
Agronomy Manager

Jeremy Klingender
Product Manager
Seed

George Kerse
Product Manager
Agrochemical

Caroline Kirk
Agronomist
Eastern North Island

Julie Gaukrodger
Agronomist
Central North Island

Shane Brownlie
Agronomist
Western North Island

Kris Bailey
Agronomist
Upper South Island

Andrew Airey
Agronomist
Mid South Island

Sam Speedy
Agronomist
Central South Island

Hannah McCoard
Agronomist
Central South Island

Callum Mitchell
Agronomist
Lower South Island

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