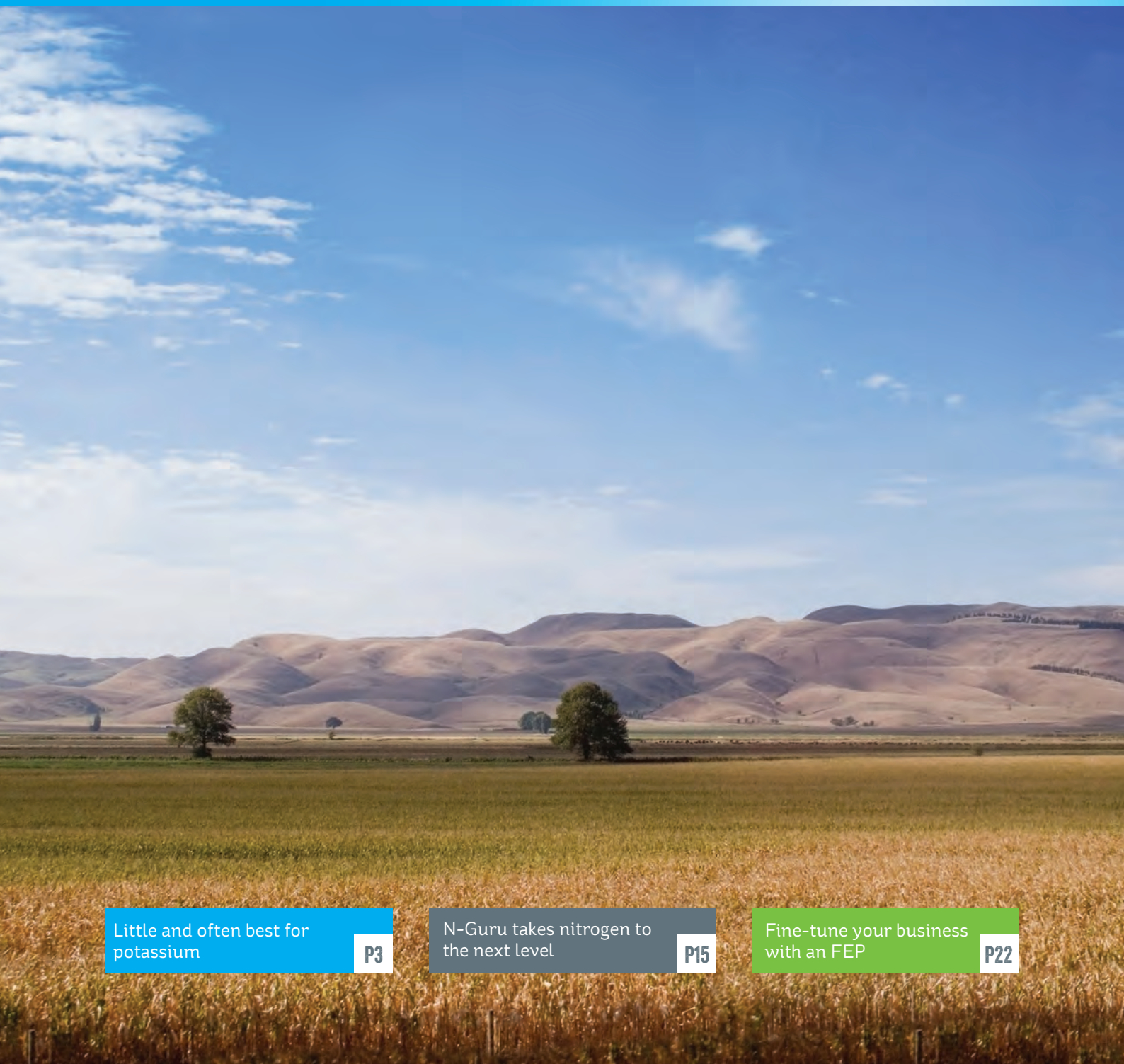
Ballance agri-nutrients

GROW

NORTH ISLAND
AUTUMN 2017



CONTENTS

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KEEP YOUR K OKAY

A strategic approach to potassium will minimise losses in your cropping business.

Arable farmers know that cropping removes large amounts of nutrient from the soil, particularly phosphorus and potassium, which should be replaced to sustain yields. Autumn is a good time to take stock and address soil fertility issues before the new season's crops are planted.

In terms of potassium (K), the ideal range for autumn-sown wheat or barley is Quick Test K 6-10 and Quick Test K 6-8 for ryegrass. While brassicas take up large amounts of potassium, extensive field trials have found very few potassium responses. However, potassium should be applied at Quick Test K 4 and below.

"If your Quick Test K results are less than desirable then you'll need a strategy to build potassium levels again," says Ballance Science Extension Officer, Aimee Robinson. "Arable farmers can spend a lot of money trying to optimise potassium levels. It is often more financially viable to supply what the crop needs to avoid a deficiency, rather than apply capital rates. A little-and-often approach may be best to avoid leaching or luxury uptake wasting your potassium investment."

Plants can take up more potassium than they need. This luxury uptake doesn't affect growth or yield but can cause animal health problems if the crop is used as feed – and it can impact on the economics of your fertiliser.

On soils prone to potassium loss – such as sands, podzols or pumices under high rainfall – it is hard to maintain soil Quick Test K levels in target ranges because of low cation exchange capacity and/or high winter leaching. On these soils, waiting until early spring to apply potassium is a more efficient and economic approach. On other soils potassium can be applied at any time.

Fertilisers contain potassium in soluble, readily available forms, so you need to consider soil tests, soil type, crop needs and climate to get your inputs right.

For more advice on potassium needs for your crop, talk to your Ballance Nutrient Specialist.

$ and straw

Cereal crop residues contain nutrients – quite a lot! Burning stubble and incorporating ash/residues returns these nutrients to the soil. Harvesting residues as straw removes most of them. Over time, this affects your soil fertility, particularly potassium and magnesium levels.

Straw's value fluctuates with the cost of the nutrients replaced with fertiliser. To help make the best choice, FAR has developed a spreadsheet that can be used for oat, wheat or barley straw. Find it at: www.far.org.nz/resources/electronic_tools/economic_cost_nutrient_losses

K and CEC

Cation exchange sites are negatively charged areas on soil particles. Positively charged potassium ions in the soil solution can attach themselves to these sites. If there is a lot of potassium in the soil solution (e.g. from fertiliser), it can move to free cation exchange sites. Potassium ions from these sites can in turn replenish the soil solution and become available to plants. Soil types have varying cation exchange capacity (CEC) and hence varying ability to "hold" exchangeable potassium.

PLANT

SOIL

PLAN NOW FOR FODDER BEET

Fodder beet can deliver excellent results if you get the groundwork right.

"Fodder beet is expensive to establish but is a potentially high-yield, high-quality feed," says Ollie Knowles, Ballance Precision Agriculture Specialist. "The key to getting the cost/benefit equation working in your favour is planning. Autumn is the perfect time to start if you want to sow this coming spring or early summer."

Perfect paddocks

Selecting your site is the first step. You need to think about this from a number of angles.

Practicality: The paddock needs to be readily accessible for machinery and stock. Consider the potential for sediment and nutrient run-off (from machinery or stock action) to affect surrounding waterways.

Size: How is your fodder beet crop fitting into your feed plan? The yield you need and how you plan to use it will determine the area required. A well-managed crop can yield 18-22 tonnes DM/ha. Yields of up to 30 tonnes DM/ha are possible under good growing conditions.

If you plan to lift the crop and feed off-site you can choose a high DM percentage fodder beet variety and plant more densely. If you plan to feed in-situ then choose a low DM percentage variety and factor in space to manage the allocation of the crop per cow. Table 1 indicates the number of cows that can be grazed per hectare at varying yields and per cow allowances for a 60-day period during winter, assuming 90% utilisation of the feed.

Choosing a mid-range DM percentage variety and planning to plant in 50 cm rows gives you the option to graze or lift.

Soil structure: Consider this both in terms of crop establishment and subsequent grazing or harvesting.

- Avoid light soils with low water holding capacity unless they are irrigated or well-fallowed. Fodder beet is very vulnerable to dry conditions during its early development.
- Avoid heavy, poorly drained soils, especially if grazing. The ability of a fodder beet crop to carry a large number of cows in a relatively small area increases the risk of pugging and other environmental damage. Too much water can lead to poor emergence and also cause disease in the crop.
- Fodder beet needs a fine, firm seed bed, so choose your site accordingly or be prepared to put the work in to make it so. Contractors with precision equipment may refuse to use it on areas with lots of surface stones.

Nutrient needs

Fodder beet is very sensitive to acid soils. If your pH is not between 6 and 6.2 then you will need to apply lime now if you plan to plant in September. It takes six months for applied lime to start adjusting soil pH levels.

Any underlying fertility issues must also be remedied before sowing. "There has been some discussion about phosphorus in relation to fodder beet," says Ollie. If the Olsen P level in the top 150 mm is lower than 15, then apply a capital application of phosphate with the base

	Crop yield (tonnes DM/ha)				
	16	18	20	22	24
Kg DM of crop offered/cow/day	Number of cows/ha for 60 days				
7	38	42	47	52	57
8	33	37	41	45	50
9	29	33	37	40	44
10	26	30	33	36	40

TABLE 1
Crop yield, feed intake and cows grazed per hectare for 60 days (Source: DairyNZ Farm Fact 1-77 October 2013)

dressing. "Despite its low phosphorus requirement, fodder beet, like any plant, needs a ready source of soluble phosphorus to encourage early establishment, so take this into account at sowing with a starter fertiliser."

Fodder beet also demands more potassium (K) and sodium (Na) than most crops. However, studies done by Plant & Food Research found that applying high rates of potassium and sodium when Quick Test K and Quick Test Na results were at 4 or above did not improve yield. See Table 2 for recommendations.

