Ballance agri-nutrients

Together,
Creating the Best
Soil and Food on Earth

Grow

North Island
Autumn 2023

Tools for developing pasture: special edition

Contents

Ballance agri-nutrients

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

ballance.co.nz
0800 222 090

Super Air

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

superair.co.nz
0800 787 372

SealesWinslow

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

sealeswinslow.co.nz
0800 287 325

Welcome to this special edition

This special edition of Grow is about helping farmers get the most from their land and soil.

When times are tough, focusing on and working with what we have can help to see us through. For farmers, focusing on their most valuable assets – their land and soil – can often highlight opportunities for improvement.

For those wanting to improve the performance of their established pasture, or to convert land into productive pasture, a wide range of land and pasture development tools and approaches are available.

At Ballance, we could see the usefulness of bringing this array of land and pasture development tools and approaches together, into a single resource. And so this 'Tools for developing pasture: special edition' came into being.

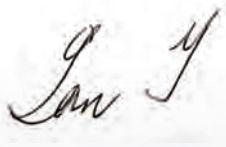
This special edition covers both growing and grazing pasture and forage crops, from the tried and true to more novel approaches. It includes ways to develop land to optimise production of pasture and forage crops, and how to better align feed supply and animal demand and utilise what you grow to underpin animal performance.

Renewing pasture, with or without a forage cropping stage, can provide system wide benefits, from moving beyond low fertility pasture to managing seasonal feed supply, pasture pests and parasites (see page 11 for more on this).

Many of the tools featured in this edition of Grow can also help to retain and enhance soil, so that less soil and nutrients enter waterways (see pages 4 and 5 for more). By developing their assets, farmers can also reduce their environmental footprint and meet the desire of markets for sustainably produced food.

We hope you will share this special edition Grow with members of your farm team, and that it will serve as a useful reference resource for you in the future.

Our commitment to supporting farmers remains steadfast, and we hope our expertise will help you through the challenges you face.



Ian Tarbotton
Science Extension Manager
Ballance Agri-Nutrients

No-till and broadcasting

Using no-tillage cropping in a pasture renewal programme helps to protect and conserve soil, control pests and provide feed.

What's no-tillage cropping?

No-tillage cropping involves sowing seed by drilling or broadcasting, without cultivating the soil. In New Zealand, most small seeded forage crops can be no-tilled – brassicas (swede, kale, turnip, rape), clover, chicory and plantain. Cereals and pasture grasses are also no-tilled.

No-tillage drilling is a proven technology, used worldwide for all types of cropping. Specialised seed drills place seed at the right depth in close proximity to fertiliser, regardless of surface terrain.

For land not suitable for drilling, seed can be broadcast, either via a truck (truck cropping) or helicopter (helicropping), or as recently demonstrated in the South Island, fixed wing aircraft. Helicropping is a useful tool for any terrain, enabling new pastures to be introduced via a forage crop, or simply to regrass old pasture to new pasture, or to bring scrub and ex-forestry land into pasture. Truckable terrain can be sown using a fertiliser spreading truck.

What benefits does broadcast cropping offer?

Healthier, undisturbed soil

Not cultivating the soil and leaving it undisturbed is good for its physical health.

No-tillage leaves the soil structure intact, with good water infiltration, making it less vulnerable to pugging and wind and water erosion. Almost no soil is lost during the crop's establishment and growing phases, mitigating the risk of sediment entering water. Soil loss during harvest depends on grazing management, but as the soil still has structural strength, it is a very different starting point to cultivated soil.

Without cultivation, fertile topsoil remains on the surface and is not buried and mixed with low fertility subsoil, and less moisture is lost from the soil.

The predator/pest relationship remains unchanged. When soil is cultivated, beneficial soil organisms such as predators of the NZ grass grub are impacted. As a result, 3-4 years after cultivation grass grub populations may increase to unmanageable levels and destroy the new pasture.

Supplementary summer or winter stock feed on sloping land

Over recent years helicropping techniques have been refined, enabling summer or winter small seeded forage crops to be established almost anywhere. Slopes steeper than 10° can be sown to summer crops, grazed and be back in new pasture for winter grazing. If sowing winter grazed crops, slopes greater than 10° cannot be grazed in winter without a regional council resource consent.

Quick and efficient

With good planning, 40 ha of crop can be established via helicropping in 6 hours. Ideally everything is done on the same day, as weather and other factors can make it difficult to get a helicopter back in a timely manner. Often weather conditions prevent cultivation or drilling operations, but helicropping just needs a break in the weather, and truck cropping can be carried out with minimal passes of lighter vehicles.

Economically competitive with cultivating

The economics of helicropping are competitive with tillage, according to analysis carried out by the 'Sustainable helicropping – protecting our soils' project. A helicopter is very efficient for non-truckable or hard to access land, but also expensive, so the size of job and ferrying time need to be part of the equation. The cost to establish a helicrop is similar to a full cultivation programme using tractors. As fertiliser trucks don't cost as much as helicopters, truck cropping is even more cost-effective.

Is helicropping suitable for you?

Stock class and slope are important factors in deciding if an area can be helicropped. Grazing large animals on a winter forage crop on steep land should be avoided. Helicropping can be used to renew pastures on steep land, either via a summer crop or by using a summer fallow (see page 11).

What are the potential drawbacks of broadcast cropping, and how are they overcome?

Lack of mineralisation

As soil is not cultivated, plant available nutrients are not released to the soil solution via mineralisation. This can be overcome by a significant capital phosphorus (P) application with the seed.

Broadcasted starter fertiliser not concentrated near the seed

A significant capital P application (400-500 kg DAP/ha) with the seed overcomes this issue. Note that after grazing the forage crop, most of the applied phosphate will still be in the paddock, enhancing the next crop.

Birds can take seed

Surface sown seed is easy for birds to take. This can be overcome by treating seed with Avipel (anthraquinone), which repels birds. Experience has shown there is less bird predation of spring sown brassicas seed (perhaps due to the type of seed coating), however autumn or winter broadcast grass seeds are vigorously consumed. Avipel, applied on top of the insecticide seed treatment, is destined to play an important role in regrassing and cover crop establishment.

Need for rain

Seed needs to be broadcast at a time when rain can be expected following seeding.

What does broadcast cropping involve?

For successful establishment and growth, the recommended steps are:

1. **Check the slope** - The NZ Government has put a 10° slope limit on growing winter forage crops such as swedes or kale without a resource consent. There's no slope restriction for summer crops of turnips, rape and plantain, chicory or plantain, which are generally back in pasture for the winter.
2. **Spray** - In October, with seasonal rain still expected and pasture cover of around 1800 kg DM/ha, spray the pasture dead with an appropriate rate of glyphosate (plus diazinon to control springtails). Ideally aircraft should use Accuflow no-drift nozzles to prevent herbicide drift.
3. **Broadcast** - Likely the same day, broadcast crop seed at 1.5-2 times the normal rate. Evenly spread slug bait at the high label rate, plus fertiliser such as Cropzeal Boron Boost at 400-500 kg/ha for brassicas. Ensure even coverage is achieved by half overlap spreading at half rates. Soluble phosphate near the seed is important for seedling establishment vigour.
4. **Side dress** - Four weeks after sowing, broadcast SustaiN at around 200 kg/ha (applying around 90 kg N as a side dressing).
5. **Control pests** - As usual, spray for pest control and germinating weeds. As the soil hasn't been cultivated, the main weeds are likely to be grassweeds, requiring a grassweed herbicide (not a broadleaf herbicide). Walk the paddock to confirm this.
6. **New pasture** - After grazing a summer crop, broadcasting grass seed to establish new pasture should be planned around the autumn drought breaking rain. Simply spray glyphosate, then surface broadcast the insect protected pasture seed treated with Avipel bird repellent, plus DAP at 200-300 kg/ha, applying half rates in a half overlap spreading technique. After a winter grazed crop, new pasture should also be sown in the same manner when conditions allow.

FOR MORE INFORMATION

ballance.co.nz/helicropping or contact your Ballance Nutrient Specialist.

