Ballance agri-nutrients

GROW

NORTH ISLAND
AUTUMN 2016

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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 over 19,000 shareholders and sells around 1.7 million tonnes of product each year, representing a turnover close to $900 million. Its products include imported and locally manufactured fertilisers, many of which attract a rebate for shareholders.

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MAGNESIUM SEASON

Pasturemag is ideal to boost grass growth before winter and, in the long term, reduce your reliance on stock supplements to avoid magnesium deficiency.

'As a component of chlorophyll, magnesium is very important for plant growth,' says Ballance Science Manager Aaron Stafford. 'It's also important for animal performance. Animals don't store magnesium so an adequate daily supply is critical, especially before and after calving, when pasture magnesium levels are typically at a low while demand is high.'

Magnesium is often omitted from fertiliser when things get tight. Research has shown that without regular inputs, soil reserves gradually decline through leaching, transfer and removals, particularly in dairy systems. 'The longer this continues, the more you need to supplement your stock directly. At some point, the numbers stop stacking up in your favour.'

Pasturemag products can help reverse a downward magnesium trend and supply nitrogen to support grass growth heading into winter. 'Applied at 400-500 kg/ha, Pasturemag supplies around 15-20 kg of magnesium per hectare, as well as 25-35 kg of nitrogen, depending on which Pasturemag product you use.'

As an added advantage, the nitrogen in Pasturemag is supplied by SustaiN. SustaiN uses AGROTAIN® nitrogen stabiliser to protect your fertiliser investment by reducing nitrogen loss as ammonia gas. Without the urease inhibitor, typical ammonia emissions account for 10-20% of the nitrogen applied as urea, unless you get 5-10 mm of rainfall within the first few hours after application. Reducing ammonia loss means more nitrogen is available to support pasture growth.

To find the best approach to magnesium for your farm, call your Ballance Nutrient Specialist.

Magnesium for pasture

- Pastures in soils with Quick Test Mg levels less than 5 (or plant tissue Mg levels less than 0.10% in a mixed herbage test) are likely to respond to magnesium supplementation. Soil Mg should be kept above Quick Test Mg of 8-10 to prevent a deficiency developing
- Around 25 kg Mg/ha/year is enough to overcome most plant deficiencies
- Around 5-20 kg Mg/ha/year is required for maintenance, depending on intensity of the farm system, soil type and drainage properties
- To increase soil magnesium levels, around 7 kg Mg/ha is needed over and above maintenance requirements
- Overseer is useful for predicting changes in soil magnesium

Magnesium for animals

- Plant tissue Mg levels need to be greater than 0.2% to meet animal needs. This requires soil Quick Test Mg levels of 25-30. Supplementation will still be needed at peak demand times (two months before and after calving)
- To overcome animal magnesium deficiencies, 100 kg Mg/ha should be applied, followed by annual maintenance dressings. However, this is a longer term corrective approach. If animals are deficient they should be supplemented directly, e.g., via drenching, dusting, or addition of magnesium oxide into compound feed (e.g., SealesWinslow's Hi Starch), or by supplying magnesium chloride or magnesium sulphate via water systems or lick blocks pre-calving (e.g., Crystalyx Dry Cow). SealesWinslow's Cattle High Magnesium Block may also be used to provide support

POST-DROUGHT PASTURE BOOST

Recent research suggests pastures will respond if you apply nitrogen after the first drought-breaking rain.

'Traditional advice was against applying nitrogen fertiliser straight after the first rains arrive, since these are often not truly drought-breaking and soil mineral nitrogen levels are typically high after a drought,' says Ballance Science Manager Aaron Stafford. However, trials on drought-affected land in Hawke's Bay and the Bay of Plenty showed that applying moderate rates of nitrogen fertiliser - 25 or 50 kg N/ha - after the first rainfall produced useful pasture responses – between 4 and 10 kg DM/kg N applied - at the first harvest, only a few weeks after application (see Figures 1 and 2).

Importantly, even when the soil dried up again after the first rainfall (as was the case at the Bay of Plenty site) the full response to the fertiliser nitrogen was not lost. It carried on when further rain arrived, so that the overall response over consecutive cuts was around 12 kg DM/kg N applied. When a second harvest was taken subsequently, the effects were still obvious compared to plots that had not received nitrogen.

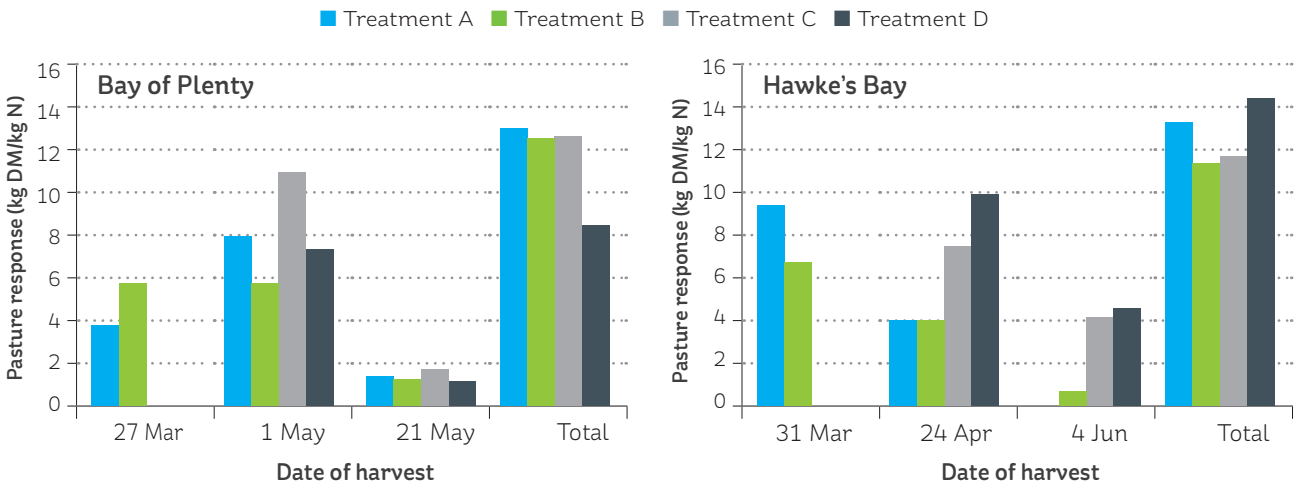
When the effect of applying nitrogen immediately after rain fell was compared to applying nitrogen after later rain, both approaches generated the same overall response. This means that the fertiliser nitrogen that was applied early was not lost or used inefficiently, even when the soil dried up after the initial rainfall.

Stock need good body condition scores going into winter, so they have a better chance of being in good condition for spring - otherwise liveweight gain, milk production and mating in the following season can be compromised. 'Speeding up pasture recovery out of a drought could make all the difference,' observes Aaron.

'If you've experienced drought conditions this summer, we recommend that you get nitrogen on as soon as possible after the first decent rain.'

What about nitrate poisoning?

At the test sites plant nitrate levels remained below 0.21% - the often-referenced 'critical' level, above which the risk of nitrate poisoning increases. However, you should still be aware of nitrate poisoning risk and take steps to manage it, since plant tissue nitrate levels can vary daily and even within a day (see page 7).



FIGURES 1 AND 2
Pasture dry matter response to urea applied to drought-affected land. Fertiliser nitrogen was applied after the first rainfall (treatments A (25 kg N/ha) and B (50 kg N/ha)) or following subsequent rainfall or irrigation (treatments C (25 kg N/ha) and D (50 kg N/ha)).

IS SLOW THE WAY TO GO?

Controlled-release nitrogen fertiliser may have the edge over quick-acting solid urea when growth rates are low or the risk of nitrogen loss is high.

Urea is concentrated, cost-effective and easy to handle, which has made it the traditional nitrogen fertiliser choice for New Zealand farmers.

Nitrate levels in the soil peak quickly after urea application. 'This surge is not helpful when growth rates are low and plants require a slow, steady supply of nitrogen over a long time,' observes Ballance Science Manager Aaron Stafford. 'Controlled-release products could better match plant needs and reduce the risk of excess nitrogen leaching into waterways.'

Most controlled release nitrogen fertiliser products currently on the market use polymer or sulphur coatings on standard soluble nitrogen fertilisers to slow down the release of nitrogen into the soil. The release period is determined by the thickness of the coating and the materials used. However, new controlled-release technologies are developing all the time.