Weed watch

Fodder beet seedlings are slow to establish (which makes the crop vulnerable to weed invasion) and they are also sensitive to some sprays and spray residues. An autumn spray will have a big impact on the weed population down the line and also on your subsequent spray programme.

The big picture

You shouldn't plant fodder beet in the same paddock two seasons running as regrowth from bulb chips will cause problems in the second crop, so think about how it fits into your whole farm picture. "Autumn spray, winter crop, spring spray, fodder beet, spray out and put into permanent pasture is one strategy," says Ollie. "Remember that grazing in-situ will return more nutrients to the soil via dung and urine compared to lifting the crop and feeding it out elsewhere."

Fodder beet is not susceptible to club root or dry rot, so can happily follow brassicas: just watch the spray residues. If the spray history is uncertain, it may be better to opt for a paddock coming out of grass.

	Quick Test Na < 4	Quick Test Na >4
Quick Test K < 4	100-200 kg MOP/ha 50-100 kg NaCl/ha	100-200 kg MOP/ha 0-50 kg NaCl/ha
Quick Test K > 4	50-100 kg MOP/ha 50-100 kg NaCl/ha	50-100 kg MOP/ha 0-50 kg NaCl/ha

TABLE 2
Potassium (K) and sodium (Na) fertiliser recommendations for fodder beet crops based on soil Quick Test levels (MOP = muriate of potash (50% K), NaCl = salt (40% Na))

To plan for your successful fodder beet crop, talk to your Ballance Nutrient Specialist.

PREPARE THE PADDOCK WELL
correct any problems with the land, e.g. drainage issues, acidic soil pH, poor fertility

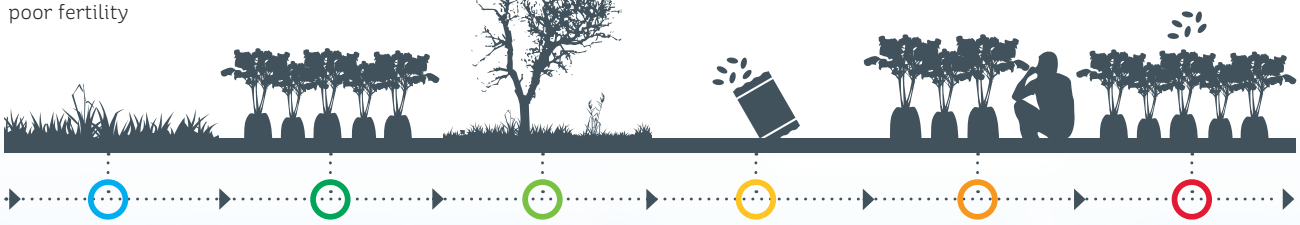
SELECT A CULTIVAR
that will grow well in the local conditions

PLANT EARLY
enough to take advantage of the full growing season

USE A STARTER FERTILISER
at sowing

CHECK THE CROP
regularly for signs of pests or disease

APPLY
post-emergence nitrogen to help crop meet its yield potential



LUCERNE IN AUTUMN

No, we haven't started a travel column. We're talking legume, not Swiss lakeside. Established and managed well, high-energy, high-protein lucerne is a valuable, drought-tolerant feed option.

"New cultivars are challenging lucerne's reputation for being expensive to establish and difficult to manage," says Ollie Knowles, Ballance Precision Agriculture Specialist. "With good management a lucerne stand can last for up to eight years, so it pays to get things right from the start by applying appropriate rates of lime and fertiliser. The longer a stand lasts, the lower the relative cost of establishment."

Site preparation is critical for good results. "Soil pH adjustment is a 'must-do' in autumn," continues Ollie. Lucerne's nitrogen-fixing bacteria prefer near-neutral conditions, requiring a soil pH of 6.0-6.2 in the top 150 mm. Sampling to 150 mm targets the zone where lucerne's roots will be searching for nutrients. This is very important in light of the potential impact of exchangeable aluminium, which may not show up in a standard pasture-depth (75 mm) sample. High levels of aluminium will inhibit root and nodule growth, which affects the yield, resilience and longevity of the stand.

The relationship of soil pH to aluminium toxicity is shown in Figure 1.

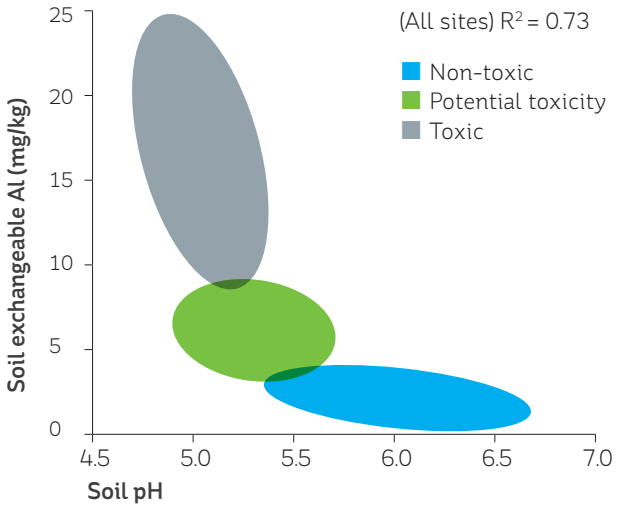


FIGURE 1
The relationship between soil pH and exchangeable aluminium. (Adapted from Moir J.L. and Moot D.J. (2014) Medium-term soil pH and exchangeable aluminium response to liming at three high country locations. *Proceedings of the New Zealand Grassland Association* 76: 41-46) The non-toxic range shown in this diagram is broader than the recommended pH range of 6.0 to 6.2 for lucerne establishment. The recommended range reflects the need for phosphorus and molybdenum to be readily available. This is greatest between 6.0 and 6.2.[1]

Apply lime at least six months before sowing so that it has time to start working and alter soil pH. Around 1-2 tonne of lime per hectare will lift soil pH by 0.1 units. "There are some soils where no amount of lime will change pH to the depth needed for lucerne," warns Ollie. "This needs to be explored through soil tests on a site-by-site basis."

Weed competition also reduces the productivity and persistence of lucerne. "While you'll still need to spray out again before sowing, an autumn spray will have a huge impact."

If your lucerne crop is already established then autumn is the time to protect the next season's yield. Let at least 50% of the crop flower before grazing to replenish root reserves. Spray established stands for perennial or winter weeds 7 to 10 days after the last autumn grazing (or in early winter), ideally when the crop is dormant (not actively growing). Spraying later may damage forming buds and delay spring growth.

For more information about lucerne and help with soil testing, contact your Ballance Nutrient Specialist.

[1] McLaren R.G., Cameron K.C. (1990) *Soil Science – An Introduction to the Properties and Management of New Zealand Soils.* Oxford University Press. Auckland.

Looking ahead

Consider what nutrients need to be available for your lucerne crop at sowing when planning the paddock's transition from autumn, through winter to spring.

	Target	Notes
Olsen P	15	Lucerne is more efficient at taking up phosphorus than other legumes.
Sulphate S	6-10 ppm	
Potassium	Quick Test K 6-8	Not generally required at sowing. Subsequent needs depend on whether the lucerne is grazed or cut. 200-300 kg K/ha can be removed in a "cut and carry" scenario.
Magnesium	Quick Test Mg > 10	
Molybdenum	> 0.5 ppm	Required for nitrogen fixation. Apply at sowing on sandstone-derived sedimentary soils (e.g. greywacke) or where molybdenum has been required in the past. Otherwise apply in response to herbage test results, especially if nitrogen content is less than 4.5%.
Boron		May be needed on pumice soils.

The lowdown on lucerne

- Lucerne is suitable for all stock classes, very palatable, high in metabolisable energy at 12 megajoules per kilogram of dry matter (MJ/kg DM) and also high in crude protein (20-30%).
- It's very efficient at fixing nitrogen and its productivity exceeds white clover.
- Its deep tap root makes it good at foraging for water and more tolerant to drought. Trials at Lincoln showed that it extracts water to a depth of 2.3 metres compared to chicory and red clover at 1.9 metres. It recovers faster from a dry spell than ryegrass by rapidly mobilising nutrient reserves from its root system.
- Conversely, lucerne doesn't tolerate waterlogged soil or flooding very well.
- Lucerne doesn't pair well with New Zealand's usual grass species, ryegrass. Some farms have successfully combined lucerne with other grasses such as cocksfoot and prairie grass or herbs such as plantain. These mixed pastures may offer some advantages in terms of pest and weed management, stand longevity and animal health, but more research is required.
- The most common approach is to plant it on its own for grazing and conserved feed, and supplement with grass or hay for fibre.
- Lucerne does not take up sodium (Na), so supplement with salt blocks to safeguard animal growth and reproductive performance.
- Red gut and bloat may be issues when grazing stock on lucerne. Strategies to avoid these problems are similar to fending off nitrate poisoning: don't put hungry stock onto the lucerne block and supplement with hay or other fibre when growth is lush.

SOIL TEST FOR pH (150 MM)
To adjust soil pH to target range (6.0-6.2)

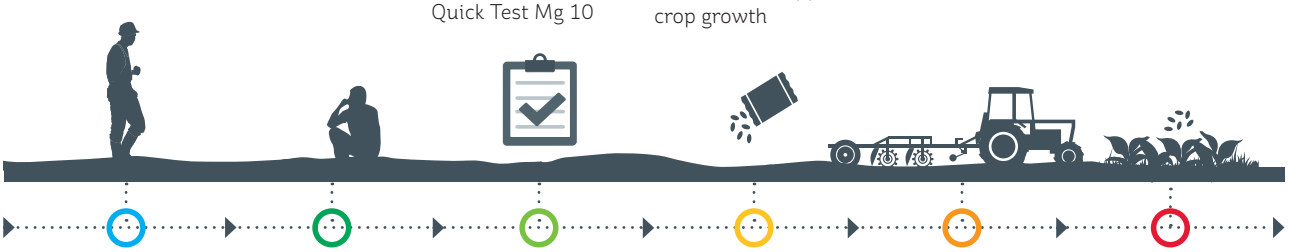
CONDUCT SOIL TEST (150 MM)
To determine levels of Olsen P, S, K, Na

TARGETS
Olsen P 15
Quick Test K 6-8
Sulphate S 6-10
Quick Test Mg 10

APPLY BASE FERTILISER
To ensure that soil nutrient levels are sufficient to support crop growth

SOW CROP
Include a starter fertiliser, e.g. Serpentine Super (200-300 kg/ha)

APPLY
potassium to replace that removed in the crop



6-12 months before sowing crop | 2-3 weeks before sowing crop | At sowing (if drilling); just prior (if broadcasting) | October (lucerne only) or March (lucerne and grasses) | After grazing or harvest

PLANT

SOIL

DON'T COME A CROPPER

Following a few best practice tips will keep soil and yields in good shape when cropping.

