

CHICORY & CLOVER GUIDE

2018/19

WELCOME TO THE SECOND EDITION OF THE CHICORY AND CLOVER GUIDE

**An essential guide to
PGG Wrightson Seeds' Puna II
chicory and clover range.**

This guide is to provide farmers with fundamental information regarding best practice management of chicory, our Rocket Fuel® mix and clovers. We hope it provides information that farmers find useful to ensure success on farm. The guide also showcases PGG Wrightson Seeds' leading products to help with decision making.

We wish you a successful season.

Please contact your local
Sales Agronomist or merchant
representative for further information.

CONTENTS

CHICORY

- 1 What is Chicory?
- 2 Puna II
- 3 Puna II Case Study: Owl Farm
- 4 Young Stock
- 4 Puna II Testimonial: Chris Coxhead

ROCKET FUEL®

- 5 Introducing Rocket Fuel®
- 6 What is Rocket Fuel®?
- 7 Rocket Fuel® Lamb Case Study: Canterbury
- 8 Rocket Fuel® Dairy Case Study: Waikato

CHICORY AND ROCKET FUEL® BEST PRACTICE MANAGEMENT

- 9 Best Practice Management
- 10 Establishment
- 11 Grazing Management
- 12 Feeding Recommendations
- 13 Animal Nutrition
- 14 Charlotte Westwood's Top 10 Tips for a Healthy Bottom Line
- 16 Grazing Plan & Stock Allocation: Sheep, Beef, Deer
- 17 Planning Example: Lamb Finishing System
- 18 Grazing Plan and Stock Allocation: Dairy Cows
- 19 Planning Example: Milking Dairy Cows
- 20 PGG Wrightson Seeds Programmed Approach® Overview

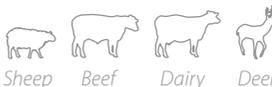
CLOVERS

- 23 Clovers
- 24 Where it All Begins: Legume Breeding
- 26 Legacy
- 27 Quartz
- 28 Hilltop

KEY INFORMATION

- 29 Website and Other Publications
- 30 Staff Contact Details

Stock Suitability Key:





WHAT IS CHICORY?

Chicory is a perennial herb with a deep taproot, leading to good drought tolerance.

Chicory produces a high yield and exceptional quality feed (12.8 MJME/kgDM and 18-30 % CP) boosting summer and autumn milk production and a great forage option to increase liveweight gains (LWG). Chicory is a flexible forage option, which can be grown as a summer perennial crop (2 years under good management), or be used as a component of a specialised mix (Rocket Fuel®) or pasture sward.

Chicory provides a bulk, high quality "low cost" feed when pasture supply is limited. For milking dairy cows with chicory included in the diet at 5 kgDM/cow/d through summer, 4.5 - 5 ha of chicory will be needed per 100 cows. Lambs can be stocked per hectare, adjusting for chicory growth and feed demand of the lambs.



Farm type:



Sowing Rate: **Pure Sward 5-7 kg/ha**



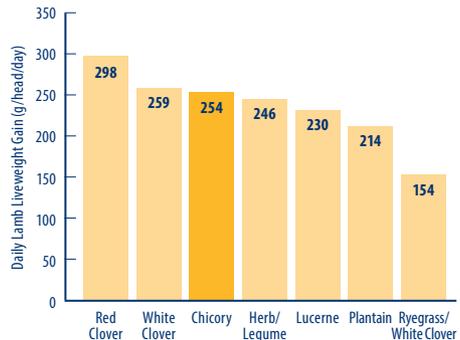
The palatable, persistent herb

- High dry matter production with improved winter activity
- Bred and selected for increased *Sclerotinia* tolerance
- A true perennial chicory with excellent plant survival rates
- Suitable for all classes of stock including sheep, beef and dairy
- Semi-erect for increased utilisation
- Thick, deep taproot giving drought tolerance
- Provides exceptional forage quality

Grasslands Puna II chicory is a New Zealand bred broad-leaved, perennial forage herb bred from true perennial chicory parents.