Controlled-release nitrogen can be useful for fertilising autumn- or winter-sown vegetable crops, for use on high-drainage pastoral soils in autumn or winter or for autumn application on pastoral soils that are wet in spring.

'It can be difficult to get nitrogen on soon enough to meet early spring feed requirements. Ground and aerial spreading is often limited in spring by soil or airstrip conditions, as well as high demand for equipment or contractors when conditions are right. Adding a controlled-release nitrogen product to your autumn mix lifts feed going into winter and supports pasture growth into the early spring flush, with minimal risk of direct nitrogen loss from the product.'

Controlled-release nitrogen is typically more expensive, so you need to evaluate the need and benefits carefully. 'In the right circumstances, controlled-release nitrogen can offer advantages over solid urea for your production, farm management and risk management.'

To find out more about controlled-release nitrogen and its suitability for your farm, talk to your Ballance Nutrient Specialist.

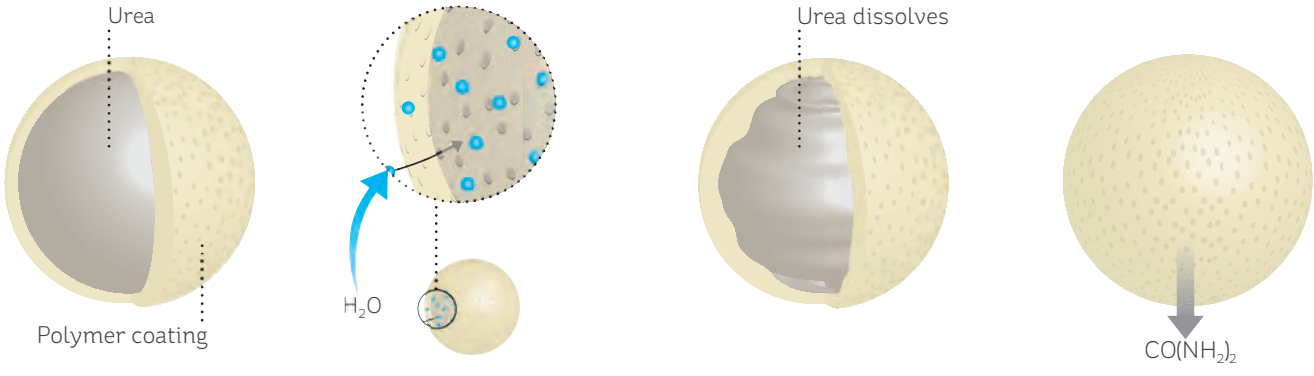
Considering controlled-release?

Answering some of these questions will inform your decision-making.

- Do you have room to improve? How much nitrogen are you removing in fruit or plant material? How does this compare to the amount of nitrogen you apply?
- Will you get better crop or pasture growth as a result?
- Is there an environmental need to consider?
- Could the same results be achieved by different means?
- Could it enhance your ability to plant at the optimum time?
- Could it allow for improvements to your farm management?
- Is it suited to your crop, soil and climate?

What about SustaiN?

SustaiN is not a controlled-release nitrogen fertiliser. It is urea coated with AGROTAIN® nitrogen stabiliser (a urease inhibitor). This minimises the loss of nitrogen to air once the fertiliser has dissolved into the soil. However, it doesn't regulate the rate of nitrogen release into the soil.



A polymer coating surrounds urea granules

Water can pass through the membrane

Once inside, water causes the urea to dissolve

Urea passes out through the membrane very slowly

FIGURE 1
Polymer coatings may be used to slow down the release of nitrogen into the soil

PUTTING N IN PLANNING

Nitrogen-boosted pasture typically costs less per kilo of dry matter than other supplements. A well-thought out nitrogen plan will help you take advantage of this fact.

'Planning ahead for phosphorus, potassium and sulphur application is pretty commonplace, but nitrogen use is often fairly reactive,' observes Jim Risk, Ballance Nutrient Dynamics Specialist. 'Taking a more proactive, planned approach will help you get the best value out of your nitrogen investment.

'Developing a nitrogen plan takes a bit of work up front, but it can result in a steadier feed supply, reducing the need to bring in feed at critical times, easing stress and improving your chances of fulfilling your farm's production potential.'

Farmers who have a nitrogen plan for the year are in a much better position to apply nitrogen fertiliser well before a predicted feed deficit. 'This is important, since you need to allow sufficient time for the pasture to respond to nitrogen fertiliser,' says Jim. 'To get the timing right, you have to factor in how your pasture will respond to nitrogen.'

The time needed to achieve a full response could vary from 3 to 14 weeks, depending on soil temperature, soil moisture, plant growth rate, available nitrogen in the soil and the rate of nitrogen applied.

'If you get a Total N soil test done, then we can use our N-Guru software to predict the likely response of pasture to nitrogen fertiliser,' notes Jim.

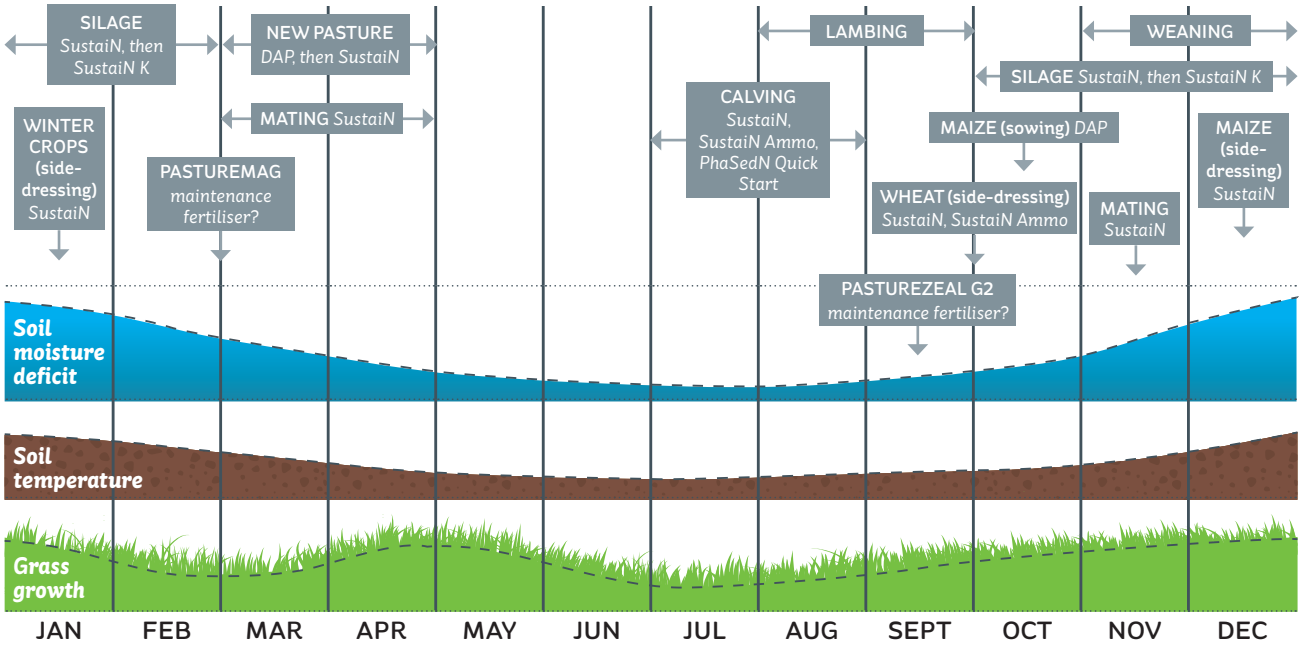
We've listed some general guidelines for developing a nitrogen plan in the panel to the right, but if you'd like some help or extra information, talk to your Ballance Nutrient Specialist.

Developing your N Plan

1. Plot your grass growth (or typical DM/ha levels) on a month-by-month calendar
2. Add in the average monthly soil temperature and soil moisture data for your farm
3. Mark in your critical feed times, e.g. mating, lambing/calving, or weaning

   Identify your feed deficits - compare your critical feed needs to grass growth (or typical DM/ha levels)
4. Identify times where you could potentially generate extra conserved feed. When you do this, consider whether you need to plan for a particularly long, cold winter or dry summer
5. Mark in times when you have other needs for nitrogen (e.g., for new pasture or crops)

   Soil test to see if existing soil nitrogen levels can meet demand
6. For each feed deficit or nitrogen application need, determine the best time to apply nitrogen fertiliser, and rate to use. To do this, you'll need to know – or be able to estimate – the nitrogen response (kg DM/kg N applied) and the time it will take to achieve this response
7. Select a product that will deliver the necessary amount of nitrogen, reduce the risk of nitrogen loss and/or supply other production-limiting nutrients at this time.



