Ballance agri-nutrients

Together,
Creating the Best
Soil and Feed on Earth

Grow

North Island
Spring 2021

Contents

Ballance agri-nutrients

Ballance Agri-Nutrients is one of New Zealand's leading fertiliser manufacturers. A 100 percent farmer-owned co-operative, the company has approximately 18,000 shareholders and sells around 1.5 million tonnes of product each year, representing a turnover close to $900 million. Its products include imported and locally manufactured fertilisers, the majority of which attract a rebate for shareholders.

ballance.co.nz
0800 222 090

Super Air

Since its inception in the 1980s, Super Air has evolved into one of New Zealand's leading agricultural aviation companies. In addition to aerial fertiliser application, Super Air has developed a world-class reputation for aircraft engineering and innovation. Wholly owned by Ballance, Super Air services most of the North Island, and from February 2021 is also servicing the South Island.

superair.co.nz
0800 787 372

SealesWinslow

SealesWinslow is a recognised leader in the production of high-performance compound feeds and feed additives. A fully owned subsidiary of Ballance, SealesWinslow has manufacturing sites located in Morrinsville, Ashburton and Whanganui, and supplies custom-blended pelletised feed to farmers throughout New Zealand. It also provides molasses feed blocks, feed supplements and additives.

sealeswinslow.co.nz
0800 287 325

Stay on top of policy

A round up of what's been happening in the environmental policies space.

More time for N cap consent

People who can't meet the nitrogen (N) cap rules that started on 1 July 2021 have more time to obtain a resource consent (see box).

A resource consent must now be applied for by 31 December 2021 (instead of the previous requirement for a resource consent before 1 July 2021).

Intensive winter grazing restrictions deferred

Intensive winter grazing rules due to come into force in May this year have been deferred until 1 May 2022.

In the meantime, the 2021/22 Intensive Winter Grazing Module, a tool to help people make immediate improvements to intensive winter grazing practices, is available at bit.ly/3kDXkJx.

Rules preventing the expansion of the area used for intensive winter grazing (to no more than was used for the practice between 1 July 2014 and 30 June 2019) still apply.

Farm environment plans

The Government is engaging with primary sector representatives, iwi Māori, regional councils, environmental organisations and other interested groups to develop new regulations for farm environment plans. These plans will be rolled out on a prioritised basis, with N impacted catchments first in line.

Biodiversity policy delayed

Decisions on the National Policy Statement for Indigenous Biodiversity, originally due in April 2021, are now expected to be released by the end of 2021.

Know your greenhouse gas numbers

Ahead of all farmers and growers needing to know their greenhouse gas numbers by the end of 2022, He Waka Eke Noa: the Primary Sector Climate Action Partnership has released farm planning guidance, and an assessment of tools and calculators for calculating greenhouse gases, both of which are available at hewakaekenoa.nz/tools.

FOR MORE INFORMATION

ballance.co.nz/essential-freshwater-policy

Applying for N cap consent

If you cannot meet the N cap rules, you will need to apply for a resource consent. Regional councils can only approve the consent if it satisfies one of two options:

Option 1: You create a synthetic N reduction plan, showing how synthetic N use will be reduced each year, so the rules can be met from 1 July 2023. In effect, this provides farms with an extra year to adjust their practices in order to comply with the rules.

Option 2: You have a report from a suitably qualified expert such as a farm planner or nutrient advisor, describing the good practices used to apply the N fertiliser, as well as the rate N would leach under the 190 kg/ha/year cap if these practices were used. This report must show that the rate at which N will leach from non-complying N fertiliser applications is not greater than the rate it enters water from applying N fertiliser at 190 kg/ha/year, as stated in the rules.

Get more out of N

Help is at hand to get the most out of nitrogen (N) fertiliser under the new rules.

The new N fertiliser cap rules mean using N wisely to get the best pasture response from applications is more important than ever.

Applying N fertiliser uniformly across all management areas on farm or following the cows and applying a set amount of N shortly after each grazing can be inefficient.

Different management areas on farm have varying levels of total soil N available for plants to use. This is partly why plants respond differently if N fertiliser is applied uniformly.

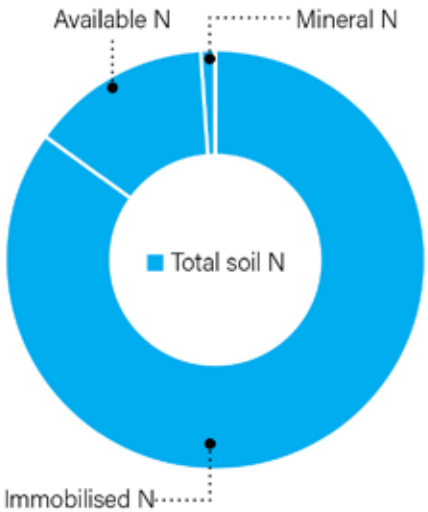
Uniform applications of N fertiliser across a farm can result in N being applied where pasture response is low, leading to both economic and environmental impacts.

With N cap rules in force, My Pasture Planner – a decision support tool designed to optimise pasture response to applied N fertiliser – helps to get the best response from your N fertiliser purchase.

Total N soil test

The first step in using My Pasture Planner to optimise the placement and rate of N is to identify the varying levels of N in the soil in different management areas on farm. This is done via a Total N soil test.

As the name suggests, the test measures the total pool of N in the soil – the combination of mineral N, available N and immobilised (mainly organic) N pools. Total N results can vary across the farm due to variations in soil type, topography and farm management.



Only a small percentage of N in the soil is able to be used by plants.

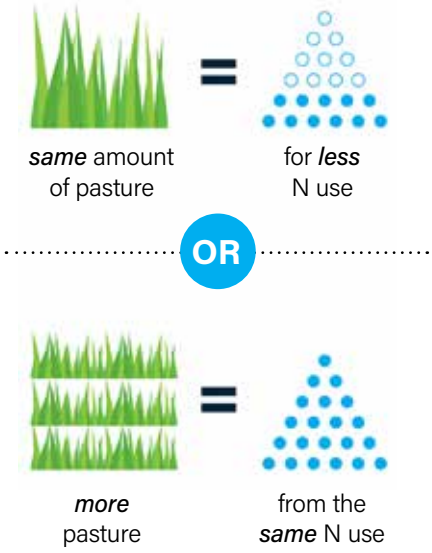
Although not often used, it provides valuable information on the potential pasture response rate to applied N (see Figure 1).

The Total N test can be incorporated into a regular soil testing regime, and involves testing each different management block on farm to a depth of 75 mm. It only needs to be repeated once every 4 to 6 years, as the total N in the soil changes slowly over time if land management has not changed significantly.

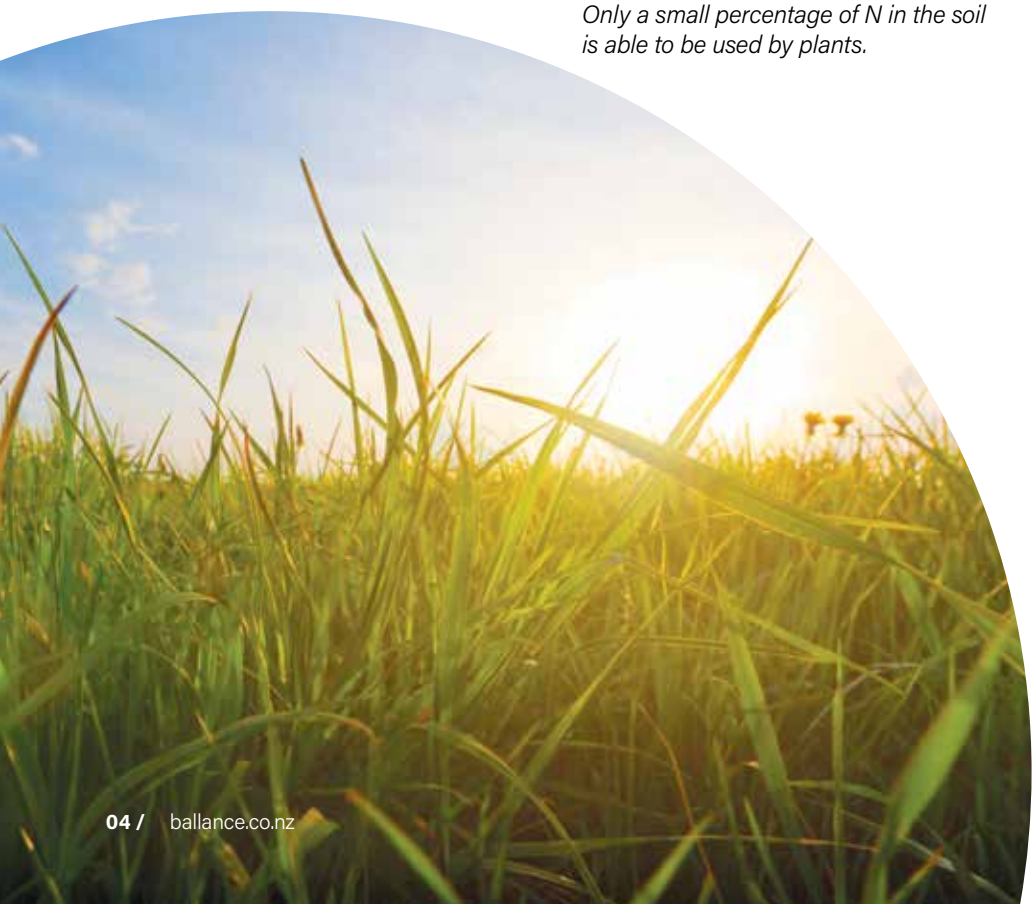
Using the Total N test results

How do the Total N test results help to optimise N application?

This is where My Pasture Planner comes in. It incorporates the scientific expertise of AgResearch, who conducted a series of trials throughout the country to understand the pasture response rates to applied N at different Total N soil test levels.



My Pasture Planner was developed with the aim of growing the same (or similar) amount of pasture with less N applied, or more pasture with the same amount of N applied.



My Pasture Planner
Make the most of your nitrogen

My Pasture Planner uses Total N soil test information to identify strategic N fertiliser applications so you can tailor both N fertiliser placement and rates on a monthly basis. My Pasture Planner can help you to grow more pasture for the same amount of N use, or the same amount of pasture for less N use. It can also be used to help meet pasture feed demand or grow feed to conserve, such as hay, silage and balage (see example output).

Ballance Nutrient Specialists can use My Pasture Planner to guide annual N fertiliser plans and show where response to N applied is likely to be less and greater. You can input certain constraints (such as when N must or must not be applied and the application rate) or let the model do its own thing. My Pasture Planner also provides some financial comparisons of its current recommendations to previous years' N use.

The tool uses the Total N soil test, a digital farm map and regional pasture growth data to predict pasture response, so N can be used more efficiently – the right product, in the right place, at the right rate and times – with less impact on the environment. This could translate into reduced N leaching and nitrous oxide emissions as modelled by Overseer.