Puna II chicory has exceptional nutritional quality, producing high yields from spring to late autumn. Extensive animal data has been generated on chicory (much of it on Puna II chicory's predecessor Grasslands Puna chicory). Grazing evaluations and trials have confirmed Grasslands Puna II chicory's high dry matter production, improved regrowth after grazing and improved persistence. Mixed sward grazing trials in Palmerston North have demonstrated Puna II's excellent plant persistence.

Daily Lamb Liveweight Gains in Summer/Autumn when Intake was Maximised in Experiments Using Ryegrass and White Clover Pastures as the Control



Reference: (Kemp, Kenyon, Morris) Massey University.

PUNA II CASE STUDY: OWL FARM

Effective Farm Area: **150 ha**

Peak Cows in Milk: **423**

Production: **178,249 kgMS**

MS/Cow: **421 kgMS**

MS/ha: **1,188 kgMS**

Owl Farm is the Waikato demonstration dairy farm, a joint venture between St Peter's Cambridge and Lincoln University alongside their seven industry partners.

Owl Farm runs 423 cows on 150 hectares (ha), which includes 18 ha of leased land. Tom Buckley (Farm Manager) and Louise Cook (Demonstration Manager) run the farm and facilitate industry interaction. A big challenge with the property is being able to grow enough summer feed to meet demand. With limited supplementary feed infrastructure on the farm it makes it hard to effectively utilise purchased feed. Therefore it was decided a summer crop like chicory would be a good option to overcome their challenges.

The 2016/17 season was the third year Owl Farm grew chicory with 19 ha of Puna II planted after Winter Star II annual ryegrass following the PGG Wrightson Seeds Programmed Approach®. The Programmed Approach™ starts with pasture condition scoring in the summer and identifying poor performing paddocks. Due to the lack of regrassing in previous years Owl Farm has required an intensive pasture renewal programme. The poorest paddocks are sprayed out in the autumn, planted into a winter crop of annual ryegrass and then sown



into a summer crop. For more information on the Programmed Approach™ see pages 20 and 21.

"Puna II chicory grows quality feed during the summer months when pasture growth can be limited. Also chicory fits in well with our need for an aggressive regrassing programme" said Tom.

"The cows production lifted when they grazed chicory; it helps balance out their diet of summer pasture, silage and PKE as it is high in protein and highly digestible."

Sticking to best practice agronomy and growing a larger area, Owl Farm increased their chicory production by 63 tDM compared to the previous season.

Combined with an increase in pasture utilisation, grass silage harvested and tonnes of chicory grown, Owl Farm has increased their home grown feed by 6.7%, increased their milk solid production per ha by 5% and reduced their imported feed by 30%. Owl Farm have been pleased with the on-farm performance of Puna II. It has provided an effective solution to the challenges that they face during dry summer months.

YOUNG STOCK

Puna II chicory provides a great source of protein and energy to meet the requirements of young growing stock.

A high protein diet is important for skeletal and muscle development and ultimately sets up the potential of the young animals future production whether it be future milk production or future carcass weight. When grazing heifers that will one day enter the milking herd it is important they reach a certain weight by mating. In summer dry areas grass quality and production can be poor. Therefore planting summer crops like Puna II chicory, that provide a highly digestible, good quality feed source, will help ensure that future animal production is not limited.



PUNA II TESTIMONIAL: CHRIS COXHEAD

Chris fattens 450 – 500 calves each year on his 100 hectare dry stock farm close to Ngatea. At any one time Chris has half the farm in Puna II chicory.

Chris says "It used to take until end of May to get my spring born weaned calves over 200 kg on grass, now they are over 220 kg by the end of March on Puna II chicory".





INTRODUCING ROCKET FUEL®

Rocket Fuel® is a PGG Wrightson Seeds mix that contains white and red clover with Puna II chicory, which provides out of this world performance over summer and autumn, boosting liveweight gains and production.