ON THE NITRATE WATCH

Nitrate poisoning can threaten stock in any season if conditions are 'right' but the risk is greatest when rain or a spell of moist, overcast days follow a drought – making autumn a time to be on alert.

'In these conditions, roots suck up nitrate rapidly, accumulating it in stems and leaves,' explains Ian Power, Ballance Environmental Management Specialist. 'It can take several weeks before levels return to normal.'

When ruminants consume excess nitrate, rumen microbes convert it into nitrite. Nitrite is rapidly absorbed into the bloodstream where it binds to haemoglobin, restricting its ability to carry oxygen. 'Lack of oxygen causes animals to stagger around "drunkenly", breathing heavily - essentially suffocating.' Chronic nitrate poisoning can cause abortion and poor stock performance, while acute poisoning is usually fatal. The blood of animals killed by nitrate poisoning is typically dark brown.

All ruminants can be affected - cattle, deer, goats and sheep. Cattle are the most susceptible and sheep the least, with young stock the most vulnerable.

'Methylene blue injections have been used to treat nitrate poisoning, but prevention is a more reliable option,' warns Ian. 'By the time symptoms appear, it is usually too late. Watching for environmental risk factors and applying appropriate management strategies is your best bet.'

Tips to reduce nitrate-poisoning risk

- If using autumn nitrogen, apply it after grazing
- Split nitrogen applications in late autumn
- Restrict access to pasture in the morning, as this is when nitrate levels are at their highest
- Give hungry stock a low-nitrate feed (preferably one that takes a while to digest, like straw or hay) before letting them consume high-nitrate feeds. They will be less likely to gorge themselves on risky pastures or forage
- Dilute high-nitrate feeds with low-nitrate feeds to help rumen microbes adapt to high-nitrate feeds. This can take three to four weeks
- Minimise pasture intake in the first 1-2 weeks following drought-breaking rain. This requires adequate supplementary feed to cover this very risky period
- Stock lightly, so animals can selectively graze and avoid hard grazing - the lower parts of stems have the highest nitrate content
- Provide a lot of clean drinking water for stock on high-nitrate forage.

If you suspect your stock are at risk of nitrate poisoning, contact your Ballance Nutrient Specialist for advice.

Nitrates in feed

- Pasture or feed with nitrate levels around 0.21% or 2,100 parts per million and above pose a risk of nitrate poisoning
- Nitrate concentrations are generally higher in new plant growth and decrease with age. Stalks are highest in nitrate content, followed by leaves and then grain
- Cereal greenfeeds and vigorous ryegrass (especially annuals) can cause problems, with 1 to 2-year old pastures posing a greater risk than older pastures
- Brassicas can have high nitrate levels, especially autumn- and winter-grazed crops

WHICH S IS BEST?

Elemental sulphur or sulphate sulphur? Think about environmental conditions and when most of the sulphur needs to be available to make the best choice.

'Sulphur is a cheap nutrient, so don't let it limit production,' says Ballance Nutrient Dynamics Specialist Jim Risk. 'However, if you are applying sulphur in autumn, it pays to understand what form of sulphur you're using and how it behaves, or your investment could be wasted.'

There are two forms of sulphur used in agriculture - sulphate and elemental. Sulphate sulphur is readily available to plants. Elemental sulphur is more slowly available. Soil bacteria have to convert it into sulphate sulphur before plants can use it. 'Sulphate is best used when there is an immediate need for sulphur, for example to support spring pasture growth, meet crop needs or rapidly address a sulphur deficiency,' says Jim. 'However, if fertiliser application is restricted to autumn, then a product containing elemental sulphur is preferable for pastoral farming, particularly where sulphate sulphur is likely to leach away over winter, so will not be available to support spring growth.'

Elemental sulphur is also helpful where fertiliser is applied less frequently – as is sometimes the case on hill country - as it increases the chance of plants having access to sulphur between applications.

If you're tackling your farm's phosphate and sulphur needs in autumn, then products from the Sulphurgain range can be an effective way to incorporate elemental sulphur into your fertiliser programme.

If your Olsen P levels are fine but you want to address sulphur needs and boost pasture growth during autumn (to extend milking, provide more winter feed, or help pasture recover from drought) then you'll want a product combining sulphur and nitrogen. In spring you might consider products such as SustaiN Ammo. But in autumn (or for any application on coarse-textured or low-ASC soils in areas where you get more than 1500 mm of rain per year) you might need to protect your sulphur a little more carefully.

The solution could be PhaSedN. PhaSedN combines elemental sulphur with SustaiN, providing sufficient sulphur to last through the winter drainage period, and nitrogen in a form that reduces the risk of loss from volatilisation in autumn's fickle weather conditions. 'PhaSedN is particularly useful on sheep and beef farms when it is not economic to apply phosphate but where availability of sulphur and nitrogen constrain pasture production.'

If your soil is suphur deficient (i.e. its sulphate sulphur levels are less than 6 ppm) then you will need some rapidly available sulphate sulphur to stop the deficiency from limiting the amount of dry matter the applied nitrogen can produce. 'This is a situation where you might consider using SustaiN Ammo. Alternatively, PhaSedN Quick Start is a best-of-both-worlds option, combining SustaiN, sulphate sulphur and elemental sulphur to meet immediate and long-term sulphur needs.'

To explore whether PhaSedN is an effective and economic option for your farm, talk to your Ballance Nutrient Specialist.

Jim Risk

Murray Lane

DRILLING AFTER DROUGHT

Direct-drilling new autumn pasture protects soil moisture reserves to support growth – an advantage at any time, but especially after a long, hot summer.

Water wise

Unlike cultivation, direct drilling minimises soil disturbance, conserving precious soil moisture reserves, which is particularly important following drought. 'Why cultivate already dry soil and lose even more moisture?' says Ballance Forage Specialist Murray Lane. 'Direct drilling also preserves soil structure, an important consideration to guard new pasture against pugging and compaction.'

There are a variety of drills available for use, but in Murray's opinion, 'The best type of drilling equipment following drought is one that closes the slot to conserve soil moisture and protect the seed. Good drilling equipment should be able to do this and place the seed evenly at the specified depth, while placing a starter fertiliser such as DAP close by to support early growth.'

Pesty issues

Pests can be a problem, whether direct drilling or cultivating. However, direct drilling leaves the soil pest predator populations alone. This is especially important in grass grub prone areas, if pasture longevity is one of your goals.

Use treated seed to control Argentine stem weevil and black beetle. After a dry summer, slugs and snails are generally not a problem. 'However, if direct drilling, it pays to check with a few wet sacks laid out overnight,' says Murray.

Weed watch

Weeds are potentially a problem after a drought. 'If you had anticipated a drought last spring, then a good option would have been to spray early to mid January, setting up a spray fallow over summer, followed by a second spray just prior to drilling,' says Murray. 'This allows you to control all perennial species in the pasture during the dry period, effectively conserving soil moisture. Dead plants don't pump soil water.' With the perennial weeds already dead and soil moisture maintained, you can drill seed earlier with confidence. If you haven't managed the mid-summer spray, then an autumn one is better than nothing, but keep this tip in mind if you are planning to re-grass any other paddocks next autumn.

Moving stock off onto this fallow paddock after feeding stops them from overgrazing your remaining good pasture and provides an area for feeding out supplements.

For more information about autumn pasture renewal, pasture management after drought and feed options, talk to your Ballance Nutrient Specialist.

New pasture sown with (rear) and without (foreground) DAP

PUGGING AND PRODUCTION

Take action now to stop pugging from damaging your pasture and your bottom line.

'Pugging has an immediate and long-term impact on production, reducing dairy pasture production by 20-80% over several months to a year depending on its severity, ' says Ballance Forage Specialist Murray Lane. 'Losses will continue after this as the affected areas are vulnerable to weeds or less desirable grasses and, if the soil structure is not repaired, prone to future pugging. Even two years after damage, total dry matter production can be as much as 15-20% lower than previous levels.'