My Pasture Planner does not recommend a specific product, and the 'right product' will depend on season and other nutrient factors, and can be discussed with your Ballance Nutrient Specialist.

Farmers can easily access outputs from My Pasture Planner which is integrated into the MyBallance platform. An annual plan can easily be created using the mapping capability, and the MyBallance integration means easy access to a fertiliser recommendation, mapped out for the farm.

My Pasture Planner was developed in collaboration with AgResearch, and partly funded by the Ministry for Primary Industries' Primary Growth Partnership. Used exclusively by Ballance, it is free for Ballance customers registered with MyBallance, and available via a Ballance Nutrient Specialist. Existing Ballance customers can register for MyBallance at myballance.co.nz. To become a Ballance customer contact the Customer Services team on 0800 222 090 or email customerservices-mount@ballance.co.nz.

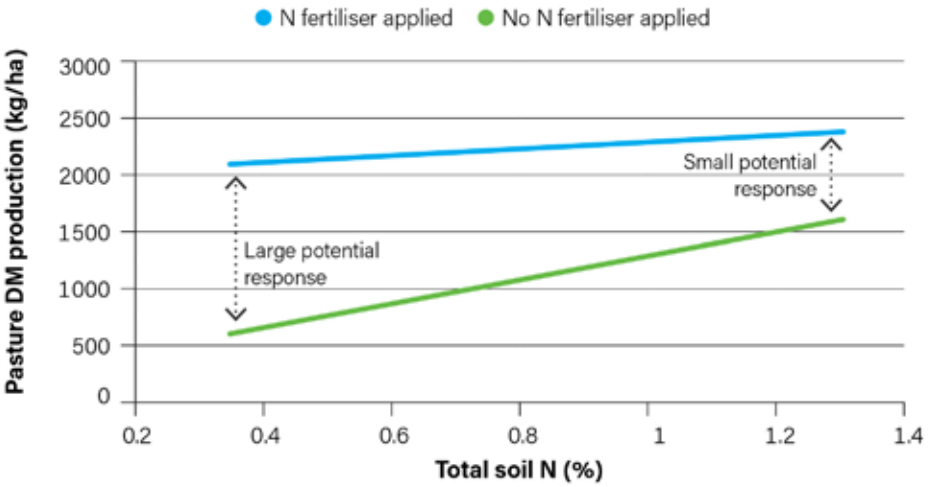
Note: My Pasture Planner is not calibrated for peat soils.

FOR MORE INFORMATION

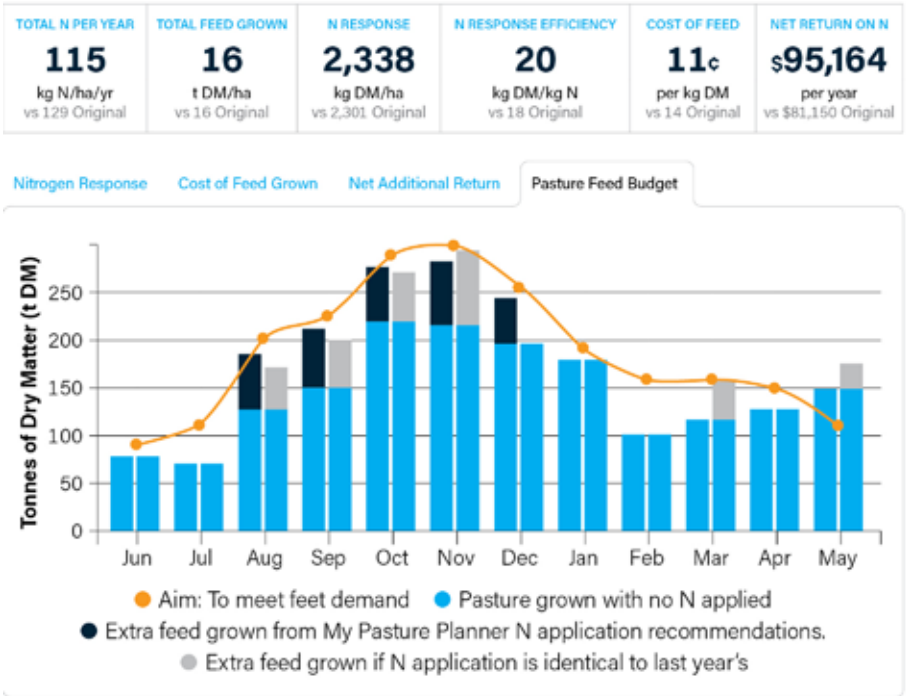
ballance.co.nz/my-pasture-planner

What do I need to run My Pasture Planner?

- ✓ MyBallance account set up with a farm map at the paddock scale
- ✓ Total N test for each management block on farm
- ✓ Current OverseerFM nutrient budget producing reports
- ✓ The previous year's N use on a monthly basis for the whole farm



A lower total soil N has a larger pasture response, and higher total soil N a smaller pasture response.



An example of a My Pasture Planner output.

Animal Water Plant Soil

Nitrogen: friend or foe?

Consider the facts behind nitrogen (N) before deciding to avoid it altogether.

"The new synthetic N cap for pasture can make it seem like N fertiliser is best avoided," says Ballance Science Extension Officer Katie Aitkenhead.

"But N is essential for growth and has a valuable part to play. In some instances the way it's used can cause problems, but it's wise to weigh up the facts before writing N off altogether."

Fact: Pastures need N

To grow properly pasture plants need large quantities of N – in greater amounts than any other nutrient. Nitrogen is a major component of plant and animal tissue, and also essential for processes such as photosynthesis.

In pastoral systems, most N in the soil comes from natural processes, such as legumes converting N from the air into plant available forms, soil microbes converting organic N into plant available mineral N, and also in most cases from animal urine and dung. Nitrogen can also be added via synthetic or biological fertiliser (see page 9).

Fact: N can help with feed shortages on any farm

Rather than seeing N as a fertiliser, it could be considered as a supplementary feed source. Using N to grow additional pasture is generally more cost-effective than buying supplementary feed.

As all plants (except legumes) are N deficient[1], N can be used strategically and sustainably on both sheep and beef and dairy farms to provide extra feed to lift or maintain animal performance at critical times of the year.

At most times of the year (excluding dry summer or cold winter conditions) N stimulates a short term increase in grass growth which, with effective grazing management, can be very helpful in overcoming feed shortages.

For sheep and beef, N is typically applied in late winter to early spring to provide extra feed for calving and lambing, or in autumn to provide extra feed before and during mating, and to help carry stock through the winter.

Deficiency in pasture

In N deficient pasture, older leaves yellow first. The plant cannot produce enough chlorophyll, so moves the N from older leaves to new growth where it is most needed.

Fact: Good N use has minimal impact on waterways

Used in the right place, at the right time and rate, N fertiliser has little direct effect on the environment.

In New Zealand, urine from farm animals, not N fertiliser, is the main source of N entering waterways[2]. As the N in urine is deposited on a small area in high concentration, the pasture cannot take it all up, and some leaches into groundwater. Leached N eventually reaches waterways, where if present in excessive amounts, it can promote excessive growth of algae.

Nitrogen fertiliser does however produce small amounts of the greenhouse gases carbon dioxide and nitrous oxide.

[1] Moot D 2019. Overcoming the weakest link in pastoral farming – a lack of nitrogen. The Journal March 2019: 12-18

[2] Parliamentary Commissioner for the Environment 2013. Water quality in New Zealand: Land use and nutrient pollution

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Legumes for N on hills

Legumes are part of the solution for nitrogen (N) deficient hill country.

Nitrogen deficiencies in much of New Zealand's hill country farmland mean pasture cannot effectively use available soil moisture.

"A lot of hill country is summer-dry, and N deficiency only compounds the issue as pasture can't make full use of the limited rainfall," says Ballance Sheep and Beef Programme Lead Richard Draper.

"The good news is that hill country is very responsive to N, and overcoming N limitation improves the productivity of pastures and animals."

Aerial application of N fertiliser to hill country can be economic, and can be considered as a way to provide strategic feed for key times such as lambing. Responses of up to 20 kg of dry matter per kg N/ha have been recorded on hill country on both islands[1].

Legume advantages

"A cost-effective long term solution to overcoming N deficiency on hill country may be through legumes such as lucerne or clovers, which typically fix 30 kg N/ha per tonne of dry matter," says Richard.

Besides their ability to fix N from the air to power pasture growth, legumes offer other advantages over grasses.

"Legumes are more moisture efficient, and grow greater amounts of dry matter when moisture is limited on hill country. They're also a higher quality feed, with a higher protein concentration than grasses, so also contribute to improved livestock performance."

Much research over the last decade has looked at the establishment and management of legumes such as lucerne, annual clover and white or red clover, and also their suitability for various farm systems.

Bonavaree Farm in Malborough has demonstrated the significant improvements in farm performance that can be achieved by switching to a lucerne based system (see Table 1).

Similarly impressive results have been recorded at Bog Roy in Omarama, where, following the development of lucerne based pastures and grazing/management systems, ewe flock performance improved 45 per cent between 2008 and 2014[2].

While lucerne may be a great option for cultivatable dryland, significant work on establishing and managing annual clovers (such as subterranean clover) on dryland hill country has shown similarly impressive results. In higher rainfall environments, red and white clovers are more likely to thrive, and will produce comparable results.

"The key is to identify the best legume for your environment and system and to manage it appropriately to drive animal and farm production.

"This is an exciting area with considerable potential to drive on-farm production and profit," says Richard.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Legume legwork

To thrive, legumes need:

- to be suitable for the farm system and environment
- higher soil fertility than grass
  - » adequate levels of phosphorus, sulphur, potassium and magnesium
  - » the micronutrients molybdenum, boron and copper
- a pH of 5.8-6.2
- grazing management (via subdivision and stock water) to control:
  - » stock pressure and prevent 'grazing-out' due to preferential grazing
  - » timing of grazing to prevent shading by grasses
  - » annual reproduction to replenish reserves.