"In a pastoral context, an autumn-sown crop is a good way to boost feed through winter," says Ballance Forage Specialist, Murray Lane. "Italian ryegrass and oats grow better than perennial pasture in colder conditions. Attention to a few key details will get the crop off to a good start, while looking after your soil."

Spray for success

In autumn, plants build up nutrients in their roots ready for winter dormancy. Roundup translocates with this nutrient flow. In spring the reverse happens, making it harder to get Roundup down into the roots of perennial weeds. "If the paddock has come out of a summer crop, ideally allow a few weeks fallow between harvest and spraying for maximum impact. You'll still need to spray again before sowing another crop or pasture in spring, but this autumn spray will have the biggest impact on perennial weeds."

Base matters

Crops remove large amounts of nutrient, which must be supplied and replaced to avoid future yields declining and/or reducing the quality of subsequent pasture. "Be realistic about your crop's yield potential. Applying nutrients based on a higher yield than you're likely to achieve is wasteful and can lead to nutrient losses, especially over winter. Be mindful of what's already in the soil. If you've come out of a summer crop, the removal rate will depend on whether the crop was harvested or grazed."

This autumn is also a good time to plan for the paddock's role in spring 2018 by identifying and addressing any pH and phosphorus issues.

Till or no-till?

Science is definitely on the side of no-till. "No till or minimum till methods leave the soil intact, preserving organic matter, moisture, soil structure and the pest/predator balance," says Murray. "Cultivation might be useful if you're breaking in extremely bad land, or addressing a serious pugging problem, pans or other underlying issues from past cultivation practices. However, in most situations direct drilling can achieve everything you need, plus it's cheaper and supports better crop yields."

A head start

Phosphate drives germination and early growth. "A starter fertiliser placed alongside the seed during drilling delivers benefits that can't be achieved with base fert alone." DAP, Cropzeal Boron Boost (for brassicas) or YaraMila Actyva S are all good options. Check that drilling equipment can accommodate fertiliser in a separate box. If fertiliser is placed in contact with the seed, use lower rates (e.g. no more than 150 kg Cropzeal Boron Boost per hectare, in 140-150 mm drill rows).

Canopy closure

Following up with a nitrogen side dressing will support canopy development, reducing weed competition and boosting crop growth. Use SustaiN to reduce the risk of nitrogen loss through ammonia volatilisation.

For more advice on autumn-sown crops, talk to your Ballance Nutrient Specialist.

Murray Lane

CEREAL SILAGE SUCCESS

Managed well, autumn-sown cereal silage offers good returns.

Whole crop cereal silage is a useful feed supplement for dairy cows. "Most is grown in spring, but there are some definite advantages to autumn sowing," says Ollie Knowles, Ballance Precision Agriculture Specialist.

"The timing of harvest has a big impact. Ideally it needs to be done at the direct chop stage, when the crop is 30-46% DM. If you squeeze a grain, the contents should have a doughy, cheese-like texture. If it's watery or milky, it means the starch isn't fully developed and the crop's high pH will cause problems during ensiling. On the other hand, if you harvest too late, the straw will be springy and hard to ensile and the grain becomes hard to digest. Using a harvester with rollers to crack the grain helps, but won't significantly improve quality.

"With an autumn sowing, your harvest window is reasonably wide – about 30 days compared to between 2 and 14 days with a spring sowing. This gives you more flexibility with booking contractors and increases your chances of a quality end product."

Autumn-sown cereal silage crops also deliver significantly higher yields, have higher protein content and require less irrigation than their spring-sown counterparts, although they may need more fungicide dressings.

When harvesting the crop, each 10 cm increase in cutting height reduces overall yield by around 1 tonne/ha. However, a higher cut will improve the ratio of grain to straw, which increases feed quality. Look for a cultivar with a good balance of total yield and grain when deciding on what to sow.

How much straw you leave behind will also have an impact on the amount of nutrient you need to replace after harvest, particularly in relation to potassium and magnesium (see "$ and Straw" page 3). "Cereals take up nutrients in large quantities during active growth. Failure to replace them will see your soil reserves and future yields decline."

Selecting the right species and cultivar is a matter of balancing, with respect to the harvest window, suitability to your climate, grain yield, soil fertility and the cost/feasibility of replacing nutrients. For example, a low-yielding crop going into a relatively fertile soil may need minimal phosphorus, which could be supplied by starter fertiliser. However, if you plant a high-yielding crop in soil with moderate to low fertility, then you'd need to address phosphate levels before sowing.

"When you see recommendations for replacing nutrients from crops the ranges are often quite broad because there are so many variables at play," says Ollie. "Therefore, good advice definitely wins out over rules of thumb."

For advice on incorporating whole crop cereal silage into your farm system, talk to your Ballance Nutrient Specialist.

WIN-WIN FOR FORAGE

Research indicates that following kale winter forage with oats may deliver feed cost benefits, while reducing nitrogen loss by 25-30% compared to leaving the paddock fallow.

Funded by the Pastoral 21 programme (a collaboration between DairyNZ, Fonterra, Dairy Companies Association of New Zealand, Beef + Lamb NZ and the Ministry of Business, Innovation and Employment), the research was conducted in Canterbury, where management practices, soil, topography and environmental conditions suited the trial approach.

"In Canterbury, Otago and Southland dairy cows are commonly wintered on forage crops – often kale – sown the previous spring," says Ballance Science Extension Officer, Aimee Robinson. "Urine from cows grazing winter forage is a major source of nitrogen loss. The nitrogen in urine patches is highly concentrated – up to 1000 kg N/ha – and it is deposited on cold, wet soil, with little plant growth to take it up."

As winter feed costs are already high (especially including land lease costs), there is demand for a solution that does not reduce yields or stocking rates. "Planting oats after the kale crop and harvesting them for silage before re-sowing kale appears to offer a number of benefits," says Aimee.

"Normally kale is grazed from late May through to mid-August. The paddock is then left fallow until mid-spring, so no plants use the nitrogen in the soil until late October, by which time much will have leached beyond the root zone of many crops. Deep-rooted, oats act like a sponge, soaking up excess nitrogen. The oat silage can then be used the following winter to supplement the kale crop."

In the trials, the kale-oats sequence yielded 3–7 tonnes DM/ha/year more feed than the kale-only system, at a similar cost per unit of DM[1] and provided all the feed needed for cows from the end of May until early to mid-August. Cows were offered 12 kg DM/cow/day of the kale, plus 5 kg DM/cow/day of oat silage, providing 153 MJ ME per cow per day. "Kale and oats complement each other well in terms of a pregnant, non-lactating cow's dietary needs."

To work effectively, this approach requires attention to some key points.

- Flat, free-draining paddocks are best suited to this system.
- Soils must be able to withstand heavy traffic in August/early September to avoid compaction when the oats are sown.
- The kale crop must be well-utilised (90% plus) so residues don't interfere with drilling/cultivation.
- The oats need to be wilted before ensiling or baling, so you need an extended dry spell in late November.
- The subsequent kale crop will need irrigation or plentiful summer rain to keep yields high.
- Timing is critical. The sooner you plant the oats, the sooner you will be able to plant the next kale crop and maximise yields. It's not worth sowing oats after 15 September or kale after 1 January. Take this into account if you are considering this approach for the coming spring.

Well-managed on suitable soils, the sequential system can be used for up to three or four seasons. Research is continuing on this win-win for production and nutrient management.

[1] In the trials, kale-only system costs ranged from 16-25 c/kg DM compared to 15-22 c/kg DM with the sequence-crop system. Kale-only system figures include the cost of hay used to supplement the forage. Standard values for cultivation, sowing and irrigation were taken from the Lincoln University Financial Budget Manual. A cost of 4 c/kg DM was used for harvest and storage of the oat silage in the sequence-crop system. The annual land rental of $1000/ha was split two-thirds for kale and one-third for oats.

What about other combos?

In terms of alternatives to kale, you need to consider ideal sowing times for best yield and other consequences. For instance, fodder beet must be sown in mid-September to late October for best winter yield, so it couldn't follow the oat crop, although it could precede it.

As long as the timing is suitable, any winter forage crop could replace the kale.

If you plan to continue the cropping sequence and follow the oats with winter forage again, there is no suitable alternative to oats. Oats deliver a better yield in the required timeframe than other cereals. Oats also germinate more reliably at low soil temperatures and produce more biomass from early-spring sowing than ryegrass. If you plan to return the paddock to pasture in autumn, then other cereals are an option.

