

**ravensdown** 

INSIGHT AND ACTION FOR AGRICULTURAL SUCCESS

# ground

**EFFECT**

SPRING 2017  
EDITION 5

"If you want  
to get ahead  
you need to be  
able to share  
information."

**James McCormick,  
Manaton Ltd.**

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## **Ravensdown Round Table**

Doubling the value of our exports by 2025

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## **Fodder Beet**

Making your fertiliser earn its keep

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# WELCOME TO THE FIFTH EDITION OF GROUND EFFECT® FROM RAVENSDOWN

**This edition of *Ground Effect*® coincides with the anniversary of Ravensdown's inception in August 1977. The co-operative idea came about through forward-thinking farmer pioneers getting together - determined to shake things up for the long-term benefit of themselves and New Zealand.**

*Ground Effect*® #5 shows you how much has changed in the agri-sector since then. But that fierce passion for farming's contribution and the imagination to picture how things could be better is as important now as it was 40 years ago.

We talked to a director and staff member who played a vital part in the co-operative's creation (page 6-7) and I was lucky enough to talk with shareholders about how they see the future (page 14-19).

In an election year, the detractors of farming are bound to make some noise. But everybody can agree - when it comes to reduced environmental impacts, stronger communities and national prosperity - smarter farming must be part of the solution.

So what do we mean by smarter farming? In this issue, there are several people who embody smarter farming; from Hayden Lawrence in Taranaki (page 8) to the Bowen family near Timaru (page 38).

To command a premium for NZ Inc's pasture-based story; it needs to be proven. We're proud of our new HawkEye decision support technology, (page 28) which will help the sector improve its traceability and farmers to easily see the impacts of their nutrient actions.

Smarter farming is also about forward thinking and mitigating the sector's environmental impacts. On page 23, you can read the research about planting poplars and willows and page 20-21 showcases farmers getting involved in water quality monitoring. If you want to find out how NZ can reduce carbon to atmosphere, check out page 12.

Outgoing Fish and Game CEO Bryce Johnson shares his viewpoints on what lies ahead. This should start some interesting conversations as we look at how we challenge our thinking on topics such as farming's social licence.



Social licence is an important part of smarter farming and Ravensdown's team is helping in this area. Our own experts explain how to avoid unplanned nutrient transfer (page 36), how cadmium in fertiliser is reducing (page 10) and how targeted aerial application ensures fertiliser is not applied on the 9% of hill country land that doesn't need it (page 30).

If you would like to provide feedback on this publication and what content you are after, please head to our survey online at <https://www.surveymonkey.com/r/GroundEffect>.

Here's to all the people devoted to smarter farming!

Best Regards

**Greg Campbell**

Ravensdown Chief Executive

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**CEO@RAVENSDOWN.CO.NZ**

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# BEHIND THE SCENES

## Ravensdown is collaborating for a sustainable future

### Lain Jager is the Ravensdown Agricultural Communicator of the Year

The prestigious agricultural communicator award was presented to Lain Jager, Chief Executive of Zespri, at Mystery Creek Fielddays. It honours those who make a significant contribution to the sector and the role they play in making New Zealand world leaders in primary production.

Lain Jager is credited for running the best business in the primary sector, taking the kiwifruit industry from crisis to global success - now supplying 32% of global trade.

"Lain is one of those natural leaders that can take a nation with him," says Greg Campbell, Ravensdown Chief Executive, "his accessibility and ability to connect with people on any level are paramount to his success."



### Soil, a balancing act down under

Dr Ants Roberts (Dr Dirt), Ravensdown Chief Scientific Officer, presenting his life's work on **building soils for long-term production and a resilient dairy business** at the South African Large Herds Conference in Drakensberg, South Africa.



### FMG Young Farmer of the Year

Congratulations to shareholder Nigel Woodhead, from Milton, who took out the Ravensdown Agri Skills Challenge and is the 2017 FMG Young Farmer of the Year!



### New Zealand Dairy Industry Awards 2017

We saw an incredible bunch of dairy farmers contend for the Share Farmer of the Year, Dairy Manager of the Year and Dairy Trainee of the Year titles in Auckland in May. Shareholders Christopher and Siobhan O'Malley took out the prestigious Share Farmer of the Year title and the Ravensdown Pasture Performance Award went to shareholders Russell and Tracey Bouma. Congratulations to all involved!



RAVENSDOWN PASTURE PERFORMANCE WINNERS RUSSELL AND TRACEY BOUMA



SHARE FARMERS OF THE YEAR (LEFT) CHRISTOPHER AND SIOBHAN O'MALLEY, DAIRY FARM MANAGER OF THE YEAR (MIDDLE) HAYLEY HOOGENDYK AND DAIRY TRAINEE OF THE YEAR (RIGHT) CLAY PATON.

# PIONEERS OF YESTERYEAR: TWO PERSPECTIVES ON RAVENSDOWN'S ORIGINS

Forty years ago a group of farmers got together and decided to take over a fertiliser company, forming the co-operative as we know it today - Ravensdown. We catch up with two people who were in the thick of what is known as the 'Gumboot Takeover' to hear what it really was like.



ALEX WRIGHT, RAVENSDOWN DIRECTOR  
1977-2006

## What was the motive?

We were responding to a farmer need for improvement in the quality and distribution of our fertiliser. We were also suspicious about Kempthorne Prosser's (KP) pricing at the time. We believed the fertiliser division was propping up the pharmaceutical division.

The whole thing really kicked off at a Federated Farmers meeting in Wellington, when the farmer representatives realised

KP had put in a bid for Dominion Fertiliser, its only competition in the lower South Island at the time. So we decided we'd try and buy Dominion.

I got involved because the Federated Farmers provincial chairman was in ill health, so I attended the meetings as the chairman of the Fertiliser Committee in Mid Canterbury, which instigated the farmer takeover bid. We were unsuccessful so it was suggested we try to take over KP and form a farmers' fertiliser co-operative.

It was at this point that the services of Ron Brierley, a well-known corporate raider, were initiated. Ron provided financial backing and expertise, working with Alan Wright, national President of Federated Farmers, who challenged him to play this deal 'with a straight bat', to which he received a positive reply.

My role was essentially to assist in sorting out who the potential shareholders were, canvassing them and collecting the cheques for \$5 out of the \$20 per tonne required.

## What was it like?

It was exciting and a total learning curve for me. I remember going out canvassing in the Manawatu, and the person who was taking me saying "this guy is pretty tight with his money, you'll be lucky to sell any shares here". We went in to talk

to him and within a very short time the cheque book came out and we went out the gate smiling.

It's been really satisfying. I'm very proud of what we've achieved. We didn't go in to lose; we did all our homework and received very good advice. I personally have stuck my neck out a lot of times and not everything's worked, but we scored on this one!

## Where do you see us in the future?

Ravensdown is going to have to move with the times - our products have changed from pretty much straight superphosphate to high-analysis fertilisers. Goodness knows what the next move is going to be but it's got to be involved in science to be of use to shareholders.

## What's your advice to the next generation?

Our next generation of farmers haven't been lucky enough to have the experience I went through, to appreciate where we are now, but I'd like to think they'll have the tenacity to fight their way through the next battle. All I'd say is follow your research closely, pick up on the opportunities and just take it from there.



ARTHUR DUNCAN, RAVENSDOWN GROUP  
MARKETING MANAGER, 1962 - 2000



**Staff member, Arthur Duncan, was there before and after the takeover and remembers the excitement and uncertainty of when Ravensdown was formed.**

## How did it happen?

After the Korean War, demand for fertiliser doubled in a matter of a couple of years. The two works in Dunedin couldn't expand to meet demand.

Farmers had a strong interest in maintaining control and ownership of their resources. The farmer group from Timaru put all their farmer-owned shares together along with Ron Brierley's to oppose Kempthorne Prosser's (KP) second bid for Dominion Fertiliser.

I heard a story that the director of Dominion, a farmer near Gore, was on his death bed when the directors' vote on the KP takeover took place. The story goes that he got himself to that meeting and made an impassioned plea to keep the farmers' control. Apparently he swayed the meeting, convincing the other farmer directors that it was more than just the value of the share; it was bigger than them. He died two years later.

## What was it like?

Back then there was all this excitement around this dire situation, but there was also tremendous support for Dominion to keep its independence.

If you think what goes on in the corporate world today is interesting, this was something else. There was a period when it looked like it was going to totally unravel, and we spent two years not knowing what the outcome was going to be. The people who actually operated the company (Dominion) just had to carry on operating the business, whatever the ownership.

My role up to that point was technical advisor to Dominion. I was the link between the scientific and economic information for farmers. At that time there was only one other person who had an agri-science qualification in the industry.

The changes that the industry went through over that period have served farmers better than any other kind of alternative could have done.

## What was the vision for Ravensdown?

There is a lot of room for personal answers on that question but I think farmers fought so hard to get control of their major resource because they wanted the best, and that included support.

The opinion was that the co-operative management system was the only way they would be able to get the technology they needed. If we (Dominion employees) had any influence at all, it was convincing others that it needed to go this way.

Farmers recognised that the best tech and info also needed to be supported by good research that was trusted. That's why the co-operative idea was so strong; because we weren't competing for knowledge, we were competing for how well we used it. The science and research allowed us to work together to develop the science base of the industry, which OVERSEER is a result of today. If there has ever been a contribution I've made, it is in developing that.

## How has Ravensdown measured up?

I think Ravensdown has performed brilliantly over the past 40 years - I can't help but feel great satisfaction for the way that we/they have served farmers. The co-operative structure fits with the way farmers think and work - if they can't understand the science they need to trust the people that provide it while having a sense of control over the source. The values of smarter farming haven't changed and the science is sound.

What was key to our survival and what Ravensdown does well is understand and keep in touch with its market - having the people in place who can recognise and identify trends and adapt to them as required. ■

# LIKE DUCKS TO WATER

Dr Ants Roberts and Julie Roberts, Ravensdown Chief Scientific Officer and Senior Agri Manager, look at progress from Whole Farm Soil Testing on Niaruo Farm in Taranaki.



JULIE ROBERTS, RAVENSDOWN SENIOR AGRI MANAGER

After successfully completing a PhD in Precision Agriculture at Massey University around 2007/8, Dr Hayden Lawrence and his wife Alecia returned to South Taranaki to manage the family's dairy farm, Niaruo. The goal? To run a sustainable farming model that was both economically and environmentally viable.

After a visit from Ravensdown in 2008/9 to discuss the merits of Whole Farm Soil Testing (WFST), Hayden and the team have taken to the concept like ducks to water. The farm has now been whole-farm soil tested every year for the last seven years.

The WFST programme began in the 2009/10 season and demonstrated the impact that a solid fertiliser history has had on producing very good soil fertility levels (Table 1).

The 2009/10 farm average soil fertility levels showed few soil fertility limitations to pasture growth and quality, but the WFST showed that there was a considerable range in soil fertility levels between paddocks (Table 1). as a result, between 2009 and 2016 there have been three to six different combination mixes of P, K and S applied each year to individual paddocks.

Table 1: Results of the first year Whole Farm Soil Testing on Niaruo Farm

	pH	Olsen P	Quick test K	Sulphate-S
2009/10 Average	6.2	62	10	11
2009/10 Range	5.9-6.5	32-106	5-18	6-17
Farm Target Range	6.0	40-50	10-12	10-12

## Reducing nutrient needs (Figure 1)

By WFST considerably less nutrients have been required since the first year. For example, P inputs have dropped from an average of 46kg P/ha prior to WFST to 20kg P/ha<sup>1</sup>. Potassium (K) inputs initially declined for the first three years but have risen again in later years. This is not surprising given that K is a mobile nutrient in Taranaki soils with no reserve K supplies, nevertheless, overall K use has dropped from an average of 65kg K/ha to 48kg K/ha. Sulphur (S) use has also fallen since WFST began, from an average of 64kg S/ha to 24kg S/ha.

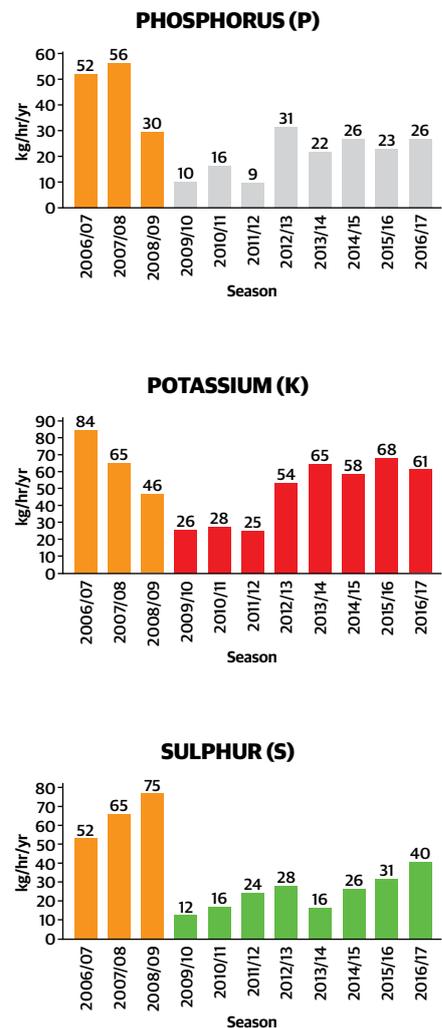
**Note:**

In 2008/09 season at a \$4.75kg MS/ha payout, fertiliser application was withheld that autumn.