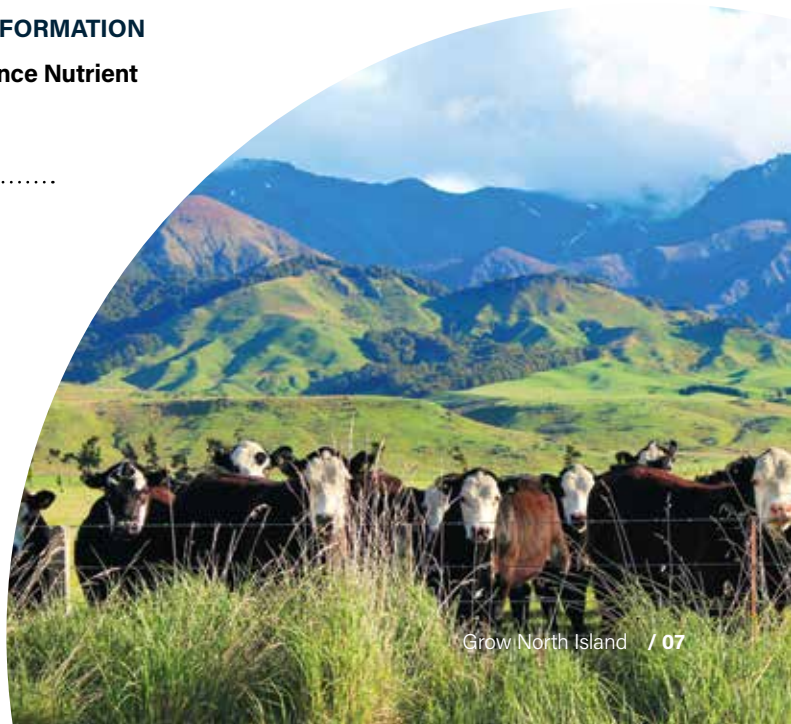
[1] Ballance Agri-Nutrients 2015. Nitrogen on hill country fact sheet

[2] Moot DJ, Anderson PVA, Anderson LJ, Anderson DK 2019. Animal performance changes over 11 years after implementing a lucerne grazing system on Bog Roy Station. Journal of New Zealand Grasslands 81: 75-80

Table 1 **Improvements in key performance indicators at Bonavaree Farm from switching to a lucerne based system**

	2002	2012	Increase
Lambing (%)	117	145	24%
Lamb weights (kg)	13.3	19	43%
Gross trading profit (ha)	$317	$792	149%

Source: Moot & Avery, 2013



N reporting made easier

A new nitrogen management tool will make it easier to track and report nitrogen (N) fertiliser applications.

Under the N cap rules, pastoral farmers are now required to track and record their N fertiliser applications.

Dairy farmers will also need to report their N fertiliser use for the current period – 1 July 2021 to 30 June 2022 – and beyond. The first report is due at regional councils by 31 July 2022, shortly after the current period ends.

The rules are complex, so in spring 2021 Ballance is launching a Nitrogen Limit Management tool for MyBallance, making tracking and reporting N use much easier.

All you need to do is enter your proof of application data (either automatically via your spreader subscription, or manually in MyBallance).

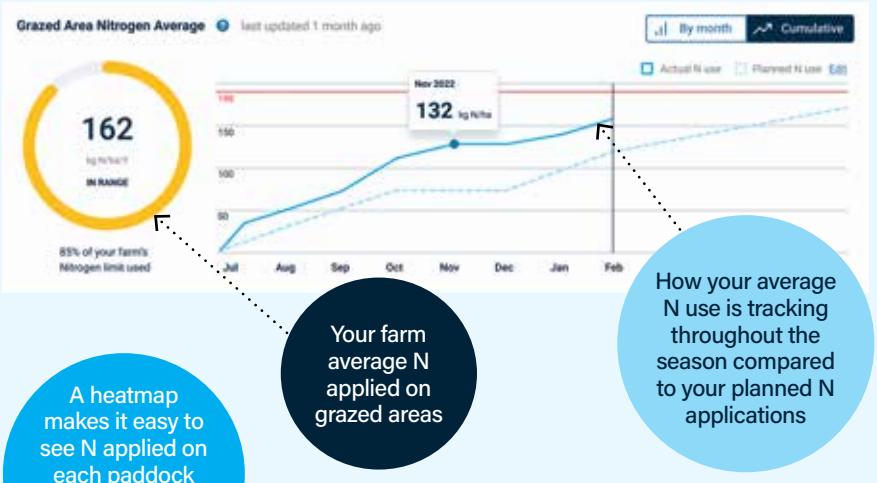
The Nitrogen Limit Management tool can help you stay on track and make any necessary adjustments so you meet the N cap.

At the end of the period MyBallance does the tricky bit for you, transforming your application data into a council-ready N usage report for you to submit to your regional council.

Rules recap

- If a paddock is used for both grazed pasture and:
  - » ungrazed crops, the N cap applies only to the pasture
  - » grazed crops, the N use on the paddock is not capped, but is included towards the farm's average, so any use over 190 kg N/ha/year on these areas must be offset by less N use in other grazed areas.
- If you cannot meet the N cap rules, you need to apply for a resource consent (see page 3).

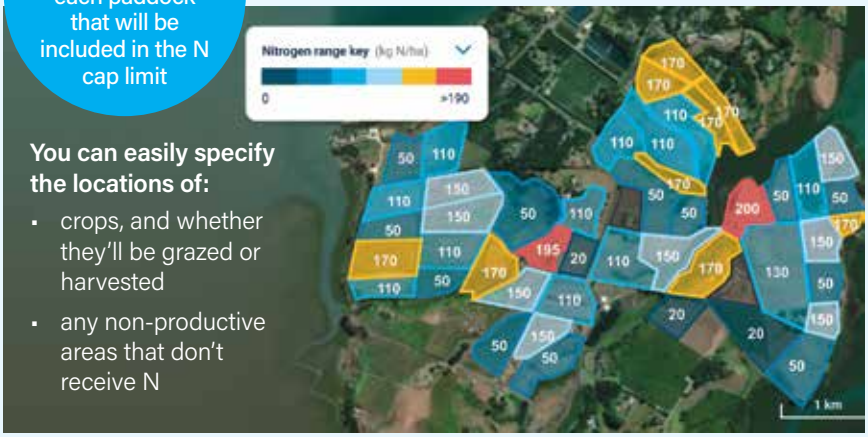
Features to help you stay on track



Your farm average N applied on grazed areas

How your average N use is tracking throughout the season compared to your planned N applications

A heatmap makes it easy to see N applied on each paddock that will be included in the N cap limit



You can easily specify the locations of:

- crops, and whether they'll be grazed or harvested
- any non-productive areas that don't receive N

Get ready to use it

Get ready to use the Nitrogen Limit Management tool when it's released in spring.

- ✓ If you're new to MyBallance, head to myballance.co.nz/register to activate your account.
- ✓ Check you have your digital farm map in MyBallance (or email gis.support@ballance.co.nz to have it uploaded).
- ✓ Ask your spreader which subscription their spreading hardware supports, and let Ballance Customer Services know on 0800 222 090.

If you're a Ballance customer, you'll get an email letting you know when the tool is available.

FOR MORE INFORMATION

For guides that explain the rules visit ballance.co.nz/essential-freshwater-policy

Contact your Ballance Nutrient Specialist to find out how My Pasture Planner can help optimise your N use.

See page 22 for more on MyBallance.

Nitrogen alternatives

What should you consider before using alternatives to synthetic nitrogen (N)?

With national caps on synthetic N use in force, some are turning their attention to other sources of N to apply on farm.

Biological fertilisers – dairy effluent, dairy whey, compost, and plant or animal waste such as chicken manure – contain N, but not the synthetic kind, so fall outside the N cap rules.

But before using a biological fertiliser, it's best to consider the following.

Can plants use the N?

Two broad types of N are applied to and found in the soil, but plants can only use one type (see Figure 1).

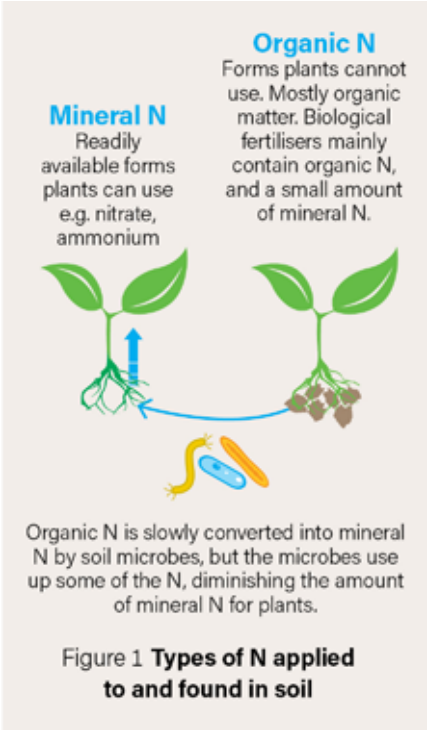


Figure 1 **Types of N applied to and found in soil**

What's the concentration of plant available N?

This is important as it determines the response from applying it. Some N may be initially available but the rate that organic N is made available to plants is determined by composition (including carbon:nitrogen ratio, below), temperature and moisture. See Figure 2.

What's the carbon:nitrogen ratio?

This is a major determinant of how fast organic N will be converted by microbes into plant available mineral N.

Carbon stimulates microbial activity, which increases competition between plants to consume N. But if the carbon:nitrogen ratio is too high, plants compete to take up mineral N quickly, so the total volume of mineral N in the soil is depleted and subsequent growth suffers. Material with a carbon:nitrogen ratio of 20 to 30:1 is typically best and promotes rather than suppresses plant growth[5].

What about other nutrients?

Many biological fertilisers have a large variation in nutrient content and rarely contain just one nutrient.

Testing biological fertilisers before application means their nutrient loading can be understood and recorded. This helps to account for other nutrients added to the farm, and to ensure all nutrients are supplied to the farm system to meet maintenance requirements.

Does it contain heavy metals?

Many composts contain some heavy metals, with levels depending on what the compost is made from. This could be undesirable for production, especially in organic systems, so test compost before application.

Could it damage soil health or the environment?

Soil health can benefit from biological fertilisers which build up organic matter quickly.

But care is needed to prevent liquids such as dairy effluent or whey from damaging soil health. Compared to manufactured fertilisers, they have lower concentrations of N, so large volumes are needed to provide N in the same amounts as manufactured fertilisers. Frequent application of large volumes of liquid wastes can damage soil structure, create chemical imbalances and potentially result in excess nutrients in nearby waterways.

Is it practical to apply?