Strip tillage

For 40 plus years maize has been grown in New Zealand via a full cultivation regime. The impact on the soil is becoming apparent and growers are seeking alternative methods. Strip tillage is proving to be both relatively simple and cost-effective. The technique disturbs only 15-20 per cent of the soil, reducing the impact on soil structure, organic matter and soil organisms.

For farmers growing maize in a new paddock each season, the good news is that as more contractors offer strip tillage their maize crops can be grown and harvested with very little disturbance to the soil. It's likely that when cropped paddocks are back in new grass they will be able to support winter grazing.

Photo: Paul Hunter

When worst is best

Renewing your worst performing paddocks provides the best returns.

When it comes to pasture renewal, identifying your worst performing paddocks is crucial for getting the best return on your investment.

"Poorest producing paddocks have the greatest potential for improvement and provide the best ROI," says Ballance Science Extension Manager Ian Tarbotton.

Paddocks can perform poorly due to low soil fertility or pH, predominance of weedy species, poor soil condition, drainage problems, pasture pests or poor grazing practices.

"Many pastures don't have ideal densities of desirable species such as clover and ryegrass. Pasture renewal, done right, can deliver an ROI of between 10 and 35 per cent," says Ian.

Many New Zealand pastures are around 10-15 per cent clover. Increasing content to the ideal 30 per cent would fix around 200 kg nitrogen/ha/year and improve feed quality, dry matter yield and animal productivity.

But how do you select which paddocks to renew? The two broad approaches are visual or performance-based selection.

Visual-based selection

"If you can see an obvious difference between paddocks, a simple visual assessment is generally all that's needed to pick the most suitable ones to renew," says Ian.

"But if the difference between paddocks isn't so clear, visual pasture condition scoring can help."

This involves ranking every paddock on the farm from best to worst on a scale of 1-5, with 5 being best (entire paddock full of desirable types of grasses and clovers) and 1 being worst (entire paddock severely damaged). A pasture condition scoring guide (developed by the Pasture Renewal Charitable Trust) is available at dairynz.co.nz/pasture-renewal. The guide provides descriptors, sample photos and suggested actions.

The best time to condition score pastures is spring (after winter recovery of ryegrass) or early autumn (if damage has occurred over summer). This is also when annual weeds are visible and gaps in the pasture can be seen while covers are low.

Visual pasture condition scoring can be repeated over a number of years so you can compare results over time and gauge the result of investing in pasture renewal.

Performance-based selection

In intensive situations, a more objective, performance-based measure of pasture growth may support better decision making. For example, detailed grazing records or a platemeter could be used to establish which paddocks yielded the least grazings during a season.

Select early

"Start selecting paddocks to renew at least 6 months before putting new pasture in, so you can fix any problems that may have affected the old pasture. Sowing new pasture won't increase production if you don't resolve the underlying causes of low pasture production," says Ian.

Building time into your renewal programme can pay off if you discover you need to increase pH for example, as lime needs 6 months or more to take effect. A soil test about 6 months before sowing enables nutrient issues to be sorted.

"Selecting the worst performing paddocks is an important first step for successful renewal. With planning and care, you'll get leafier, more palatable pasture that's higher in metabolisable energy and grows more on the shoulders of the season. The result will be more milk and faster liveweight gains. Pasture is the most cost-effective form of feed, and investing in renewing it can make a real difference to your bottom line."

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Nutrients for new pasture

New pasture can provide significant benefits, but requires nutrients to fulfil its potential.

"With the right nutrients at sowing and during establishment, new pasture is more likely to establish well and deliver production gains," says Ballance Forage Specialist Murray Lane.

Getting ready

Ideally, soil should be tested at least 6 months before sowing new pasture.

"This gives you time to address low soil fertility or pH before the new pasture goes in. Lime, for example, takes 6 months or more to have an effect," says Murray.

Pasture prefers a pH of 5.8-6.0, so if soil pH is low (<5.5), lime should be applied. When pH levels are low, aluminium in the soil solution can be toxic to ryegrass and inhibit root development.

"Browntop roots are more tolerant of aluminium than ryegrass, hence the predominance of browntop on poorly fertilised hills."

Low soil pH can also affect the availability of nutrients. For hill country, correcting soil pH with aerial lime application is generally only economical if soil pH is less than 5.5.

"If the Olsen P is less than 15, you typically get a better return from applying phosphorus (P) and sulphur (S) rather than lime. Higher Olsen P supports clover growth, and the nitrogen (N) clover fixes supports ryegrass growth. Aspect can be important in drier regions; southerly slopes are more likely to support clover growth."

A strong start

Germinating seeds need ready access to P and N; both are critical for early plant development. Phosphorus, essential for early root and shoot development, is not very mobile in the soil. A ready supply of P close to the developing plant is the best way to support all-important early root growth. Nitrogen encourages greater tillering and leaf expansion, leading to faster leaf canopy cover and weed suppression.

Di-ammonium phosphate (DAP) drilled next to the seed at 100-150 kg/ha is an excellent starter fertiliser option when drilling, providing N and P to get seedlings off to the best possible start. Drilling starter fertiliser such as DAP with seed produces a greater response than broadcasting it.

When broadcasting starter fertiliser onto the soil surface with helicropping or truck cropping, more P and N is required. As the soil is uncultivated, there is no soil mineralisation (release of nutrients in a plant available form). For this reason, in land and pasture development where seed is often surface sown, a significant capital P application applied with the seed enhances seedling establishment.

"Often the targeted hill country has a poor fertiliser history, so this capital fertiliser application is important not only for seedling establishment, but also for the future productivity of the new pasture. It's vital to apply the P with the seed, not after it's been growing for some time," says Murray.

"A starter fertiliser is useful regardless of the situation. If not drilled with the seed, then spreading 200-300 kg/ha DAP with broadcast new pasture is important for vigorous seedling growth."

Post-emergence/side dress N

Post-emergence N applications increase tiller production and dry matter yield, and improve pasture persistence and competition with weed species (because of leaf expansion). Depending on conditions, clovers can take up to 18 months to establish and fix enough N for their own requirements plus those of companion grasses.

After the first grazing, typically when the pasture is 6-7 weeks old, an application of 30 kg N/ha should go on. Subsequent applications of N should be made after each grazing (around every 6-8 weeks) for the next 12-18 months, until clover N supply has become significant.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Annual ryegrass no-till drilled with DAP (back) and without DAP (front).

Choose your pasture well

PGG Wrightson Seeds Programme Leader Grasses Michael Norriss looks at the importance of selecting pasture mixes and endophytes.

Choosing what plant species to sow in a new pasture has been an open question since agriculture began. More recently, different cultivars and endophyte strains have become available, adding complexity to a farmer's choice.

There are differing views on how pasture mixes and endophytes can improve economic returns, and how these choices can influence agricultural environmental impacts. Most farmers desire pastures that are both economically viable, as well as environmentally sustainable. Interestingly, it is likely that both these outcomes are strongly linked in the long term.

Pasture mixes

Plant species, and even cultivars within a species, have different responses to the same pasture environment. For example, putting annual species in a perennial mix, or high fertility species in a low fertility soil, or a species requiring rotational grazing in a set stocked pasture, will lead to eventual dominance of species and cultivars that are best adapted to the specific environment.

A rule of thumb is the more complex the mix, the more difficult it is to manage to the specific needs of each species, and the more likely that some species will be lost while the mix trends towards what is most suited to the grazing, climate, and soil environment.

With higher fertility soils, reasonable moisture and standard grazing management, perennial ryegrass and white clover tend to dominate over time, regardless of the starting species mix. Perennial ryegrass and white clover are both long lived species, require reasonable fertility and moisture, and are well adapted to surviving under grazing. Further advantages to this binary mix are palatability, good animal performance, great grazing management flexibility, and nitrogen fixation by the white clover.

If a wider range of species is desired, these might be better sown as simple mixes of compatible species in separate paddocks, so that grazing, fertility, soil type and possibly soil moisture can be specifically controlled to maximise the performance and persistence of each mix.