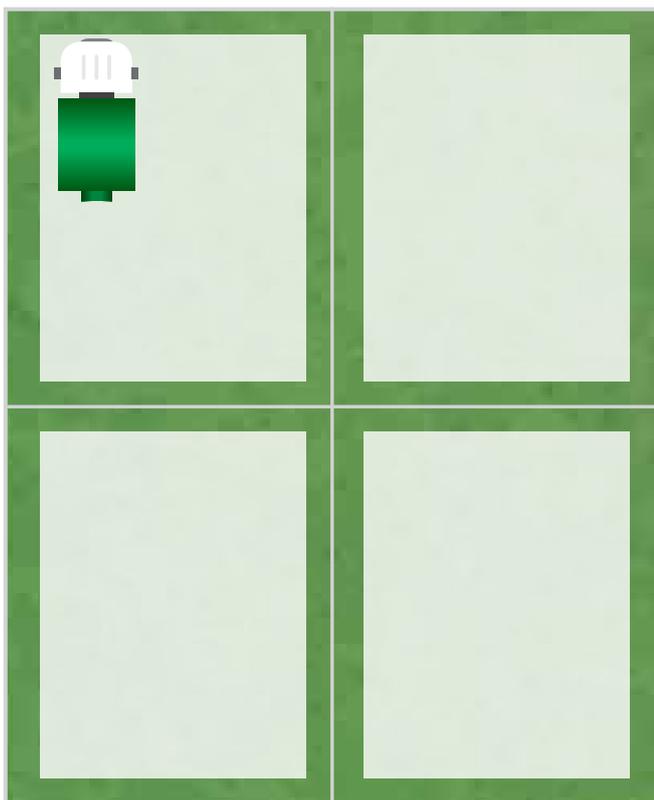


HAYDEN AND ALECIA LAWRENCE OF NIARUO FARM

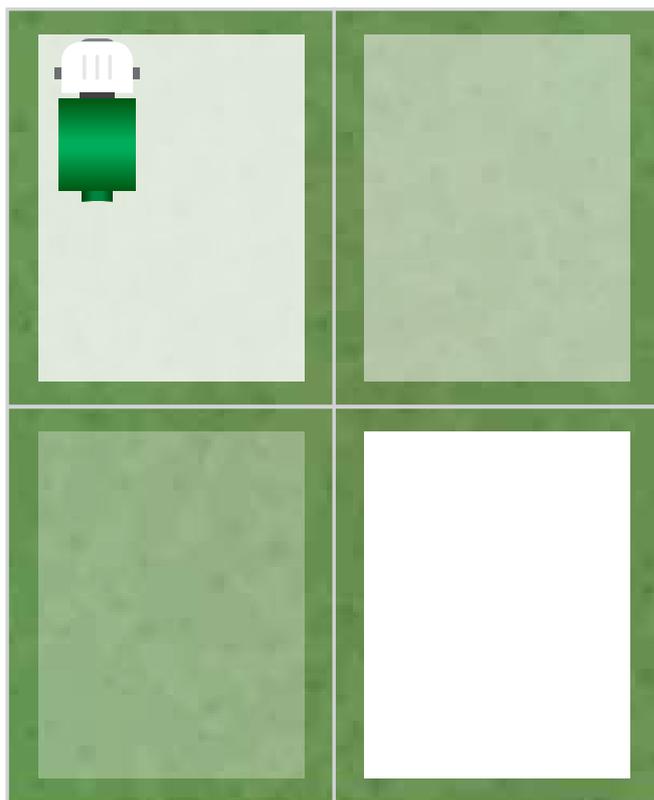
Figure 1: Annual nutrient use on Niaruo farm before (orange bars) and after WFST



### Blanket application



### Variable rate application using WFST data



## BLANKET APPLICATION VERSUS VARIABLE RATE AS A RESULT OF WHOLE FARM SOIL TESTING

## Results

The change in fertiliser policy as a result of WFST has, of course, added to the cost of soil testing as every paddock is tested, not just a number of monitor paddocks. However, there is also considerable scope for savings in fertiliser expenditure as demonstrated by this story (Table 2), or alternatively increasing pasture production and quality in low soil fertility situations by correcting deficiencies. Hayden and the team have saved an average of \$118/ha (range \$74-\$186/ha) compared with the previous fertiliser programme.



**Table 2: Costs and benefits of WFST on Niaruo farm (\$/ha)**

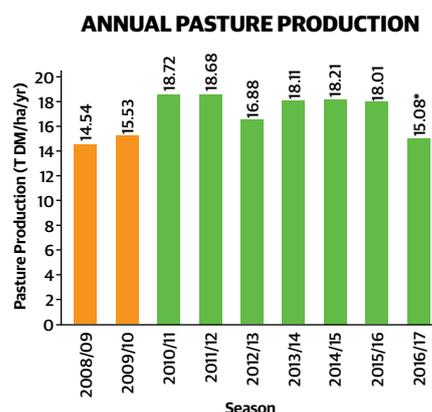
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
<b>Total fert spend (excl N and Lime)</b>	\$295	\$290	\$193	\$70	\$93	\$74	\$180	\$159	\$170	\$175	\$182
<b>Soil testing costs</b>	\$10	\$10	\$10	\$34	\$34	\$34	\$34	\$34	\$34	\$34	\$34
<b>Cost of previous fert program</b>	\$290	\$290	\$290	\$290	\$290	\$290	\$290	\$290	\$290	\$290	\$290
<b>Annual savings</b>	-	-	-	\$186	\$163	\$182	\$76	\$97	\$86	\$81	\$74

**Note:** Nutrient costs based on P (\$2.99/kg) and S (\$0.59/kg) in superphosphate, K (\$1.31/kg) as KCl ex Stratford Store and \$50/t cart and spreading charge.

Has the new strategy affected pasture production? In this case, Hayden and the team routinely measure pasture cover and growth with a C-Dax pasture meter to get a handle on the immediate and annual feed/pasture position to assist tactical grazing management and N application decisions.

Arguably, average annual pasture productivity has been increased from 15t DM/ha to 17.7t DM/ha (2016/17 year to February only) since WFST began (Figure 2). However, it is not possible to know how much the WFST programme has contributed to this, as Hayden and the team are constantly implementing opportunities to better manage their resources of soil, pastures and cows. ■

**Figure 2: Annual pasture production on Niaruo Farm**



\*Note: 2016/17 year was reported to February only.

# CADMIUM: THE FACTS

By Mike Manning, Ravensdown General Manager of Innovation and Strategy



MIKE MANNING, RAVENSDOWN GENERAL  
MANAGER OF INNOVATION AND STRATEGY

**Cadmium is a naturally-occurring, non-essential heavy metal present in low concentrations in air, water and soil. Cadmium naturally occurs in phosphate rock from which phosphate fertiliser is made. In a two-part series, Mike Manning will introduce the cadmium concerns and the work being done to solve them, and industry research and findings to date.**

## Cadmium in fertilisers

The discovery of large deposits of phosphate rock on Ocean, Nauru and Christmas islands in the Pacific Ocean was a game changer for the fertiliser manufacturing industry. Starting at around the turn of the last century, companies began to import rock phosphate for the manufacture of superphosphate from these islands. Within a 16-year period, the domestic production of superphosphate reached 75,000 tonnes annually.

Until the 1990s much of New Zealand's phosphate fertiliser was derived from Nauru rock phosphate which has relatively high cadmium (Cd) levels. Since then, rock phosphate with lower cadmium levels has been sourced from other geographic locations. The fertiliser industry has been actively managing cadmium in our fertilisers since early 1995 when a voluntary limit for cadmium in fertiliser was established by the Fertiliser Association.

The Cd level, initially greater than 450mg/kg P, was brought down in stages culminating in a voluntary upper limit of

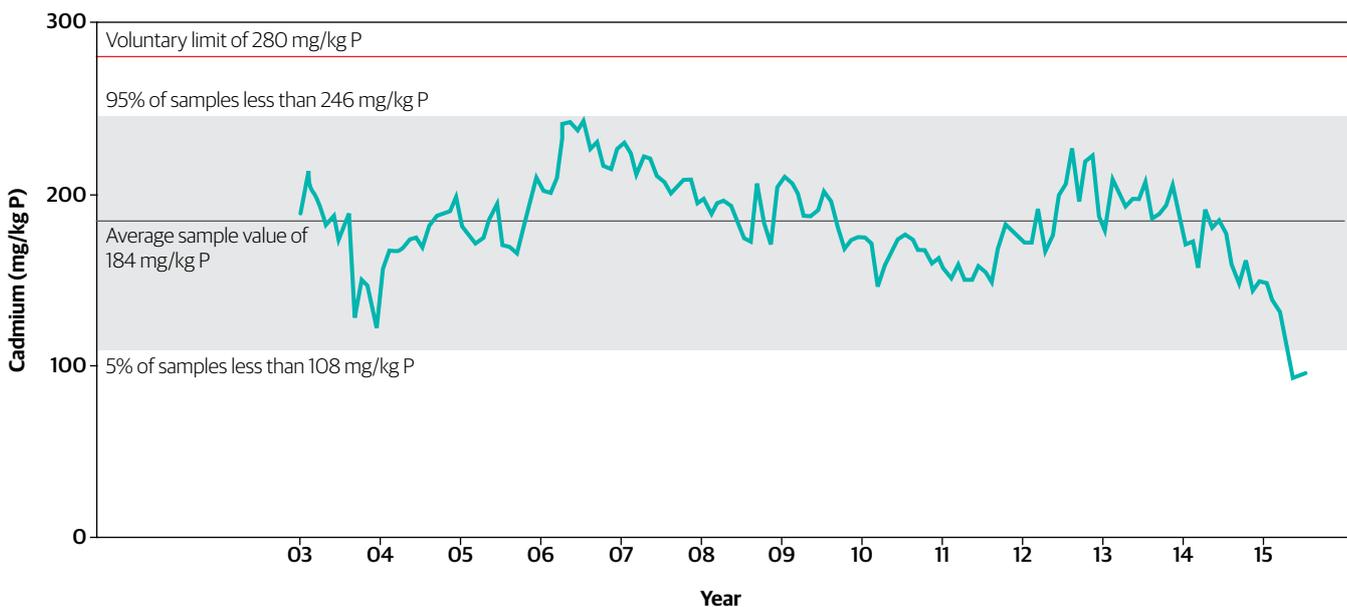
280mg Cd/kg P in January 1997<sup>1</sup> which has been monitored and audited through the Fertmark programme since 2001. The analysis showed that the long-term average Cd concentration in phosphate fertilisers ready for despatch was 184mg Cd/kg P (Figure 1) - well below the voluntary limit.

Since 2003, New Zealand has had two individual samples declared as exceeding the 280mg Cd/kg P limit, which were only slightly above at 285 and 299mg Cd/kg P. However, in recent months the analysis showed cadmium levels in phosphate fertilisers was below 102mg of Cd/kg of P for the first time.

The industry continues to take a responsible approach with respect to sourcing raw materials and phosphate fertilisers with lower cadmium content, subject to market availability and trade constraints.

*In our next edition of Ground Effect (Autumn 2018) we will cover industry research into New Zealand cadmium soil and food levels.* ■

**Figure 1: Cadmium concentration in fertiliser samples**



**Note:** Cadmium concentration in fertiliser samples from the main manufacturing sites (based on data from Quality Consultants of New Zealand Limited). The line shows the monthly mean concentration, the straight line above shows the mean value over the whole period, and the shading marks the 90th percentile interval of the sample data<sup>1</sup>.

The Fertmark Tick means that fertiliser has been independently audited to ensure what's on the label is actually in the bag and the Fertmark Code of Practice relates to all fertilisers made and sold under the Fertmark programme.

Fertmark now includes the requirements of the Agricultural Compounds and Veterinary Medicines Act which requires fertilisers to be supplied in such a way as to minimise risks to food safety and animal welfare.



# Cadmium Facts



Cadmium is a soft, bluish-white metal.



The newest use for cadmium is for telluride solar panels.



Cadmium is chemically similar to zinc and mercury.



Cadmium compounds are used as red, orange and yellow pigments, to colour glass, and to stabilise plastic.



Cadmium was discovered in 1817 simultaneously by Stromeyer and Hermann, both in Germany.



A source of cadmium exposure is food, with oysters having the highest natural levels.



The average concentration of cadmium in the Earth's crust is between 0.1 and 0.5 parts per million (ppm).