	Oats	Kale
Critical requirements	Soil conditions suitable for cultivation or drilling during winter or early spring High utilisation of previous kale crop	Full irrigation or adequate and reliable summer rainfall
Sowing date	Late August 120 kg seed/ha	Early December 4 kg seed/ha
Fertiliser	Nil	200 kg DAP or Cropzeal Boron Boost/ha 100 kg Superten 5K/ha
Post-emergence nitrogen	Mid October 40-50 kg N/ha (85-110 kg SustaiN/ha) Early November 40-50 kg N/ha only if required	5 weeks after emergence 100 kg N/ha (220 kg SustaiN/ha) 11 weeks after emergence 100 kg N/ha
Harvest	Late November As green-chop silage	Late May to mid-August Graze in situ
Expected yields	5-7 tonne DM/ha	10-13 tonne DM/ha

TABLE 1
Management of kale-oats crop sequence. Seed rates should be increased if conditions are less than ideal for germination. Actual yields for both crops will depend upon growing conditions and soil type. Information adapted from "Winter sequence cropping kale and oats on winter support land for increased production and reduced nitrogen leaching", DairyNZ

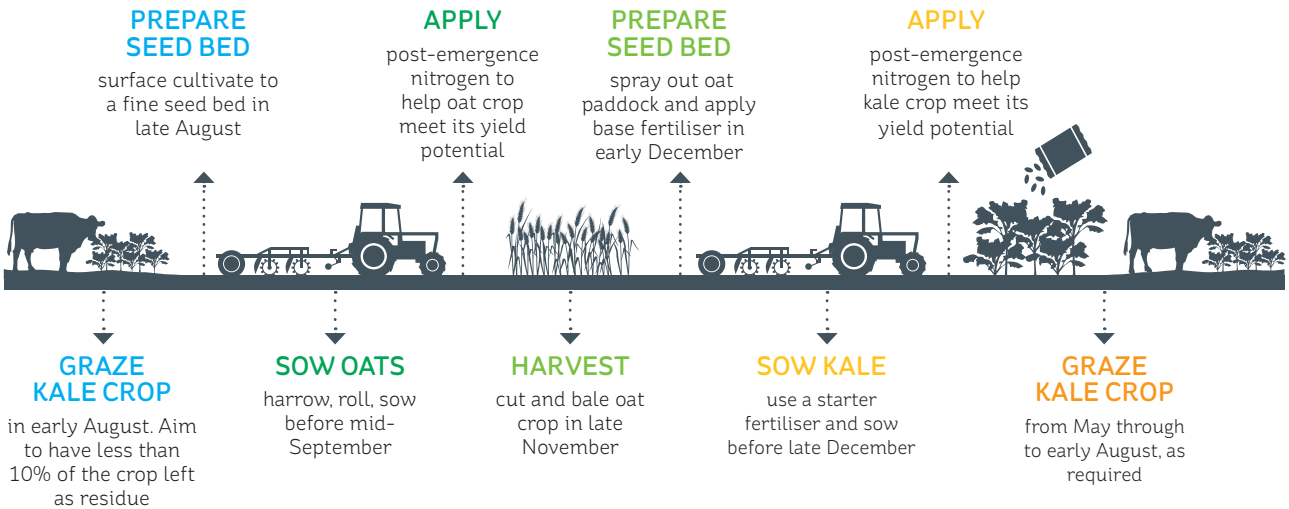


FIGURE 1:
Management of kale-oats crop sequence

PLANT

SOIL

GOOD START FOR GRASS

Whether you're putting in ryegrass for winter or renewing permanent pasture, that precious seed needs readily available nitrogen and phosphorus to perform.

The key success factor at sowing is providing germinating seeds with immediate access to the nutrients they need. This requires a more specific approach than your base fertiliser can deliver. "Phosphorus is essential for early root and shoot development, but it's not very mobile in the soil," explains Ballance Science Extension Officer, Josh Verhoek. "A ready supply of phosphorus close to the developing plant is the best way to support this all-important early growth."

This is true whether you cultivate or use no-till methods. "Generally, soil fertility declines with depth," explains Josh. "Cultivation buries topsoil and base fertiliser will then be thinly distributed through the top 50 to 60 mm, so nutrients are well out of reach of germinating seeds. With no-till methods, soil disturbance is reduced and this affects mineralisation – the process that 'unlocks' nutrients from the soil. Consequently, it takes longer for some soil nutrients to become available to plants. Also, any phosphate broadcast onto the surface will move very slowly into the soil and is unlikely to be accessible to your germinating grass seed."

Including nitrogen in your starter fertiliser is also important – particularly following a crop – to encourage greater tillering and leaf expansion, leading to faster leaf canopy cover. The quicker the canopy cover develops, the fewer problems you will have with early weed invasion.

"DAP provides both nitrogen and phosphorus, making it an excellent starter fertiliser," says Josh. "Drilled adjacent to seed, it's going to put the right nutrients in the right place to get that grass off to the best possible start."

Autumn re-grassing checklist

- Address liming and capital fertiliser well in advance
- Ideally allow a few weeks' fallow after harvesting the summer crop
- Spray out weeds (and any remaining clover if planting permanent pasture next autumn to help control clover pests)
- Choose the right endophyte
- Drill seed with DAP
- Allow 5 to 6 weeks before grazing. Graze with light stock or limit grazing time to prevent pasture and soil damage
- Apply nitrogen to support growth while clovers re-establish (for permanent pasture)
- Spray to control broadleaf weeds

For more advice on pasture renewal or starter fertiliser, talk to your Ballance Nutrient Specialist.

Josh Verhoek

THE ACID TEST

Would a combination of gibberellic acid and nitrogen fertiliser work better than either alone? Research suggests not.

"Gibberellic acids are natural growth hormones found in flowers, fungi and bacteria," explains Ballance Science Manager, Aaron Stafford. "The research focused on one form – GA_3 – which has been gaining popularity as a pasture growth enhancer."

From 2013 to 2016, Ballance commissioned field trials at eight New Zealand sites to investigate the benefit of yield response to GA_3 applied with or without nitrogen fertiliser.[1] Trials were conducted in spring, summer and autumn, with GA_3 applied at 8-30 g/ha. Ballance also collaborated with Belfast-based Agri-Food and Biosciences Institute (AFBINI) to fast-track evaluation on their comparable ryegrass-based pasture systems, with separate trials run in Northern Ireland in 2014 and 2016.

Pasture yield in control plots (i.e. with no treatments applied) was compared to yield with application of nitrogen fertiliser, GA_3 or GA_3 plus nitrogen fertiliser. The latter treatment was included to see whether GA_3 and nitrogen fertiliser effects were additive, and whether nitrogen fertiliser could reduce previously observed pasture growth rate "lag effects" following GA_3 application.[2] In these trials, GA_3 was applied at rates between 8 and 30 g/ha. Nitrogen application rates were 20-30 kg N/ha (depending on the trial series). The 2014 AFBINI trial also tested relative pasture response to nitrogen in liquid, granular and fine particle (FPA) form.

Conclusions were consistent across the board, regardless of location, timing, rate of GA_3 applied and presence or absence of nitrogen.

- GA_3-treated plots yielded more DM than control plots at first harvest (21 to 25 days after application) but there was a consistent pasture growth rate lag over ensuing harvests.
- Total pasture yields over 2-3 harvests from the GA_3-treated pasture were not significantly different to control plot yields.
- Co-application of nitrogen made no difference to the GA_3 pasture response pattern over time – i.e. the responses to GA_3 and nitrogen fertiliser were additive rather than synergistic.

This is clearly illustrated in Figure 1. "Overall, nitrogen had the only significant effect on pasture yield over combined harvests. As an aside, there was also no significant difference between granular, liquid or FPA forms of nitrogen, echoing previous field trials we have commissioned.

"These findings suggest that the benefit from GA_3 (applied with or without nitrogen) declines over time. Instead of producing a lot of additional feed, it shifted the timing of its availability," says Aaron. "This may be useful to meet an immediate feed shortage. However, because the subsequent yield lag occurs quickly – over the next 1-2 cuts or grazings – the feed deficit may simply be shifted a few weeks if growth rates aren't sufficient to compensate for the lag."

These factors need to be weighed up when deciding how to fill a feed deficit, e.g. using GA_3, nitrogen fertiliser or imported supplementary feed. "In fairness, some studies have shown yield lags following nitrogen fertiliser application, attributed to factors such as ryegrass outcompeting and shading clover, reducing longer term nitrogen fixation. However, with nitrogen fertiliser the lag isn't apparent until harvests 4-5, when it is more likely to be offset by improved growth rates in later spring."

The outcomes confirm the importance of Ballance's science-based approach to product development. "We've been interested in the potential product opportunities arising from the combination of GA_3 and nitrogen fertiliser. As part of our research, we investigated the effect of granular application of GA_3; however, this was not effective. Due to the greater cost and practical challenges of using liquid nitrogen (with no response advantage over granular nitrogen), we're not convinced we would be providing additional value for our customers."

For advice on boosting your pasture yields, talk to your Ballance Nutrient Specialist.

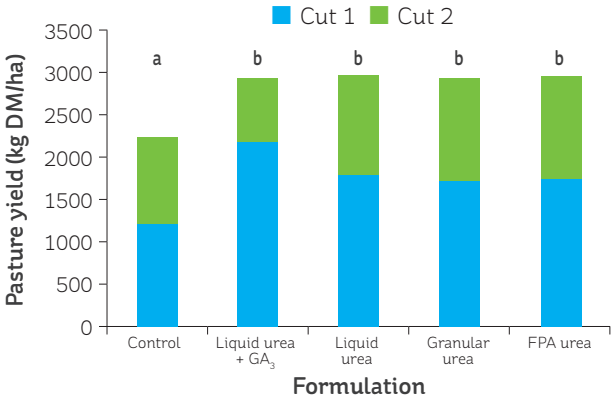


FIGURE 1
Pasture yield response over two harvests combined for various treatments (AFBINI trial for Ballance, 2014). All urea treatments applied at 25 kg N/ha. GA_3 applied at 30 g active ingredient/ha. Treatments annotated with the same letter indicate total yield assessed over two harvests is not significantly ($P > 0.05$) different.

[1] Research conducted as part of Ballance's Clearview Innovations Primary Growth Partnership with the Ministry for Primary Industries.

[2] Matthew, C., Hofmann, W.A., Osborne, M.A. 2009. Pasture response to gibberellins: A review and recommendations. *New Zealand Journal of Agricultural Research* 52: 213-225.

BE INFORMED ABOUT N FORMS

Thinking about using liquid nitrogen fertiliser? Make sure it's for the right reasons.