Pugging occurs when soil is so soft and waterlogged that the surface can't support the weight of grazing animals. Wet conditions combined with high stocking density, as happens when block or strip feeding in paddocks over winter, is a common recipe for pugging. Areas with high water tables and clay soils are particularly vulnerable, especially under high stocking rates.

Pugging affects pasture by damaging plants and soil. Plants get torn and buried, reducing the number of tillers. Soil can be compacted and drainage reduced, which in turn makes the growth zone colder and anaerobic. These factors severely impact the pasture's potential for growth.

The risk of nutrient and sediment loss in run-off is also increased by pugging. Rain doesn't soak into pugged soil areas very well, resulting in more water running over the soil surface.

However, some forward planning can help you minimise your pugging risk and its potentially expensive consequences. Check out our practical tips opposite to see how many you could implement on your farm.

For more information on managing your pugging risk, or restoring pasture after a pugging event, talk to your Ballance Nutrient Specialist.

Practical tips

- Good pasture cover gives better protection against pugging – build pasture cover leading into winter, especially if summer drought has left it worse for wear. If conditions are right, consider giving it a helping hand by applying autumn nitrogen.
- Graze wetter paddocks before the wetter parts of the season.
- Graze land that is at risk of pugging with lighter stock.
- Increase the time intervals between grazings.
- Limit grazing time to around 4 hours in wet conditions.
- Consider using stand-off pads when soils are wet or waterlogged. If these are not available, consider using a sacrifice paddock to contain pugging to a small area.
- Winter stock off-farm.
- If feeding out in the paddock, consider putting the feed out before letting the stock in to stop them from following the farm vehicle.
- Keep heavy machinery off paddocks when soils are wet.
- Avoid working the soil when wet. 'In fact,' says Murray, 'it's best to avoid cultivating altogether when re-grassing. Soil takes time to settle down and gets pugged more easily when there is no structure.'

GET YOUR MOLY ON

ANIMAL

PLANT

Molybdenum (Mo) may be a cost-effective way to boost your pasture growth - and possibly your profit.

'A spate of molybdenum-induced copper deficiencies in the 1950s still haunts this potentially useful nutrient,' says Ballance Nutrient Specialist Bruce Beckingsale. 'Molybdenum helps clover fix nitrogen from the atmosphere - ultimately this increases grass growth and the proportion of clover in the sward. If molybdenum is applied in the right situation and at the right rate, it can significantly improve production.'

When this was first discovered in the 1950s, farmers responded a little too enthusiastically, repeating the recommended application for several years. Animal health issues due to high levels of molybdenum affecting copper uptake soon followed.

MAF field trials in the 1970s proved that the same pasture response could be achieved with much less molybdenum – less than a third of the amount recommended by the original research. However, nervousness around molybdenum lingered. Some land has not had molybdenum applied since.

The upside of this is that the response to its reintroduction can be impressive. 'The MAF research showed increases of up to 20% in annual pasture growth where molybdenum had not been used for 15 years or more,' says Bruce. 'It's also common to hear reports of carcass weights increasing by 1 to 1.5 kilograms where renewed molybdenum application has improved the amount of high-quality feed available for growing lambs.'

Another positive is that molybdenum is extremely cheap - less than $1.00 per hectare. 'Adding Granular Molybdenum to fertiliser so that it is applied at 200 grams/ha will supply enough molybdenum for five years. No other plant nutrient has the same cost:benefit ratio,' says Bruce.

On low-fertility farmland, the cost:benefit of plant nutrients from highest to lowest is likely to be: molybdenum, sulphur, phosphorus. 'I have seen recent cases where spending about $100/ha on these nutrients, combined with good grazing management, has changed store country into finishing country through the dramatic increase in clover.'

For herbage testing and advice on incorporating molybdenum into your fertiliser strategy, talk to your Ballance Nutrient Specialist.

Mo or no?

Soils with a high pH due to high lime inputs may not need molybdenum as lime application releases minute amounts of molybdenum that are locked up in the soil. However, some soils have adequate molybdenum levels even at low pH, so it's important to check the status by testing actively growing clover. If this shows molybdenum at less than 0.1 ppm and nitrogen at less than 4.5%, applying molybdenum at the recommended rate is extremely unlikely to induce copper deficiency but it will give a significant increase in pasture growth and clover content.

PLANT

SOIL

TIME FOR LIME?

Like any farm input, lime needs to be applied strategically to get the best results.

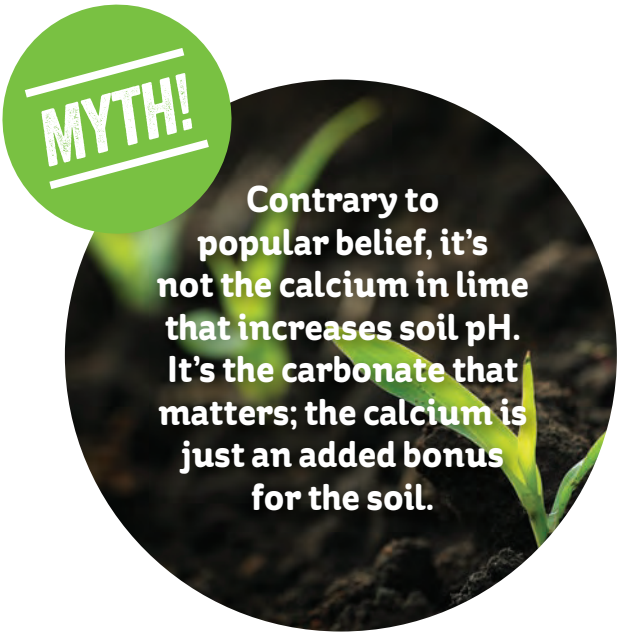
'Keeping soil pH in the optimum range – between 5.8 and 6.0 - has many benefits,' says Jim Risk, Ballance Nutrient Dynamics Specialist. 'On most New Zealand soils - peat being the exception - a pH below 5.5 can make aluminium in the soil more available to plants. If levels of exhangeable aluminium are three to five parts per million or more it can inhibit root growth, leading to poor plant performance.

'Soil pH also affects the availability of nitrogen for plants. Low pH limits both the development of clover root nodules and the availability of molybdenum, which is needed by the rhizobium bacteria in the root nodules to fix nitrogen from the air and recycle it into the soil for other plants. Low pH also inhibits the activity of soil micro-organisms, reducing the amount of nitrogen released from organic matter. This is why limed soils sometimes appear greener.'

How does lime work?

Natural processes such as plant growth, leaching, the breakdown of organic matter and the conversion of ammonia to nitrite and then nitrate (nitrification) release hydrogen ions (H^+) into the soil. Over time this can increase soil acidity – reflected in a decline in soil pH. 'When we measure pH, we're actually measuring the concentration of hydrogen ions in the soil,' explains Jim. 'The more hydrogen ions, the more acidic the soil.'

Lime contains high levels of a substance called calcium carbonate ($CaCO_3$). The carbonate (CO_3^{2-}) part of this is negatively charged and reacts with the positively charged hydrogen ions, neutralising them. As more and more hydrogen ions are neutralised, the soil becomes less acidic and the pH increases.



When is lime needed?

On most intensively farmed, high-producing ryegrass-clover pastures, you will achieve optimal pasture growth by maintaining pH at 5.8-6.0 on mineral soils or 5.0-5.5 on peat soils.

As Figure 1 illustrates, you can achieve pasture production increases of 5-10% by applying lime when the pH is below 5.5. Once pH is in the 5.5-6.0 range, your growth gains will depend on your starting pH. 'As the graph suggests, if your starting pH was 5.4, lime application (2.5t/ha) could achieve a 5% increase, but if your pH was 5.9, the same amount of lime is unlikely to increase pasture production.'

With aerial applications on hill country it is typically only economic to lime when soil pH is less than 5.5. Even then, correcting deficiencies in phosphorus and sulphur may deliver better returns than liming. 'If the Olsen P is less than 15 you will typically get a better return from applying phosphorus and sulphur than lime.'

Some crops have highly specific needs (for example, blueberries like acid conditions) but a pH of 5.8 to 6.2 will suit a wide range of common crops. 'For cropping you need to measure pH to a greater depth – 150 mm instead of the usual 75 mm,' says Jim. For forestry plantations, a pH of 4.5 to 6 is optimal for *Pinus radiata*.

How much and how often?

As a rule of thumb, each tonne of good-quality lime (containing more than 80% carbonate) will increase the pH by 0.1 units. Be careful not to over-lime as this can decrease the availability of trace elements, leading to animal health problems or induced trace element deficiencies in plants.