(1) See source code on page 40



# HOW NO-TILLAGE CAN MITIGATE CLIMATE CHANGE

By Dr John Baker and Dr Craig Ross



DR JOHN BAKER, ONZM

**Emphasis today is strongly on reducing all of agriculture's Green House Gases (GHG), which include carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>). However, few people realise that farming also holds several keys to recapturing a significant amount of, at least, the CO<sub>2</sub> emissions from all sources - CO<sub>2</sub> being the most prevalent of the three GHGs. The extent to which soil is disturbed during the ground preparation and seeding process oxidises soil carbon that escapes into the atmosphere as CO<sub>2</sub>,**

New Zealand sows about one million hectares of new pastures and crops each year. If all of this was undertaken by low-disturbance no-tillage with full residue-retention, the net emissions of carbon dioxide from the soil would be reduced by about 9.2 million tonnes, according to Ghatohra's research<sup>1</sup>. In fact, the soil would gain about 0.5 million tonnes of new carbon (equivalent to 1.8 million tonnes of carbon dioxide (CO<sub>2</sub>) per year.

According to the Ministry for the Environment latest figures<sup>2</sup> New Zealand's total net emissions of GHGs, as of 2015, was 80.2 million tonnes of CO<sub>2</sub>-equivalent, of which 48% or 38.4 million tonnes was from agriculture. Applying Ghatohra's research to these figures we have calculated that no tillage could offset about 11% of New Zealand's total net GHG emissions and 24% of agriculture's.

Although it is gathered from the atmosphere, carbon is one of the most essential nutrients of plants. Returning that recaptured-carbon to the soil would not only take some pressure off the need to reduce other GHG emissions but it would

also rebuild soil organic matter levels. With that comes improvement in soil health and crop yields, which have deteriorated over time under conventional tillage.

Ghatohra's research at Massey University in 2012<sup>1</sup> showed that sowing agricultural seeds by low-disturbance no-tillage (summer barley followed by winter forage or cover crop, with full residue-retention) could recapture about 1.8 tonnes/ha/yr of carbon dioxide gas from the atmosphere and sequester this back into the soil as solid or liquid carbon. Continuing to till the soil, on the other hand, results in a net carbon dioxide discharge of about 7.4 tonnes/ha/yr. The low-disturbance no-tillage process and rotation can therefore be regarded as carbon-positive as far as the soil is concerned, whereas conventional tillage is always carbon-negative.

In New Zealand, one tonne of harvested grain usually leaves about one tonne of crop residue behind. This is a resource that we have only recently realised the true value of - not just as a relatively modest source of nutrients, but also as a rich source of recyclable carbon.

## Recapturing carbon

The process of recapturing atmospheric carbon dioxide gas is based on photosynthesis, which is a fundamental function of all green plants. Photosynthesis converts CO<sub>2</sub> gas from the atmosphere into solid or liquid compounds of carbon such as plant carbohydrates.

Getting the re-captured carbon back into the soil involves three main farm processes:

1. Leaving the residues of dead or dying pastures and crops (including the straw, stubble and dead roots of harvested crops, or entire cover crops, all of which contain about 40% carbon) to decompose on the soil surface where earthworms and other soil fauna incorporate it into the soil free of charge.
2. Allowing the roots of growing crops to transfer some of the carbon directly into the soil as root exudates.
3. Passing the living vegetation

through farm animals, which excrete a proportion onto the soil as carbon-rich dung, even though they also belch some of it directly back into the atmosphere as methane gas.

## The issue with decomposing

Decomposing residues on the surface of the ground have always been regarded as a nuisance because they interfere with the passage of machinery. So we have been in the habit of disposing of them by one means or another before they decompose. For low-disturbance no-tillage to work, that practice must stop.

## What not to do

**Burn residues:** This discharges most of the CO<sub>2</sub> directly back into the atmosphere and is definitely carbon negative.

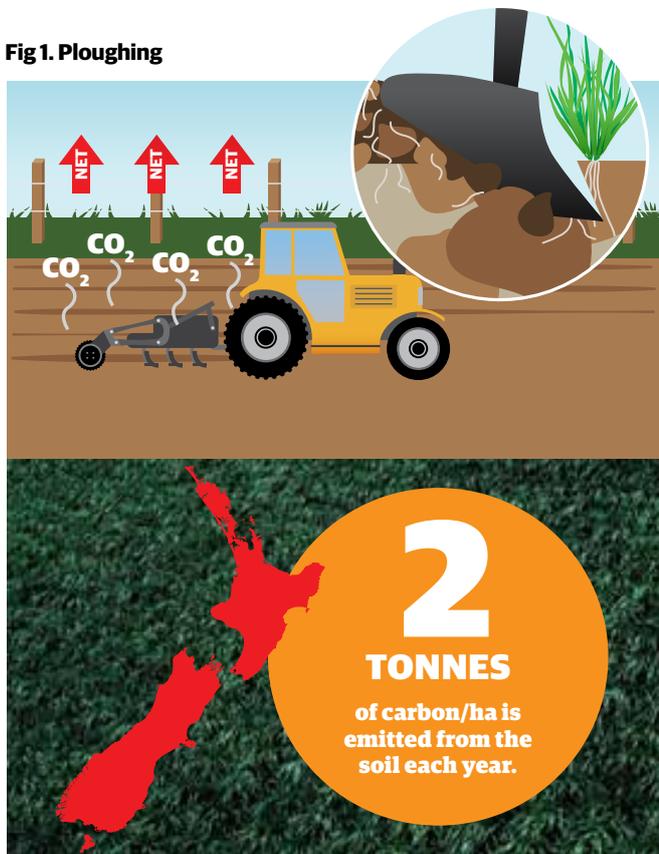
**Bury residues:** This is largely carbon-negative because in most cases more existing soil carbon is oxidised to CO<sub>2</sub> in the burial process than is gained from the residues being buried.

## Acceptable practices

**Baling residues:** This is less carbon-negative than burning or burial because a portion of the carbon in crop residues is contained in the roots, which of course are not baled or burnt.

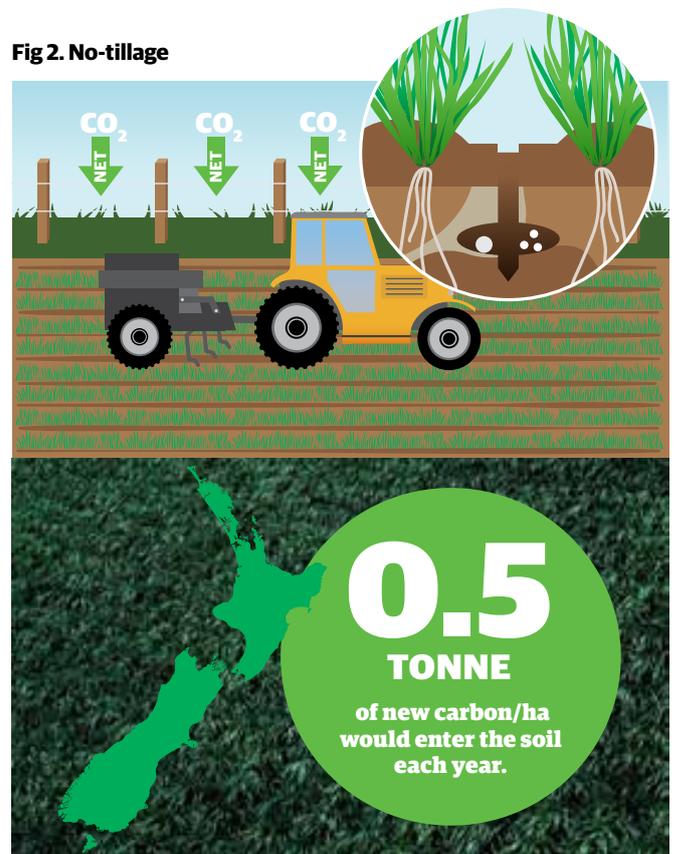
While not all no-tillage machinery is low-disturbance, and some unlikely to be carbon positive, the good news is that the best of the carbon-positive low-disturbance no-tillage seed drills was invented in New Zealand. It has the ability to increase crop yields and profitability at the same time as recapturing soil carbon – surely this is a better solution than the Government paying penalties for not meeting emission targets? ■

Fig 1. Ploughing



TILLING THE SOIL CONTRIBUTES TO THE AGRICULTURAL INDUSTRY'S TOTAL CO<sub>2</sub> EMISSIONS OF 38.4 MILLION TONNES A YEAR WITH 2 TONNES/HA/YR EMITTED FROM THE SOIL.

Fig 2. No-tillage



NO-TILLAGE CAN REDUCE AGRICULTURAL CO<sub>2</sub> EMISSIONS BY 24% WITH 0.5 TONNES OF NEW CARBON/HA ENTERING THE SOIL EACH YEAR.

# DOUBLING THE VALUE OF OUR EXPORTS

**The government set what some may see as a substantial target - to double the value of New Zealand's agriculture exports by 2025. To celebrate Ravensdown's 40<sup>th</sup> anniversary we gathered together four agri-industry experts, and long-term Ravensdown shareholders, to debate what will be the factors that determine whether New Zealand can achieve this goal.**

**To see the full debate go to our website -  
[www.ravensdown.co.nz/ravensdown-round-table](http://www.ravensdown.co.nz/ravensdown-round-table)**





Here are the highlights of what was a day of thought-provoking debate from our shareholder panelists, **Dr William Rolleston, Hilton Collier, Satwant Singh, Alex Wright and Greg Campbell.**



**Dr William Rolleston (WR), Former National President of Federated Farmers and Acting President of the World Farmers' Organisation**

“The agricultural industry needs to band together and use our industry bodies to get behind the industry to make change. The more efficient farmers get, the less we get paid for our product. The industry and the country

as a whole need to figure out what we can do to add value that puts more money in the pockets of the farmers without them just converting that into land value. So solving that problem first would drive us in the right direction.”



**Satwant Singh (SS), 2015 Nuffield Scholar (income volatility) and Fonterra Commodity Risk and Trading team member**

“I’m a firm believer that there’s much more to the agriculture industry than just making a profit; there’s a unique lifestyle that we want to keep alive and be able to pass on to the next generation. Doubling the value of our

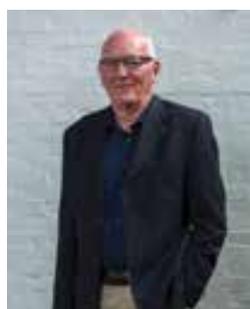
exports by 2025 will mean that the agricultural industry will have to find a middle ground with those outside of the Ag bubble. Public perception is still a major concern as many people still don’t fully understand what’s behind the farm gate and that’s going to be a challenge going forward. Even if we’ve got the science and research behind us, if the public doesn’t have the trust, then our science won’t go far.”



**Hilton Collier (HC), founding shareholder of Agfirst and Maori Economic Development Board member**

“I can see a time coming where the power that drives what we produce and how we produce it at an on-farm level will be driven by consumer demand. We’ll need a far greater level of sophistication in terms of

understanding consumer behaviours, market segmentation, and understanding how we extract value for what we do here in NZ. I think at a grassroots level we have a farming community, a bunch of small businesses, who work incredibly hard and I wonder whether we are adequately rewarded for those efforts. Understanding that we need to have a view over our whole supply chain is going to be critical to our future success.”



**Alex Wright (AW), founding Director of Ravensdown (28 years) and former chair NZ Co-operative Association (eight years)**

“The agriculture industry is constantly changing and developing, and so are all the issues and problems that face us as farmers. We have to do things differently if we are going to carry on producing the quality of food

and product that we actually want to, and that’s never going to end. Reaching the 2025 target will mean that there’s an ongoing demand on science and that’s where farmers are relying on organisations like Ravensdown to lead us in the right direction so we can play our part.”



**Greg Campbell (GC), Ravensdown CEO**

"In our organisation we're not primarily here to sell fertiliser, which surprises a lot of corporates. What actually drives us is doing the right thing and making sure that the services that we provide, are 'at the right time, at the right place, for the right reason, particularly with greater transparency, which I think the

agriculture sector is welcoming. Our sector wants to prove ourselves and ensure that the economic outcome is preserved, but the environmental impact is minimised as we go forward."

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**"I believe one of the first steps is to build the trust between every New Zealander and the agriculture industry. Consumers across the globe are looking for it." Greg Campbell**

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## The co-operative influence in doubling the value of our exports by 2025

**SS:** "I see value in co-operatives and their purpose and place in the future, but it comes down to making sure that the co-operatives are providing the right service for their members. I feel that we must continue to look backwards to remember why we created the co-operative - which was to add that value throughout the supply chain and make sure that the farmers at the end don't end up being the ones at the bottom and everyone in between is taking the margin. A co-operative is what its members make it, so going forward, its place in the future of agriculture all depends on its members and what they want it to look like."

when it comes to convincing and debating with policy makers."