"Applying liquid nitrogen fertiliser to foliage is sometimes touted as being a more efficient means of getting nitrogen into plants, compared to applying granular nitrogen fertilisers to soil. However, most research shows no difference in total yield, little impact on nitrogen losses, and a greater risk of leaf scorch with foliar application," says Ballance Science Manager, Aaron Stafford. "It pays to factor this into your decision making."

Liquid nitrogen fertiliser may be useful if you want to:

- use existing irrigation infrastructure to reduce nitrogen application costs (i.e. fertigation)
- apply nitrogen fertiliser with gibberellic acid (see page 13)
- apply nitrogen very evenly at very wide bout widths (for arable farming).

DM matters

Ballance compared the response of pasture (and numerous crops) to liquid and solid nitrogen fertiliser applied at equivalent rates. Results showed no significant difference in total dry matter production. The additional pasture growth was also the same whether nitrogen was applied via multiple applications in liquid form (10 applications at 3 kg N/ha) or as a single application in granular form (30 kg N/ha applied once).

Counting your losses

It has been proposed that foliar application of nitrogen reduces "unproductive losses" compared to applying granular nitrogen fertilisers to the soil.

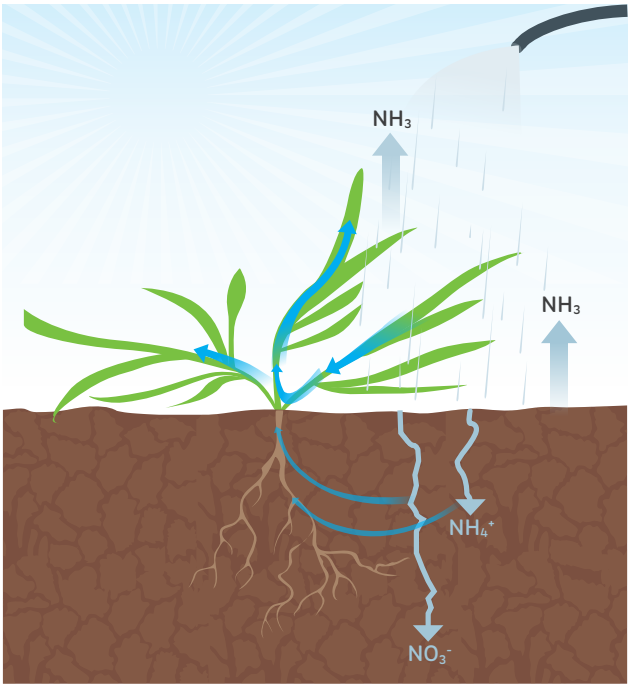
If you follow good agricultural practice, leaching and denitrification[1] losses from solid nitrogen application should be low. Immobilisation[2] may temporarily remove nitrogen from the "plant available" mineral N pool, but it will become available later as a result of mineralisation. That leaves volatilisation losses.

The enzyme that helps convert urea to ammonium (from which ammonia volatilisation can result) is present on and in foliage as well as in soil. Ammonia loss from foliar urea has been measured at less than 1% and up to 16% of the nitrogen applied.[3] For granular urea applied at pastoral rates, ammonia loss typically falls in the range of 10-20% of the nitrogen applied[4], with higher losses for cropping rates. Applying urea a few hours before 5-10 mm of rainfall will greatly reduce these losses. If this can't be achieved, then switch to SustaiN, as ammonia losses from this product will be about half those of standard urea.

Collateral damage

Liquid urea is commonly chosen for foliar application as it is generally less likely to cause leaf scorching than sulphate of ammonia or potassium nitrate. However, the higher the rate of nitrogen application and the more concentrated the urea solution, the greater the chance of damage. Applying liquid nitrogen fertilisers to damp leaves (e.g. in the early morning or late afternoon) or when humidity is high, can also increase the risk of leaf scorch. "Leaf scorching can affect the plant's ability to efficiently use foliar-applied nitrogen fertiliser. This may offset any benefits from reduced losses via ammonia volatilisation, etc."

For more information on nitrogen fertiliser options, talk to your Ballance Nutrient Specialist.



Liquid nitrogen fertiliser can be taken up by leaves, or enter the soil. It can also be lost from the leaves or soil by volatilisation

[1] Denitrification is the conversion of nitrate to gaseous forms of nitrogen by bacteria in waterlogged soil.

[2] Immobilisation refers to the conversion of plant-available forms of nitrogen (nitrate, ammonium) into unavailable organic nitrogen forms in the soil. Mineralisation is the reverse process.

[3] Stiegler, C., Richardson, M., McCalla, J., Landreth, J., & Roberts, T. (2008). Indirect measurement of ammonia volatilisation following foliar applications of urea on a cool- and warm-season putting green turfgrass species. *Arkansas Turfgrass Report* 2007, Arkansas Agricultural Experimental Research Series, 557, 80-84. Bowman, D.C., & Paul, J.L. (1989). The foliar absorption of urea-N by Kentucky bluegrass turf. *Journal of Plant Nutrition*, 12, 659-673. Bowman, D.C., & Paul, J.L. (1990b). Volatilisation and rapid depletion of urea spray-applied to Kentucky bluegrass turf. *Journal of Plant Nutrition*, 13, 1335-1344

[4] Zaman, M., Saggar, S., Stafford, A.D. (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

BACK TO N BASICS

Uncertain how to best use nitrogen on your pasture or want to take it to the next level? Read on!

"Whether you want to boost covers before winter or are looking ahead to spring, start with the four Rs," says Ballance Science Extension Officer, Josh Verhoek. "Once you've got those sorted, you can use N-Guru to refine your approach."

Right time

- Nitrogen fertiliser is the cheapest way to fill a feed gap, provided conditions are right for growth when it's needed. Use your response timeframes for planning (see Table 1).
- Pasture covers should be between 1500 and 1800 kg DM/ha (50-70 mm high) so there is enough leaf area for photosynthesis to power plant growth.
- You need 5-10 mm of rain (or irrigation) within 8 hours of application to move nitrogen into the soil and reduce losses to the atmosphere (ammonia volatilisation).
- Soil temperature needs to be above 6°C.

Right place

- High-fertility paddocks with productive pasture species give the best response.
- Don't apply to waterlogged soils and keep away from waterways.
- Check regional authority rules and regulations for any limits on nitrogen use.

Right product

- SustaiN will help protect your nitrogen from volatilisation, which can commonly steal around 10-20% of your applied nitrogen. Loss potential rises with the rate of nitrogen you apply.
- Products like SustaiN Ammo or PhaSedN effectively address sulphur and nitrogen needs.
- Sticking with urea? Read about the pros and cons of liquid and solid urea on page 14.

Right rate for response

- Individual applications of 20-40 kg N/ha are generally more efficient than fewer applications at higher rates.
- Nitrogen response efficiency (kg DM/kg N) is relatively linear up to 50 kg N/ha. Efficiency can be greater on low-N soils than high-N soils. Rates can be increased up to 60 kg N/ha in rapid growth periods, e.g. spring (see Table 1) or when shutting up silage paddocks.

Pasture growth rate (kg/DM/ha/day)	Response kg DM:kg N	Weeks for full response	Cost $/kg DM
Slow (10)	5:1	10-14	0.23
Moderate (20-40)	10:1	6-8	0.12
Fast (50-70)	15:1	5-6	0.08
Rapid (80)	20:1	3-4	0.06

TABLE 1
Pasture growth rate and nitrogen response. Assumes nitrogen applied at optimal rates and cost of nitrogen at $1.17/kg (SustaiN at $537/tonne).

Got the basics sorted? N-Guru is your next step

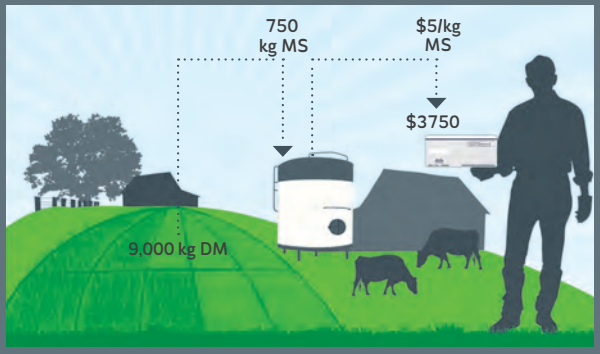
N-Guru uses Total N information to see whether variable rate application will give you better bang for your nitrogen buck.

Imagine soil tests on a 100 ha dairy farm show that 50 ha has a Total N of 0.7% (high-N area) and 50 ha has a Total N of 0.3% (low-N area).

The farmer applies 30 kg N uniformly, achieving a 10:1 response (10 kg DM/kg N), producing 30,000 kg DM.

However, gains are potentially greater in the low-N area (13:1 response) than in the high-N area (7:1 response). Guided by N-Guru, the farmer would apply 60 kg N/ha to the low-N area and none to the high-N area, delivering 39,000 kg DM. Converting the extra 9000 kg DM to production (assuming 12 kg DM/kg MS and a payout of $5/kg MS) gives you $3,750 more for the same N investment.

Remember "no significant difference" in your Total N results is still useful information, supporting uniform application and helping to gauge the size of the likely pasture response to nitrogen, particularly how it changes throughout the season in relation to pasture growth rates.



AUTUMN N FOR SHEEP AND BEEF

A nitrogen boost in autumn offers many advantages for your farm's performance in spring.

"It's now widely accepted that a ewe's weight around mating affects the chances of her getting in lamb and having multiples," says Josh Verhoek, Ballance Science Extension Officer. "It also helps with milk supply after lambing, which in turn helps get lambs up to weight quickly. The later you leave it to put weight on your ewes, the harder it is. Getting that feed into the system in autumn means you only have to worry about holding it through winter, rather than struggling for weight gains when grass growth is minimal."

A similar logic applies to beef. "The better your herd condition going into winter, the more positive things will be in spring. The 'National Wise Use of Nitrogen Focus Farm Project' indicated that nitrogen use could drive liveweight gains in cattle, whereas with sheep the gains were related to more ewes per hectare raising more lambs per hectare."