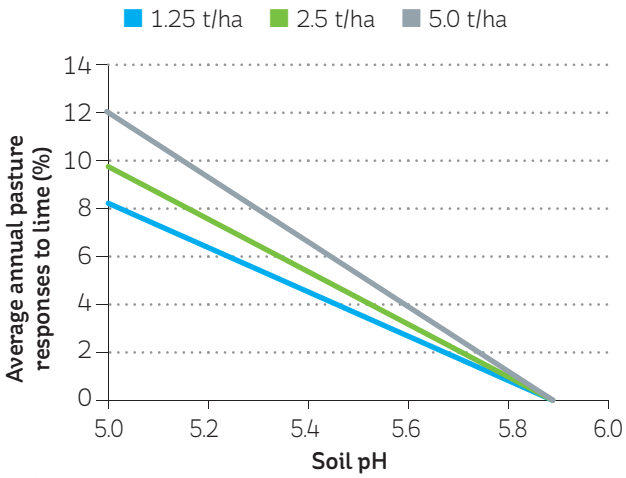


FIGURE 1
Pasture response to lime application. This graph is indicative of typical responses. Lime responses outside these general guidelines do sometimes occur.

Once in maintenance mode, it doesn't matter if lime is applied every year or every second or third year. It is the amount applied that determines the duration of response, so it can be managed as cashflow allows. Under most situations 2.5 tonnes of lime/ha every four to five years will maintain the pH of pastoral soils. However, application should be based on soil pH testing.

Finer the better?

The fineness of the lime does not affect the end result, only the speed at which it is achieved. 'Finer lime breaks down faster and initially increases the pH more rapidly, but the total change in pH is the same when the same amount of lime is applied.'

In good-quality agricultural-grade lime (over 80% carbonate) over 50% of the particles will be smaller than 0.5 mm and less than 5% will be bigger than 2 mm. As a result, the effect of the lime will be apparent a year to 18 months after application. Lime with a lower carbonate content will be less effective at raising pH, no matter what the particle size.

What time of year?

It is best to lime in still conditions from late spring to autumn.

Avoid applying large amounts of lime between autumn and early spring, particularly on dairy farms, as it can increase the risk of hypomagnesaemia. It's best, especially on farms with a history of metabolic issues, to leave as long a period as possible between lime application and calving.

Agricultural-grade lime typically takes 12-18 months to take full effect. It is particularly important to apply it at least one year in advance if you need to adjust pH before establishing crops.

For advice on lime needs for your farm, talk to your Ballance Nutrient Specialist.

Flying lime?

Agricultural grade lime should always be used when applying by air – fine grades are a safety hazard for pilots. Plus they are much more likely to drift and end up in the wrong place. If you're not sure whether or not the lime you plan to use is suitable for aerial application, check with your Ballance Nutrient Specialist or your Super Air pilot.

Peat practice

A Ballance research collaboration will help inform lime use on peat soils.

'We are investigating whether a regular, annual application of lime will improve rooting depth on peat,' reports Ballance Forage Specialist Murray Lane. 'The usual practice when farming on peat is to initially cultivate in a large amount of lime to raise the pH – around 10 to 15 tonnes per hectare – and then grow a crop before establishing pasture. Lime should then be reapplied at three-to-four year intervals. However, often this isn't done, resulting in shallow root depth and pasture pulling, which is hard to address without starting over. The goal is a strategy to get better results from both your peat pasture and your lime investment.' This work is being supported by Graymont Lime, with assistance from former AgResearch scientist (now consultant) Paddy Shannon.

BEST SOIL TEST FOR P

Over- or under-estimating soil phosphorus levels can affect your production and profitability. Use a reliable soil test and regular testing to guide your decisions.

Soil tests are used to assess the fertility of a farm's soils and to monitor changes over time. They provide a valuable benchmark of soil fertility and inform your fertiliser recommendations. In New Zealand, the Olsen P test has been widely used since the 1970s to measure soil phosphorus levels.

'The Olsen P test has been rigorously calibrated for plant responses across a wide range of soil types, climates, seasons and years in New Zealand. This makes it a reliable way to tell where your phosphorus levels sit in relation to the agronomic optimum,' says Ian Power, Ballance Environmental Management Specialist.

'If you are below the agronomic optimum, applying more phosphorus fertiliser to maximise production is a wise investment. If you are over the agronomic optimum, there is more chance you will lose phosphorus to the environment [see Figure 1] and/or waste money on above-maintenance phosphate fertiliser applications.'

The Olsen P test was developed in the 1950s for use on alkaline soils and its critics are quick to point out that our soils are largely acidic, says Ian. 'However, a lot of our soils are derived from recent sedimentary material. A lot of their mineral content is not readily available to plants. Soil tests that use acid-based methods tend to extract these minerals and consequently over-estimate their availability. The alkaline-based Olsen P test gives a more accurate result.[1]

'The Olsen P test may underestimate plant-available phosphate when lime has been recently applied or when reactive phosphate rock (RPR) has been used. Conversely, when soil pH is low or the anion storage capacity (ASC) is high, it can over-estimate phosphorus levels. But these same weaknesses – and more - apply to other soil tests,' points out Ian.

A very important point is how well a soil test has been calibrated for pasture yield on our soils (see Figure 2). Extensive research from a series of national response trials determined that the modified Olsen P test used in New Zealand (which uses soil samples measured by volume rather than weight[1]) is the best predictor of phosphate responsiveness in our soils. 'Newer tests have come along but are unlikely to dramatically improve the accuracy or reliability of predicting phosphate fertiliser responsiveness.'

For help with soil tests, talk to your Ballance Nutrient Specialist.

Get the best from your soil tests

- Use a soil test that is well calibrated for our soils e.g. Olsen P.
- Use the same soil test each time and sample at least every other year. Trends are as important as absolute values and if you change tests or don't test regularly, these are impossible to monitor.
- Sample the same paddocks at the same time of year.
- Avoid areas where animals congregate, e.g. stock camps, and around gateways and troughs.
- Avoid sampling within three months of fertiliser or lime application.

Ian Power

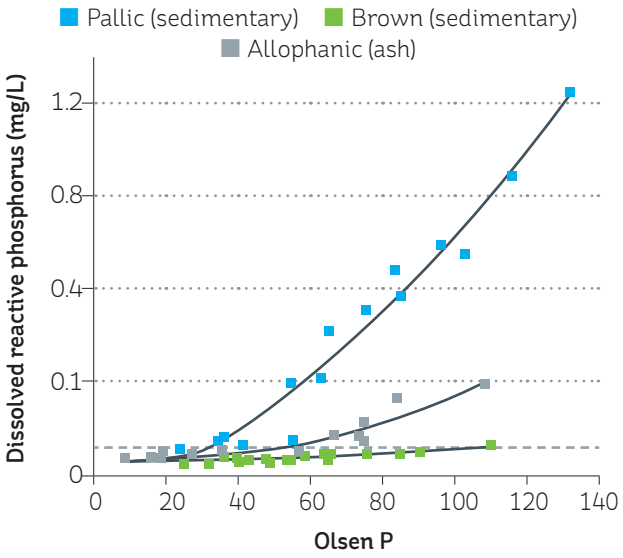


FIGURE 1
As Olsen P status increases so does the risk of phosphate being dissolved and potentially lost.[2]

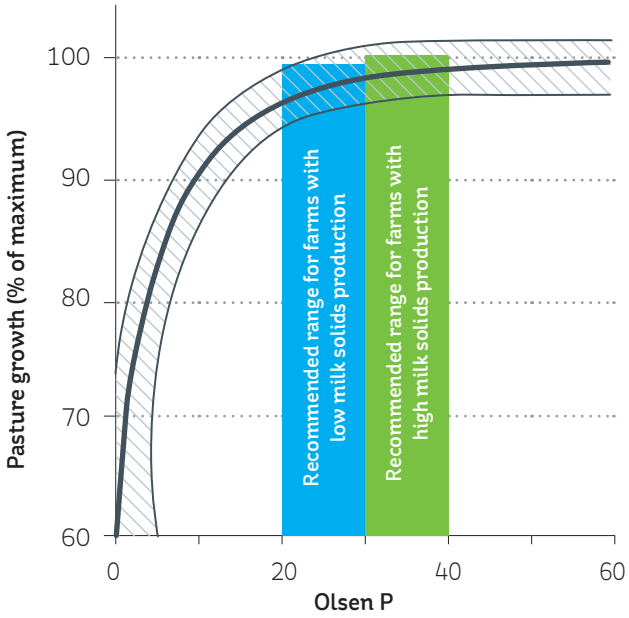


FIGURE 2
Pasture growth levels off at the agronomic optimum, even if Olsen P levels increase. This graph is for sedimentary soil, but similar responses occur for ash, peat and pumice soils.[2]

Sizing up the 'competition'

Some companies promote alternative tests for phosphorus, most of which have not been well calibrated for New Zealand soils.