**HC:** "All businesses want to see value; I think what we tend to forget is that value is more than just the bottom line. Certainly, it's an important metric and it's one that we need to keep an eye on, but in the agri-business sector people are connected by whakapapa who've come together to form a business. And while our shareholders certainly like receiving their dividend, they also expect us to take care of the environment and do things that are within the wider spirit and for the good of our communities. In many ways I see this reflected in our engagement with

particularly for those farmers who have been around in the sector for a while. I just wonder if that's around transparency and trust. I get a sense that people really take us at our word and that's part of the values of the company that were set in place from a foundation perspective, and now we carry them going into the future."

**AW:** "I agree, but I think that it's harder to keep that going because we've got to remember that we've got another generation of farmers, ones that never had to wait for their fertiliser or see their crops not growing quite as good as they should, so we've got to be mindful of them and in some cases start from square one."

## Innovation and value add

**WR:** "My job at the World Farmers' Organisation means that around the world I've been talking about farmers in New Zealand, and the developed world, wanting to have access to big data, robotics, automation and genetic technologies - while the farmer next to me from Africa is talking about innovation being getting rid of the hand-hoe. But an underlying desire to increase technology on the farm is the same. There's the art of farming and then there's the science of farming and as the science of farming gets better it reduces the need for the gut reaction - we can make decisions a lot earlier and foresee issues quicker than ever."

**AW:** "Looking back, from the beginning Ravensdown was science-led and over the years that I've been involved, the products that we put on the ground have changed in their form but the science behind the products has stayed the same. It comes down to the fact that good science stands the test of time and you can't argue against it. If you've got the documentation/data right on what certain actions achieve, that is unbeatable."

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**"The expectations of the people we supply products to are changing and that's going to force behavioural change for us here at farm level. And if we can't respond to those pressures we are at risk of being left behind - and that's where science and innovation will lead us through."**

**Hilton Collier**

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**WR:** "I agree, shareholders want to be challenged positively, bench-marked against others to make sure that they're best in class. One of the things about the agriculture industry is that it's made up of a whole lot of small businesses (farmers) and just by themselves they can't do much, but together they can do a lot and that's why there are so many co-operatives in so many aspects of agriculture. Working together we actually have quite a lot of strength, which is imperative, particularly when it comes to persuading the government, but also working collectively to invest in research and development. Without co-operatives the farmers' voice could risk coming across fragmented and not particularly articulate

Ravensdown, and the involvement across a range of things from paying good rebates, giving advice, research and development projects and supporting various community initiatives."

**AW:** "I believe that if we didn't have co-operatives in the agri-sector I think we'd risk becoming very much like the Australian market, which is very piecemeal. I think that it would become much more cut throat in the marketplace and the proprietary companies would be looking to maximise their margins rather than provide a service."

**GC:** "I sense that currently there's a great loyalty behind the Ravensdown brand,

**SS:** "Alex makes a good point, the agricultural industry in New Zealand has definitely been tracking along looking at innovative ways to do things smarter. Going forward, due to greater public scrutiny our farms need to adopt more formal business practice. At the same time we have to continue to be innovative and work together collaboratively to look at new solutions that suit the environment that we are heading into."

**HC:** "There's a lot of science and data coming in, we need to recognise that the world we are in is going to fundamentally change. Ten years ago, who would have thought we'd have meat patties made from plant products, who would have thought we could grow hamburgers without having live animals running around? The products that we produce and sell to the world are changing. The expectations of the people we supply products to are changing and that's going to force behavioural change for us here at farm level. And if we can't respond to those pressures we are at risk of being left behind - and that's where science and innovation will lead us through."

**"I feel that we must continue to look backwards to remember why we created the co-operative - which was to add that value throughout the supply chain and make sure that the farmers at the end don't end up being the ones at the bottom and everyone in between is taking the margin."**  
**Satwant Singh**

## The tradeoffs and negatives associated with the 2025 goal

**WR:** "The reality is that there are tradeoffs. You can't have everything at the same time and that's a challenge for us. If we go for 100% climate change mitigation, then that would affect our economy; if we go for 100% clean water tomorrow, we'd have to completely disrupt agriculture. When it comes to climate change, New Zealand is actually recognised as being really good carbon-efficient animal protein producers. If you penalised farmers that would just push production somewhere else and produce more carbon dioxide or methane in the world and that would be going in the wrong direction."

**HC:** "We seem to be living in a regulatory environment that is geared towards forcing farmers to change, whereas I think what we need to do is give farmers the tools and the enablers they need to do the right thing by the environment. I believe that most farmers are environmentalists - they do care about their land and their water but they don't always have the tools and they don't always have the cash-flow and the funding to go out and change things. Thanks to constant innovation, hopefully over the next 10 years we'll be surprised at how quickly farmers start to do things that are good for the environment. Some of it will be down to regulation, but there will be a lot of new tools that we will have in our arsenal to deal with climate change, such as being able to grow grass with less fertiliser, to even grow animal feed with a lot less water than we are currently using."

**WR:** "We do have to be careful that we don't think we are all going to produce plant-based products in the future. The beauty of the livestock industry is that we have these "machines" called sheep and cattle that can self-propel themselves up and down the hillside and convert grass into edible material!"

**"The beauty of the livestock industry is that we have these "machines" called sheep and cattle that can self-propel themselves up and down the hillside and convert grass into edible material." Dr William Rolleston**

**AW:** "I agree it's about following science and implementing the results. Farmers are ready to absorb whatever they can be given. What we've got to learn a lot more about is talking to the rest of the community - explaining what we are doing, and explaining overall what the whole community needs to do to deal with some of the problems around climate change."

**GC:** "I believe one of the first steps is to build the trust between every New Zealander and the agriculture industry. Consumers across the globe are looking for it. The person who buys the product wants to look right down the value chain to the farm to understand the people behind the product and know that they're doing the best they can to protect their environmental capital, the natural capital that they have here in New Zealand and which is a point of difference to the rest of the world."

**SS:** "Following on from Greg, that's where the co-operatives and the industry bodies need to help the farmer to make that connection. They play a huge role in being able to help the farmers and industry move through this and go on this journey together. Farmers need to be able to rely on these organisations to provide that for them." ■



# THE RISE OF CITIZEN SCIENCE

By Anna Wilkes, Ravensdown Environmental Policy Specialist



ANNA WILKES, RAVENSDOWN ENVIRONMENTAL POLICY SPECIALIST

**Six years on from the release of the National Policy Statement for Fresh Water Management, rural community science groups are growing in number and are stepping up to respond to regional council targets.**

The Clutha Community Trust Water Project is an example, where, in this case, the Otago Regional Council's (ORC) Water Plan Change 6A sets water quality thresholds for farm drain discharges.

Here, farmers are required to demonstrate compliance in order to avoid the need for resource consent for discharge. Project Manager, Hamish Anderson, a Stirling dairy farmer and former Clutha District Councillor, helped set up the Clutha Community Trust Water Project in 2015. The project has more than 150 members who belong to one of eight catchment groups. Hamish coordinates the delivery and collection of sample kits from local meeting points to minimise travel times. Farmers collect water samples themselves from compliance points where water leaves their farm drains and enters a waterway. Samples are analysed and results reported by an accredited laboratory twice a year, in spring and autumn.

"It's still early days for the project," says Hamish, "The current aim is to help farmers understand what impacts their current

on-farm practices may be having on water quality in farm drains that leave their property and how water quality varies seasonally."

He says it is too soon for any changes in farm practice to be measured, however catchment groups can use the data to identify areas of particularly good or poor water quality and identify which parameters are of most concern in their catchment.

"There'll always be questions over the scientific rigour of data collected by citizen scientists but it provides a means of helping farmers to better understand the drivers behind the increasing regulation of farming activities," Hamish says.

The ORC is fully supportive of the project and encourages farmers to take advantage of local opportunities to help them get to grips with regional plan requirements. Clutha Development works with the Council's Education team to ensure consistency in messaging and that lessons learned can be applied in other areas of the region.

CLUTHA COMMUNITY TRUST WATER PROJECT MANAGER HAMISH ANDERSON (RIGHT) AND PROJECT ADMINISTRATOR SARAH PIWARI DELIVERING WATER SAMPLE KITS.



Ravensdown Environmental are piloting a separate water quality testing project called the Kakanui Coastal Water Quality Farmers group, where 10 properties had

water quality samples collected for the first time in autumn 2017. Results are reported to farmers on an individual basis as well as a group catchment basis. ■



## Water samples are tested for

- Nitrate and nitrite nitrogen
- Dissolved reactive phosphorus
- Ammoniacal nitrogen
- *E. coli*

SARAH PIWARI COLLECTING WATER SAMPLES ON A LOCAL FARM.



# THE SCIENCE BEHIND *E. COLI* TESTING

By Rebecca Withnall, Ravensdown ARL Manager



REBECCA WITHNALL, RAVENSDOWN ARL MANAGER

## Why test for *E. coli*?

Checking water quality in a waterway helps us to understand the effects of land use, the health of the waterway and the suitability for recreational activities such as swimming. Faecal indicator bacteria

are commonly tested as a measure of water quality.

*Escherichia coli* (*E. coli*) is commonly found in the intestines of warm-blooded animals, including people. In waterways, *E. coli* is associated with recent faecal contamination and can cause gastrointestinal illness in people. It is referred to as an indicator because it provides an indication of the presence of other disease-causing organisms (pathogens).

Common sources of *E. coli* in waterways include:

- Untreated sewage discharges
- Stormwater runoff
- Animal waste (farm animals, wild animals and birds)

*E. coli* results are reported as Most Probable Number (MPN) or Colony Forming Units (CFU) per 100mL depending on the testing method.

## How is the test carried out?

Ravensdown's Analytical Research Laboratory (ARL) uses the Colilert-18 testing kit that cuts down the testing time from 48 hours to 18 hours. This test gives both the number of coliforms grown and how many of these are *E. coli*, with the results being reported in MPN. ■

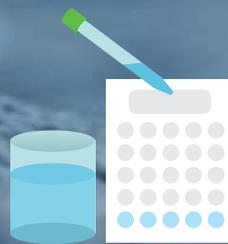
### Step 1

Add the growing medium to the water sample and mix (Collilert-18).



### Step 2

Pour mixture into tray, seal and incubate at 35°C for 18 hours to grow the bacteria



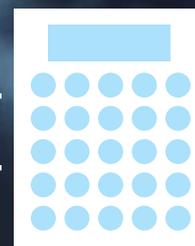
### Step 3

Count the number of colonies formed

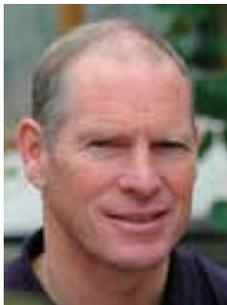
POSITIVE COLIFORMS



NEGATIVE RESULT



# POPLAR AND WILLOW ENVIRONMENT AND SOIL SOLUTIONS



IAN MCIVOR,  
GENERAL MANAGER  
NEW ZEALAND  
POPLAR AND  
WILLOW TRUST

**A large portion of the New Zealand Poplar and Willow Trust's research is undertaken in response to national concern about soil protection, conservation and water quality. The Trust's research is supported by the soil protection and conservation work done by regional councils and farmer-support organisations around the country.**

"Expertise is readily available in many regions, with financial assistance in some cases, as it's an issue of national economic importance," says the Trust's General Manager and senior scientist with Plant and Food Research, Ian McIvor.

"Farmers can have one of the greatest effects on water quality by reducing sediment movement into their waterways," Ian says.

"There are really three issues - the movement of nitrogen, phosphorus and sediment into waterways. Poplars and willows are planted to arrest the movement of that sediment."

Phosphorus, for example, is generally bound to the sediment rather than being dissolved in the water. When poplars and willows are planted they reduce the amount

of sediment getting into waterways, improving water quality.

Ian says farmers know the irreplaceable value of their soil as a medium for root growth, nutrient and water supply, and locale for soil organisms necessary for nutrient recycling.

"Soil loss equals loss of primary production. Water is critical but it is replenished by rainfall, whereas there is no magic soil cloud to replenish soil lost. Its loss has the potential to turn plenty to poverty."

Poplars and willows also contribute to stock health by offering shade and shelter in weather extremes as well as a fodder option in drought conditions.

"They have low nutrient requirements, most being returned to soil at leaf fall. Treat the cost as a normal budget item like shearing. It has to be done. Your poles are like lambs; minimise deaths, but recognise that under harsh circumstances deaths do occur. You still put the rams out each year, so plant poles each year while aiming to identify reasons for any losses."

*Guidelines on where and how to plant poles are available on [www.poplarandwillow.org.nz](http://www.poplarandwillow.org.nz) along with some easy to understand videos on the placement and planting of poles, helping their survival and management.*

## Taranaki farm trial

Eastern Taranaki farmers and Ravensdown shareholders, Hugh and Maureen Paterson, have had poplars and willows planted across their dairy farm for the past two decades for shade, shelter and fodder.

The farm is home to two poplar trial blocks. The first 100 trees were planted in 2014 and the second 100 were planted in 2015. The survival, height and diameter growth of the trees are measured annually for the first three years then at regular intervals for the life of the trial, which is expected to be at least 15 years.