There are a range of species (and cultivars within those species) that are more appropriate for environments outside those suitable for perennial ryegrass and white clover pastures. Conventional options include shorter

lived ryegrasses for better cool season growth, tall fescue, cocksfoot, bromes (several species), meadow fescue, chicory, plantain, red clover and lucerne. These all have specific requirements that provide additional management challenges, while addressing specific weaknesses of perennial ryegrass and white clover pastures (such as winter growth, drought, soil fertility, flooding, animal finishing and nitrate leaching).

A range of less conventional species and more complex mixes are also under discussion in the wider pastoral industry. These mix recommendations appear to be a response to concerns about current farming practice, including lack of biodiversity, over-intensification, water quality, greenhouse gas emissions, animal welfare and nutrition, soil health and pasture persistence. Questions remain around if, how, and to what degree these mixes can address these issues. More research is required before objective recommendations can be made.

Tips for selecting pasture mix and endophyte

- Clarify your goals.
- Understand your options.
- Keep it simple.

Pasture endophytes

Pasture endophytes – fungus that infects ryegrass and tall fescue – control some key insect pests, so have big impacts on perennial ryegrass pasture persistence and animal health. The type of endophyte chosen determines how well local insect pests are controlled, and any impacts on grazing animals. Without endophyte, perennial ryegrass pastures in most of New Zealand wouldn't persist.

Without a specialised test, you wouldn't know pasture endophyte is in your seed or pasture. It lives entirely inside the seed or plant and depends on its grass host for food and shelter.

The grass plant, in turn, benefits from the diverse chemicals the endophyte produces. These chemicals reduce overgrazing by both insects and animals, especially during times of

plant stress, so help improve plant persistence. However, if animals ingest sufficient amounts of chemicals like lolitrem B or ergovaline there are negative impacts, including reduced growth rates, overheating in warm environments, and ryegrass staggers.

'Standard' or 'wild type' endophyte found in many older pastures or cultivars provides moderate insect control while causing ryegrass staggers, reduced animal production, and potentially heat stress.

Researchers have discovered some unique ('novel') endophytes, whose chemistry profiles differ from 'wild type' or 'standard' endophyte. These 'novel' endophytes reduce or eliminate negative animal impacts, but depending on the endophyte strain, insect control varies widely.

In grazing pastures, the 'AR37' novel endophyte reduces (but does not eliminate) animal impacts, while greatly enhancing insect control. Another 'novel' endophyte 'AR1' is very safe for sheep and cattle, but does not control some major pasture pests. So far, no endophyte is available that has no effect on animals and controls all insect pests.

Not all ryegrass and tall fescue cultivars available to farmers contain 'novel' endophytes, and not all 'novel' endophytes are available in all cultivars.

Endophyte in seed has a lifespan shorter than the seed itself, so stored seed may still germinate while having lost its endophyte. Make sure the seed you buy has a recent viable endophyte test, and be careful storing seed once bought.

Choosing the best 'novel' endophyte for either your ryegrass or tall fescue pasture is an important decision; talk with an expert to help ensure the right endophyte for your farm. It pays to ask:

1. What are the important insect pests of ryegrass or tall fescue in your area?
2. What negative animal impacts would you desire to reduce or eliminate?
3. What cultivars are available with the endophyte you require?

FOR MORE INFORMATION

Contact PGG Wrightson Seeds on 0800 805 505 or your Ballance Nutrient Specialist.

Black beetle, a pasture pest

Photo: Trevor James, AgResearch

Harnessing catch crops

The future of intensive winter forage crop grazing relies on the adoption of several good management practices. Brendon Malcolm from Plant & Food Research looks at whether catch crops are part of the answer.

Brendon Malcolm, Plant & Food Research Team Leader - Soil Function & Health

Catch crops are short duration crops established between two main crops, or as part of a pasture renewal programme. They are primarily grown to mop up nitrogen (N) to reduce the risk of nitrate leaching, but can also provide other benefits such as soil protection, reduced weed pressure, and increased soil biodiversity/health.

They are by no means a new phenomenon. Traditionally, and still today, catch crops are sown after summer crops, before the onset of winter. However, research in recent years has shown their potential to reduce environmental impacts when sown in winter after winter grazed forage crops, when soils are typically at their coldest.

The benefits of winter sown catch crops are maximized when winter active species (for example cereals such as oats) are sown early after winter grazing. While catch crops are typically slow to establish during the cooler months, sowing early means the crops are physiologically that much further advanced so when soil temperatures warm in spring, they develop significantly quicker, take up more soil N and produce more biomass earlier.

Establishing catch crops in winter can have obvious practical challenges, depending on the weather and soil conditions. Particularly wet environments can make sowing difficult, and crops are more at risk of failure.

A key learning from our latest trials is that in wet, heavy rainfall environments like the West Coast, including Italian ryegrass with a cereal increases the probability of establishment. In addition, avoiding over-cultivation can minimise the risk of surface capping. More generally, oats and Italian ryegrass has also been a go-to option for systems where the paddock is needed back in a grazing rotation early, as the regrowth from Italian ryegrass can negate the need to resow immediately after oats are grazed or harvested.

Our latest studies in Southland and Canterbury have shown that the amount of sediment movement within 40 m² plots of intensively winter grazed paddocks (slopes <5°) can be reduced by approximately 40 per cent when a catch crop is sown, compared to fallow conditions (see photo). Any sediment-associated phosphorus was also shown to be significantly reduced. In addition, a new leaching experiment in Southland at the Southern Dairy Hub (see photo) has indicated that oat catch crops can significantly reduce nitrate leaching from urine patches when sown between July and late September. Results also showed that any enhanced N mineralisation from cultivation of soil when the catch crops were established was mitigated by the oats.

Through our current Sustainable Land Management and Climate Change Freshwater Mitigation programme (primarily funded by Ministry for Primary Industries), we have developed a project Facebook page (see below) where trial updates and new information are regularly shared with followers. Over the final 18 months of the project, we will continue to monitor effects of catch crops on runoff on the West Coast, as well as set up demonstrations around good practice catch cropping in each of the three regions of focus (Canterbury, Southland, West Coast).

FOR MORE INFORMATION

www.facebook.com/catchcrops

On-farm catch crop runoff experiment in Southland

Nitrate leaching experiment at the Southern Dairy Hub, Southland

Summer fallow

Keeping land out of production for a summer growing season can be useful in a pasture renewal programme.

Summer fallow, traditionally used in dryland areas to conserve moisture, can also be beneficial in pasture renewal programmes, with or without a cropping phase.

"Incorporating summer fallow into a pasture renewal programme effectively controls persistent perennial weeds, breaks the clover pest cycle, and prevents soil moisture loss due to transpiration, as dead plants don't pump water," says Ballance Forage Specialist Murray Lane.

Summer fallow involves spraying out old weedy pasture in early January with a non-residual herbicide (glyphosate) and leaving it dead for 2-3 months. Adding dicamba controls existing clovers, setting up a period of time with no clovers to control nematodes specific to clovers. It is important to note dicamba has a clover plant back period of 2 months.

Once weedy pasture seedlings have germinated, the area is sprayed out a second time, before sowing the new pasture mix with capital fertiliser.

Let's look at how summer fallow can be incorporated into both pasture-to-pasture and pasture-to-crop-to-pasture renewal programmes.

Pasture-to-pasture

When regrassing with a one spray pasture-to-pasture programme in autumn, soil moisture will be depleted (see photo). Also, the one spray does not control seedling grasses that germinate after spraying, and is unlikely to effectively control perennial weeds, especially after a drought. A two spray summer fallow addresses these issues, giving control of seedlings and mature weeds, plus soil moisture retention (see Figure 1).

Pasture-to-crop-to-pasture

If a pasture renewal programme includes a cropping stage, depending on the crop, the new pasture can be sown in autumn or in spring. A spring sown crop followed by spring sown new pasture does not lead to good perennial weed control. An autumn spray is required for effective glyphosate translocation through weed root systems.