Nitrogen-boosted pasture is the cheapest form of feed and in addition sheep and beef country is generally very responsive to applied nitrogen. "It's common to get a 20:1 response on hill country – 20 kilos of dry matter for every kilo of nitrogen – so applying 30-40 kg N/ha will lift available feed considerably. Steeper country is often more nitrogen-responsive because there is less clover present. Consequently, in this country nitrogen application can be more profitable than phosphorus and sulphur. Used strategically, nitrogen can help build a bank of feed while you have good growing conditions in autumn, which will be ready to go when you need it later. It won't turn into rank feed over winter.

"Soil temperature is an important factor in terms of nitrogen response," continues Josh. "The critical threshold is 6°C and you can often be more certain of exceeding this in autumn than later in the season.

"Choosing the right product is vital. Autumn rainfall can be fickle. With urea, you need that all-important 5-10 mm of rain within eight hours of application to reduce nitrogen loss from ammonia volatilisation. SustaiN gives you more leeway with that timing, reducing losses by 50%. If sulphur is a limiting factor, consider PhaSedN. This contains SustaiN and elemental sulphur, which is better at enduring wet winter conditions than soluble sulphate sulphur. If you decide to wait until spring, then SustaiN Ammo or PhaSedN Quick Start are good nitrogen plus sulphur options."

Looking ahead

Working with FARMAX, Ballance is exploring the value proposition of applying 30-40 kg N/ha once in early spring (around lambing). It is thought that nitrogen application at this time reduces lambing losses, improves lamb growth and helps the ewe maintain body weight, with the carryover benefits that come from this.

The project is also modeling related nitrogen loss, to address any environmental concerns. As hill country is very nitrogen limited, fertiliser nitrogen tends to be used very efficiently by pasture. Furthermore, ewes and lambs deposit small volumes of urine often, resulting in lower nitrogen leaching losses compared to those from cattle. When complete (March 2017), the project will help drystock farmers make sound strategic decisions regarding use of nitrogen.

CLIPPINGS

NOT ALL ADVICE IS EQUAL

You may still call them "fert reps" but increasingly you'll see "Certified Nutrient Management Advisor" on their business cards, reflecting our commitment to robust, science-based advice.

"We now have 37 Certified Nutrient Management Advisors on the team, with more on the way to this certification," says Ballance Science Extension Manager, Ian Tarbotton. "To get certification, you have to complete intermediate and advanced papers in Sustainable Nutrient Management through Massey University and complete a competency assessment. It's a very demanding, rigorous process with a strong practical component. We provide solid technical back-up and internal buddying to help our applicants succeed at each step."

"Backing our products and advice with sound science has always been important at Ballance," says Ian. "This programme builds on that foundation, particularly to enhance capability in the broader issues of nutrient management."

Ballance has welcomed the increased accountability within the industry, which has developed since the establishment of the Nutrient Management Advisor Certification Programme in 2012. "Any salesperson can stand there and say what they think you want to hear, but they may not hang around to see the consequences. The advice you receive needs to be underpinned by science and training. This will deliver better results for your profitability and sustainability."

For more information on the nutrient management advisor certification programme see: www.nmacertification.org.nz

AG-SCI FOR SCHOOLS

SOIL FOOD & SOCIETY
He Oneone, he Kai me te Hāpori

Ballance is proud to support an innovative programme bringing the science of food production to the next generation.

Funded by MPI's Sustainable Farming Fund, the 'Soil, Food and Society' project is delivering a science teaching resource for students in years 5 to 8. The web-based resources cover how food is grown, taking students from soil health (including nutrient depletion and replenishment), plant life and the concept of photosynthesis, to what appears in their lunch boxes. Fun science experiments back it all up and get students off screens and into the outdoors.

The easy-to-follow lesson plans are integrated with the New Zealand Curriculum and designed to engage students in scientific thinking and help them present their findings in a scientific way.

Importantly, the resource promotes discussion and understanding around the critical role that science and the primary industries play in our society. The initiative is also a good precursor for some of the agribusiness, agricultural/horticultural skill training, mentoring and career development programmes emerging in New Zealand's secondary schools.

The first version of the resource was launched at the U-Learn Conference in October 2016 and version two will be released in October 2017, following feedback from teachers and students.

Ballance was one of a number of agricultural industry partners to support this project - for more information and to view the resources go to: www.soilfoodsociety.online

SPREADSMART® FLIES HIGH

Ballance's innovative GIS-driven aerial topdressing system has won a prestigious industry award.

SpreadSmart® was recognised at the New Zealand Spatial Excellence Awards in November 2016, winning the Innovation and Commercialisation category. The award judges commented that SpreadSmart® demonstrated a "well-designed and rounded solution that cleverly combines positioning, GPS and aviation technology."

When using SpreadSmart®, a predefined spread map is loaded into a GPS unit connected to the hopper and hopper controller. Fertiliser flow and placement is determined automatically – all the pilot has to do is fly the plane.

SpreadSmart® helps keep fertiliser out of no-go zones and allows variable rate application, so different parts of the farm get exactly the volumes of fertiliser they need. With fertiliser being one of the largest on-farm costs, precision applications make budgets go further, improving farm margins.

SpreadSmart® technology has been fitted into Ballance's Super Air topdressing division's aircraft in Wairarapa and King Country. Wider commercial application is anticipated.

The award win here enables SpreadSmart® to be entered into the Asia Pacific Spatial Excellence Awards, to be held in Sydney in April 2017. Watch this space!

LIME MATTERS

Common Q&As about pH management

In what range should I manage my pH?

This depends on soil type and the economics of liming.

- A pH of 5.8-6.0 is considered optimum for most mineral soils.
- A pH of 5.0-5.5 is usually sufficient for peat soils. This is because they have little aluminium or manganese. In mineral soils, these elements can become toxic to plants at pH < 5.5, one reason for their higher optimum pH.
- A pH of 5.5-5.6 is the likely economic optimum for hill country farms with lower stocking rates and per hectare profit margins. Small responses are likely from further liming, but it's unlikely they will justify the capital cost.

Some plants do respond to lime in some soils above a pH of 6.0. Lucerne likes pH around 6.5. In some soils, molybdenum is still deficient at a pH of 6.0, which can give rise to further lime responses. However, it is more cost-effective to apply a small amount of molybdenum than a large amount of lime!

Is urea/SustaiN making my pH drop faster?

High use of nitrogen technically does increase your lime requirement. A farm using 150 kg N/ha would need 270 kg lime/ha to neutralise acidity. For every 1 kg N/ha applied as urea or SustaiN, you need around 1.8 kg lime/ha. DAP is approximately twice as acidifying as urea or SustaiN, while sulphate of ammonia is three times more acidifying. Assess these effects using Overseer.

Do organic farms have the same lime requirement as inorganic farms?

Soil acidification happens in organic and conventional farming systems. Differences in lime requirements will relate to differences in pastoral production and carrying capacity. These will be higher on conventional farms due to use of nitrogen fertiliser and imported feeds, etc.

HOW MUCH LIME IS TOO MUCH?

Raising soil pH above 6.5 can affect availability of plant-essential trace elements such as zinc, boron, copper, iron and manganese. At higher pH, increased molybdenum supply can further reduce copper availability. These effects can reduce animal uptake of trace elements, influencing their health.

I've heard I should apply more calcium to increase calcium base saturation. What is this about?

On soil particles there are negative- and positive-charged sites. Basic cations (Ca^{2+}, Mg^{2+}, K^{+} and Na^{+}) in the soil solution are attracted to the negative sites on soil particles. "Total base saturation" is the percentage of the negative soil particle sites occupied by cations. "Calcium base saturation" is the proportion of sites occupied by calcium. The Base Cation Saturation Ratio (BCSR) Theory (also known as the Ratio Theory or Kinsey Theory) defines an ideal ratio of cations on these soil exchange sites. However this theory has some key flaws:

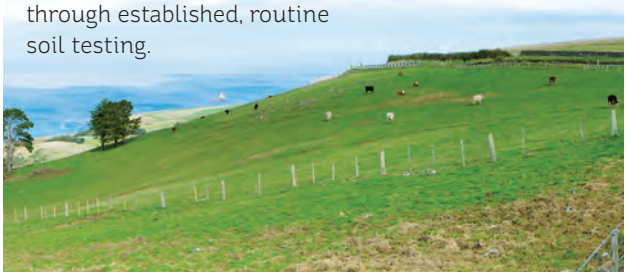
- Plants don't care what the ratio of nutrients is on soil particles, as long as there is enough of each nutrient to support growth. All nutrients could be in the "ideal" ratio but still in excess or deficit of plant needs.
- Soils differ in their capacity to store nutrients, depending on pH. Two soils with the same base saturation can have a very different ability to supply nutrients to plants.

The best way to keep soil productive is to ensure that a minimum quantity of each nutrient is present. Managing nutrients based on "sufficiency" takes into account nutrients in soil solution, as well as the nutrients on soil exchange sites that are also plant available.

How much lime is required annually if my pH is already optimised for my soil type/farm?

Maintenance lime needs range from 100-500 kg/ha/year depending on soil type and farming intensity. Soil acidity is caused by soil biology breaking down organic matter and converting ammonium to nitrate: acidification rates increase with the amount of organic matter being recycled. Farms carrying more livestock with greater annual pasture yield will need more lime to neutralise generated acidity than those with lower yields and carrying capacity.

Most dairy and intensive sheep/beef farms will require 2.5 tonnes lime/ha every 4-5 years (around 400-500 kg lime/ha/year). Overseer nutrient budgeting software can help predict this requirement, but it should always be monitored through established, routine soil testing.



HOME GROWN

Soil tests calibrated for New Zealand conditions will give you the best results.

"If someone recommends sending your soil samples to an overseas laboratory for testing, it's time to start asking questions," says Ballance Nutrient Dynamics Specialist, Jim Risk.