Colwell P
This uses the same method as Olsen P, but with a longer extraction time; as a result, it extracts more phosphorus. It has similar limitations to the Olsen P test. Calibration is limited for New Zealand soils.

Modified Morgan P (Reams)
This is common in the USA, but not in New Zealand. It is not well calibrated for New Zealand soils.

Truog P
New Zealand's most commonly used soil P test before Olsen P. In soils with phosphate minerals (e.g. apatite) it tends to overestimate plant-available phosphate. In high pH or recently limed soils, it underestimates plant-available phosphate. Calibration is limited compared to Olsen P.

Bray 1 and Bray 2
These are commonly used in forestry. They have similar limitations to the Truog test. They are not well calibrated for New Zealand agricultural, arable and horticultural industries.

Mehlich 3
This is growing in use worldwide as it tests for major cations and trace elements with one extraction. It has similar limitations to the Bray and Truog tests. This soil test has potential, but needs extensive calibration over several years before it could be assessed for use in New Zealand.

Resin P
This has been used in New Zealand since before the 1990s. It is useful for soils that have a history of RPR use, but has limited value with other soils.

Total Phosphorus
This test attempts to measure all the phosphorus in the soil (including unavailable organic and inorganic fractions). It does not relate well to plant-available phosphate across different soil types due to soils having differing proportions of inorganic and organic phosphorus, so is less useful for estimating pasture responses.

References

[1] DC Edmeades, AK Metherell, JE Waller, AHC Roberts, JD Morton (2006) Defining the relationships between pasture production and soil P and the development of a dynamic P model for New Zealand pastures: a review of recent developments, *New Zealand Journal of Agricultural Research*, 49: 207–222

[2] Roberts AHC, Morton JD 1999. *Fertiliser use on New Zealand dairy farms*. Auckland, New Zealand, New Zealand Fertiliser Manufacturer's Research Association. 36 p.

More information can also be found on the Hill Laboratories website, www.hill-laboratories.com

CEREALS AND PH

As cropping paddocks increase in size, we can begin to see variations in soil pH that may affect plant health and reduce yields.

'Variations in pH can result from differences in soil type, uneven historic lime applications or bringing lime storage areas or previously un-limed areas into production when changing farm or paddock layout,' says Ballance Knowledge Transfer Specialist Micheal Keaney. 'When amalgamating paddocks, it pays to sample old and new areas separately and apply lime accordingly until pH results are in the desired range.

'Ideally, lime should be applied with the same accuracy as fertiliser, but this is sometimes not achieved,' says Micheal. Limitations of spreading equipment aside, applying lime in windy conditions can result in enough variability to create crop problems later.

The closer the paddock's average pH result is to the critical requirement of any crop in the rotation, the more pH variability becomes important. One response is to apply enough lime to bring the average pH to the upper optimum range of the crop in your rotation - pH 6.2 for most crops. This will require more lime in the short term, but volumes should return to normal down the track.

Another option is to measure the variability more thoroughly, taking a larger number of samples to produce detailed 1 hectare grid pH/nutrient maps and applying lime in a targeted fashion. Once you achieve a more uniform pH across the paddock, this uniformity will be consistent over time.

'The advantage of this approach is that it can give you other information to improve your crop nutrient management,' concludes Micheal. 'It's an investment up front but should pay for itself in lime, nutrient savings and crop returns in the medium to long run.'

If you're interested in detailed soil pH testing for your next arable crop, talk to your Ballance Nutrient Specialist, who will be able to recommend an appropriate service provider in your region.

Effects of low or high pH

Soil pH has an impact on the availability of other nutrients in the soil. If the soil pH gets too low, aluminium becomes more available to plants. Too much aluminium can affect plant rooting depth, limiting access to water and nutrients. Barley is particularly vulnerable to low pH.

If the soil pH gets too high (e.g. pH of 6.5 or more) the risk, particularly in cereals, is that plants won't get enough trace elements like zinc, copper or manganese.

'Both scenarios will have an impact on crop health and yield, showing initially as discoloured or distorted leaves,' says Micheal. 'However, while zinc, copper or manganese deficiencies can be treated fast with foliar nutrient sprays, there is no quick fix for damage resulting from low pH. The best approach is to plan your cropping well in advance and apply lime a year before the most pH-sensitive crop in the rotation.'

ASSESSING VALUE

Jeff Morton, who was a science extension specialist with Ballance for 10 years, explains how two fundamental 'laws' can help you sort fact from fiction in the face of sales claims, to make sound fertiliser decisions.

During my career, two basic 'laws of science' have helped me to interpret research results to provide sensible advice.

The first is the law of the minimum, which states that production or output is determined by the input or factor that is the most limiting. For example, when growing a dryland crop, increasing rates of nitrogen will not boost yields if water is limited.

The second is the law of diminishing returns. If you start from a low-input base point, outputs will initially increase in relation to inputs but will eventually level off. From this point, continuing to increase inputs results in smaller and smaller improvements in output, which are unlikely to justify the cost.

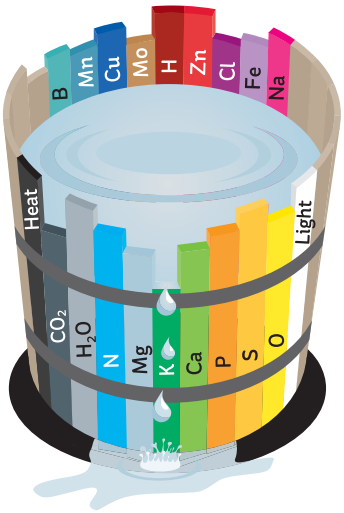
Alarm bells should ring if you are advised to apply a nutrient to 'maximise yields' when tests show there are significant reserves in the soil. A classic example is fodder beet and salt. Plant & Food Research trials show that as soil sodium levels increase, less salt is required in fertiliser. However, some advisers are ignoring this and recommending application of salt at high rates regardless of soil sodium levels.

Maize is another target. In many paddocks, reserves of plant-available potassium are more than adequate for maize growth. Yet we still hear of outrageously excessive potassium fertiliser recommendations - up to pasture-like capital potassium levels. Maize will 'luxury feed' and take up more potassium than it needs if it is available. If the maize is turned into silage, this excess potassium is removed in the crop. When the silage is fed to cows, these high levels of potassium can limit the availability of calcium, magnesium and sodium, which are often deliberately added to meet cow requirements.

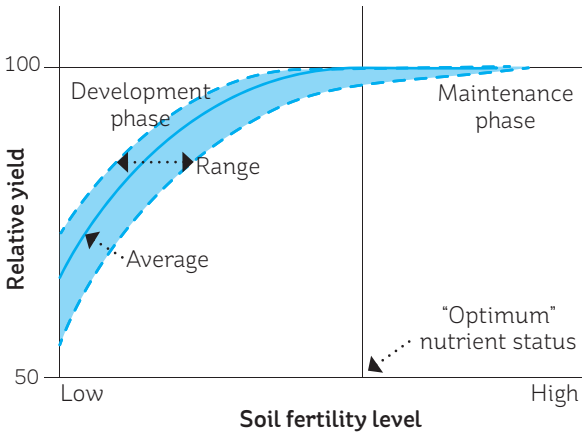
To get the best economic return, both laws must be observed. Applying nutrients where potential is limited by a lack of another nutrient or climatic factor (usually moisture) or where they are readily available in the soil is wasteful, inefficient and ultimately unprofitable.

For soil testing and sound nutrient advice, talk to your Ballance Nutrient Specialist.

Jeff Morton



LAW OF THE MINIMUM
In this illustration, the barrel's capacity (representing farm output) is dictated by the potassium input, despite other inputs being higher. Any input or factor in your farm system could act as this limit – often water is the critical issue.