To introduce autumn sprays and improve weed control (without cultivation), a summer fallow period can be incorporated. In Figure 2, a winter ryegrass crop sown in the first autumn is terminated the following January, setting up a fallow. The new perennial pasture is then sown in the autumn after the fallow. The three sprays result in superior perennial weed control. Dicamba should be included in the first spray to remove clover for nematode control.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Protecting seeds and seedlings

When new pasture is sown, treated seed should be used to protect seedlings against black beetle and Argentine stem weevil. In hill country, where seed is likely to be surface sown with no soil disturbance, it should also be treated with a bird repellent such as Avipel, and sown according to rainfall and soil moisture conditions.

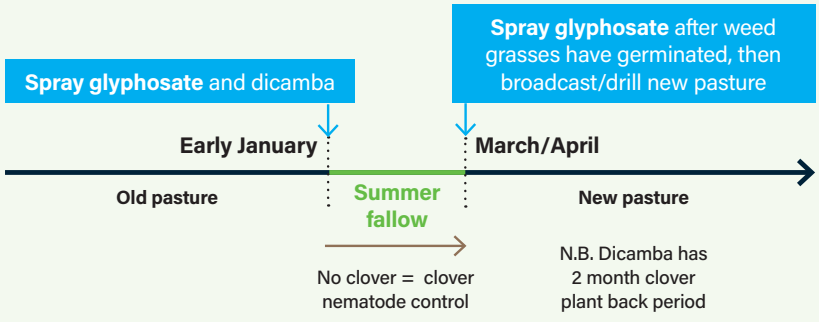


Figure 1 **Pasture-to-pasture summer fallow**

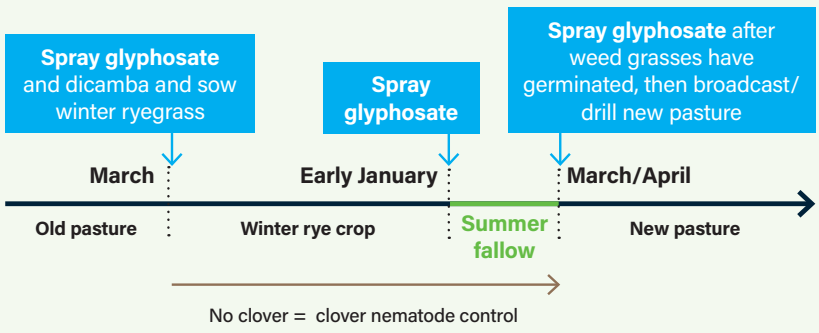


Figure 2 **Pasture-to-winter-rye-crop-to-pasture summer fallow**

Broadcast in practice

Since moving from cultivation to broadcast cropping, a North Island farmer is getting the results he desires.

Colin Armer and his wife Dale own several dairy farms and Waihora Station, a large beef and dairy operation west of Lake Taupō.

Colin first became interested in helicropping in 2009, after having trouble with pasture establishment and persistence. Using cultivation to establish crops for winter stock feed also led to problems with soil loss, buried fertility and a resurgence of grass grub populations.

Moving to no-tillage cropping with a tractor and drill overcame some of these problems, but sometimes large areas of the paddock were left uncropped.

Broadcast cropping, using a truck or helicopter depending on terrain, has allowed the Armers to do away with cultivation. In recent years, truck cropping has become the key management practice on their farm. The crops produced are used to fill a winter feed deficit, and as part of a wider pasture renewal programme.

Today, Colin is leading the use of both heli- and truck cropping. He also chaired the Ministry for Primary Industries - Sustainable Farming Fund 'Sustainable helicropping – protecting our soils' project, tasked with identifying techniques to retain soil on the land during winter cropping.

Along the way, the Armers have learnt from their own observations and from other farmers, scientists and their helicropping contractor.

Importantly, adding an insecticide with the Roundup pasture spray has resulted in excellent springtail control and crop seedling establishment.

"Without cultivation, it's critically important to control slugs and snails," says Colin. A high rate of waterproof slug and snail bait is applied evenly over sown areas on or close to the day of sowing. Understanding the different ballistics of slug bait, seeds and fertiliser granules led to half overlap flying at half rates, and the same with the fertiliser truck when truck cropping. Striping in the crop disappeared with this application technique.

A key part of Colin's success relates to fertiliser. He applies a capital rate of phosphate fertiliser (400 kg Cropzeal Boron Boost/ha) so the seed germinates into a phosphate rich soil. This makes up for the lack of soil mineralisation when cropping without cultivation. Most of the applied phosphate is retained in the paddock, so not only does it drive a superior crop yield, it is also still in the paddock to enable clover to compete when the new pasture is sown. A side dress nitrogen application is also flown on 5-6 weeks after sowing.

Currently, around Labour Weekend every year, 330 ha of crops are established by broadcasting the seed on newly sprayed out pasture, with no cultivation or drills. Last year it was split between helicropping and truck cropping, depending on terrain and resource consent requirements. A swede yield of around 20 tonnes dry matter per hectare is expected to be ready for grazing in June this year.

Soil retention is a key driver of adoption. By leaving the soil intact, fertility is not buried and soil moisture and rainfall infiltration are unaffected by the cropping. The crops are generally not strip grazed, preferring to reduce hoof concentration and soil damage by multi-day block grazing. New pasture seed is broadcast soon after grazing, further protecting the soil from loss. This seed is protected from birds by Avipel, a very effective bird repellent seed treatment identified in the Helicropping project.

The Armers are developing another tool, broadcasting Avipel bird repellent treated ryecorn into swale areas to act as buffer zones, intercepting any potential overland flow.

"Our understanding of how helicropping can help to conserve soils has come a long way over the years," says Colin. "But it's more than that. Our crops are established quickly, without soil disturbance, in a timely manner, with much reduced health and safety risks to our people, especially at this time of farm labour scarcity.

"Any farmer wanting to broadcast crop using helicropping or truck cropping should do some homework. Finding a keen and knowledgeable pilot or driver is important, as is identifying the key elements and following the programme. Identify the stressors and control them. This includes sowing early. When broadcasting seed, rain needs to fall on it to germinate it, hence I sow around Labour weekend every year."

FOR MORE INFORMATION

ballance.co.nz/helicropping

Colin's pasture renewal programme

Colin regrasses old pasture via a one swede crop programme. His excellent crop yields mean he crops about 5 per cent of the farm annually, leading to 5 per cent new pasture annually.

Colin has adopted a 12 month programme. If the targeted paddocks have particularly bad weed challenges, it may be beneficial to use a double crop programme.

Colin Armer

October	Oversow swede crop into sprayed out pasture with broadcast cropping techniques.
November - June	Manage the crop with nitrogen side dressing and weed and pest control.
June - July	Graze swede crop with R1 or R2 cattle/cows to fill a winter feed deficit, generally using multi-day block grazing.
July - August	Oversow new perennial pasture ryegrass and white clover using Avipel treated seed plus capital fertiliser.

Best value from fertiliser

What's the best course of action if falling farmgate revenue is making your fertiliser spend a stretch?

Falling farmgate revenue coupled with higher fertiliser prices means many farmers are having to consider cutting back on fertiliser applications. If continuing to apply key nutrients is not an option, it's best to cut back applications in a strategic manner.

Continuing to apply key nutrients

For most farmers, continuing to apply key nutrients such as phosphorus (P) and sulphur (S) will be worthwhile. Pasture growth and vigour will be maintained to support production, and legume growth and its associated benefits will not be impacted.

In a 5 year study on Te Kuiti Research Farm, annual applications of P fertiliser at 250 kg/ha of superphosphate maintained pasture production, but withholding it in autumn of 1982 caused a drop in pasture and clover production (see Figure 1)[1]. Similar results were observed at Ballantrae Hill Country Research Station and other long term trial sites[2].