The work is part of a national trial of a group of experimental poplars, *Populus maximowiczii x trichocarpa*, bred at Plant & Food Research for the New Zealand Poplar and Willow Research Trust<sup>1</sup>. The experimental trees are planted with several commercial poplar clones to compare their growth, form, tolerance to wind and to rust and response to stock presence.

The Taranaki trial site is one of six - each in a different climatic zone. Farmers plant the poles according to a supplied planting plan. The Patersons are watching the poplar trial with interest but results aside, Hugh says it's good to be helping scientists, Ian McIvor and Trevor Jones. ■

**"There is no magic soil cloud to replenish soil lost."**

(1) See source code on page 40

# LESSONS LEARNED AND A LASTING LEGACY



**BRYCE JOHNSON, RETIRING FISH AND GAME CEO**

**As Fish & Game head Bryce Johnson prepares to hand over the mantle after 37 years at the helm, we asked him to share his views on his time and where New Zealand is heading.**

The nature of environmental advocacy means you have to try and be an optimist. However, as I approach retirement, I sense I am becoming a pessimist. As I prepare to leave my post, I'd like to reflect on our environmental journey during my time at the helm of Fish and Game.

Environmental activism was relatively new when I began in my present role with the New Zealand Acclimatisation societies in 1980, just three years after Ravensdown was established.

My first major campaign involved the proposal to dam the Clutha River at Clyde in Central Otago to provide electricity for a second aluminium smelter at Aramoana near Dunedin. This was a milestone in the development of a freshwater conservation ethic in New Zealand.

In 1981 the Water Conservation Order legislation was achieved by the Acclimatisation Society, which exists to this day. While it was not realised at the time, the stage was effectively being set for the transition of agriculture onto a path towards environmental sustainability.

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**"Environmental activism was relatively new when I began in my present role."**

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The Acclimatisation Societies became Fish and Game councils in 1990 and were actively involved in the passage of the Resource Management Act in 1991. What this statute did was formally recognise the finite nature of New Zealand's land and water resource and accord it primacy. It effectively knocked pastoral agriculture off its previously assumed perch of resource-use dominance and underpinned the transition to what has now become known as a 'social licence to operate'.

A further milestone occurred in 2002 when Fish & Game New Zealand began its controversial 'dirty dairying' campaign, responding to the land-use intensification and expansion of the dairy industry. Public awareness of the issue increased dramatically and 'dirty dairying' became a permanent feature of the New Zealand lexicon.

Off the back of Fish & Game's 'dirty dairying' campaign the Environmental Defence Society ran a conference in 2008 calling on the government to establish a 'Sustainable Land Use Forum' (SLUF). This coincided with environmentalist Guy Salmon bringing what was termed 'collaborative governance' back to New Zealand from his research of the Nordic countries - a concept where a government of-the-day faced with a major conflict between competing interests commits to implement any agreements between them.

SLUF became the Land and Water Forum (LWF). Ten years on it has now produced more than 200 recommendations, very few of which have been implemented by central or regional governments. Central government still has neither a published implementation plan nor any communications strategy to socialise its outcomes.

In frustration, Fish & Game left the Forum in 2015. Forest & Bird and Federated

Mountain Clubs left earlier this year. With hindsight, it would have made much more progress if the government had kept out of it and simply become the servant of the Forum outcomes.

Today, the law around the use of New Zealand's natural resources of land and water is comprehensive and clear, and so is public opinion. Pastoral agriculture, in all its major forms, is now in the public spotlight, with political parties ultimately taking their policy direction from that public opinion, especially in matters involving private use of public natural water resources.

Pastoral agriculture will be increasingly pushed into traceable environmentally sustainable practices. Our favoured markets will demand it. Interestingly, fertiliser companies may have largely dodged the bullet of public opinion so far, providing a useful space for them to identify, adapt and manage public messaging on the inevitable new futures.

I believe pastoral agriculture would greatly benefit from some formally structured 'foresight planning' - where it defines, in collaboration with environmental interests, alternative thinkers and marketers, just what and where it needs to be in 30-50 years' time to retain its social licence to operate; and profitability.

Notwithstanding the leadership being shown by the likes of Landcorp, my

lingering sense is that the dairy and dry-stock sectors do not want to seriously contemplate their longer-term future much beyond where they are now. In political terms, they are progressively failing to retain control of their own future, which will invariably result in a new future being served to them by public opinion and political response.

To my mind, New Zealand is in urgent need of an entity formally responsible for futures thinking - a 'Commission for Future Generations' has a good ring about it. It would require brave leadership, be answerable to Parliament, independent of the government of the day, with a mandate to conduct investigations and report to Parliament across all portfolios. New Zealand's response to climate change urgently needs such treatment.

For the likes of Ravensdown, it too needs to attempt to define its 30-50-year desired future and contemplate the changes required to achieve it. The fertiliser industry is currently inextricably linked with the problem and now needs to recast itself in the public mind as an environmentally responsible part of the solution.

Public opinion will become king and smart sectors will endeavour to meet it with fresh messaging. A slow read of section 5 of the RMA would be an excellent place to start. ■



**"I believe pastoral agriculture would greatly benefit from some formally structured 'foresight planning'."**

# MAKING YOUR FODDER BEET FERT EARN ITS KEEP

By Rachel Goodger, Ravensdown Agri Manager



RACHEL GOODGER, RAVENSDOWN  
AGRI MANAGER

**Rachel Goodger, Ravensdown Agri Manager, looks at a three-year Sustainable Farming Fund (SFF) project, "Agronomic solutions for fodder beet". The project, which started in spring 2016 is investigating fertiliser responses in fodder beet from its first year.**

The seven trials, from Southland to Waikato, have been investigating the effects of rates and timing of nitrogen, potassium and boron on fodder crop yield and health. The trial farm I have been looking after, "Martock Holdings" in Geraldine, is a family trust farm owned and run by brothers Haden and Matthew Batty.

The final harvest at the Batty farm indicates a good plant response to nitrogen (up to 100kg N/ha) with little yield

difference where applications were split. Some differences in plant uptake were measured from a range of potassium and boron rates and timings, but no significant difference in yield.

## System and trial methods

The Battys grow fodder beet to sell to a dairy grazer for wintering cows. It is a profitable crop, if done right. They use a medium to high dry-matter fodder beet variety, supported by kale and oats for the grazer's cows.

The Battys and I walk the crop regularly with weekly monitoring and fortnightly visits from Ravensdown Agronomist Chris Lowe.

## Paddock selection process and preparation

The fodder beet is grown in a three-year rotation. They use a mix of lighter and heavier soil types to manage feed utilisation, environmental impact and risk of damage to the soil in poor weather events.

Seedbed preparation involves top working with a ripper, discs and roller to suit the soil type, minimise stones and help keep the nutrients in the top soil. Haden employs a stale seedbed technique<sup>1</sup>, spraying off weeds before drilling the beet, which, when done right, ensures good seed placement and a fine, firm seed bed for a good strike and to help herbicide performance.

## Soil testing, fertiliser use and herbage testing

Soil testing to 15cm is completed in early winter. The beet base mix contained major nutrients plus magnesium, sodium and boron with capital phosphate added as required. Nitrogen side dressing was applied 4-6 weeks after sowing, and herbage testing guided further side dressings, which included nitrogen and potassium before canopy closure.

## Weed, pest and disease management

The fodder beet seed was coated with fungicide and insecticide, with further insecticides applied during establishment for pest control and to reduce risk of virus transmission.

- **Mid-October:** Robust pre-emergence herbicide combination applied with an insecticide just after drilling. Two weeks after crop emergence the post-emergent weed control programme started.
- **November:** Additional insecticide sprayed due to increased insect pressure.
- **February:** A fungicide was applied before disease pressure caused any issues.
- **March:** A further preventive fungicide was applied.

The final yield was measured by an independent assessor on 1 June at 34 tonnes per hectare. ■



RAVENSDOWN FODDER BEET PHOTO  
(NOT FROM THE BATTY'S FARM)

The potassium rate and timing of application had no effects on biomass production, with an average yield of 31 t/ha, likely due to the soil supply of potassium.

Crop biomass increased as a result of both rate and timing of N application; from 28 t/ha for the 'control' to 33 t/ha for the 100kg N/ha treatments. However, there were no further differences among the nitrogen treatments, averaging 34 t/ha.

#### **Acknowledgement**

*Agronomic solutions for fodder beet is a three-year project funded by Ravensdown, the Ministry for Primary Industries Sustainable Farming Fund, the Foundation for Arable Research, Beef + Lamb NZ, DairyNZ, Ballance Agri-Nutrients, Agricom, Agriseeds, Cropmark Seeds, DLF, Seed Force, Bayer CropScience and supported by SIDDC. The project is led by Plant & Food Research.*

(1) See source code on page 40



# HARNESSING YOUR DATA – NEW TECHNOLOGY WILL GIVE A BETTER PICTURE

**With so much data noise around a typical farm these days, it's hard to see the impact of critical decisions. With innovations such as sensors and automated technology, the challenge is to not only keep up with data collection, but to get smarter about what you do with your data as the volume grows.**

Ravensdown talked to Mid Canterbury sheep and beef farmer James McCormick, who is using an early release of the software HawkEye® that is being designed to help farmers make smarter nutrient decisions for better farm and environmental outcomes.

"HawkEye will give me a better overview of what I'm trying to achieve on my farm," James says. "It puts all my nutrient information in one place eventually allowing me to see the end picture in forecasting pasture growth and what I should be doing with my farm inputs to achieve the goals I am setting for production."

James who was involved in developing the platform describes it as a simple and easy-to-use view of his farm business.

"It's taking the guess-work out of farming and making it easier to manage, by being able to see what you've done in the past and being able to compare it to what you're doing now.

"Time is the biggest cost in any business – identifying ways to improve productivity in one hit not only saves you time, but money. Say you're going to put urea on – you will be able to manage and make those decisions all through HawkEye; from your

soil test results, to what the predicted N-efficiency is, through to how many stock units you are trying to feed, adjusting your inputs to see what you are likely to produce. Suddenly you're making smarter more educated decisions on growing feed, and feed equals money."

The ability to share the farm information at different levels with his contractors and advisors, James says, will give him the flexibility and freedom to run his farm from anywhere.

"It's pretty important if you want to get ahead that you're able to share information with contractors, advisors and staff. By having those independent views of what you're doing, you are more likely to pick up on things you've missed."

James says the most important thing HawkEye will solve, by working with Ravensdown and C-Dax, is the ability to run the farm from anywhere. "To be able to access and share our farm info means we don't have to jump through all the hoops to

gather our information to make decisions. Not only that, but the ability to use all of this to forecast your productivity, putting all your farm info into context will make it easier, quicker and simpler to reach your end goal.

"The flexibility will give me so much more freedom and control of my time. Nine times out of ten you're on the farm when you need to look something up or make a decision, being able to do it from the paddock on my iPad rather than have to go all the way home to log in to the computer will save me a lot of time. It's like remote management – you have one source of the truth that can become like a virtual meeting room where you and your team can all be looking at the farm and discussing things on the phone. I think it'll become a huge part of the business having everyone on the same page."

Fundamentally James says the gain will be in the ability to learn from the data rather than it just being a farm record. ■



HAWKEYE CAN BE USED  
ANYWHERE ON-FARM  
WITH DATA CAPABILITY.



# FARMING TO OUR STRENGTHS

By Dr Rob Murray, Product Development and Innovation Manager C-Dax and Kimberley Bray, National Services and Technology Manager

**Farming to our strengths means focussing on pasture utilisation and traceability. New Zealand does not have the farming capacity to feed and clothe the world; we produce trusted products and operate as a specialty provider.**

That's us. That's what makes us special. And that's what people want from us. An example is Fonterra's traceability and supply chain technologies.

These ideas and ideals are driven by data. More than ever before, people want to know where their products are coming from and that their products are safe and sustainable.

HawkEye® is a new software system under development that is being designed to provide deeper insights and decision support tools for New Zealand farmers in the area of nutrient management and farm productivity.

The end product will receive information from physical processes and automation aides, such as sensors and turns them into agronomic and economic efficiencies, environmental support information, and decision support tools for farming operations.

In the future HawkEye will turn insights into action through collaboration with leading industry and research partners, Farmax, Analytical Research Laboratories (ARL), Massey University, Hyperception, Ravensdown and C-Dax Agricultural Solutions, to provide precision farming tools when you need them.



**KIMBERLEY BRAY, RAVENSDOWN NATIONAL SERVICES AND TECHNOLOGY MANAGER**

Farming is all about the land. Taking a geospatial approach with HawkEye just makes sense. By working with our community we have taken the enduring concepts of managing farm production and land fertility and simply digitised them.

As the world continues to harness the power of new technology, agriculture is no different. Rather than being one system to do it all, it is envisioned that HawkEye will focus on being the best in land analysis, fertility, nutrient management, and pasture productivity, whilst making it easy to get systems to work with each other using the primary industry data standards and tools to help put the power back in farmers' hands.