Synthetic N products are designed to be easily applied to provide readily plant available N. Huge volumes of biological fertiliser are needed to get the immediate growth boost synthetic N application provides.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

1 Longhurst B, Rajendram G, Miller B, Dexter M 2017. Nutrient content of liquid and solid effluents on NZ dairy cow farms. Science and policy: nutrient management challenges for the next generation. Occasional Report No. 30. Fertilizer and Lime Research Centre, Massey University

2 Ashekuzzaman SM, Forrestal P, Richards KG, Daly K, Fenton O 2020. Grassland Phosphorus and Nitrogen Fertiliser Replacement value of Dairy Processing Dewatered Sludge. Sustainable Production and Consumption 25: 363-373

3 Compost Use and Soil Fertility [accessed May 2021] https://ag.umass.edu/vegetable/fact-sheets/compost-use-soil-fertility

4 Wiedemann SG 2015. Land Application of Chicken Litter: A Guide for Users. Australian Government Rural Industries Research and Development Corporation 14/095

5 Watkins M, Nash D 2010. Dairy Factory Wastewaters, Their Use on Land and Possible Environmental Impacts – A Mini Review. The Open Agriculture Journal 4: 1-9

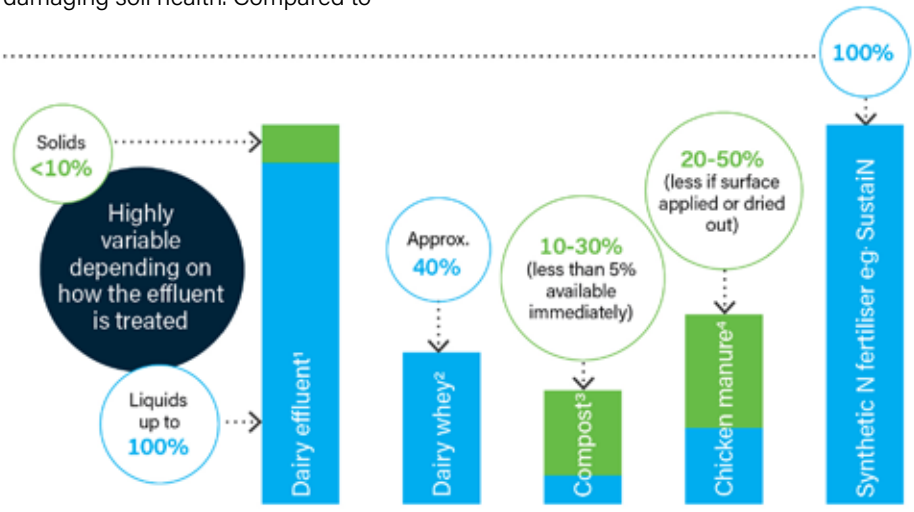


Figure 2 **Estimated percentage of N applied in biological and synthetic N fertiliser that is plant available within 1 year**

Which N is best?

Which produces the greatest pasture response – liquid, fine particle or granular nitrogen (N)?

With heightened interest in getting the best response efficiency from N applications (kg DM/kg N applied), we look at whether different N application methods actually live up to the claims sometimes made about them.

	Granular N	Fine particle N	Liquid N
Soluble solid N (e.g. urea)...	...in its original form	...finely ground into particles and suspended in water	...fully dissolved in water
Application	Spread (ground or aerial)	Sprayed (ground or aerial)	Sprayed (ground or aerial) Fertigation (applied with irrigation water)
Claimed to...	...produce a similar pasture response to other N application methods	...increase pasture response (compared to granular N) by: • distributing nutrients (N) more evenly • increasing leaf uptake • reducing losses via leaching and volatilisation	
Claims backed by science?	✓[1] A 2018 review of all know available research comparing fine particle and granular N found insufficient experimental evidence to show any agronomic advantage of fine particle over a granular fertiliser product[1]	✗[1]	✓[1] and ✗[1] ✓ Distributes N more evenly ✗ Does not increase pasture nitrogen efficiency[1] A 2018 review found liquid N had no significant pasture response efficiency gains compared to granular N[1]
Science says pasture response is...	-	similar to granular N[2] ≈	similar to granular N[1] ≈
Other pros ⊕	Can apply other nutrients alongside N	Can apply other additives or multiple nutrients	Convenience of applying with irrigation Can be applied with gibberellic acid Fertigation distributes nutrients evenly
Other cons ⊖	Possible compatibility issues if mixing with incompatible products	Application costs may be higher May take longer to apply	If high N concentration or applied in heat of day, can scorch leaves and reduce yield

Recent research: fine particle versus granular N

Fine particle application of N was not found to improve pasture response compared to granular N in research comparing the two methods[2]. The results of this research are in line with the 2018 research review (above).

The research assessed five treatments in a small plot trial on a Southland dairy farm:

- control (0 kg N/ha)
- fine particle application of SustaiN at 25 kg N/ha and 50 kg N/ha
- granular application of SustaiN at 25 kg N/ha and 50 kg N/ha.

To check for seasonal differences, the trial was replicated in spring and autumn, and pasture production was measured four and eight weeks after application.

Overall, fine particle application at either rate or in either season did not significantly increase pasture production compared to the equivalent granular N application (see Figure 1).

Both methods did increase pasture production compared to not applying any N, and the greatest response was produced by applying N treatments at the highest rate of growth in spring as compared to autumn.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist. For more on fertigation, see page 21.

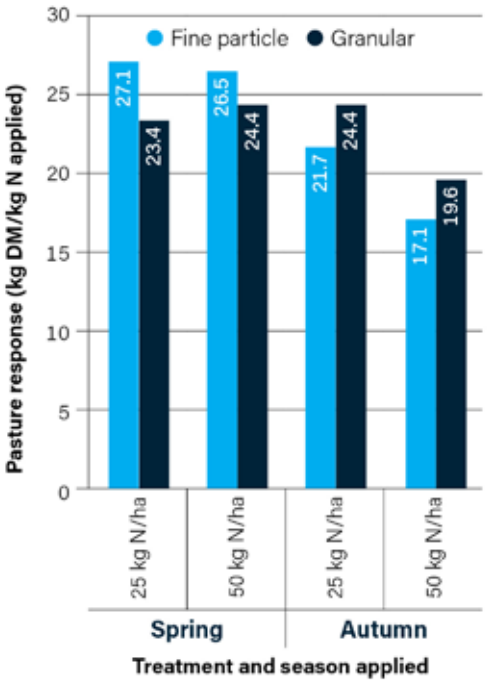


Figure 1 **Pasture response (measured over two cuts)[2]**

1 Morton J, Tillman R, Morton A 2018. Review of research on pasture yield response to fine particle application of fertiliser in New Zealand, New Zealand Journal of Agricultural Research

2 Risk JT, Dawson AE 2019. Comparing fine particle and granular nitrogen response on Southland pastures. Nutrient loss mitigations for compliance in agriculture. Occasional Report No. 32. Fertiliser and Lime Research Centre, Massey University

More now, less later

Gibberellic acid increases feed in the short term, but at the expense of yield in subsequent weeks.

Extensive trials have shown the plant growth hormone gibberellic acid – with or without nitrogen (N) – brings feed supply forward, but does not increase overall pasture yield[1,2,3].

Gibberellic acid is widely promoted as an enhancer of pasture growth, including when used with N fertiliser. Several years of local and overseas trials assessing the effectiveness of this combination, and of gibberellic acid alone, have shown increased pasture yield in the short term, but at the expense of reduced yield in subsequent weeks.

In the trials, pasture plots received one of the following:

- control - no treatment
- N fertiliser only - granular or liquid
- gibberellic acid - liquid
- N fertiliser plus gibberellic acid - granular N and solid gibberellic acid or liquid N and liquid gibberellic acid

Pasture was typically first harvested 21 to 25 days after application, to simulate grazing and assess the response, with subsequent cuts at four to six weeks.

New Zealand trials were conducted by independent researchers in Waikato,

Canterbury and Southland, and Northern Ireland trials were conducted by the Agri-Food and Biosciences Institute.

A declining difference

Overall, at first harvest plots treated with gibberellic acid alone had a strong pasture response and significantly higher yields. But in subsequent harvests, the yield advantage of the gibberellic acid treatment declined, and after several cuts the difference between gibberellic acid treated plots and control plots declined, so the gibberellic acid treated plots were not significantly different to the control.

Synergistic benefits?

To assess if adding gibberellic acid to N fertiliser has a synergistic effect compared to using N fertiliser alone, the two treatments were compared.

At all three NZ locations, there was no significant difference in total pasture yield between N plus gibberellic acid and N only treatments (see Figure 1), although both treatments produced significantly more pasture than the untreated control. Similar results were observed in the Northern Ireland trials.

The Northern Ireland trials included solid as well as liquid gibberellic acid. Only the liquid gibberellic acid produced a significant pasture response at the first cut, and the solid gibberellic acid did not produce a yield advantage at either first or second cut. This suggests foliar application of gibberellic acid is required for effective uptake by plants.

Results across all locations were consistent from year to year and not affected by variables such as season and soil type, and the findings of the NZ and Northern Ireland trials were largely consistent.

Overall results indicate that the benefit from gibberellic acid diminishes over multiple harvests, and that feed produced within the first three weeks of application comes at the expense of yield in subsequent weeks.

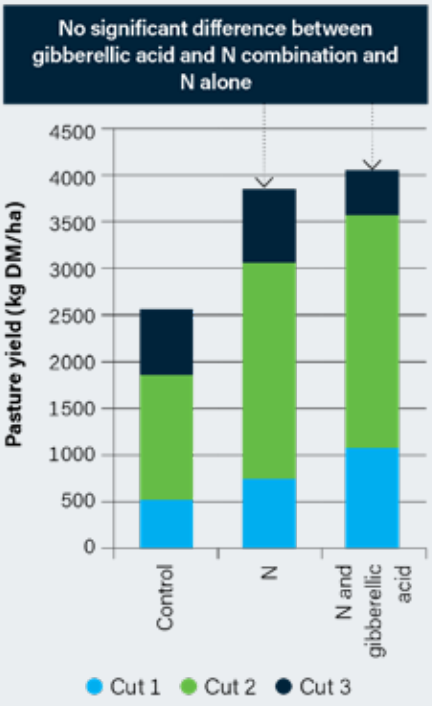
Using gibberellic acid (with or without N fertiliser) to bring feed supply forward may still be of value when there is a feed deficit, provided the deficit is not merely shifted. Rather than producing a large amount of additional feed, gibberellic acid has a greater role in shifting the time of the feed availability.

So for farmers, is the benefit of extra feed in the short term worth the costs of treatment and less feed in subsequent weeks?

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Figure 1 **Pasture yield in response to N fertiliser applications (30 kg N/ha) with or without gibberellic acid (30 g a.i./ha). Trials conducted in Southland, spring 2015**



[1] Higgins S 2016. *Comparison of the relative agronomic performance of several different plant growth promoting formulations in ryegrass-based pasture, under non-moisture limited late winter/early spring conditions*, Agri-Food and Biosciences Institute, Northern Ireland

[2] Higgins S, Watson C 2014. *Comparison of relative agronomic performance of several different plant growth promoting formulations in ryegrass-based pasture, under non-moisture limited late winter/early spring conditions*, Agri-Food and Biosciences Institute, Northern Ireland

[3] Ledgard SF 2016. *Review of research on effects of application of gibberellic acid alone or in combination with fertiliser nitrogen on pastures*, AgResearch report for Ballance Agri-Nutrients

More profit, less loss

Phosphorus (P) losses, which can affect farm profits and waterways, can be reduced.

"New Zealand soils are naturally low in P, an essential nutrient for growth, so it's added in order to grow pastures and crops," says Ballance Environmental Management Specialist Ian Power.

"But like nitrogen (N), if too much P is lost and ends up in waterways it can result in excessive aquatic plant growth and algal blooms."

How P is lost

Unlike N, which is mainly lost via leaching, P does not normally leach. Instead, most P losses to water occur via runoff from pastoral land, carrying soil particles with P attached.