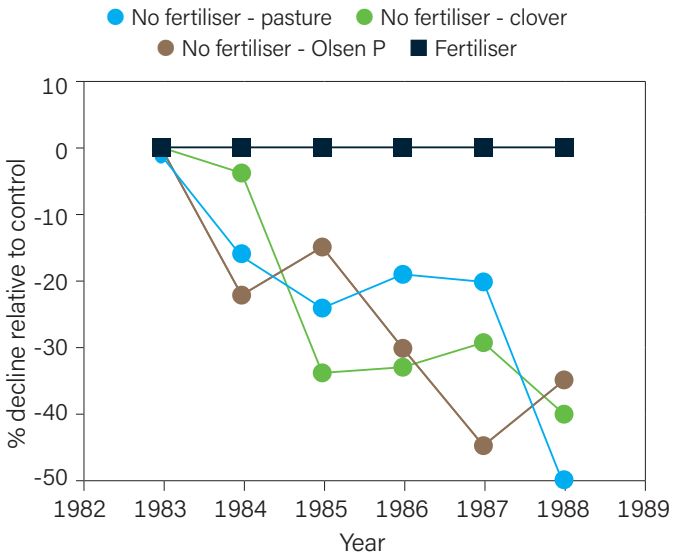


Figure 1 **Effects of not applying P compared to applying it**

Source: Figures derived from MB O'Connor, CE Smart and SL Ledgard 1990. Long term effects of withholding phosphate application on North Island hill country: Te Kuiti

Focusing on fertiliser efficiency

Farmers who have to cut back on fertiliser will want to get the best value from their fertiliser spend.

Phosphorus, the costliest fertiliser nutrient, is not very mobile in the soil, so if P levels are above optimal, P applied as fertiliser can be cut back gradually, for example by halving the application rate. This is an option for many dairy farms, which are already operating above economically optimal Olsen P, and cutting back on P applications will also reduce P runoff.

Most sheep and beef farms, however, do not have above optimal Olsen P levels, so withholding P will impact production. Long term trials show both pasture and animal production (ewe live weights, lamb production, wool weights) decline at about 5 per cent per year when P fertiliser is withheld[1,2].

Hill country farms can consider using variable rate technology to apply fertiliser strategically to areas that will provide the best returns. In modelling reported on in the last edition of Grow (spring 2022), SpreadSmart variable rate application continued to provide higher returns than fixed flow rate application. Variable rate application allows fertiliser to be applied based on soil fertility or land class, for example. Dairy farms could apply fertiliser to less fertile slopes and exclude it from more nutrient rich flatter areas and gateways.

Another option is to prioritise which nutrients and lime to apply, focusing on the most limiting nutrients (see Table 1).

Table 1 **Prioritising nutrient (and lime) application to areas of most value if financially constrained**

Land management area to apply fertiliser to (from highest to lowest priority)	**Nutrients/lime to apply** (from highest to lowest priority)
Crops	Nitrogen, phosphorus, lime
New pasture	Nitrogen, phosphorus, sulphur, potassium, lime
Hay and silage	Potassium, nitrogen, phosphorus, sulphur, lime
Older pastures - ground spread	Phosphorus, sulphur, lime
Older pastures - aerial spread	Phosphorus and sulphur, lime

Lastly, sulphur is the least costly nutrient, but is very mobile in the soil, so annual applications should be continued so clover production, for example, is not limited by a deficiency.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist. For more on SpreadSmart variable rate application contact Super Air on 0800 787 372.

1 MB O'Connor, CE Smart and SL Ledgard 1990. Long term effects of withholding phosphate application on North Island hill country: Te Kuiti. Proceedings of the New Zealand Grassland Association 51: 21-24

2 Lambert MG, Clark DA, Mackay AD 1990. Long term effects of withholding phosphate application on North Island hill country: Ballantrae. Proceedings of the New Zealand Grassland Association 51: 25-28

Side dressing brassicas

Post-emergence nitrogen (N) helps brassicas meet their yield potential.

Brassica forage crops such as kale, rape, turnips and swedes provide excellent feed, and additional benefits when used in pasture renewal programmes.

"A cropping phase in a pasture renewal programme helps to control perennial weed species and break the clover pest cycle," says Ballance Forage Specialist Murray Lane.

Brassicas are often grown in poor performing or low yielding paddocks, and to optimise yield, any issues need to addressed before sowing. A soil test, including an Available N test, at least 6 months before sowing is recommended.

Post-emergence N, in addition to starter fertiliser N and phosphorus (P) at sowing, is also important for brassicas to meet their yield potential, regardless of how the crop is sown.

"The starter fertiliser, such as DAP which supplies N and P, drilled with the seed is important for vigorous early seedling establishment. The N side dressing boosts leaf growth and size, so plants catch more sunlight and form a full canopy. This further boosts the crop's ability to convert sunlight into energy to improve yield, and also to outcompete weeds."

Right time

After P and N are applied at sowing, all of the crop's remaining N requirement is best applied as a single side dressing prior to canopy closure, 4 to 6 weeks after sowing.

"Targeting N application to high growth periods such as this reduces the risk of nitrate poisoning. If N is applied too late in the season, close to grazing when growth is slowing, nitrate levels may be high. Late season applications are also hard to justify economically."

Right rate

An Available N test measures how much N the soil is likely to supply the crop. If planting into former pasture land, organic N levels may be quite high, effectively reducing the amount of fertiliser N needed.

The amount of fertiliser N a crop requires can be worked out as follows:

Crop's N demand - **Available N in soil** = **N to apply as fertiliser**

For example, for a kale crop:

@2.5% N x 15 t/ha =

375 kg N/ha - 180 kg N/ha = 195 kg N/ha

Figure 1 shows typical N requirements of brassicas.

"Be realistic about yield, taking into account what level your soil and climate will support. The Ballance brassica calculator can help refine yield prediction and N application rate," says Murray.

Applying excess N does not increase yield, and just raises the protein content. When the crop is grazed, N is redeposited in urine patches, increasing the potential for N loss. Excessive N application in conjunction with high background sulphur levels also increases the risk of SMCO, which can cause red water (haemoglobinuria) in grazing stock.

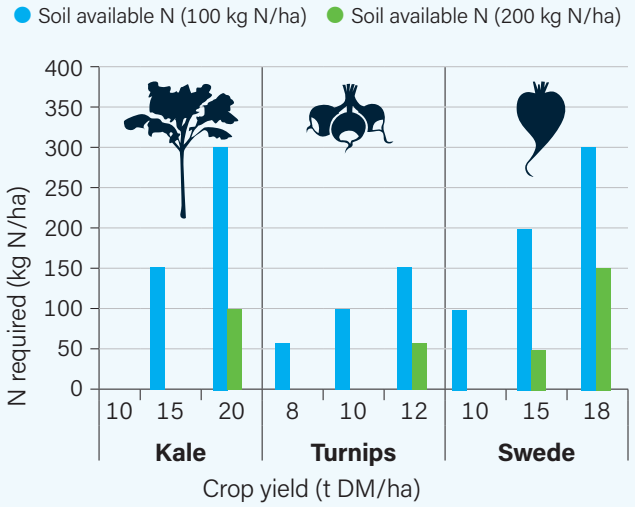


Figure 1 **Typical N requirements of spring sown kale, swedes and turnips**

Right product

Cropping often uses large volumes of N and the potential for loss can be high. If using urea, volatilisation losses can be high unless 5-10 mm of rainfall (or irrigation) occurs within 8 hours of application. Using SustaiN (urea treated with Agrotain) will reduce this risk.

Typical rates are 150-200 kg/ha SustaiN as a side dressing, depending on time of sowing, yield potential and Available N test results.

"As timing is important, a product like SustaiN reduces losses if conditions aren't ideal for N application when the crop needs it most."

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Autumn feed supply

Ballance Sheep and Beef Programme Lead Richard Draper looks at options for matching autumn feed supply and demand.

Over most of the country, pasture supply is most variable in autumn, largely due to the significant variation in rainfall quantity and timing (see Figure 1).

In recent years, matching autumn feed supply and demand has been further complicated by not being able to reliably get stock away when needed.

With multiple stock classes on farm at this time of year, compromises often need to be made. One such perennial issue is the trade off between allocating feed to young stock (such as weaned lambs) and ensuring ewes head into winter with optimal body condition.

Autumn management decisions have lasting impacts that flow into the following season, so getting it right is important for both maximising the opportunities and minimising the risks in the year ahead.