The aim? To provide the tools for farmers to plan their outcomes, putting the right product in the right place at the right time, safely, and knowing that what you achieved is what you planned.

At its heart, HawkEye is about simplifying complex science and putting it in farmers' hands. The system is being designed to:

- View and manage farm fertility using feature-rich visualisation tools.
- Place orders for Ravensdown fertiliser and agrochemicals from the map, in areas that need it most.
- Pasture measurement results automatically fed into HawkEye from C-Dax Pasture Meters.
- Self-spread and self-spray data automatically fed into HawkEye from C-Dax units.
- Premium feed tools including Predictive Feed, Strategic Feed, and benchmarking algorithm SmartPasture (the only one of its kind in New Zealand).
- Integration with Ravensdown, ARL, C-Dax, Hyperception and Agrigate: schedule applications, get proof of placement-spreading information, nutrient summaries and take advantage of hyperspectral imagery.
- Work with Ravensdown and Massey University research projects related to precision agriculture, via the university's commercialisation arm Massey Ventures.

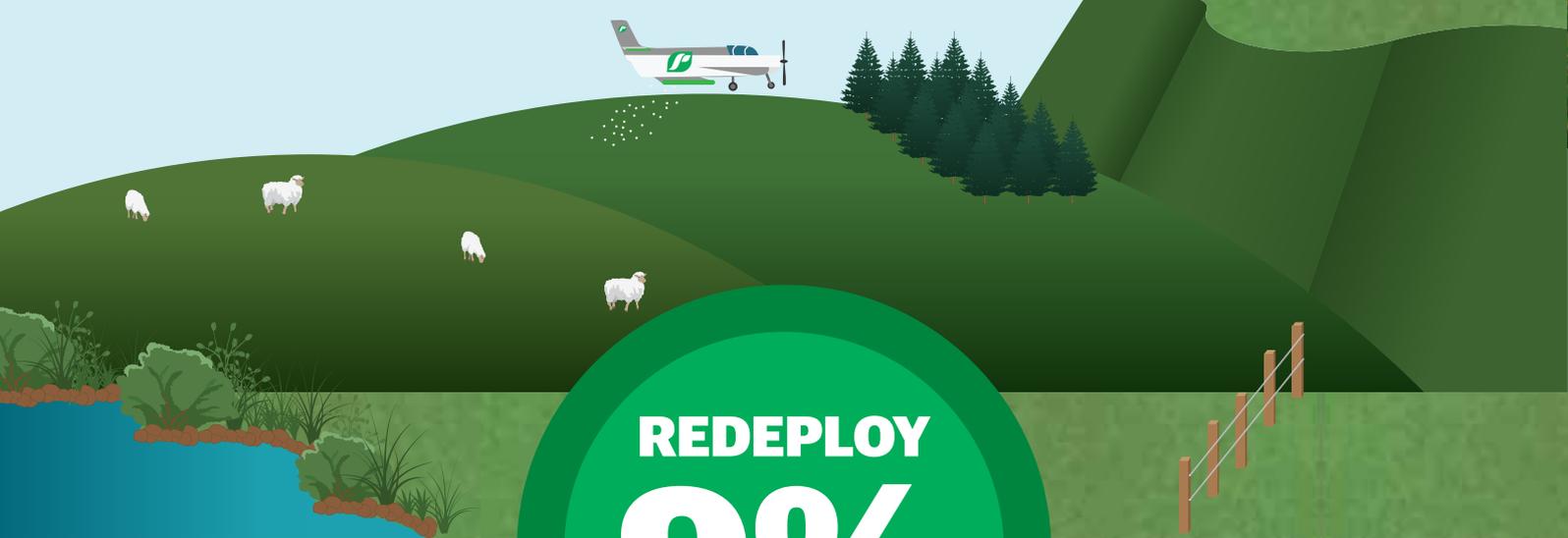
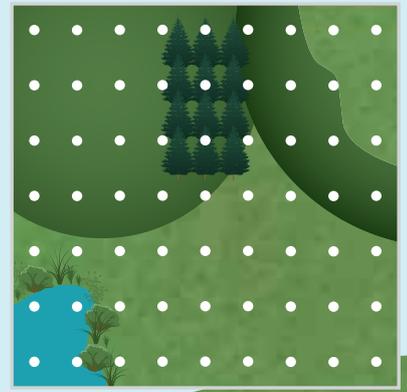
The reality is that you can collect information in all sorts of forms, and we have been doing that on New Zealand farms for generations. The difference now is how we bring all that information together, meaning your insights result in action more easily. HawkEye won't just collect information, it use it. ■

# PGP Update

**Figure 1: Aerial top dressing**

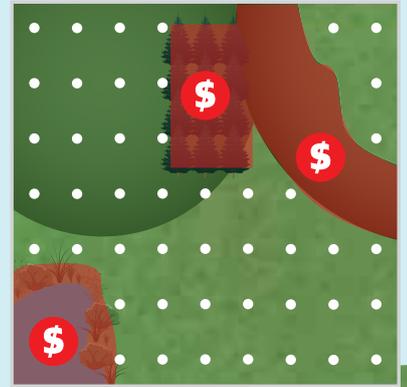
Using variable data to avoid top dressing non-productive areas of your farm such as swamps, ponds, forestry blocks and steep faces, you can redeploy, on average, as much as 9%<sup>1</sup> of your fertiliser that you can also use to invest back into more productive areas of your farm.

Figure 1 shows current practices and figure 2 shows what Ravensdown's Intellispread technology offers through variable rate application and data.



**Figure 2: Variable rate application using variable data.**

 Exclusion zones are zones avoided during variable rate application by using more detailed data.



# SELENIUM UNDER THE SPOTLIGHT

By Dr Ants Roberts, Ravensdown Chief Scientific Officer



DR ANTS ROBERTS, RAVENSDOWN CHIEF SCIENTIFIC OFFICER

**New Zealand specific reference ranges for selenium (Se) in pasture and animal tissue have been established for nearly 20 years. Supplementation trials and quantitative modelling have resulted in a dietary recommendation of 0.03mg Se/kg DM for dairy cows grazing New Zealand pastures.**

However, confusion is rife because recommendations up to 10 times higher are not uncommon. This is partly driven by scepticism that the low minimum recommended intakes do not reflect the needs of the modern dairy cow.

To address the confusion, we commissioned researchers Stacey Hendriks and Associate Professor Richard Laven, both from the Institute of Veterinary, Animal and Biomedical Sciences at Massey University. Their task was to review all available national and international scientific literature to determine whether current reference ranges for selenium are still relevant today.

The review<sup>1</sup> draws from 57 publications written between 1960 and 2015.

## Findings of the Se review

1. The nutritional importance of adequate levels of Se in dairy cows is well established.
2. In cattle, the principal clinical problem associated with Se deficiency is white muscle disease, but is also associated with a range of sub-clinical conditions.
3. Only milk production and reproductive losses have been reported in grazing dairy cows in New Zealand.
4. Minimum dietary recommendations differ between countries, being in New Zealand (0.03 Se/kg DM), Australia (0.04 Se/kg DM), United Kingdom (0.1 Se/kg DM), and United States of America (0.3mg Se/kg DM), respectively.
5. It has been suggested that the difference between the NZ and USA recommendations are in part due to the high intake of vitamin E from grazed pasture versus total mixed rations. Vitamin E is a strong anti-oxidant, which acts like selenoproteins.
6. Reference ranges for animal tissue samples for diagnosing Se deficiency differs markedly between countries (Table 1).
7. Most of the published data reviewed is consistent with the current New Zealand recommendations rather than the US ones. Several studies in herds with marginal or inadequate Se status, based on the New Zealand recommendations, but severely deficient based on US recommendations, showed no effect on either productivity or health after Se supplementation.
8. One cautionary aspect of the review was that while Se has been the best researched mineral, we still lack a definitive upper threshold of the marginal range.

While it is possible that the upper threshold of the marginal serum Se range is too low, this is not justification to match the US recommendation of >890 nmol/L.

Based on the outcome of the review there is no evidence to change the current dietary recommendation of 0.03mg Se/kg DM for dairy cows grazing New Zealand pastures. ■

**Table 1: Selenium reference ranges in animal tissue<sup>1</sup>**

	NZ marginal range	UK marginal range	USA marginal range
<b>Whole blood Se, nmol/L</b>	130-250	150-250 (300-500 neonate)	630-1500
<b>Serum Se concentration nmol/L</b>	85-140	100-120	440-890
<b>Blood gSH-Px, U/ml (NZ); U/g Hb (UK and NA)</b>	0.5-3.0 @ 25°C	20-30 @ 37°C	15-25 @ 37°C
<b>Liver Se, nmol/kg fresh weight</b>	600-850	200-300 (800-900 neonate)	1500-3200

(1) See Source Code on page 40

# NEW ZEALAND'S PURVEYOR OF LUXURY

**Nick Aubrey, Director of The New Zealand Luxury Group, talks value add**

**When I was a child all I wanted was to be a farmer, just like my father, and his father before him.**

As I stood looking out over the Mackenzie Basin with my father one day, it was with a heavy heart that he explained how farming had become a luxury.

I can only imagine how difficult that moment was - for the fourth generation to tell the fifth. My father was worried about the economic sustainability of working the land; worried about the future of our family.

From that moment I made a decision; if farming in New Zealand wasn't sustainable for my generation, I'd make sure it was for the next, and so began my career in the New Zealand primary sector.

It has always seemed that the New Zealand primary sector is predicated on hope - hoping for rain; hoping for sunshine; hoping for the market to lift.

Like a farmer hoping for rain, I too had been hoping; hoping that our existing structures would drive market change, and

**"My father was worried about the economic sustainability of working the land; worried about the future of our family."**

hoping that if I worked in the sector for long enough that I would grow into a position of influence to lead this change.

Perhaps some of the most influential words I've ever heard came in a conversation with Randy Hetrick, a former United States Navy SEAL Commando. I was talking to Randy about some of the challenges in New Zealand's primary sector, and my hopes for the future. Randy succinctly put it to me that on the battlefield, where every action is a matter of life or death, "hope is not a course of action".

With Randy's words echoing in my mind, I decided to break free from the existing structures. You could say that was when the concept of The New Zealand Luxury Group was ignited.

The luxury brands we work with believe that New Zealand's farmers are the best in the world. They tell me of their desire for a personal and exclusive relationship with our farmers. They also tell me how hard it is to buy New Zealand primary produce; how hard it is to work their way back through convoluted and protectionist supply chains to meet "their" farmers.

## Starting out

The New Zealand Luxury Group is a company in its infancy, but with an incredibly simple mandate - to connect New Zealand's very best growers to the world's most exclusive luxury brands. We want to make it easy, safe and profitable for luxury brands to work with New Zealand's farmers.

In many ways we are a bespoke sourcing partner for our clients - introducing them

**"Our focus is not just niche - it is ultra-niche. We specialise in high value, small volume programmes."**

to growers in New Zealand, who share their philosophy, and who can deliver exactly what they are looking for.

Our focus is not just niche - it is ultra-niche. We specialise in high value, small volume programmes - be it limited edition leather goods with a French fashion house, a seasonal release garment range with one of Italy's leading apparel brands, or an exclusive programme with one of China's own emerging luxury fashion icons. Similarly, with our farmers, we focus on telling the stories of individual families, rather than industries.

Transparency benefits those with nothing to hide. We work to facilitate direct relationships between our farmers and our customers, delivering a suite of natural goods through bespoke international supply chains, and demanding that our supply chain partners enable the level of transparency required to bring the story of our farmers to life.

We have no intention to replicate existing processing structures, many of whom are world leading, and who perform very useful and necessary functions. Nor



do we intend to dictate supply chain partners - our clients have worked in their respective industries for generations, and they know who they can trust to deliver the quality their customers demand. For this model to be scalable, we work alongside existing supply chain partners who are leaders in their field, wherever in the world they may be located - including tanneries in Italy, France, Turkey and China.

We believe it is unrealistic to expect increasing retail prices to offset increasing

cost of production, on its own and in perpetuity. We all must do our part to support a sustainable farm-gate price, and this begins with transparent communication. A direct relationship enables informed decision making about market requirements for our farmers, minimising their compliance burden. It also enables incredibly targeted and efficient marketing spend - delivering exactly what the market requires, rather than what third parties think their customers are looking for.

Most of all the direct relationships deliver absolute exclusivity to our customers; recognising that every farm has a unique story to tell, and that no luxury brand wants to share a story with another.

While our initial focus is on luxury leathers, the model is already evolving with the needs of our customers. It can and will be applied across a selection of New Zealand's very best natural produce.