"Sediment and P losses literally go hand in hand. Loss of topsoil is problematic for farmers, and also for waterways as it reduces water clarity and light for aquatic plants and animals."

Phosphorus is also lost as soluble P (from fertiliser or high fertility soil particles) that dissolves in water.

"This water soluble P can be the more concerning in certain situations, as it's immediately bioavailable for unwanted algae and aquatic weeds."

The drivers, risk factors and mitigations for P and sediment loss are often the same (see Table 1).

Reducing P fertiliser losses

"If it rains directly after a fertiliser containing mainly water soluble P, such as superphosphate or diammonium phosphate, is applied, some fertiliser P is inevitably lost. But luckily these losses can be reduced by up to 75 per cent by using a phosphate fertiliser with low levels of water soluble P, such as SurePhos[1]," says Ian.

Alternatively, the PastureSure range combines SurePhos with SustaiN, an N fertiliser that reduces N lost as ammonia gas by around 50 per cent (compared to standard urea)[2].

Most of the P in SurePhos and PastureSure slowly releases over a period of months, thus more P is retained and less is lost to the environment. Both also contain a small amount of water soluble P to boost pasture growth immediately.

SurePhos and the PastureSure range are currently only available at limited stores in the North Island.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Driver	Risk factor	Mitigation
Timing of P application	Soluble P runoff	Avoid applying P fertiliser when risk of high rainfall Use a fertiliser with low levels of water soluble P e.g. SurePhos, PastureSure
Pugging	Increased runoff	Minimise pugging of soil
Tracks, lanes and races	Runoff carries P and sediment to waterways	Divert runoff from tracks, lanes, and races to paddocks
Light soils (sandy, pumice)	Prone to erosion	Avoid grazing heavy stock on these soils and maintain pasture cover
Heavy clay soils	Reduced infiltration, increased runoff	
High Olsen P levels	Increased loss of P attached to sediment	Keep Olsen P to optimal levels Use a fertiliser with low levels of water soluble P e.g. SurePhos, PastureSure
High effluent application	Increased runoff	Increase effluent block area and/or reduce application rate
Stock (mainly cattle and deer)	Dung directly deposited in waterways Bank erosion	Exclude stock from waterways
Steep slopes	Landslide and surface erosion	Plant suitable trees, spaced appropriately, on at risk slopes Graze with smaller cattle or sheep
Heavy rainfall	Runoff leading to sediment and P loss	Install wetlands and/or detention bunds Use a fertiliser with low levels of water soluble P e.g. SurePhos, PastureSure

Table 1 **Drivers and risks of P and sediment losses and mitigations**

[1] McDowell RW, Smith C, Balvert S 2011. The environmental impact and agronomic effectiveness of four phosphorus fertilisers: Report for Ballance Agri-Nutrients, October 2011

[2] Zaman M, Saggar S, Stafford AD 2013. Mitigation of ammonia losses from urea applied to a pastoral system: The effect of nBTPT and timing and amount of irrigation. Proceedings of the New Zealand Grassland Association 75: 209-214

Phosphorus near seed

Crops with the right nutrients at sowing and during establishment are more likely to meet their yield potential.

Phosphorus (P) is one of the most critical nutrients for early plant development (the other being nitrogen).

Phosphorus helps with early root and shoot development. The effects of P deficiency on plants include poor seedling establishment and root development, stunted top growth and spindly stalks, leading to delayed maturity and poor seed and fruit set.

Phosphorus is a relatively immobile nutrient in the soil. Poor growth conditions during early stages can impair the plant's ability to forage for nutrients, making it even harder for crops such as brassicas, which are already poor foragers of nutrients.

Application method makes a difference

Starter fertiliser placed in close proximity to the seed provides the P for early root development and growth. Seedlings can access these nutrients much more easily than if fertiliser is broadcast on the soil surface.

Research commissioned by Ballance has shown the yield benefits in brassicas by placing P close to seed[1]. Compared to broadcasting, P drilled with the seed increased yield by almost 2 t DM/ha. Broadcasted P, however, is better than no P at all, and increased yield by almost 2 t DM/ha compared to the control, and by more than 2 t DM/ha when it was incorporated into the soil (see Figure 1).

These findings can be applied to help improve nutrient use efficiency (t DM grown/nutrient applied) and reduce nutrient losses.

Products for proximal P placement

Starter fertilisers drilled close to seeds place high concentrations of the nutrients critical for a good start in the best position (see Table 1).

Ideal for cereals, the compound fertiliser YaraMila Actyva S is easy to drill, with smooth, free flowing granules less prone to clogging drilling equipment. It also spreads well, with tests showing it can be spread up to 32 m bout widths on well calibrated spreaders.

For fodder beet and shallow rooted brassicas such as turnips and swedes Cropzeal Boron Boost is ideal. These crops all require boron, and Cropzeal Boron Boost can be drilled next to the seed with relative safety at rates of up to 150 kg/ha without harming the seed. It can also be broadcast at higher rates. Molybdenum, also important for brassicas, is best addressed in the regular fertiliser programme as required.

As compound fertilisers, both YaraMila Actyva S and Cropzeal Boron Boost have a specific ratio of nutrients in each granule, so provide nutrients evenly, promoting even growth and reduced risk of striping.

Drilling starter fertiliser enhances establishment

- With no-tillage cropping, drilling starter fertiliser makes up for the lack of soil mineralisation that comes with cultivation.
- In cultivated soil, starter fertiliser enhances seedling establishment because cultivation often brings low fertility soil to the surface where small seeded crops are sown.

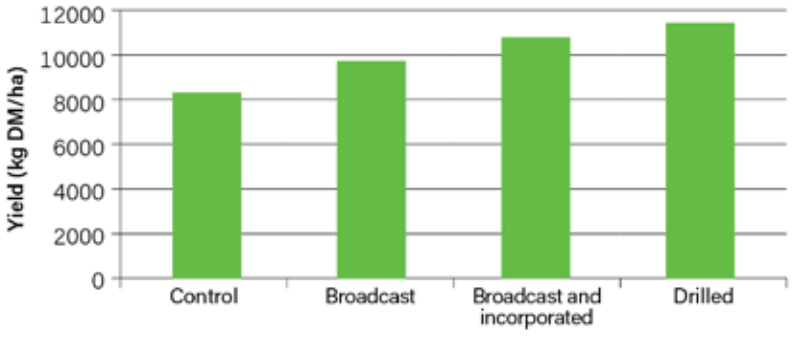
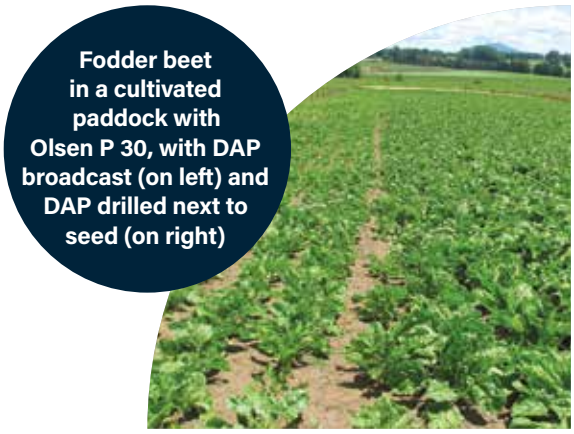


Figure 1 **Effect of P application method on kale yield**



Fodder beet in a cultivated paddock with Olsen P 30, with DAP broadcast (on left) and DAP drilled next to seed (on right)

Table 1 **Starter fertilisers that can be drilled for cereal crops, brassicas and fodder beet**

Crop	Fertiliser	Nitrogen %	Phosphorus %	Potassium %	Sulphur %	Also contains
Cereals	YaraMila Actyva S	15.0	7.0	12.5	3.0	Magnesium
Brassicas and fodder beet	Cropzeal Boron Boost	16.0	19.5	0.0	1.0	Boron

[1] Fletcher A, Wilson D, Maley S, Sinclair K, Arnold N, de Ruiter J, Armstrong S 2008. Crop & Food Research Confidential Report No 2225: Yield responses of forage brassicas to phosphorus rate and placement at sowing and to nitrogen application

Two sides of copper

Too little or too much copper (Cu) can cause problems.

Copper (Cu), an essential micronutrient, is frequently added with fertiliser, but deficiency in both plants and animals is increasingly widespread as farming removes soil's natural Cu reserves.

Copper is needed by plants for photosynthesis, transpiration and nitrogen fixation. Animals also need Cu for functioning of the nervous and immune systems, bone growth and hair or wool pigmentation.

Some caution is needed, however, as excessive Cu intake can cause Cu toxicity in animals.

Copper deficiency

Low Cu soil or pasture levels can cause Cu deficiencies in both plants and animals ('simple deficiency') and deficiencies can also be induced, for example when a high soil pH decreases Cu availability to plants (see Table 1).

Animal Cu deficiencies are more common in young stock, and deer and cattle have greater Cu requirements than sheep.

Pasture testing is required to diagnose a simple deficiency in both plants and animals (see page 16 for more information on herbage testing for Cu). Visual diagnosis is insufficient, as a number of other issues produce similar symptoms, and soil testing does not indicate Cu levels of pasture.

Copper toxicity

Excessive Cu intake from drenches, licks, or from eating pasture recently fertilised with Cu additives can cause Cu toxicity, especially in sheep, which are more sensitive to Cu toxicity than cattle and goats.

Symptoms in affected animals include depression, lethargy, weakness, jaundice, anorexia and thirst.

Some supplements such as Palm Kernel Expeller (PKE) can have high Cu levels, and if fed in large amounts can push cows into the toxic range (especially if Cu levels in the pasture are already high), making them more vulnerable to death during stressful times such as calving.

	Plants	Animals
Possible causes	**Simple deficiency**: Low Cu levels in soil / Low Cu levels in pasture **Induced deficiency**: Alkaline (high pH) soils, soil compaction, drought, very wet soils, heavy liming (may be a short term effect) / Molybdenum, iron, sulphur and zinc affecting Cu absorption and utilisation	
Risk factors	Sands, marine and river silts, peats, podzols, limestone soil with high pH	▪ Young stock ▪ Grazing on brassicas (Cu levels usually too low for animal health)
Symptoms include	▪ Stunted growth, wither tip (tip goes white) ▪ Clovers and other legumes more sensitive than grasses	Joint inflammation, bone fractures, osteochondrosis, loss of co-ordination in hind legs, chronic diarrhoea in spring (peat scours), change in hair pigmentation, reduced immunity to disease
Diagnosis	**Simple deficiency**: Pasture testing **Induced deficiency**: Soil testing / If pasture testing indicates Cu deficiency (under 4 mg/kg DM) test blood or liver samples to confirm if deficiency is also induced	
Treatment	Apply Cu with fertiliser	▪ Veterinary treatment ▪ Supplements e.g. Seales Winslow Cattle Winter Crop Block ▪ Applying trace elements to pasture

Table 1 **Cu deficiency in plants and animals**

FOR MORE INFORMATION Contact your Ballance Nutrient Specialist.