Tools to fill an autumn feed gap

Farmers have various levers they can pull to increase feed supply (see Table 1) or reduce demand at this time of year, each with different cost profiles and lead in times. The most economic solutions are used strategically, and in advance of the imbalance, so are not always easy (or possible) to use if the season changes rapidly.

Also consider the availability of supplementary feed to purchase at short notice in your region, and if the farm contour allows this to be fed effectively. If using grain or concentrates, stock may also need time to transition.

On the demand side, selling down stock classes may be an appropriate option if the trading margin is less than the cost of feed supplied.

But caution is needed. Depending on the length and size of the feed pinch, the cost of additional feed required should be evaluated against the future income earning potential of these animals.

Opportunity to push feed forward

Subject to soil moisture, pasture growth rates are typically better in March and April than May. This means nitrogen (N) response rates are higher, and the cost of N grown pasture is cheaper earlier in autumn.

There is an opportunity to build covers while conditions allow. Maintaining longer rotations and covers into winter will also help to maximise winter growth rates as 'grass grows grass.'

At a typical autumn response rate of 15:1, the cost of N grown feed would be approximately 20-22c/kg DM at current pricing, meaning it remains one of the best value, timely and practical options to fill a feed gap.

As with many things in farming, making decisions early supported by good evidence will set the best platform for success and leave production outcomes much less to chance. Reviewing the feed budget is a good starting point.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

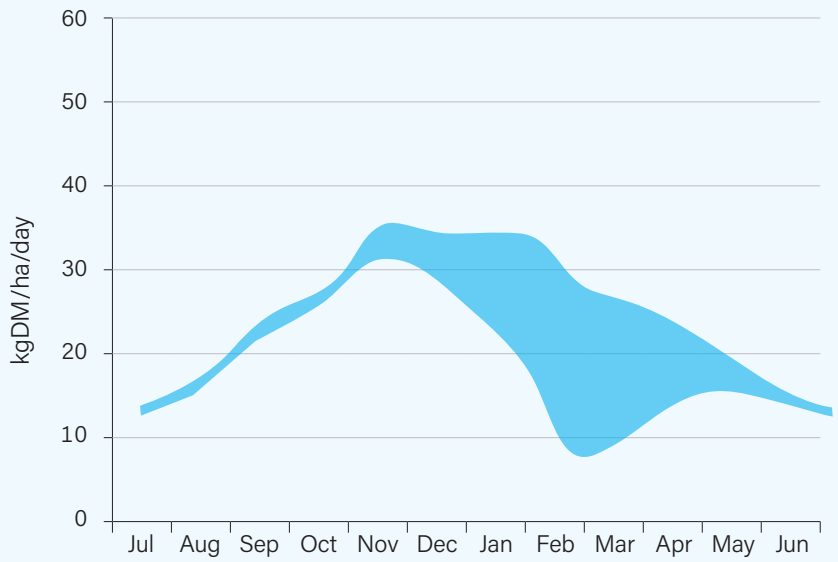


Figure 1 **Example pasture growth curve for an East Coast North Island farm. Pasture growth will fall within the shaded range in 50 per cent of years.**

Table 1 **Levers to increase feed supply**

Feed solution	Feed quality	Cost	Lead in time
Summer/autumn crop	High	$	4-6 months
Baleage/silage	Variable	$$*	<24 hours*
Grain/concentrates	High	$$$$$	1-2 weeks
Nitrogen fertiliser	High	$$	3-6 weeks

*assumes already on farm and made from genuine surplus

A leg up for legumes

What can help clover flourish in pasture?

Clover provides high quality feed and nitrogen (N) for other pasture species, so how can it be enhanced?

"Many pastures are around 10-15 per cent clover, but 30 per cent is ideal," says Ballance Nutrient Dynamics Specialist Jim Risk.

Clover has a role to play in converting less productive land into more productive country. In pastures, clover is important for sheep and beef finishing, or for high quality feed on dairy farms. Cultivars selected should be more tolerant of close grazing for sheep, or rotational grazing for dairy cows.

To enhance clover establishment in new pastures, ensure the prior 3 months are in crop with no clover, as this helps control clover pests such as nematodes. Herbicide residues can also affect clover establishment, so ensure none remain when clover is sown.

"When establishing new pastures with clover, alone or mixed with other non-legume species such as plantain or chicory, get advice from your seed company on the appropriate seed rates so you get good plant numbers in the sward. Smaller seeds such as clover are more sensitive to sowing depth, and are ideally broadcast on the surface or sown at less than 1.0 cm."

Nutrients for clover

Clover is more susceptible to nutrient deficiencies than grasses, so soil test to check levels of phosphorus, sulphur, potassium and magnesium. A pH of 5.8-6.0 is sufficient. A herbage test can be used to check levels of micronutrients such as molybdenum.

"Clover can take up to 18 months to cycle N in a new pasture situation, so some N may be required in the initial stages of pasture establishment. Sowing new pastures with a fertiliser containing N such as DAP can enhance establishment."

Adequate soil potassium (K) levels help improve and maintain clover content. On some soils, soil K reserves may not be able to meet demand, so maintenance K applications are required – typically 20-30 kg K/ha on sheep and beef farms and 40-70 kg K/ha on dairy farms.

In most maintenance situations where K levels are adequate, a single application of K can be made alongside other maintenance fertiliser inputs at a suitable time during the growing season. In high loss situations, such as coarse soils in high rainfall areas where K can leach, the application can be split to ensure the plant has access to sufficient K throughout the season.

Let the sunlight in

Clovers grow close to the ground so are easily shaded by grasses, particularly when competing with ryegrass's high growth rate in mid to late spring.

Once established, grazing new pastures early on keeps the sward open, letting sunlight in and encouraging clover. White clover does best under rotational grazing with grass kept relatively short. The first three or four grazings should be quick and grazed to lower residuals, encouraging tillering of pasture species and preventing shading of clover. Grazing ryegrass at or near to the three-leaf stage maximises pasture performance and maintains light for clover.

Clover is preferentially grazed, and this should be avoided in new pastures, particularly by sheep. Despite being more resistant to overgrazing than ryegrass, levels can be reduced by set-stocking.

"If clovers are present but struggling to compete, particularly in hill country, another management tool you can use is very low rates of glyphosate herbicide to suppress grass growth (chemical topping) and allow clovers to flourish."

Applying a very low rate of glyphosate herbicide just before grasses start to bolt in late spring regulates plant growth and stops grass seedhead emergence. Seek advice on the appropriate rate and management of herbicide use.

"To set up the new pasture for the next 5-6 years, make sure clover can contribute to overall production over a long period," says Jim.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Sediment intercept buffers in June prior to grazing helicropped swedes. Ryecorn treated with Avipel bird repellent had been broadcast in strategic strips soon after the swedes were sown.

Graze for the soil

What management practices can reduce the impact on soil when grazing crops or new pasture?

Buffer strips

During grazing, well located and managed buffer strips can reduce the velocity of overland flow and capture sediment. A 3-5 m wide grass buffer strip is generally sufficient, according to results from the 'Sustainable helicropping - protecting our soils' project.

Buffer strips can be deliberately left as part of the cropping plan, or established during crop seeding. Strips of old weedy pasture left strategically within the crop is a simple way to create buffer strips, but will continue to be a source of weed seed and reinfestation.

A better option is broadcast sowing (or drilling) strips of ryecorn treated with Avipel bird repellent. In tall crops such as kale, these strips could be located along proposed electric fence breaks for multi-day block grazing. With appropriate management, the ryecorn will survive the crop grazing, and be a useful solid, dry resting area for stock, while intercepting overland flow. They can be easily terminated later in the season for new pasture establishment.

Strip versus multi-day block grazing

While strip grazing optimises utilisation of a forage crop, it concentrates hooves, potentially creating significant soil damage (pugging) in winter, which is made worse with cultivated soil and if stock have to walk back over an already grazed area to access water. Mobile troughs and back fencing could reduce the damage. If strip grazing either summer or winter crops, AgResearch generated data suggests grazing from the top of the slope towards the base to help prevent soil loss[1].