In our own way we are New Zealand's purveyor of luxury. ■

# WHICH RYEGRASS IS RIGHT FOR ME?

By Jeremy Klingender Ravensdown Seed Product Manager



JEREMY KLINGENDER, RAVENSDOWN SEED PRODUCT MANAGER

**Choosing the right perennial ryegrass can be a daunting task when all sales reps say they have the best, avoiding the important question of which is the best for you? Here are some of the options you should look at when choosing a perennial ryegrass for your farm.**

Roughly a quarter (7-8million hectares) of New Zealand's land mass is made up of improved pasture<sup>1</sup>, with sheep and beef and dairy taking up most of this.

According to Beef and Lamb NZ there is an estimated 240,000ha of re-grassing in the sheep and beef sector in any given year.

Each seed breeding company will conduct its own trials to determine how their new perennial ryegrass stacks up against other grasses before they bring it to market<sup>2</sup>. This will give them information

on what conditions their ryegrass likes growing under, which seasons its growth will be strongest, insect pressure, the performance of the endophyte, and of course how well it grows. The trial data is all available for you to read on the National Forage Variety Trials website.

## So which ryegrass is best for you and your farm?

There are four main points you have to consider when choosing the right perennial ryegrass.

1. *Endophyte* strain (relative to insect pressure)
2. Flowering or heading date
3. Ploidy (tetraploid or diploid)
4. Where the ryegrass comes from



Insect pressure is one of the main reasons perennial ryegrasses don't persist<sup>3</sup>. The higher up in the country you are, the more protection against insects your ryegrass will need. Black beetle, porina, Argentine stem weevil, grass grub and field crickets all have a huge effect, stripping valuable dry matter and even killing out ryegrass pastures. Choosing and understanding the correct endophyte strain is very important for the longevity of your pastures. ARI, AR37, U2 and NEA2 are all novel endophytes and have been developed by plant breeders to help protect grasses from insect attack.

## Ploidy

**Ploidy:** is a term referring to the amount of chromosomes per cell. The two main ploidies are tetraploid and diploid.

**Diploids:** are the most common, normally found on sheep and beef farms, and have two sets of chromosomes per cell.

**Tetraploids:** have four sets of chromosomes per cell, which are larger, and generally grow bigger darker leaves, larger but fewer tillers, larger seeds, have a higher ratio of water soluble carbohydrate (cell contents) to fibre (cell wall), higher ME and are highly preferred by livestock.

(1, 2, 3, 4, 5) See source code on page 40

## Heading dates

Heading dates (flowering) are important as they control the extent of early spring production and late spring quality. All ryegrasses are benchmarked against the cultivar Nui's heading date of approximately 22 October. There is a strong relationship between early spring growth and early flowering<sup>4</sup>. Although flowering makes pastures grow faster in spring, it is associated with a drop off in quality. As stems develop, fibre may rise and ME may drop. With late flowering varieties, the decline in quality occurs later, allowing for better quality for stock in the late spring period.

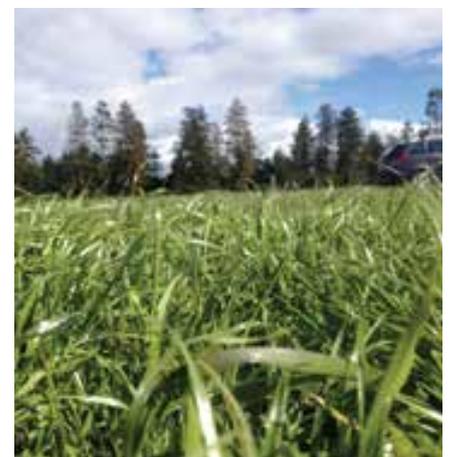
Further, high DM intakes can be maintained through this critical period.

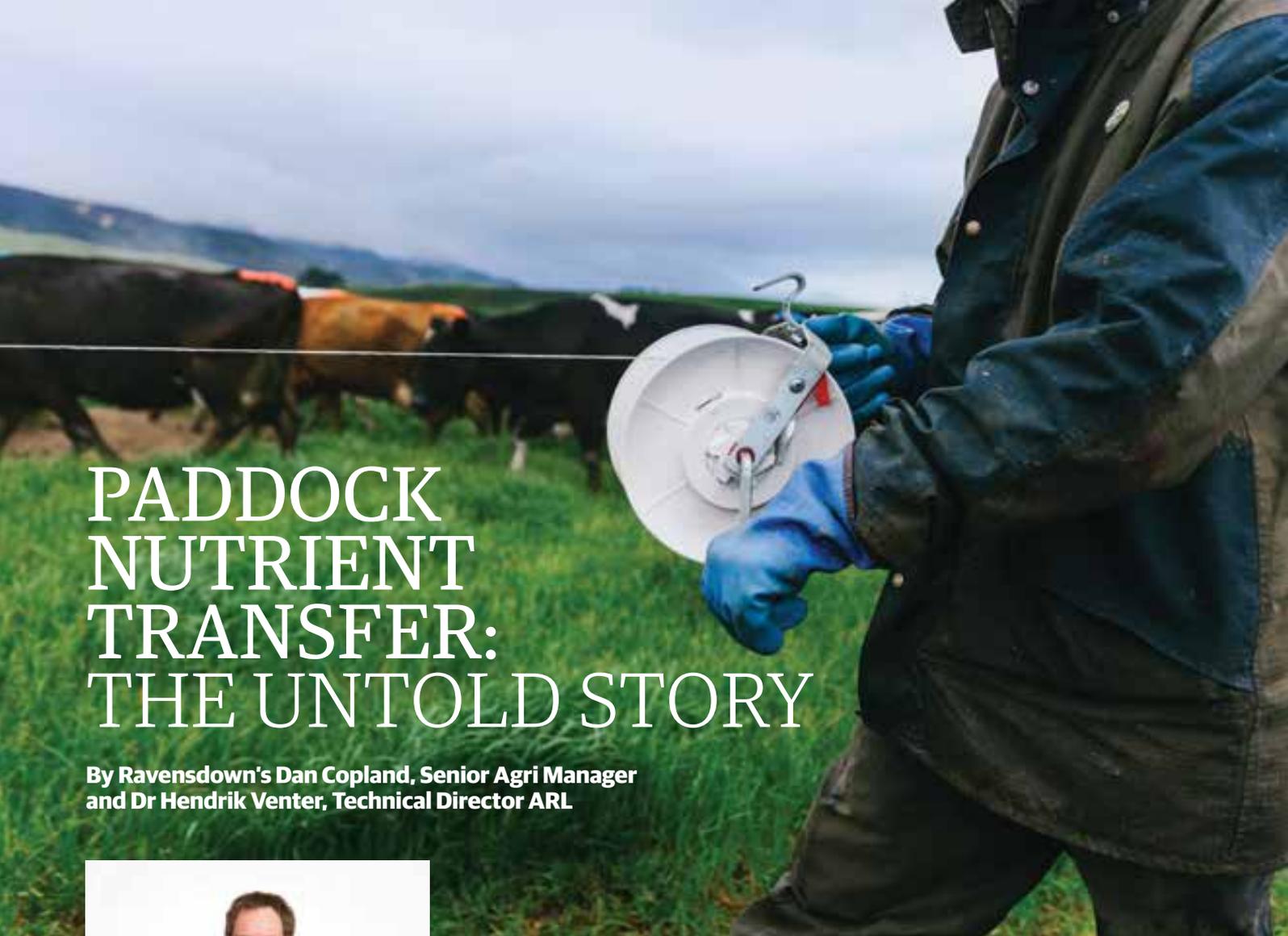
Low post-grazing residuals can still be maintained on the standard flowering ryegrasses through good grazing management at this time; alternatively, these are ideal paddocks for conservation, with high quality silage made if cut below 3.5t DM/ha.

In November, new leafy material available post silage-making should provide high quality forage to complement the late flowering ryegrass paddocks<sup>5</sup>.

## Lineage

Like top-quality breeding stock, it is important to understand the blood lines or parentage of your grasses. It's pointless trying to grow a plant that doesn't perform in your environment. Most of the breeding lines of grasses in New Zealand come from North Western Spain as the conditions there are very similar to ours. The difference being, the germ plasm is millions of years old so the perennial ryegrass has evolved over centuries to be able to survive those conditions. ■





# Paddock Nutrient Transfer: The Untold Story

By Ravensdown's Dan Copland, Senior Agri Manager and Dr Hendrik Venter, Technical Director ARL



DAN COPLAND, RAVENSDOWN SENIOR AGRI MANAGER



DR HENDRIK VENTER, RAVENSDOWN TECHNICAL DIRECTOR ARL

**Nutrient transfer by grazing animals is a well-researched and understood phenomenon, occurring to varying degrees in most farm systems in New Zealand<sup>1</sup>. But understanding the impact on pasture growth across a paddock is less clear.**

Nutrient transfer within paddocks, and the subsequent accumulation of nutrients, could be causing inconsistent growth across your paddocks, which could be having a major impact on your overall pasture production.

The good news is there are simple, practical and cost-effective steps that can be taken to limit the impact and potentially increase pasture production across your farm.

## What's the cause?

The impacts of nutrient transfer from excreta are becoming more prevalent and are especially noticeable in Canterbury on recently converted farms. Over the past two decades there has been a significant increase in the number of dairy conversions in Canterbury. Many factors have been considered when designing the layout of these farms. These considerations have led to many of the farms having large (10ha+), long, and sometimes narrow paddocks.

Ravensdown agri managers and our customers have observed that paddocks often perform better at the cow laneway (front) ends and underperform furthest away from the cow laneways. Variabilities are clearly evident in the paddocks:

- Pasture quality
- Persistence
- Composition
- Growth rate
- Fertiliser response
- Irrigation response
- Drought tolerance
- Insect and disease pressure

Grazing practices and animal behaviour mean animals are spending more time in the front ends of paddocks which results in disproportionate distribution of excreta. This means nutrients are transferring from the back to the front of the paddock and key nutrients, such as potassium, magnesium and phosphate, are accumulating, being the likely factor in the differences of pasture performance within the paddock.

# Getting to the root of it Solutions

To quantify the impact of nutrient transfer within paddocks, two farms in Mid Canterbury were extensively soil tested, with paddocks split into back, middle and frontal zones and sampled accordingly.

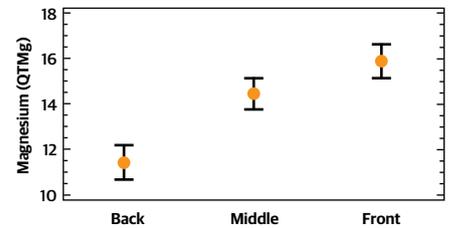
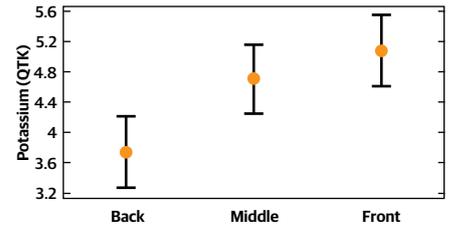
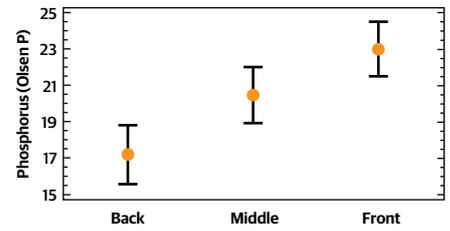
Significant differences between front and back zones were observed for Mg, K and Na in the 0-7.5cm soil layer. Subsurface soil samples (7.5-15cm) were found to have significant differences between zones P, K, Mg and Na. Results for K and Mg are presented in Table 1. It is assumed that nitrogen will also be having a major impact but no testing to quantify the impacts has been done at this stage.