Puna II chicory and red clover combine to give high yielding, great quality and deep roots that last more than one year and access ground water deeper than other forage types.

Legacy and Quartz white clovers provide high quality feed, with the added benefit of nitrogen fixation from white clovers.

Components of a Rocket Fuel® Mix

Rocket Fuel® is sold in a 13 kg bag, 1 bag = 1 hectare

39%



15%



15%



31%



** All components are Superstrike® treated. While stocks last. Components of the mix may change subject to availability.*

ROCKET FUEL®

WHAT IS ROCKET FUEL®?

➤ *Why Rocket Fuel® over Puna II chicory alone?*

Chicory doesn't fix nitrogen

White and red clovers fix nitrogen, which means more feed.

Greater ground cover

White and red clovers 'fill in' areas between individual Puna II chicory plants, which means more feed per bite for grazing animals and a crop that's more likely to retain available moisture/dew.

Animal preference

Animals prefer eating mixed diets over single species crops. Through the season the preference of lambs for different forages change giving more of a reason to sow mixtures with different forage types.

Feed quality

Legumes remain the gold standard of the very best quality feed for livestock.

➤ *Why no plantain in Rocket Fuel®?*

Summer forage mixes that contain both plantain and chicory have limited agricultural chemical options to control many common weeds.

➤ *Rocket Fuel® in a bag? Why not my own herb/clover mix?*

It's simple: One bag per hectare.

Cost effective: Rocket Fuel® - no more expensive than your own mix using individual components.

High performing cultivars:

- ***Puna II chicory***
Fully certified Puna II chicory means great quality, true to label seed (you're getting what you pay for).
- ***Legacy large leaf white clover***
New generation clover, more leaf, more yield and more nitrogen fixed.
- ***Quartz medium leaf white clover***
Versatile performer, great yields, persistence and autumn activity.
- ***Sensation red clover***
Strong early season growth, great persistence and low levels of formononetin (potentially reducing risk of flushing ewes pre-tup).



ROCKET FUEL® LAMB CASE STUDY: BRAD HAZELDINE, CANTERBURY

Area Planted: **35 ha**

Lambs Grazing: **1,000**

Average Lamb Weight Gain: **320 g/day**

Brad Hazeldine who leases a 1300 hectare (ha) property, 'Leadervale', near Cheviot has been very impressed with the performance of Rocket Fuel®.

Brad planted 35 ha of Rocket Fuel® as a trial in spring 2016. Planted into dry conditions in early September after an extended drought the Rocket Fuel® had 1000 lambs weaned onto it 10 weeks later in mid-November. These lambs were continually rotated around the Rocket Fuel® throughout summer before coming off late March. Over this period Brad regularly weighed the lambs to monitor

performance and was surprised with an average growth rate of 320 g/day versus lambs at the same stocking rate on lucerne, achieving only an average of 220 g/day in comparison.

"I was most impressed by the regrowth in what was a horribly dry summer. I was grazing it pretty hard and Rocket Fuel® was out performing anything else by a long shot."

After a short break Brad then used Rocket Fuel® as feed for the mating of his 700 two-tooth ewes for their first cycle and the crop was being break fed to ewes over winter. With the success Brad has had this season due to the combination of a deep taproot with the Puna II chicory and the excellent quality attributes enhanced by the clover. His plans are to plant another 35 ha this spring.



ROCKET FUEL® DAIRY CASE STUDY: BADEN PRIEST, WAIKATO

Farm Size: **86 ha**

Area Planted: **9 ha**

Cows in Milk: **295**

Baden milks 295 dairy cows on 86 hectare (ha) on State Highway 27 north of Morrinsville.

For the past three years Baden has planted 9 ha of Rocket Fuel®. Baden is impressed with how much clover comes through.

Like most farms, summer pasture growth is unreliable but Baden can rely on the production of Rocket Fuel®.

Baden said "the summer quality helped keeping the cows at 2 kg MS/cow.day during January".