What's in it?

We take a look at the nutrient content of some of Ballance's key products.

SustaiN Powered by AGROTAIN

	N	P	K	S	Mg	Ca
SustaiN	45.9	-	-	-	-	-
SustaiN 20K	27.5	-	20.0	-	-	-
SustaiN Ammo 30N	29.8	-	-	13.7	-	-

SurePhos

	N	P	K	S	Mg	Ca
SurePhos*	-	7.8	-	9.5	2.0	22.0

PhaSedN

	N	P	K	S	Mg	Ca
PhaSedN	25.3	-	-	28.5	0.1	5.7
PhaSedN Quick Start	31.3	-	-	17.0	-	2.3

Superten

	N	P	K	S	Mg	Ca
Superten	-	9.0	-	10.5	-	22.0
Superten 10K	-	7.2	10.0	8.4	-	17.6

PastureSure Powered by AGROTAIN

	N	P	K	S	Mg	Ca
PastureSure 10K*	7.6	4.9	10.0	6.0	1.3	14.0
PastureSure 15S*	9.5	5.9	-	15.0	0.8	15.8
PastureSure Impact*	12.1	5.7	-	7.0	1.5	16.2

Sulphurgain Pure

	N	P	K	S	Mg	Ca
Sulphurgain Pure	-	-	-	90.0	-	-

Pasturemag

	N	P	K	S	Mg	Ca
Pasturemag	6.9	5.8	-	7.1	4.3	14.0
Pasturemag 10K	5.5	4.6	10.0	5.7	3.4	11.2

* North Island only

Nrich SOA

	N	P	K	S	Mg	Ca
SOA (Nrich SOA)	19.5	-	-	22.0	-	-

Cropzeal

	N	P	K	S	Mg	Ca
Cropzeal 15P	13.2	15.0	12.5	0.8	-	-
Cropzeal 20N	18.6	10.5	-	11.5	-	-
Cropzeal Boron Boost	16.5	19.5	-	1.0	-	+ Boron

	N	P	K	S	Mg	Ca
Serpentine Super	-	6.8	-	8.4	5.0	16.5
Serpentine Super 10K	-	5.4	10.0	6.7	4.0	13.2
Kieserite Granular	-	-	-	16.0	16.0	
Calmag	-	-	-	-	38.0	1.7
Triple Superphosphate	-	19.0	-	-	-	13.0
Muriate of Potash	-	-	50.0	-	-	-
Sulphate of Potash	-	-	41.0	17.0	-	-
DAP	17.6	20.0	-	1.0	-	-

YARA

	N	P	K	S	Mg	Ca
Yaramila Actyva S 15-7-12.5	15.0	7.0	12.5	3.0	1.2	-
YaraMila 12-10-10*	13.0	10.5	10.0	2.0	1.0	-
YaraMila Complex	12.0	5.0	15.0	8.0	1.6	-
YaraBela CAN	27.0	-	-	-	2.0	4.0

FOR MORE INFORMATION

For the nutrient content of all Ballance products, see the price list at bit.ly/35Mfi3A

Testing above ground

Herbage testing is valuable for identifying issues that soil testing cannot.

"If productivity is less than expected, a macro- or micronutrient deficiency, or both, could be the issue," says Ballance Environmental Management Specialist Ian Power.

Regular soil testing identifies macronutrient deficiencies, but what about micronutrients?

"For micronutrients, soil testing is only suitable for boron, and the only way to accurately assess if other micronutrient levels are adequate for production is by herbage testing."

This is because plant uptake of micronutrients can be affected by factors such as soil type, soil compaction, soil pH and soil moisture. Herbage testing can also measure plant concentrations of macronutrients, and thus reflect the nutritional intake of grazing animals.

What type of herbage sample?

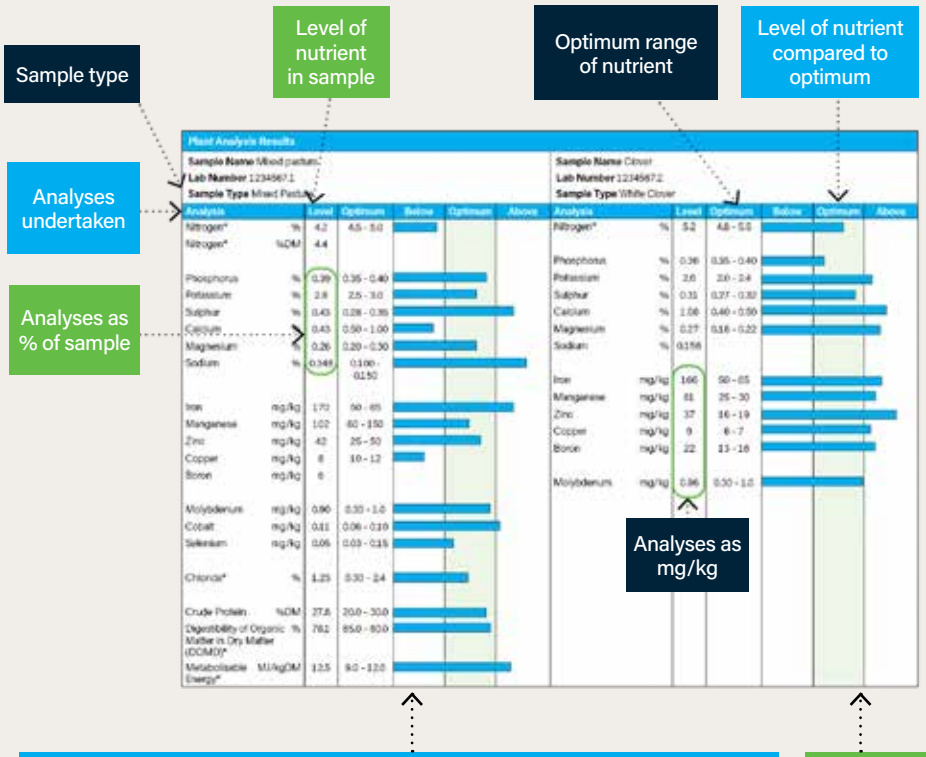
Different types of samples serve different purposes (see below). When taking a sample prior to grazing, avoid atypical areas such as urine patches, fence lines, gateways and close to troughs, hedges and trees.

What are you testing for?

Nutrient deficiency	Nitrogen deficiency	Nutritive value of plant to animals
Take a clover only sample	Take a grass only sample	Take a mixed pasture sample

Understanding herbage test results

Herbage test results provide a lot of information, as shown in this example.



"Generally, below optimum nutrient levels in clover samples could mean pasture growth is being restricted, and nutrients may need to be applied," says Ian.

"However, other issues may be impacting the clover's nutrient uptake, such as soil compaction, insect and other pests, pH and other nutrient levels. For example, if manganese (Mn) levels in the clover are low the soil pH may be high and restricting Mn uptake. If an issue with nutrient uptake is suspected, then herbage tests results should be looked at in conjunction with a soil test and a site inspection for factors that could reduce nutrient uptake."

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

The mixed pasture sample has:

- 0.39% phosphorus (3.9 g phosphorus in each kg of dry matter)
- 8 mg/kg copper (0.008 g copper in each kg of dry matter)
- below optimum nitrogen, calcium and copper, and all the other nutrients at or above optimum.

The white clover sample has:

- 0.36% phosphorus (3.6 g phosphorus in each kg of dry matter)
- 9 mg/kg copper (0.009 g copper in each kg of dry matter)
- all the nutrients at or above optimum.

K response on brassicas

In what circumstances should potassium (K) be applied to a brassica crop?

Brassicas take up large amounts of K – second only to the amount of nitrogen (N) they take up. A kale crop removes even more K than N.

But applying K does not always improve crop yield.

Potassium is one nutrient that plants can take up more of than they need (luxury uptake), resulting in plants containing excess K. Excessive application (or poorly timed applications) of K can contribute to luxury uptake, and waste money with no additional yield.

Brassicas are usually grazed in situ and often grown on soils with varying levels of fertility, so the yield response from applying fertiliser can be variable. While New Zealand's young soils generally have adequate levels of readily available K for brassicas, the amount of K available for plant use depends on several factors such as the soil type, past K inputs and land use.

An initial soil test prior to planting will help determine fertiliser application for optimal yield and economic return. The challenge lies in using the soil test results to decide on the types and amounts of fertilisers to apply, including how much, if any, K fertiliser to apply.

Research on K response

One example of research in response to this challenge tested three levels of K on swedes with a soil test level of MAF QT K 4[1]. Potassium was applied at 0, 50 and 100 kg K/ha. Overall the trial showed no significant effects from added K on total dry matter yield (see Table 1).

Herbage K levels, monitored four times between 7 February and 15 March, were highest on K treated plots at the first sampling date, then dropped and remained similar to each other across the remaining sampling dates (see Figure 1).

This suggests that regardless of K treatment, herbage K levels were sufficient for yield, explaining why there was no response to added K at this trial site.

This result is supported by other work which has found similar results of no response to K added to brassicas such as swedes and turnips with adequate soil K levels.

For example, there was no response to K application in a 2008-9 Taranaki turnip trial at MAF QT K 5[2].

A 2006 study found there was seldom a response to K inputs when there was sufficient supply of K in the soil[3].

A response is only observed if soil K tests are very low. For example, in a 2008-9 swede trial with low soil K levels (MAF QT K of 2), the response was due to the high yield potential and low soil test K value at the site[2].

Recommendation for K

According to research, K is only recommended to be added to a crop for a K response when the soil K test is low. As a rule of thumb, as the soil test drops below 5 an increasing amount of K (i.e. 50-100 kg K/ha) can be applied to ensure any yield response is achieved at low soil K levels. If soil K levels are 5 or more, no K is required.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

[1] SD Armstrong, RC Butler, S Gowers 2000, swede and kale fertiliser application trials 199/2000 Crop and Food Research confidential report No. 295. Report prepared for Southfert.

[2] Fletcher AL, Johnstone P, Maley S, Arnold N, Read JB, Zyskowski RF, Chakwizira E, Minchin R 2011. Development of the Forage Brassica Calculators – trial results. Report prepared for Ballance Agri-Nutrients by Plant & Food Research

[3] Wilson DR, Reid JB, Zyskowski RF, Maley S, Pearson AJ, Armstrong SD, Catto WD, Stafford AD 2006. Forecasting fertiliser requirements of forage brassica crops. Proceedings of the New Zealand Grassland Association 68: 205-210

Table 1 **Yields for 1999/2000 swede K fertiliser trial**

	Total dry matter (t/ha)		
Treatment (kg K/ha)	0	50	100
Winton cultivar	15.66	16.58	16.22
Doon Major cultivar	12.66	12.35	12.73
Least significant difference (5%)		1.3	

What's this? To be real (with 95% confidence), the difference between the treatments must be greater than this figure. When it isn't, there is no significant difference between treatments.