If you are noticing that pasture production across your paddocks is inconsistent and appears to be noticeably better at the cow laneway ends, then the first step is to contact your agri manager to discuss zonal soil testing. If the results suggest that nutrient transfer is occurring then simple actions can be taken, such as back-fencing cows, targeted effluent applications and variable rate fertiliser applications. Basically you will be redeploying nutrients to the poor-performing areas while withholding nutrients from areas already at "luxury" levels. ■

**Table 1. Differences in soil potassium and magnesium content for different zones expressed in kg/ha.**

Zone	0 - 7.5 cm soil layer		7.5 - 15 cm soil layer	
	Potassium	Magnesium	Potassium	Magnesium
Back	80	74	90	78
Middle	103	90	113	99
Front	122	100	121	109

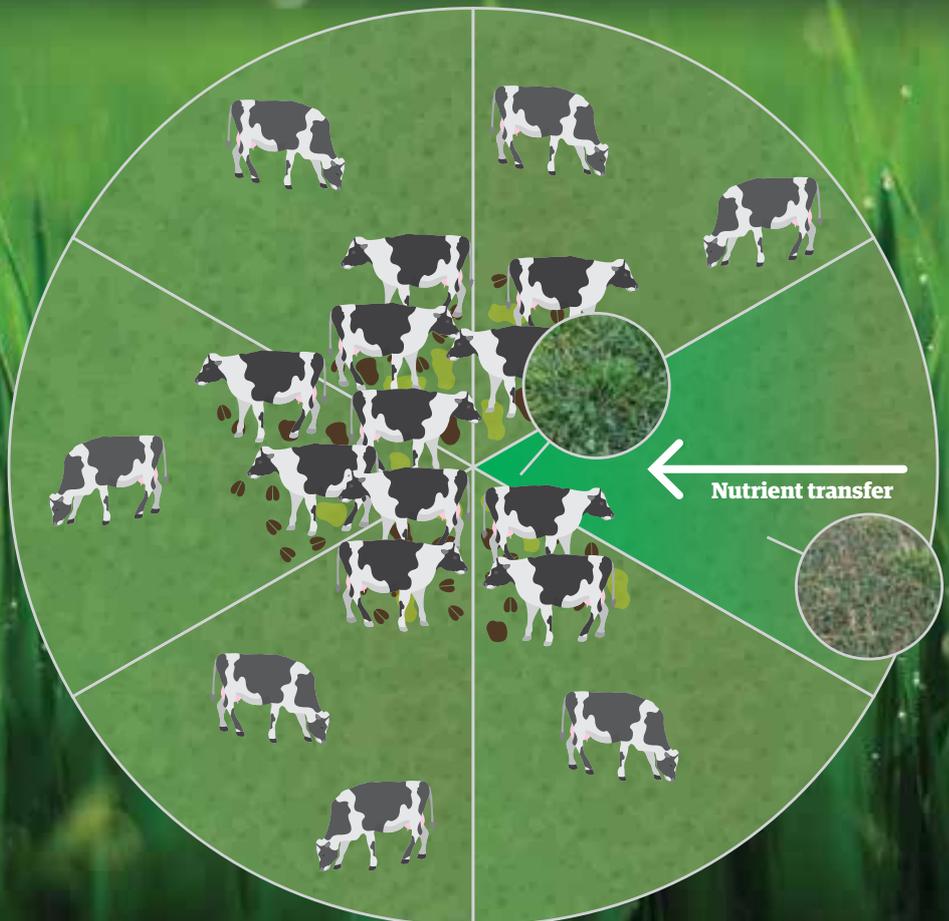
**Effect of nutrient transfer also observed below 7.5cm**



NUTRIENT TRANSFER WITHIN A TYPICAL CANTERBURY DAIRY FARM WHERE COWS CAMP BY LANE WAY EXITS WHICH LEADS TO NUTRIENT BUILD UP

## Ways to mitigate nutrient transfer

- ✓ Apply effluent irrigation at the backs of paddocks
- ✓ Apply fertiliser to the backs of paddocks
- ✓ Fence cows into the backs of the paddocks



(1) See source code on page 40

From a potato-growing family taking on the market to the kiwi fruit industry taking on the world - we hear from shareholders, the Bowans and the Skiffingtons about the power of NZ Inc at a grass root level.

## DETERMINATION GETS YOU THERE IN THE END - HEARTLAND POTATOES



RAYMOND (RIGHT) AND JAMES (LEFT) BOWAN OF HEARTLAND POTATOES



**Seven years ago Raymond Bowan was forced to make a huge call when his major customer closed down their local plant in Washdyke. Raymond went from growing the potatoes to owning the whole potato chip process, to putting the potato packets on supermarket shelves.**

A self-described quiet achiever, Raymond prefers to fly under the radar but the venture has opened him up, taken him out of his comfort zone and into the limelight. "Owning the process is quite different - I knew I could grow them, but we were forced into a spot. We were so naïve at the beginning but we were determined to have a go," he says.

Being a farmer gave Raymond the right work attributes to take on the Goliaths of the potato chip world. "Farming isn't an easy lifestyle, it's a lot of hard work, these were the skills required to do the hard slog and take it to the end."

But first Raymond and his family, wife Adrienne, son James, and daughters

Charlotte and Kate had to start from the beginning, literally; they bought a factory with no equipment and no idea how it all worked.

"It was really daunting and it put a lot of financial pressure on us," Raymond says. "They always say 83% of new businesses fail, so we had to go out to the market with some points of difference - we don't cook in palm oil, we've got no transfats and we're gluten free. The new packs also have no MSG, but most importantly we have traceability."

On their Fallgate farm near Geraldine, Raymond, and now James grow all the potatoes that make Heartland potato chips. Without realising just how important it was to consumers to know where their food comes from, Raymond says they were accidentally ahead of their time.

Adrienne says customers like their David and Goliath story. "All of a sudden everyone wanted to know the story and poor Raymond was being asked to speak at lots of events. We've got such wonderful feedback."

"It's a real story, with an awful lot of uniqueness to the product," Raymond says.

"One being we've got a very low carbon footprint. With our product all made here in South Canterbury, we've got the ultimate quality control.

"We thought we must have been doing something right if they're (larger entities) trying to copy us. When we went to Wellington to present to Foodstuffs, they opened the door because they knew consumers wanted to know where their food came from, and from there demand has really taken off."

Now the Bowan family of five employ 22 staff, 14 in the factory and eight on the farm.

"It's got to where it is now a wee bit quicker than we thought - we've exceeded our six year goals and have just brought a new kettle chip range out, which has been going really well," says Raymond.

"It was a big thing to do when you look back at it - but I have no regrets, I'd do it all again." ■

# KIWIFRUIT POWERHOUSE POST PSA



WAYNE AND ELAINE SKIFFINGTON OF WESKO LTD

## Dealing with crisis and overcoming enormous odds seems to come with the territory in the primary sector. No more so than the kiwifruit industry's Psa crisis in 2010.

The story of how they came back out on top oozes with the classic New Zealand traits of true grit, innovation and spirit, defining what it is to be a part of 'NZ Inc'. New Zealand was the first country to develop the commercially viable kiwifruit and now the first Psa resilient kiwifruit; once again punching above its weight on the global stage. Te Puke kiwifruit farmer and Ravensdown shareholder Wayne Skiffington, an early adopter of the resilient variety G3, recalls when Psa struck and how the now-branded SunGold (G3) saved the industry.

"G3 has been massive for us, we took a gamble early on in grafting G3 when Psa hit. It was a highly vulnerable time to be

introducing new shoots and while we did lose 60% of them, little did we know that it would be our saviour later on," says Wayne.

He says a lot of farmers rightly didn't have the confidence to spend the money on grafting G3 at the time, when there was no guarantee that it would work, especially in the midst of coping with the devastating effects of the Psa incursion.

"The industry was down for three years but once the gold started producing, the confidence started growing."

Unfortunately, so did the costs for the licence to grow it. When the Skiffingtons started grafting back in 2010 it cost \$8000 a hectare for the licence to grow the fruit and this year it has cost them over \$222,000 a hectare. The increase in cost is indicative of the value of the product and confidence in its resilience to Psa.

The size of New Zealand's kiwifruit business is nothing to be sniffed at, with over \$20 million a year invested into new cultivar development by its growers/Zespri, government and Plant and Food Research. It's this research that saw the new cultivar G3 come to fruition and this kind of dedication that has New Zealand viewed as the world leader in Psa research.

"While our country was not the first to be affected by Psa, our effectiveness in handling the disease has been world leading," says Simon Limmer, Chief Operating Officer at Zespri. "Our industry, in conjunction with the

New Zealand Government, was quick to establish Kiwifruit Vine Health (KVH), an entity to specifically lead the response and research into Psa. Over time, KVH has become a global kiwifruit reference for the management and research into pests, disease and biosecurity. It was the cohesion of our response and the resilience of our growers, as well as the investment made in the new SunGold variety that saw us through the crisis and back on top."

New Zealand kiwifruit provides 32% of global trade. With \$1.9 billion in global sales for 2015-2016 and a goal to hit \$4.5 billion by 2025, New Zealand's kiwifruit business is vying for more room in the world's fruit bowl.

The story of the kiwifruit industry's growth follows a similar vein to the dairy industry, Wayne says as he reflects over the past 23 years since he left dairy farming and switched to kiwifruit.

"In the early days, the average size of a kiwifruit farm was three hectares, now the average farm is 10, and then there's the bigger farms which are like the corporate dairy farms. The biggest difference between dairy and kiwifruit though is there are no vet bills and there's only one 'milking' a year."

With export volumes and sales from New Zealand set to increase by around 60% by 2025, it seems this New Zealand powerhouse is going from strength to strength. ■



# 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.

## REFERENCES

### PAGES 10-11

#### CADMIUM: THE FACTS

1. Abraham E. et al, 2016 Cadmium in New Zealand's agriculture and food systems. Occasional Report No. 29. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. [http://www.massey.ac.nz/~flrc/workshops/16/Manuscripts/Paper\\_Abraham\\_2016.pdf](http://www.massey.ac.nz/~flrc/workshops/16/Manuscripts/Paper_Abraham_2016.pdf)
2. Taylor M. et al, 2017 Current state and trend of cadmium levels in soil, freshwater and sediments across the Waikato region. Occasional Report No. 30. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand [http://www.massey.ac.nz/~flrc/workshops/17/Manuscripts/Paper\\_TaylorM\\_2017.pdf](http://www.massey.ac.nz/~flrc/workshops/17/Manuscripts/Paper_TaylorM_2017.pdf)

### PAGES 12-13

#### HOW NO-TILLAGE CAN MITIGATE CLIMATE CHANGE

1. Ghatohra, A. S. (2012). Effect of method of tillage on loss of carbon from soils. PhD Thesis, Massey University Library.
2. New Zealand's Greenhouse Gas Inventory 1990-2015 <http://www.mfe.govt.nz/climate-change/reporting-greenhouse-gas-emissions/nzs-greenhouse-gas-inventory>

[govt.nz/climate-change/reporting-greenhouse-gas-emissions/nzs-greenhouse-gas-inventory](http://www.mfe.govt.nz/climate-change/reporting-greenhouse-gas-emissions/nzs-greenhouse-gas-inventory)

### PAGE 26-27

#### MAKING YOUR FODDER FERT EARN ITS KEEP

1. Dr Charles N Merfield (2015) False and Stale Seedbeds: The most effective nonchemical weed management tools for cropping and pasture establishment. The BHU Future Farming Centre Permanent Agriculture and Horticulture Science and Extension - <https://www.bhu.org.nz/future-farming-centre/ffc/information/weed-management/false-and-stale-seedbeds--the-most-effective-non-chemical-weed-management-tools-for-cropping-and-pasture-establishment-2015-ffc-merfield.pdf>

### PAGE 23

#### POPLAR AND WILLOW ENVIRONMENT AND SOIL SOLUTIONS

1. I McIvor, SLMHCE Project - Poplar and Willow Breeding Programme, Grant No: 08/02, Regional Council's Willow and Poplar Research Collective/Plant & Food Research, <https://www.mpi.govt.nz/funding-and-programmes/environment-and-natural-resources/sustainable-land-management-and-hill-country-erosion-programme/slmhce-project-poplar-and-willow-breeding-programme/>

### PAGE 30

#### PGP UPDATE

1. The use of variable rate fertiliser applications in NZ hill country, M.D White<sup>1</sup>, A. K. Metherell<sup>2</sup> and A.H.C. Roberts<sup>3</sup>

### PAGE 31

#### SELENIUM, UNDER THE SPOTLIGHT

1. Hendriks S. and Laven, R. 2017. Selenium requirements in grazing dairy cows: A review. Report to Ravensdown Ltd. Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Palmerston North.

### PAGES 34-35

#### REGRASSING: WHICH RYEGRASS IS RIGHT FOR ME?

1. Pastoral Input Trends in New Zealand, MPI - ISBN 978-0-478-38864-0 (online) <http://beeflambnz.com/PageFiles/6837/Pastoral%20input%20trends%20in%20New%20Zealand.pdf>
2. Cropmark website, Pasture and Forage Crop Trials: Identifying Winning Varieties, <http://www.cropmarkseeds.com/Seed-Trial>
3. Can pasture persistence be improved through the use of non-ryegrass species? [https://www.grassland.org.nz/publications/nzgrassland\\_publication\\_2248.pdf](https://www.grassland.org.nz/publications/nzgrassland_publication_2248.pdf)
4. Improving the grazing and drought tolerance of temperate perennial grasses (Kemp & Culvenor 1994) <http://www.tandfonline.com/doi/pdf/10.1080/00288233.1994.9513074>
5. What perennial ryegrass should you sow? Grant Edwards and Racheal Bryant, Agriculture and Life Sciences Faculty, Lincoln University.



PROFESSOR IAN YULE AND DR ROB MURRAY SETTING UP THE C-DAX PASTURE METER AT THE MASSEY UNIVERSITY DAIRY FARM.

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## The Last Word

We hope you enjoyed the fifth edition of Ravensdown's Ground Effect. Let us know what you think by filling out our quick survey at this link <https://www.surveymonkey.com/r/GroundEffect>

If you'd like to contribute to the next edition please contact us on the details below.

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On behalf of Ravensdown, we'd like to thank you for your valuable contribution to our primary industries. We continue to invest in developing our agri-science, technology and innovations to capture insights for the good of your business and the country. Keep up the good work of smarter farming for a better New Zealand.

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## Contributors

The Ravensdown Editorial team would like to thank:

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