Multi-day block grazing is an increasingly common way of reducing pressure on the soil. The reduction in hoof concentration leads to less soil damage. The technique is to fence stock in a 4 day block of feed, providing a mobile water trough and preventing access to earlier grazed areas with a back wire. If bad weather arrives, move stock to a new 4 day break a day early.

Transitioning is important, as initial stock gorging has to be managed. With appropriate block size (feed on offer), stock quickly settle down to the new regime, move less and are more settled, doing less damage to the soil. It also frees up farmer time. Pioneered by farmers with too many mobs to move, instead of daily moves for all mobs, stock are moved twice a week. As crop utilisation efficiency is likely to be lower, area of crop grown should be increased.

In the 'Sustainable helicropping – protecting our soils' project soil loss trials, helicropped soil on a 20° slope lost almost no soil when multi-day block grazed compared to strip grazed cultivated soil on a 10° slope[2].

Graze new pastures lightly

New pastures can be broadcast sown soon after grazing, using Avipel treated pasture seed. These new pastures need special treatment initially, to both protect the soil and the new pasture. Graze new pastures frequently with younger or lighter stock, keeping the sward open to let in light for clovers and to protect developing roots and crown. Application of nitrogen (SustaiN) instils vigour into the seedling grasses to help smother weeds and frequent light grazing allows clover seedlings to establish. Applying SustaiN at around 65 kg/ha (30 kg N/ha) after each grazing in the first year encourages root growth and tillering and reduces weed competition.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist or visit ballance.co.nz/helicropping

1 Monaghan RM, Laurenson S, Dalley DE, Orchiston TS 2017. Grazing strategies for reducing contaminant losses to water from forage crop fields grazed by cattle during winter. New Zealand Journal of Agricultural Research, 60(3): 333-348

2 Lane PMS 2022. Preventing soil loss from hill country cropping, comparing Helicropping to crops established by cultivation. Adaptive Strategies for Future Farming. Occasional Report No. 34. Farmed Landscapes Research Centre, Massey University

Managing spring surplus

Closing up some paddocks to manage spring surplus minimises cost and workload, and provides an array of benefits.

Surplus pasture growth in late spring can cause pastures to become rank, leading to reduced feed quality and animal performance. Rank pastures lose density and clover content, and grow less dry matter the following autumn.

Dropping some paddocks out of rotation – a practice known as deferred grazing – manages late spring surplus and prevents pasture on the rest of the farm from becoming rank.

The recently completed 'Pasture Management in a Volatile World' project has proven closing up paddocks to be worthwhile both within paddocks and across a whole farm system.

Deferred grazing involves closing up about 10-15 per cent of paddocks for a minimum of 90 days from mid-spring to late summer or early autumn. As some paddocks are removed from grazing, stocking rate increases elsewhere and the spring feed surplus is better used and overall pasture quality on the farm is maintained.

Deferred grazing is ideal for farmers who want a no cost solution to managing spring surplus. It avoids the costs and work involved in making and feeding out hay or silage, or in chemical topping, and can also be used on hill country where making supplementary feed is not feasible.

Deferred grazing also provides a range of other benefits, including:

- **A late summer or early autumn feed wedge** - deferred paddocks provide a valuable source of late summer or early autumn feed, particularly in drought years.
- **Increased pasture persistence** - in deferred paddocks, ryegrass and other desirable species can produce new tillers, and reseed and produce new plants in autumn, which can increase pasture persistence.
- **Increased clover** - research has shown that when deferred pastures are grazed in late autumn, the content of clover can increase.

- **Increased production from the deferred area the following year** - the amount of mineral nitrogen potentially available for plant uptake was also significantly higher, probably due to higher levels of litter content enhancing mineralisation of organic matter.

How to defer paddocks

The following process can be repeated annually:

- **Select paddocks to defer** - these can be underperforming paddocks, and should have high fertility pasture species such as ryegrass and clover, and not be overrun with weeds. Select 10-15 per cent of the farm, avoiding stock corridors or recently deferred paddocks.
- **Monitor pasture cover** - when a late spring surplus emerges, you can act.
- **Remove paddocks from grazing round** - from when pasture starts to send up seedheads (mid-spring) until seeds drop (late summer) – exact timing will vary around the country.
- **Graze the deferred paddocks** - break feed the paddocks back into the grazing rotation with cattle or a large mob of ewes. Graze to low residuals over one or two grazings, giving light to ryegrass seedlings and new ryegrass tillers. Treat these paddocks like new pasture, and graze again lightly before winter.

Evidence from the project on deferred grazing has been summarised into a handbook (see below). The project was a team effort, funded by the Ministry for Primary Industries' Sustainable Farming Fund with co-funding and support from Ballance Agri-Nutrients, Beef + Lamb New Zealand, Environment Bay of Plenty, Waikato Regional Council, Plant & Food Research and AgResearch.

FOR MORE INFORMATION

Deferred Grazing Handbook at bit.ly/3Jresyn

Deferred Grazing Fact Sheet at bit.ly/40acxnO

Grow Graze

Summer forage, anywhere

Summer forage crops can be established almost anywhere.

Providing high quality summer forage for young stock to grow through the summer can be relatively easy.

"Forage crops can be sown practically anywhere using techniques such as helicropping," says Ballance Forage Specialist Murray Lane.

Variable weather conditions can lead to variability in pasture production and pasture quality over summer, which can be particularly hard on young stock, requiring supplementary feed to be supplied.

"On tractor country, seasonal production gaps can be filled with grass silage made from spring surpluses, or with maize silage, or PKE or feed concentrates. However, these feed sources are not suitable for all farms, creating an opportunity for forage crops," he says.

"With a little planning, forage cropping can be used on most farms to supply significant amounts of high quality summer feed."

The forage crops in question can be split into two types:

- single graze turnips
- multi-graze rape, rape and plantain, Pasja/Hunter, chicory, plantain and Pallaton Raphno.

All of these crops can be established with minimal soil disturbance using no-tillage drills, helicropping or truck cropping, and the paddocks can be back in new grass for winter grazing.

"These crops can be particularly important for young stock and replacement dairy cows. If dairy heifers fail to reach desired weight, their time in the dairy herd will be limited. Similarly with a beef animal, its time on farm will be longer than needed, resulting in higher costs. With sheep the summer crop aids the early sale of non-replacement lambs and can be useful for flushing ewes prior to tupping, before going back into new pasture for the winter.

"By feeding adequate forage crops through summer, dairy and sheep and beef farmers can guarantee stock quality regardless of summer conditions, while also regrassing parts of the farm.

"We're not talking about cultivation. No-tillage cropping with drills and truck cropping can be done on tractor country, and helicropping can be used on non-tractor country. Summer cropping is not constrained by the Government's regulation on slope. Crops can be established and grazed on slopes greater than 10° over the summer, and be back in pasture for winter grazing.

"Follow the proven steps. Spray to kill existing pasture and springtails in October while rain is still likely to occur. Then evenly broadcast seed, slug bait and fertiliser using a half overlap, half rate application technique. Then when regrassing, broadcast Avipel bird repellent treated ryegrass seed with fertiliser in the same manner," says Murray.

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Feeding summer crops

The right summer crop, grazed well, can fill a feed gap and generate good returns.

In late summer and autumn, pasture growth is most variable in many regions. Too little summer rain, and feed becomes tight, too much and quality issues may arise.

It is also a time when a lot of stock can be still on farm.

"Specialist forage crops such as legumes, herbs or brassicas can increase farm resilience by providing a reliable supply of high quality strategic feed at a time when pasture quantity or quality is often lacking," says Ballance Sheep and Beef Programme Lead Richard Draper.

"Quality feed's particularly important for achieving good growth rates in young stock, with the advantage that faster growing lambs can be killed sooner at a desired weight," he says.

Faster growing animals are also more efficient at converting forage to meat, as they require a lower proportion of total feed for maintenance, and use more feed for growth. This also increases the gross margin for these animals.

Crops can also provide additional system advantages, such as a 'clean' parasite free feed to help manage worms or drench resistance, and other animal health issues such as endophyte or facial eczema.

The right crop for the job

"With a variety of options and cultivars, selecting the right forage crop for the job's important. Consider when the crop's needed, and how it will be utilised," says Richard.