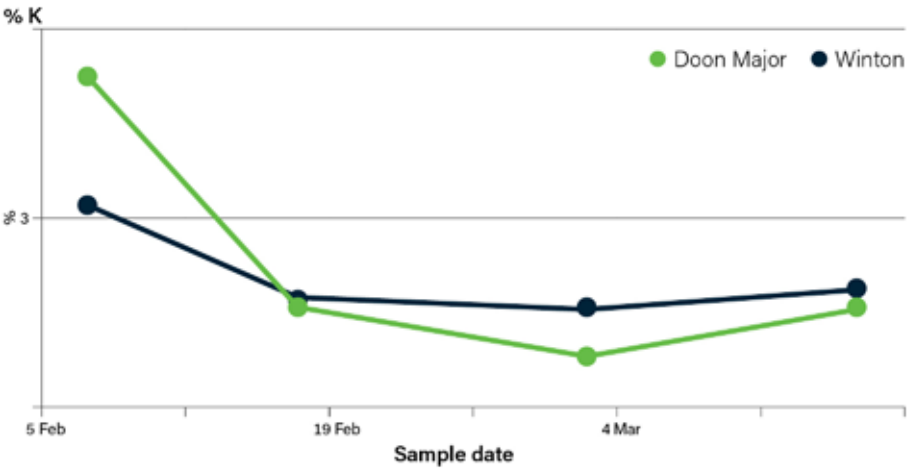


Figure 1 **Effect of adding K to leaf K levels in 1999/2000 swede K fertiliser trial**

Is more intensive better?

Does more intensive soil sampling improve return on investment (ROI)?

"Soil testing is known to effectively monitor soil fertility trends over time, and we've noticed a growing interest in all paddock testing and other more intensive soil sampling," says Ballance Science Extension Officer Angus Dowson.

"This is largely driven by a desire to optimise nutrient inputs and crop responses, and advances in GPS and GIS technology make it possible."

On the surface it seems logical: more sampling captures more detailed variability in soil fertility so enables more tailored fertiliser recommendations and an improved ROI. But is this actually the case?

More not always best

A review of current soil sampling methods concluded that variability in soil fertility, maximum potential yield and crop value need to be considered when choosing a soil sampling strategy[1].

"Most importantly, farmers who are interested in all paddock testing need to have a plan for how to use the data to ensure they get an ROI," says Angus

Traditional versus all paddock testing

	Traditional approach	All paddock testing
Approach	▪ Soil test areas based on expected differences in fertility due to soil type/management/crop	▪ Soil test every individual paddock
Pros	▪ Captures broad variations and trends in soil fertility ▪ Cost-effective (1-2 tests per management unit)	▪ Captures more detailed variation in soil fertility ▪ Allows for more tailored fertiliser plan
Cons	▪ Loses some of the inter-paddock variation	▪ Higher cost ▪ Time consuming
When to use	▪ Soil testing history is good ▪ Paddocks have not been reformed during farm development ▪ Fairly consistent long term farm/ nutrient management ▪ Well established soil test transects	▪ Soil testing history not good ▪ Paddocks have been reformed during farm development/conversions ▪ Precision technology already used on farm

FOR MORE INFORMATION Contact your Ballance Nutrient Specialist.

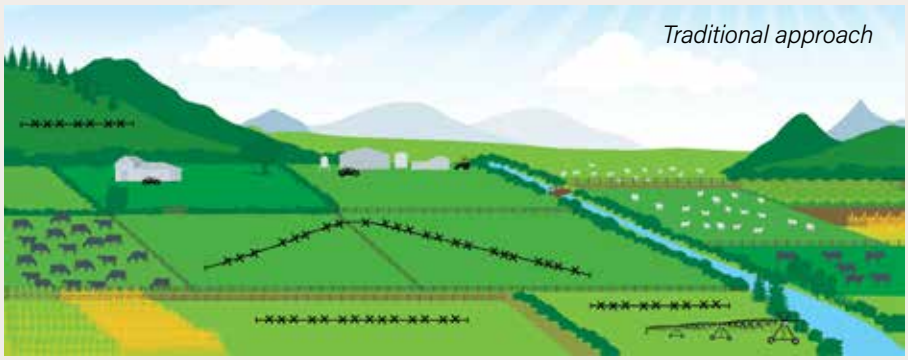
[1] Knowles O, Dawson A, 2018. Current soil sampling methods - a review. Farm environmental planning – Science, policy and practice. http://flrc.massey.ac.nz/publications.html. Occasional Report No. 31. Fertilizer and Lime Research Centre, Massey University

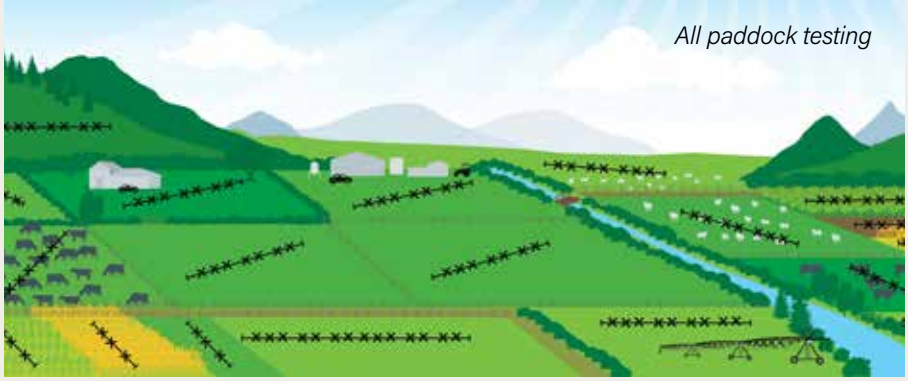
Which approach should I use?

"All paddock testing can be a valuable tool for farmers who are already using precision technology, such as electromagnetic soil mapping, and precision planters and fertiliser spreaders to optimise crop yields," says Angus.

"It can also be useful in situations where a farm's base fertility is completely unknown, with no or poor soil testing history, such as after a farm purchase. All paddock testing can help to guide sampling in the future.

"But if soil test history is good, blocks have been well established, and management is 'stable', traditional 'directed' soil sampling of blocks or land management units is perfectly adequate for creating robust fertiliser plans."





Sustainable soil tests

Good management can prevent cadmium (Cd) from accumulating to potentially harmful levels in soils.

Cadmium is a naturally occurring element found in many phosphorus (P) fertilisers, that, at elevated levels, can be toxic to humans and livestock.

Sensible fertiliser use and farm management will keep cadmium accumulation to a minimum, and our soils healthy, now and in the future.

The Tiered Fertiliser Management System (TFMS) is recommended for all farmers, especially those applying more than 30 kg P/ha/year. The TFMS came out of a 2011 national strategy to minimise the potential risks of cadmium in rural production.

The TFMS uses an initial Cd soil test result to determine management actions (soil testing and fertiliser use). Most farms are in tiers 1 or 0, which require retesting in five years (see Table 1).

Testing for cadmium

The TFMS relies on effective, appropriate and accurate soil testing, and there are three approaches, each of which should be used in different circumstances (see Figure 1).

FOR MORE INFORMATION

ballance.co.nz/cadmium-management

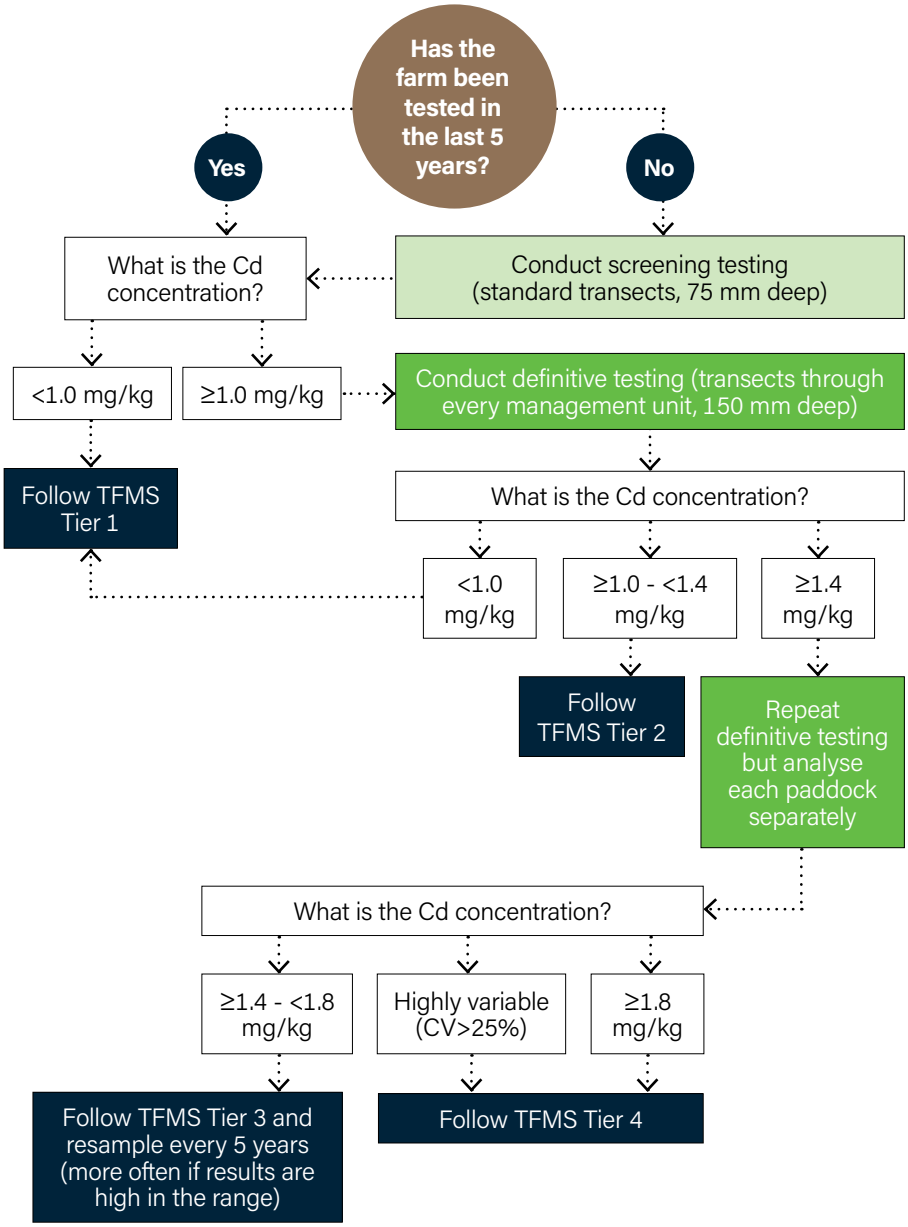


Figure 1 **Cadmium testing approaches and TFMS tiers**

Table 1 **Summary of Tiered Fertiliser Management System (TFMS)**

Tier	Soil Cd concentration (mg/kg)	Summary of management actions
0	<0.6	▪ Retest in 5 years
1	≥0.6 - <1.0	▪ Retest in 5 years ▪ Restrict fertiliser product choice based on application rate
2	≥1.0 - <1.4	▪ Restrict fertiliser product choice based on application rate ▪ Limit rates of application
3	≥1.4 - <1.8	▪ Restrict fertiliser product choice based on application rate ▪ Further limit rates of application
4	≥1.8	▪ No further cadmium accumulation permitted ▪ Site-specific investigation required

Is calcium needed?