LAW OF DIMINISHING RETURNS
In this graph, optimum nutrient status is achieved where the solid average line starts to flatten out, signalling change from a development phase to a maintenance phase. Continuing high levels of fertiliser input at this point will incur extra cost but won't increase yield.

HIT OR MYTH?

Come along as we take some common farming 'shaggy dog tales' for a walk.

MYTH: NITROGEN FERTILISER ADVERSELY AFFECTS SOIL MICROBIAL ACTIVITY

TRUTH: Studies conducted by LandCare Research showed that annual applications of urea over seven years actually increased soil microbial activity. It also improved the ratio of desirable bacteria to less desirable fungi. Applying urea causes more pasture growth, which helps to increase the organic matter content of the soil. This results in a greater supply of nutrients that can be used by soil micro-organisms.

MYTH: MOST PARTS OF NEW ZEALAND GET ENOUGH RAIN TO MINIMISE NITROGEN LOSS FROM VOLATILISATION

TRUTH: NIWA's nationwide rainfall records show that only on 10-20% of days is there sufficient rainfall to minimise volatilisation losses. Furthermore, this rain needs to arrive within 8 hours of application to prevent these losses occurring.

MYTH: SUPERPHOSPHATE MAKES SOILS MORE ACIDIC

TRUTH: Long-term trials conducted on Winchmore research farm concluded that superphosphate itself does not lead to any notable increase in soil acidity. These 70-year-long experiments found that any increase in soil acidity was due to the effects of improved soil fertility, partly because plant growth gradually acidifies soil naturally and partly because better pastures can carry more stock, which results in more nitrate leaching, which also increases soil acidity.

MYTH: NUTRIENTS NEED TO BE PRESENT IN SPECIFIC RATIOS IN SOIL TO OPTIMISE PASTURE GROWTH

TRUTH: Extensive research in this area has shown that pasture growth is dependent on having *sufficient* of each nutrient, rather than any particular *ratio* of nutrients. In a New Zealand setting, as long as the Quick Test Ca, K and Mg levels are around 5, 7 and 10 respectively, pasture growth will not be limited by any of these nutrients. The ratio of these nutrients in the soil does not influence pasture growth.

MYTH: CROPS SOWN BY DIRECT DRILLING WILL NEED MORE NITROGEN FERTILISER THAN CROPS GOING INTO CULTIVATED LAND

TRUTH: This belief stems from the knowledge that cultivation improves soil aeration and stimulates microbial activity, which in turn helps to release nitrogen from soil organic matter. It was thought that direct drilling did not cause an equivalent effect. However, most research shows that direct drilling disturbs the soil sufficiently to cause nitrogen release from organic matter as a result of increased microbial activity. Consequently, the fertiliser nitrogen requirements for plant establishment are similar, regardless of whether direct drilling or cultivation is used.

IN FOR THE RESEARCH

By co-funding and participating in Sustainable Farming Fund (SFF) research, Ballance helps deliver practical, science-based solutions to benefit New Zealand farmers.

'Ballance proactively targets research investment towards the most pressing issues facing farmers in the field,' says Ian Tarbotton, Ballance Science Extension Manager. 'We're definitely focused on best bang for buck, seeking projects with a high chance of success and strong synergies with other initiatives. Working with other organisations on issues of common interest stretches our investment further and also brings a range of perspectives to the problem, so the resulting tools or solutions are real-world ready.'

Nutrient management is a major point of interest, particularly in light of the government's focus on freshwater quality and consequent implementation of the Freshwater Management Plan. Two of Ballance's current SFF projects examine nutrient loss and strategies to reduce it.

'The more we can refine our understanding of nutrient dynamics in specific farm systems and environments, the more we can refine the range of tools or mitigations that we can apply to reduce nutrient losses while supporting economic production,' says Ian.

A third project seeks to find new controls for a production-limiting pasture pest. 'To date, black beetle has caused problems in some warmer North Island areas, especially Waikato and the Bay of Plenty. It is likely to become more widespread in those regions and move into others, so we need to improve our ability to fight it.'

Ian Tarbotton

Sustainable nutrient management on Waikato peat soils

This project is using on-farm trials and computer modeling to better understand how nutrients (specifically nitrogen and phosphorus) are lost from peat soils. The end goal is to use the findings to develop practical recommendations regarding fertiliser and effluent irrigation practices for these soils.

Who's involved? Ballance; AgResearch; DairyNZ; Waikato Regional Council; Landcare Research; dairy farmers on Waikato peat soils – a.k.a. the Peat Farmers Group.

Resource use on high feed-input dairy farms

High feed-input dairy farming is on the rise, especially in central Waikato. This project is using case-study farms to examine the effects of system changes over the last decade on emissions and losses, production and profit, as well as testing options to improve sustainability. Practical solutions will be explored and shared with farmers, industry and policymakers through field days, farmer publications and conference presentations.

Who's involved? Ballance/SealesWinslow; DairyNZ; Pioneer; Waikato Regional Council; AgResearch; a group of Tatua high-input dairy farmers.

Combating black beetle in pasture

Using particular ryegrass endophytes is the best defence against black beetle but it's not always successful. This project hopes to deliver a new countermeasure by exploring the impact of soil pH on beetle development. As well as future-proofing the black beetle control toolkit, the project may generate knowledge to help farmers with other scarab pest problems, such as grass grub and manuka beetle.

Who's involved? Ballance; AgResearch; McDonalds Lime; DairyNZ; dairy farmers.

What's SFF?

The Ministry for Primary Industries invests up to $8 million per year in Sustainable Farming Fund projects. The SFF supports 'communities of interest' to work on applied research and extension projects that tackle a shared problem or develop an opportunity. Projects require a non-government funding contribution of at least 20%.

A BOOST FOR FODDER BEET

Planning to feed fodder beet over winter? Fodder Beet Block is a convenient way to provide the phosphorus your stock may need.

'Fodder beet crops are increasingly popular but can be light on phosphorus for animal needs,' explains Jackie Aveling, SealesWinslow Product Development Manager. 'Fodder Beet Block contains phosphorus in a highly available form to help address that deficit. It is also a good source of magnesium and trace elements, making it ideal when wintering dairy cows on fodder beet.'

If an animal's diet lacks phosphorus, it will start using body reserves, primarily from its bones. Severe deficiency will result in brittle bones and breakages. A downed cow remains alert but unable to rise. It may try to crawl around on its forelimbs. 'Discussions with farmers highlighted that the impact of phosphorus deficiency is not limited to creeping cows but is reflected in rapid weight loss and lower production and conception rates. This is backed up by research on the role of phosphorus,' says Jackie.

Silage and straw should be fed alongside fodder beet to compensate for its low fibre and protein content. However, a phosphorus deficiency may still remain. On-farm testing of Fodder Beet Block during winter 2015 showed cows consumed around 100-200 g per day, which supplied enough phosphorus and magnesium to balance their diet. Its trace element content is also helpful.

'New Zealand's soils are reasonably high in iron. Animals eating fodder beet ingest more soil than those grazing pasture or leafy crops and so take in more iron. Iron can interfere with the normal absorption of many trace elements, particularly copper,' says Jackie. 'Fodder Beet Block provides cobalt, copper, iodine, selenium and zinc – trace elements that may be in low supply when stock are grazing fodder beet or other bulb-based winter forage crops.'

As well as observing an absence or reduction in metabolic problems, farmers who tested Fodder Beet Block found it very easy to use. Dusting fodder beet (or accompanying silage) with DCP (dicalcium phosphate) is a common way to supplement phosphorus, but it's an unpleasant, time-consuming and imprecise method. The application rate (50 g per cow per day) assumes that half of the DCP will end up in the ground rather than in stock and it's difficult to spread the product evenly to help every animal get its requirement. 'The palatable, molasses-based formula of Fodder Beet Block ensures that stock lick it often enough to ingest the recommended daily dose without waste.'

To find out more about Fodder Beet Block, talk to your Ballance Nutrient Specialist or SealesWinslow Technical Sales Representative.

Using Fodder Beet Block

- Ideally use it from dry-off until you commence milking. Two months is minimum.
- Allow one block per 25 head of stock. Provide enough to prevent overcrowding and ensure shy feeders get their share.
- Place blocks at the crop face in front of the cows. The tubs are easy to move as the fence is shifted.
- Always provide unlimited drinking water and adequate quantities of roughage.
- Do not feed to sheep.

HELP FOR HORSES

If you want to add variety or balance to your horse's diet, need a convenient and healthy treat or support for specific equine issues, Horslyx could be the answer.