For example:

- Forage brassicas such as rape and leafy turnip provide high yielding multi-graze options that provide flexibility in stock classes and sowing dates. Maturity is typically 6-10 weeks for leafy turnip, and 10-14 weeks for rape, and letting the crop mature or ripen reduces the risk of animal health issues such as scald.
- Herb and legume crops such as chicory, plantain and clover provide energy and high protein feed for priority stock classes.
- All forage crops can be used as a break crop option in a pasture renewal programme.

Executing well

Getting the most from a summer forage crop firstly involves achieving an economic yield, then grazing to maximise the return on it.

"To generate good returns, use a stock class that will perform well on the crop. When transitioning to some crops it's common to see liveweight losses for the first week while animals adapt to the new feed, but once transitioned daily liveweight gain will be dramatically higher than from pasture. The most effective way of maximising liveweight gains is to put a smaller number of animals on the crop for a longer period."

Sufficient crop should be allocated to achieve target performance, and the number of animals per block based on the desired rotation length.

"Pushing for higher utilisation may impact the crop's regrowth potential as well as animal growth rates. To strike a balance, monitor residuals and shift animals when appropriate for the crop."

FOR MORE INFORMATION

Contact your Ballance Nutrient Specialist.

Feed for key times

Veterinarian and farm advisor Trevor Cook explains what 'adequate feeding' looks like.

Trevor Cook

Having enough feed to maximise production is as much about timing as it is about quantity.

For a high performing ewe, feed demand ranges from 1 kg DM/day to 3 kg DM/day over the year. What is more, the timing of that demand is totally predictable. Given that predictability, why are so many flocks underfed at critical times? Most of the supply to meet that demand can be controlled, so can be planned for.

For both ewe flocks and breeding cows the feed demand coming into lambing and calving is one of the critical ones, because to underfeed then compromises every aspect of those outcomes.

Colostrum, milk yield and offspring survival are all influenced by that feeding. It is so important that I am prepared to accept some underfeeding earlier on to ensure sufficient for that key time. It is always risky to advise that, because any underfeeding can be dangerous. But both ewes and cows can tolerate not being fed well in mid-pregnancy in the interests of having enough when it really matters.

Taking body condition into the winter is one of the most powerful buffers for when the feed supply is less than expected. But any loss of that condition must occur early enough in the pregnancy to not compromise the end of pregnancy.

Hence the value of that other tool of subdivision. Rationing the allocation of feed – especially when there is not quite enough – is just as powerful as body condition in buffering shortage. A common scenario is for breeding females to be fed too much during pregnancy and not have enough at the end because the allocation of pasture could not be controlled enough.

Feeding females well at mating is not as often a weak point in the breeding cycle. It is intuitive to do this, and autumns and springs tend to provide that feed. Changes in feed supply patterns are challenging our ability to be in control at this critical time. That does not take away its importance. Young breeding females need the most protection when the feed supply is behind.

The feed supply that is most difficult to be more in control of is for ewes at peak lactation, usually around mid-spring. That is when their feed demand is at its highest, and we rely on the spring pasture growth to provide that. When the October pasture growth is slower than for September it is nigh impossible to change the supply. That is what the 2022 spring did for much of the North Island. The outcome is lowered lamb weaning weights.

But even in that extreme, body condition, fertile soils and active pastures still buffer the impact.

FOR MORE INFORMATION

beeflambnz.com

Topping up winter feed

Supplementing winter feed to meet animal requirements provides a healthy animal to maximise production come spring.

Winter forage crops provide relatively high yields of quality feed at a time when pasture is typically deficient in quantity and quality. But as not all feeds are created equal, balancing the diet is key to a healthy, productive animal.

Winter crops help to support liveweight gain over winter for young and growing stock, or maintenance for dry and/or pregnant ewes and cows. While quantity and quality of feed and balancing protein and fibre are essential for achieving liveweight milestones, minerals and trace elements can often be overlooked.

Macrominerals such as calcium (Ca), magnesium (Mg), phosphorus (P) and sodium (Na) and the five key trace elements – copper (Cu), cobalt (Co), iodine, selenium (Se) and zinc (Zn) – play an essential role in maintaining the health status of animals, especially over winter.

Winter crops can be notoriously low in macrominerals such as Ca and P which are essential for bone development in young stock (see Table 1). The first step is to have the crop tested. While book values help with average values, testing the crop gives the true value of what feed is available. Crops containing high levels of bulbs deliver low Ca, P and Mg. Animals' soil intake is also much higher with bulbed winter crops, and the high levels of iron in soil affect animals' uptake of other minerals.

All minerals directly impact animal health and productivity, and understanding their roles and importance is the first step to better balancing the diet.

Mineral	What animals need it for
Ca	▪ Skeletal development in young animals (bones store Ca in adult cattle) ▪ Muscle function
P	▪ Energy metabolism ▪ Works closely with Ca for bone development
Mg	▪ Nervous system ▪ Carbohydrate metabolism ▪ Enables animals to efficiently process winter crops, which can be high in water soluble carbohydrates
Na	▪ Balancing body fluid ▪ Winter crops can be high in water, and Na helps move fluid around the body for use and to manage waste (urine and dung)
Cu	▪ Muscle development in young animals and foetuses ▪ Pregnant cattle's Cu demand and risk of deficiency is highest in winter and early spring; deficiencies in young animals can impact growth and calf survival[5]; organic Cu supplements over winter protect against the higher iron intakes due to soil ingestion
Co	▪ Converted by rumen microbes into vitamin B12 which stimulates appetite[3] ▪ Over winter Co supplementation can drive intakes and target liveweight gains, when energy is diverted to keeping the animal warm and growth rates in young stock can reduce
Se	▪ Immunity and managing oxidative stress[3] ▪ Adequate Se over winter acts as an insurance policy for calving season, and any winter stresses
Zn	▪ Development of keratin, the main protein in hoof and hair ▪ Winter crops can lead to wetter paddocks and softer feet; adding Zn supports strong feet over winter (particularly in the South Island where pastures are significantly lower in Zn)

All in all, testing winter feed and balancing the diet with the right minerals for the stock class sets up animals for a new season and continues to support young stock to meet liveweight targets over the winter months.

Table 1 **Mineral concentrations of winter crops[1,2,3,4]**

		Ca	P	Mg	Na	Cu	Co	Se	Zn
		%/kgDM				mg/kgDM			
Requirements	**dry cattle**	0.60	0.27	0.30	0.10	14	0.11	0.30	50
	growing calves	0.58	0.40	0.20	0.10	-	-	0.30	45
Kale	**leaves**	3.35	0.30	0.35	0.26	-	0.36	-	40.9
	stem	1.29	0.26	0.27	0.34	-	0.47		46.5
Turnips	**leaves**	3.89	0.34	0.42	0.26	-	0.63	-	87.4
	bulb	0.74	0.30	0.18	0.20	-	0.71	-	60.5
Swede	**leaves**	2.94	0.27	0.38	0.15	-	0.31	-	53.3
	bulb	0.13	0.24	0.16	0.07	-	0.46	-	43.6
Fodder beet	**tops**	1.08	0.29	0.75	1.81	7	0.23	0.08	54
	bulb	0.16	0.15	0.14	0.35	6	0.22	0.02	28

FOR MORE INFORMATION

sealeswinslow.co.nz or 0800 287 325

1 Cornforth IS, Stephen RC, Barry TN, Baird GA 1978. Mineral content of swedes, turnips and kale. New Zealand Journal of Experimental Agriculture, 6:2, 151-156

2 DairyNZ 2021. Facts and Figures

3 National Research Council 2001

4 Hill Laboratories 2015. Fodder beet result data, September 2015 Newsletter

5 Beef and Lamb 2012. Trace element nutrition of cattle fact sheet

25129

Ballance agri-nutrients

Together, Creating the Best Soil and Food on Earth

Together, reducing phosphate loss by up to 75%*

SurePhos®

An effective and sustainable phosphate that is better for the environment.

*Relative to superphosphate products.

Now available in the South Island

ballance.co.nz | 0800 222 090