Do we need to add calcium (Ca) to our soils or not?

"Plants need Ca, but deficiency is virtually unknown in New Zealand as our soils are naturally quite high in it," says Ballance Environmental Management Specialist Ian Power.

While an absolute Ca deficiency has never been reported in New Zealand for pasture or crops, in some fruit at certain times demand can outstrip supply.

For example, Ca deficiency can cause bitter pit in apples, and calcium chloride or calcium nitrate sprays are used to prevent it from occurring.

"Some consultants who follow the ratio theory might recommend high inputs of Ca," says Ian.

The ratio theory proposes that the ratio of Ca, potassium, and magnesium (Mg) are important, and that plants grow best in a soil with 60-80 per cent of the available cation exchange sites occupied by Ca.

"But in most situations this is unnecessary, as there is sufficient Ca in most soils. The ratio theory also results in inefficient use of resources, according to an examination of data from numerous studies." (See page 19 of Grow Spring 2020 for more information.)

Possible pitfalls

"Besides the fact that there is sufficient Ca in our soils, applying it can cause animal health issues," says Ian.

For dairy cows, a high dietary intake of Ca can cause milk fever, and it is recommended to avoid lime application several months before calving and to also avoid direct Ca supplementation during the dry period (non-lactating period before calving).

Applying Ca to the soil can also exacerbate the leaching of Mg. When the ratio of Ca to Mg increases, the Ca can displace some of the Mg bound on the cation exchange sites, so more Mg is in the soil solution and at risk of leaching.

Many fertilisers applied to supply other nutrients also contain Ca (see Table 1).

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Table 1 **Some Ballance fertilisers containing Ca**

Fertiliser	Ca %
SurePhos	22
PastureSure range	11.8 - 16.5
Superten	22
Potash Superten blends	11 - 19.8
Sulphurgain blends	13.8 - 21
Serpentine Super	16.5
Potash Serpentine Super blends	8.3 - 14.9
PastureMag range	6.6 - 14
Gypsum	20 - 23
Lime	30 - 40
Dolomite	15 - 20
Ballance Dicalcic Pastoral	30.9
Reactive phosphate rock (RPR)	30 - 35

Calcium's role in soil and plants

In soil, Ca affects soil aggregate stability (regulation of the movement and storage of air and water throughout the soil profile).

In plants, Ca is a component of cell walls and membranes, is required for protein synthesis and ion uptake, mediates some enzyme reactions and is important for root and tip development.

A pivot that irrigates and provides fertiliser.

Spotlight on fertigation

More light is being shed on using fertigation to get the most from nitrogen (N) applications.

A Sustainable Farming Fund (SFF) project is investigating if urea applied by fertigation could increase N use efficiency, clover content, and pasture production and quality compared to solid urea.

In the project's first year, which involved two trials at Lincoln University during the 2019/20 season, fertigation did not result in an increase in pasture production or quality across different N treatments.

In the first trial, solid urea fertiliser was applied and irrigated either immediately or two days later, or was fertigated (dissolved in water and applied with irrigation) onto mixed perennial ryegrass and white clover pastures. Over a period of eight months, seven harvests were taken, with each of the three application treatments producing similar amounts of dry matter (DM).

In the second trial, pasture production was compared across different application frequencies. Nitrogen was either fertigated once a month or weekly onto mixed perennial ryegrass and white clover pastures. An identical total amount of N was applied in both cases – 25 kg N/ha once a month or 6.25 kg N/ha per week. Both approaches again produced similar amounts of DM.

Pasture quality was not affected by application method, frequency or rate, with all treatments producing similar amounts of crude protein, neutral detergent fibre content and metabolisable energy.

Effects of season and rate

The second year of the project involved two trials at Lincoln University during the 2020/21 season, looking at the effect of fertigation only in shoulder months, and of varying application rates.

One trial tested whether applying fertiliser only in shoulder months (as opposed to throughout the season) would produce similar pasture production and quality, due to increased clover content boosting production throughout the summer season.

A second trial, looking at fertigation application rates, compared the pasture production, pasture quality and clover content produced by fertigation at 16 kg N/ha, 20 kg N/ha and 24 kg N/ha.

IrrigationNZ plans to release the results of these trials in spring 2021.

Future directions

The project hopes to provide irrigators with clear information for successful fertigation, including advice on how to successfully design, install, and manage fertigation systems. Irrigation systems with fertigation must generally be managed differently to conventional irrigation systems.

Trials to date have been conducted on cut and carry blocks, and future trials may also consider nutrient transfer from grazing animals. Additional measurements including N leaching and N fixation will also be important to consider under a fertigation and conventional dairy farm system.

Ballance is collaborating with IrrigationNZ, the Ministry for Primary Industries, Pāmu Farms of New Zealand and others on this project.

FOR MORE INFORMATION

The project's year 1 summary results report is available at bit.ly/3zeEuwj

PHOTOS: IrrigationNZ

Lincoln University Masters student Tommy Lee worked on the trials.

Innovation & Collaboration Project Award - Hiringa Energy Executive Director and Co-Founder Cathy Clennett and Ballance CEO Mark Wynne

Celebrating success

Ballance's work and investment in science, innovation and communities were celebrated at the 2021 Primary Industry New Zealand Awards last month.

"We were proud to be a finalist in three out of the seven categories – it's real recognition of the leadership and innovation across our Ballance team," says Mark Wynne, Ballance CEO.

Ballance's joint hydrogen project with Hiringa Energy won the Innovation & Collaboration Project Award. The project will use wind energy to produce green hydrogen to power Ballance's Kapuni plant, and produce low emissions nitrogen fertiliser.

Surfing for Farmers, a programme that enhances farmers' wellbeing by getting them off farm and into the surf, took out the Team Award. Ballance's East Coast team is a founding, premium sponsor of Surfing for Farmers.

The leadership qualities of Ballance Science Extension Officer Angus Dowson were also recognised at a national level, with Angus in the top three vying for the Emerging Leader Award.

Team Award - Surfing for Farmers

PHOTOS: Clare Toia-Bailey / image - central

"It's important that we share our stories and celebrate all the hard work being done in the primary sector, that's why we enter these awards," says Mr Wynne.

"We all want a productive and sustainable future – producers and consumers. Awards like this help encourage people and businesses to make that happen through hard work and investment."

New MyBallance app

The new MyBallance mobile app makes it easy to access your farm's nutrients from anywhere.

Using the MyBallance app, which launched earlier this year, you can view and order from your fert recommendations, view soil tests, and place new product orders, wherever, whenever. We've also integrated mapping into the order journey.

You can also use the app to check the weather on My Farm Forecaster, the most accurate weather forecast available in New Zealand.

The MyBallance app was developed as a result of research indicating people want to interact with Ballance when they're out on farm. More features will be added over time in response to usage and customer feedback. The app works on both Android and Apple.

MyBallance is available exclusively to Ballance customers and can be accessed on any laptop, desktop or tablet, as well as via the app. Ballance customers can activate their MyBallance account at myballance.co.nz. To become a Ballance customer and gain access to MyBallance phone 0800 222 090 or email customerservices-mount@ballance.co.nz.

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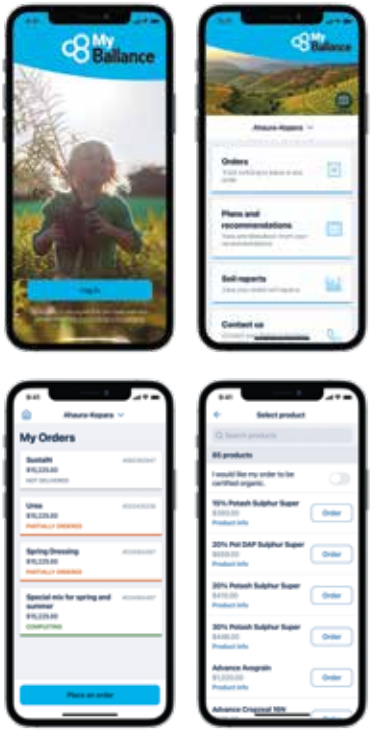
My Ballance



Family recipe for success

Balancing sustainability with profitability is a recipe for success for the award winning van Ras family.

The van Ras family are the Regional Supreme Winners for the Waikato in this year's Ballance Farm Environment Awards.

Two generations of the van Ras family are proud to call their 76 ha dairy farm, Waiorongomai Valley Farm, home, along with 215 cows and 8 ha of maize.

Johan and Kylie van Ras and Johan's parents Richard and Truus enjoy working together to build a successful family business. They purchased the farm together in 2010, after leasing it for six years.

Always on the lookout for ways to reduce their environmental impact, they are planting 8000 natives on a 4.5 ha riparian area as part of their Farm Environment Plan, and recycle their plastics and scrap metal.

Stock health is a priority, and a unique water treatment system for iron and manganese has had a big impact.

Their hunger for new ideas and information, along with their desire to share positive stories from the farming industry, spurred them to enter the Ballance Farm Environment Awards.

As Regional Supreme Winners, the van Ras family hosted a field day on their property in May, sharing their experience in getting the most from technology, riparian planting and best practice soil and fertiliser management.

In selecting them as the regional winners for the Waikato, the awards judges noted the family's desire to improve on current practices and plans, and their well paced progress based on soundly researched decisions. They stock according to the farm's limitations, maintaining stock wellbeing and performance.

As well as receiving this year's Regional Supreme Award, the van Ras family have also received the Ballance Agri-Nutrients Soil Management Award, DairyNZ Sustainability and Stewardship Award, WaterForce Integrated Management Award and Synlait Future Leaders Award.

Despite their achievements, the van Ras family remain humble and understated, and value their community.

Ballance Farm Environment Awards

The Ballance Farm Environment Awards celebrate farmer and grower achievement, showcase good practice and share positive farming and growing stories.

FOR MORE INFORMATION

nzfeawards.org.nz

2021 Ballance Farm Environment Awards Regional Supreme winners (left to right) Kylie, Johan, Truus and Richard van Ras

23695

Ballance agri-nutrients

Together,
Creating the Best
Soil and Feed on Earth

Meet the new MyBallance mobile app

Order products on the go

See and order from your fert recommendations

View latest soil tests

Easy log in with Touch or Face ID

Now it's easy to manage your farm's nutrients from anywhere

Our new mobile app is the easiest way to keep your farm at your fingertips. Now you can view and order from your fert recommendations, view soil tests, and place new product orders, wherever, whenever. That means more time out in the field and less time stuck in the office. Download the free app today.

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