Used with great success in Europe and now available in New Zealand through Farmlands, Horslyx is a range of tasty lick blocks that provide a natural, trickle-fed supply of nutrients. 'The blocks are resilient enough to be used outside, but the molasses-based formulas are easily broken down in the horse's gut and readily digested to deliver their beneficial ingredients without risk of colic,' explains Jackie Aveling, SealesWinslow Product Development Manager.

Horses originally adapted to feed on a wide range of vegetation. The forage-based diet of the modern, domesticated horse is more limited. Horslyx fills the nutritional gaps in grass, hay, haylage and similar feeds, so contributing to a balanced diet.

For those worried about their horse's sugar intake, the news is good. 'When Horslyx is fed correctly – little and often - its sugar is absorbed in the small intestine, so is less likely to upset the flora in the hind gut, significantly reducing the risk of laminitis,' says Jackie. Nevertheless, Horslyx needs to be introduced gradually and access managed to avoid over-indulgence, especially if forage is limited.

All blocks in the Horslyx range contain antioxidants (vitamin E and selenium) to support strong immune systems, have a high oil content to sustain skin and coat condition, and provide biotin, zinc and methionine for healthy hooves.

Respiratory Horslyx - helps horses breathe more easily. It contains vitamin C, which has been scientifically proven to benefit lung function, along with menthol, eucalyptus and aniseed to clear mucus.

Mobility Horslyx - supports healthy joints and connective tissue. It contains glucosamine and MSM (a form of organic sulphur), which work together to maintain tendons, ligaments, cartilage, connective tissue and shock-absorbing synovial fluid. An independent UK university study showed horse stride length significantly improved when clinically sound but noticeably stiff horses were given Mobility Horslyx.

Garlic Horslyx - offers the general health benefits of pure garlic oil.

Farmlands currently stock all varieties in 5-kilogram tubs, with Original Horslyx also sold as a 15-kilogram block as well as a handy 650-gram mini size. 'This is ideal for distracting or rewarding horses during vet and farrier treatments or for encouraging horses to stretch,' explains Jackie. 'It's also a perfect treat to take to events.'

To see Horslyx in action, search for Horslyx videos on YouTube or check out the Horslyx Facebook page.

For more information, see www.horslyx.co.uk and talk to your Ballance Nutrient Specialist, your SealesWinslow Technical Sales Representative or visit your local Farmlands store.

TURN 'STRAW' INTO GOLD

Crystalyx Forage Plus is an easy way to get the best out of poor-quality pasture or forage.

'At the end of a long, hot summer, pasture and peace of mind can both be a little stretched,' says Natalie Hughes, SealesWinslow Science Extension Officer. 'You're more likely to be paying attention to the *quantity* of feed available rather than the finer details of its *quality*.

'Yet feed quality is important if you're going to get the most out of your farm. If we can improve feed quality, it's easier to extend the lactation or build stock condition going in to winter. Using a product like Crystalyx Forage Plus can make a real difference here.'

From late summer through early autumn, feed quality is reduced because pasture is very high in fibre and short on some essential nutrients. Drought exacerbates this issue. Poor-quality feed or pasture can affect liveweight gains or reduce milk production, because it delivers less energy to animals than they would get from a less fibrous feed.

Drip-feeding small amounts of molasses – the base ingredient of Crystalyx lick blocks - boosts microbial growth, and that in turn helps the rumen break down lower quality pastures more efficiently.

'When farmers use Crystalyx Forage Plus in these conditions, we typically see liveweight gains,' says Natalie. 'For instance, on-farm trial work in Northland showed that feeding Crystalyx Forage Plus increased liveweight gains in R1 steers by 30%.'

Scientific studies in the laboratory showed that rumen fluid from cows provided with Crystalyx Forage Plus increased the amount of neutral detergent fibre (NDF) that was digested, regardless of the quality of feed. The average increase in digestibility of the NDF was 40 g/kg – this would mean animals were able to capture more energy from the diet, which would help growth and/or lactation.

'Of course, feed is not just about energy,' says Natalie. 'Stock need the right minerals and trace elements, too. In late summer and autumn, pastures can be short on some of these, so it's good to have a way to get those missing nutrients into animals – and that's one of the other benefits of using Crystalyx Forage Plus. The blocks provide a safe, efficient way to trickle-feed essential minerals.

'Some minerals, such as magnesium, are not stored in the animal to any great extent. Animals need to ingest them in their feed on a day-by-day basis. A system that provides these minerals and trace elements in controlled amounts helps to reduce the chance of a deficiency and supports production.'

Crystalyx Forage Plus provides magnesium, calcium and phosphorus, as well as five trace elements (cobalt, copper, iodine, selenium and zinc), plus five different vitamins. As the blocks are based on dehydrated molasses, daily intake is limited, so animals can't take in more than they need.

Crystalyx Forage Plus blocks are convenient to use in both rotationally grazed and set'stocked situations, and they are suitable for both dairy and beef enterprises.

For more information on Crystalyx Forage Plus and other products in the Crystalyx range, talk to your Ballance Nutrient Specialist or SealesWinslow Technical Sales Representative or visit www.crystalyx.co.nz

TIP-TOP FOR TUPPING

Pre-tupping feed management is crucial to maximise ovulation rates, in-lamb and multiple rates to get you closer to the ideal of two lambs per ewe in spring.

'Monitor the weight and body condition score [BCS] of your hoggets and ewes regularly in the lead up to the start of mating,' says SealesWinslow Science Extension Officer Paul Sharp. 'To ovulate well and become pregnant, ewes need to at least hold condition and ideally be gaining it. Barrenness increases markedly if ewe liveweight drops below 45 kg. Above that, every additional 4.5 kilograms - up until at least 70 kg liveweight - will increase the chance of twins by 6%. Gaining weight in the pre-tupping period helps lift ovulation rates even in heavier ewes.'

Hoggets need to keep growing both in the lead up to tupping and during it. Lack of feed in the first ten days of pregnancy can affect egg survival.

Of course, this critical feeding period comes at a time when pasture is often least able to meet needs, particularly after a long, dry summer, when it will be high in fibre and low in energy.

Dividing your flock according to weight and BCS will allow you to target feed to best effect. 'Your flushing strategy needs to weigh up the chance and value of an increased lambing percentage against the cost of feed and/or the potential impact on winter and spring pasture,' says Paul.

'A ewe who is in BCS 3 and 60 kg is about 8 kg heavier than a ewe at BCS 2 of the same frame size. It will take the lower BCS ewe 53 days to catch up – probably longer, as 150 grams per day is at the high end of the scale in terms of potential weight gain. You may be better to focus on ewes that need to make a smaller improvement. This is where your easiest gains are and where you can make the most efficient use of available feed and get the best return from any supplements you need to purchase.'

Address any pasture quality or quantity shortages with a suitable high-energy supplement. Be aware of any farm-specific mineral deficiencies and preferably supply required trace elements little and often to ensure stable diet and animal intakes.

For help with your pre-tupping feed strategy talk to your SealesWinslow Technical Sales Representative.

Pre-tup diet facts and figures

Target intakes should be around 2.5% of liveweight per day, e.g. 1.5 kg DM/day for a 60 kg ewe.

Target dietary requirements	
Crude protein	10-12% minimum – 14% for hoggets
ADF	16% minimum – aim to be as close to this as possible, but not below it. Quality declines the more ADF exceeds 16%
Energy content	10.5 MJME/kg DM. Higher is better. A mature ewe needs 40-60 MJME to gain 1 kg in liveweight
Good mineral status	Trace elements (particularly selenium) are key to cycling, active heats, holding to mating and good embryo implantation

THE ALL-PURPOSE MAINTENANCE FERTILISER NOW CONTAINS SUSTAIN

Our popular Pasturemag product range just got better. It's been upgraded to include SustaiN as the nitrogen source, making it the ideal, all-purpose maintenance fertiliser for dairy farms.

Pasturemag supplies the five key nutrients needed for productive dairy farms, including magnesium, which is essential for animal performance. Applied in autumn, Pasturemag delivers magnesium when pasture levels are low, but demand is high.

And now, with the inclusion of SustaiN, Pasturemag also gives you more available nitrogen to boost grass growth heading into the winter.

To find out more talk to your Ballance Nutrient Specialist or call 0800 222 090.

Pasturemag™ Ballance™ agri-nutrients