"For a start, soil samples can deteriorate quickly, particularly in respect to their nitrogen content. If the samples get warm or moist, their nutrient levels can change. Labs recommend getting your samples to them as soon as possible. A long-haul flight is likely to affect their quality and consequently your results.

"Secondly – and most importantly – tests offered by New Zealand laboratories have generally been calibrated against yield on New Zealand soils." This means that their target ranges or values reflect the impact of the nutrient's availability on yield or pasture responses in New Zealand growing conditions across various soils, based on extensive research.[1]

Local laboratories will also use methodologies that are appropriate for our soils. Different testing procedures can generate very different results. The solution used to extract nutrients from samples is a case in point.

Methods used overseas for phosphorus extraction can be acid-based, for example the Bray Test. However, many of our soils come from recent sedimentary rock containing phosphate-bearing minerals not available for plant uptake. Soil tests that use acids tend to extract these minerals and consequently over-estimate phosphorus availability. "The Olsen P test uses an alkaline, bicarbonate extraction solution. This, along with its calibration, is why it is considered the best way to measure phosphorus levels in New Zealand," says Jim.

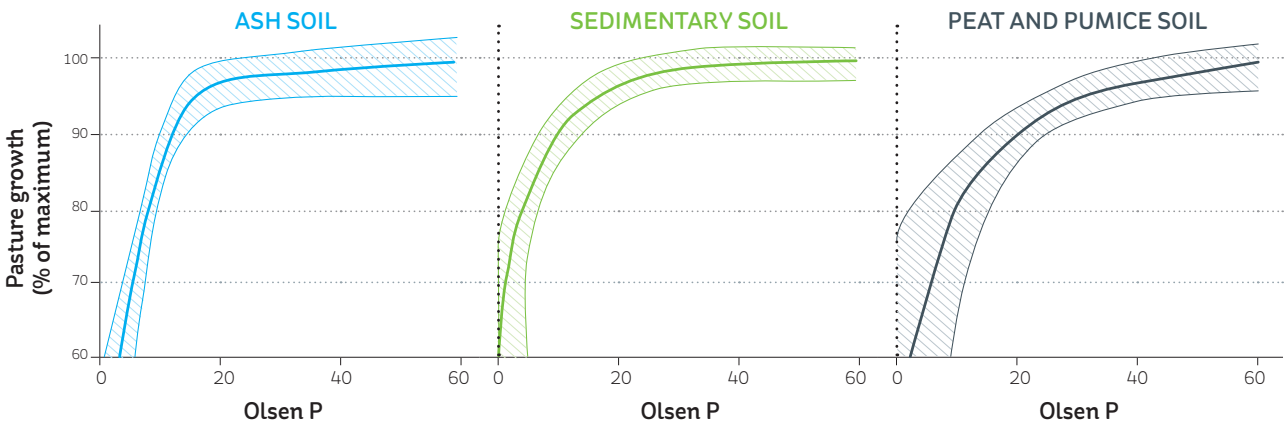
For help with your soil testing programme, talk to your Ballance Nutrient Specialist.

[1] Tests for pH, Olsen P, Quick Test K, Quick Test Mg, Sulphate S and Organic S have all been widely calibrated. Calibration for Quick Test Ca, Quick Test Na, Available Al, Available N, Resin P and Available Co is more limited.

Testing tips

- Use soil tests that are well calibrated with our soils, e.g. Olsen P.
- Sample at least every other year – same paddocks, same tests, same time of year. Trends are as important as absolute values.
- Avoid areas where animals congregate, e.g. stock camps and around gateways and troughs.
- Avoid sampling within three months of fertiliser or lime application.
- See page 20 for more information about monitor block, whole farm and grid testing.

Jim Risk



GOING OFF THE GRID

Paddock size and history, cost-benefit and ability to act on results are factors to consider when evaluating the intensity of your soil-sampling programme.

Regular soil sampling is integral to good nutrient management and maximum returns from your nutrient investment. Generally, a sampling programme will focus on monitor blocks as an indicator of your farm's soils and their changing pH and fertility. Various sampling methodologies are followed to ensure the samples deliver robust results.

Some companies are promoting grid sampling or nutrient mapping, which measures each paddock's pH and nutrient status on a much finer scale. Grid sample sites are recorded using GPS coordinates, so the same spots can be re-sampled each time.

So how do you decide whether this approach is right for you? Ballance Science Extension Officer Aimee Robinson takes us through the issues.

Applicability

A paddock's size and history has a big impact on the variation of pH and nutrients within it. "A large paddock may have more natural variation," says Aimee. "Variation can also arise when you combine several smaller paddocks or properties and bring areas into production which have not received any nutrient or lime inputs – old races or areas once occupied by buildings, for example."

Profitability

Grid sampling and analysis costs more than the monitor block approach. This has to be offset by fertiliser or lime savings and/or increased yields or production. In a region with strict regulatory limits, you may consider the potential for increased compliance, accountability and traceability as a benefit. "Whether or not the payoff warrants the investment will be different for each farm or farmer."

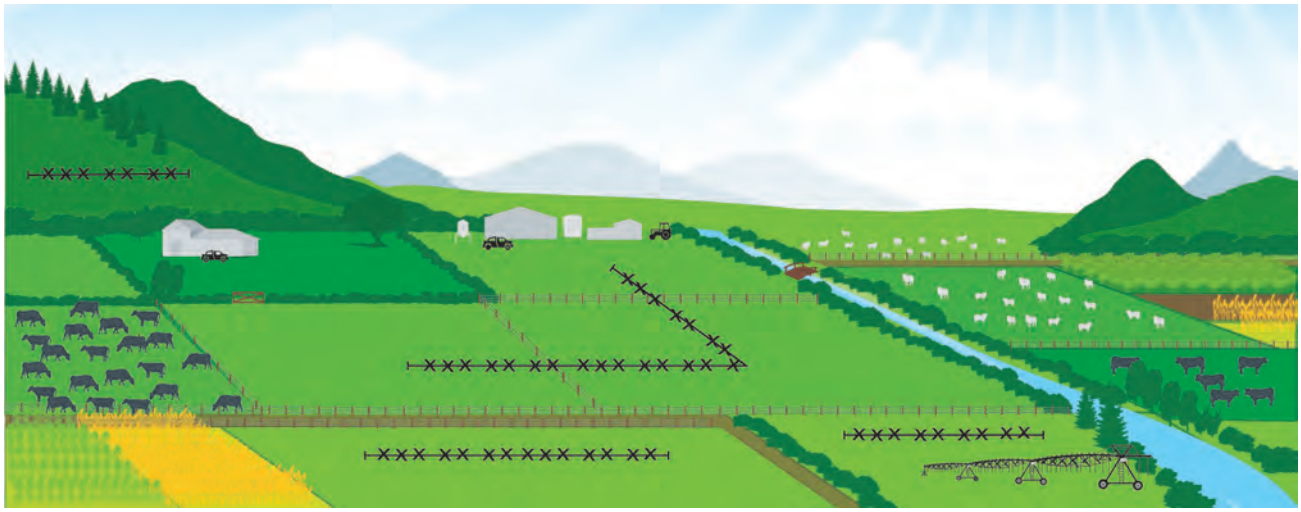
Practicality

Grid sampling or nutrient mapping results are used to inform variable application of lime and fertiliser. "You have to be prepared to go that next step or you lose the benefit of the information." You need access to equipment that can reliably and accurately vary the target application rate, without affecting product spread patterns. To make this practical, it really needs to be automatically driven from GPS-defined application maps.

Aimee observes that grid sampling's rise in profile has been triggered mainly by large-scale cereal growers. "Variations in pH have a marked impact on cereal crop health and yields, so it's something growers will keep a close eye on. Plus large rates of lime are needed to shift pH, so potential savings can be significant."

At this point, Ballance definitely recommends regular soil testing but does not offer grid sampling as part of its service. Paddock by paddock sampling (or whole farm sampling) is a middle-ground option that may offer benefits for some – particularly high-production dairy farms. Once more, the return on investment lies in what you do with the more detailed information.

If you'd like to review your sampling approach, talk to your Ballance Nutrient Specialist. "We can help you weigh up the benefits for your farm business and can recommend and work with a reputable contractor if you decide grid sampling is the way to go."



Soil testing transects. Areas with different soil types and/or different uses must be sampled separately. On hills, transects should run horizontally across the hill, rather than vertically up and down

MOVING THE N PROBLEM?

What are your responsibilities in terms of nitrogen loss when wintering cows off-farm?

Dairy cows are commonly wintered off-farm to conserve pasture covers or reduce pugging damage. Some may winter off as a deliberate strategy to keep nitrogen (N) losses within limits on their own farm. "This raises questions around responsibility for nitrogen-loss management when grazing off," says Ian Power, Ballance Environmental Management Specialist. "Who is responsible: the landowner, the owner of the stock or both? The same question applies to grazing replacements off-farm."

It appears that if you are grazing off on someone else's property under contract most regional councils see duty resting with the landowner to ensure that any stock brought onto the property can be managed within the farm's own nitrogen loss limits. The grey area seems to be leased land. In future, lease agreements may be amended to shift some or all of the compliance responsibility to the lessee. However, where would that leave the landowner?

At present, the argument is largely a philosophical and personal one. "If everyone manages their nitrogen losses within limits all is well and good. However, if contract grazing your stock on another property creates a problem there, is it really your responsibility? There may be another farmer's cows grazing there as well!

"It's unlikely at this point that you're going to voluntarily propose a contract to your grazier requiring them to meet their nutrient management and loss requirements," says Ian. "However, if it matters to you, shop around and select a grazier that is at least conscious of the issues and mindful of their nitrogen loss targets. You could check if the property your animals are going to is compliant with local regional council requirements. You could also ask to see an up-to-date nutrient budget report before you sign a contract and discuss how the grazier will meet their obligations.

"Some rile that if we are morally responsible for where our dairy cows graze, should we also consider the leaching from a maize silage crop when we buy the resulting silage or for the impact of heifers we buy as replacements? Do we have an ongoing responsibility for animals we sell when they go to another property? As one farmer said to me, 'Where does it stop?' These are extreme scenarios, but we have seen through the PKE debate how an ethical position can impact on-farm practice."

The debate presents opportunities as well as dilemmas. For arable and sheep and beef farmers, taking in dairy grazing over winter fits well with crop rotations or farm systems and provides income at an otherwise cash-poor time. Possibilities depend on any nitrogen loss limits, which vary by farm, catchment and region.

"It is worth considering that it's collective, catchment-wide nutrient loss results that will drive future policy, regulation and limits. Perhaps that's the strongest reason to think a little bit about your impact beyond the farm gate."

For advice on managing your winter nutrient losses, talk to your Ballance Nutrient Specialist.

FUTURE-PROOF FARMING

Farm environment plans are an opportunity to fine-tune your farm business.

"Farm environment plans are becoming an integral part of regional plan rules throughout the country," observes Alastair Taylor, Ballance Farm Sustainability Services Manager. "It's understandable to view them as another annoying compliance requirement, however, done well, they can have great benefits for your farm management and bottom line."

Some councils offer free support to help develop a plan and funds or subsidies for related improvements.

What is a farm environment plan (FEP)?

A FEP (or FEMP, SMP or LEP – they all amount to the same thing) identifies a farm's environmental risks and outlines strategies to address or manage them. The risks focused on are usually nutrient loss, particularly loss of nitrogen and phosphorus to waterways or groundwater.

A year-end nutrient budget will be at the heart of your FEP. However, the FEP will also encompass risks to soil quality, resource availability – especially water – biodiversity and historic heritage.

"Lots of good environmental practice information is available to farmers and growers. It can be a bit overwhelming. The advantage of a FEP is that it is tailored to your farm and your compliance environment, and highlights the changes and practices that will really make a difference."

That difference is not limited to environmental outcomes. Table 1 shows how environmentally friendly practices can have broader benefits. "Obviously some measures require more capital investment than others. The key is getting well-qualified advice, so you know what your options are and can plan ahead."

For this reason Ballance has a dedicated team available to help farmers and growers get the most from this process. Ballance is continuing to invest in its Farm Sustainability Services Team to meet the needs of this evolving landscape.

"Time and resources put in now will help you farm sustainably into the future," says Alastair. "A farm environment plan is an investment. A compliance fine is just a cost."

For more information about FEP requirements in your region, talk to your Ballance Nutrient Specialist.

Alastair Taylor

Practice	Environmental benefits	Farm business benefits
Nutrient budgeting.	Reduces risk of nutrients entering waterways or groundwater.	Enables effective resource use of fertiliser, effluent, feed and irrigation.
Excluding stock from waterways and wetlands.	Improves water quality and biodiversity.	Reduces stock losses, drain maintenance and risk of flood damage. Increases land value.
Retiring extremely steep land.	Keeps soil on slopes and nutrients and sediment out of waterways.	Reduces risk of slips impacting on productive land downhill. Saves time and effort managing stock.
Ensuring tracks and races are well-designed.	Prevents sediment and nutrients from pooling or entering drains and affecting water quality.	Reduces risk of lameness in stock. Easier on farm vehicles.
Managing effluent application and storage effectively.	Stops excess nutrients from leaching or running off into waterways and groundwater.	Saves on fertiliser and spreading. Avoids excess potassium in feed affecting animal health.
Using no- or low-till cultivation methods.	Preserves soil quality and its ability to manage nutrients.	Retains soil structure and organic matter to support crop or pasture growth.

TABLE 1
Examples of good practices and potential benefits. Note: This table is not comprehensive.

CALL US TO STRIKE GOLD

All your answers in one call – that's the goal of Ballance's award-winning customer services team.

Buzzing from taking out the retail support services sector of the 2016 CRM Contact Centre Awards – beating major competitors like Foodstuffs and Countdown – the team is not resting on its laurels. A huge LED screen looms large in the Mt Maunganui Contact Centre, allowing Team Leaders, Deb Elliott, Amy Short and their teams to judge their performance at a glance: calls taken; calls waiting; level of service. You can feel your adrenaline surge just looking at it.

"We want our customers to know that they are important to us. Regardless of how many calls are waiting or how many calls we've taken that day, we are on that call with you," says Deb, adding that during spring there are days where the team have fielded 100 calls by 9:00 am.

Building a winning team requires careful recruitment and training. "We look for people who are passionate about customer service, who really care and yet have a competitive edge. It's important that they not only care about the customer but are determined to do the very best for them."

Contact Centre recruits go through a six to eight week training programme, living and breathing Ballance products and systems, to ensure they hit the phone lines in top form. "We train new reps on basic orders in their first week and progressively move to more complex orders until they can complete an order back to front, in their sleep. Then once they're on the phones they can focus 100% on what you're saying, not on what they have to do," explains Deb.

The next month or two is about embedding customer service and phone skills. Reps are evaluated every month against key criteria and receive feedback on their performance. "Are they listening or assuming? Are they asking the right questions? Are they professional and friendly? It's all about creating the best experience possible and accurately meeting your needs."

The road to victory

This year's CRM Awards win was a huge milestone in the evolution of Ballance's Customer Services team. "It's amazing to be given this recognition by our peers in the Contact Centre industry."

The achievement is all the more special for being the result of a team-led effort, with extra coaching, peer led role-plays and creating a culture within the team to provide customers with an exceptional experience. "Our goal was to become a finalist and when this was announced we went crazy... When they said we'd actually won, we were absolutely ecstatic!"

Contact us

Call our award-winning customer services team free on 0800 222 090 to place a fertiliser order, ask about pricing and other product information, register for on-line ordering, request a shareholder pack or assistance with any other Ballance-related query.

You can also order fertiliser:

- through your local merchant
- at your nearest Ballance service centre
- or from your Ballance Nutrient Specialist

PHOTO: Basking in glory (and sunlight). Some of the winning Ballance Customer Service team. Back row, from left: Srini Twigley, Deb Elliott, Loryn Birkholtz, Amy Short. Front row, from left: Simon Marino, Edwin Sullivan, Meagan Goodchild, Lauren Duthie, Deejay Apihai

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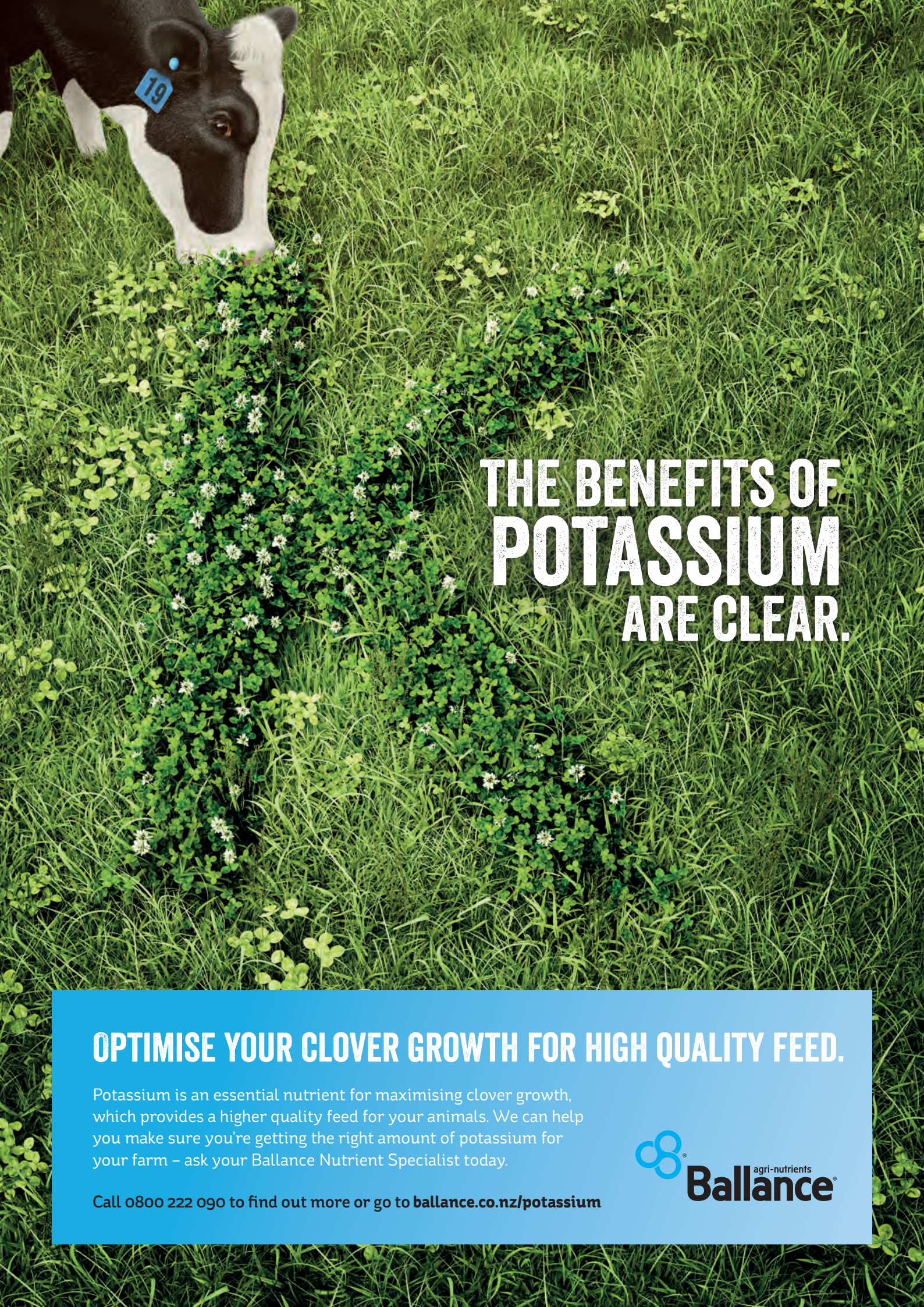

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