Baden plants his Rocket Fuel® in spring after spraying out poor performing grass paddocks. Once the Rocket Fuel® is established a broadleaf and grass weed spray are applied to control weeds, which would otherwise reduce yield. To help both the chicory and clovers to establish Baden gives his Rocket Fuel® paddocks a light early graze when the chicory plants have 6-7 true leaves.

After three years of using Rocket Fuel®, Baden hasn't needed to use clover when establishing perennial pasture in the autumn. Baden explained "the key benefit is I don't have to sow clover as these were established 6 months earlier". "Already having the clover means I only need to plant ryegrass in the autumn, which is direct drilled after a light spray".



Baden uses Base AR37 tetraploid ryegrass in his effluent areas and Excess AR37 in his non effluent areas. The pasture 12 months later has great clover content and looks strong in the summer. Another key benefit Baden has noticed was the lack of ryegrass staggers due to a high yielding summer crop and the introduction of new high quality ryegrass cultivars such as Excess and Base AR37.



CHICORY AND ROCKET FUEL® BEST PRACTICE MANAGEMENT

To ensure you get the most out of your Rocket Fuel® or Puna II chicory crop ensure that you follow best practice management.

The next section of this guide, covers the following best management sections:

- Establishment
- Grazing
- Feeding
- Animal Nutrition
- Grazing planning for dairy, beef and lambs
- The PGG Wrightson Seeds Programmed Approach®

Please remember this is only a guide, please contact your merchant representative or PGG Wrightson Seeds Sales Agronomist for further information.

CHICORY AND ROCKET FUEL® ESTABLISHMENT

➤ Time of Sowing

- *Spring sowing:* Chicory seed is sensitive to the cold, sow when soil temperatures are 12 °C and rising.
- *Autumn sowing:* This is possible, provided:
 - Chicory has sufficient time to establish before going dormant in cool conditions.
 - Soil moisture must be sufficient for good germination.

➤ Method of Sowing

- Seed may be drilled or broadcast and has been successfully direct drilled under favourable conditions.
- For conventional sowing roll before and after sowing, for all other sowing options roll after sowing.

➤ Sowing Rate

- Rocket Fuel® = One bag/ha
- Pure stand Chicory = 8 - 10 kg/ha
- Chicory is a very small/light seed, don't sow deeper than 1 cm.
- Superstrike® clover includes pesticide and nutrients to improve the establishment and growth of clover seedlings.

➤ Soil Type and Fertility

- Soil test before sowing to allow correction of low soil pH or nutrient deficiencies.
- Well drained soils and moderate to high soil fertility are best for Puna II chicory and/or Rocket Fuel®, both for optimising agronomic performance, and for effective grazing management.

➤ Weed Control

- Control broadleaf and grass weeds in previous crops before sowing Puna II chicory and/or Rocket Fuel®, but watch for chemical residues and residuals and plant back periods.
- Select paddocks on the basis of low risk of weed burden, especially thistles.
- Post-emergent weed control may be possible with Puna II chicory and/or Rocket Fuel®, but it is important to discuss with your local retailer or chemical specialist to get advice on the best options.

➤ Pests and Disease

- Assess presence of pests before sowing Puna II chicory and/or Rocket Fuel®, and plan for control measures.
- Slug bait will enhance establishment where slug pressure is observed, especially if using minimal tillage.
- Monitor the crop post-sowing and seek advice if pests or disease are seen.
- Use preventative insect control prior to sowing if required.

CHICORY AND ROCKET FUEL®

GRAZING MANAGEMENT

Rotationally graze Puna II chicory and Rocket Fuel®.

Set stocking is not recommended due to risk of plant loss and poor persistence of chicory and red clover components.

➤ First Grazing

Make decisions around first grazing based on chicory development. Graze Rocket Fuel® when Puna II chicory:

- Has reached 7 true leaves per plant. Grazing too early may reduce plant survival.
- Plants are 20 to 30 cm high.
- Plants can't be pulled out of the ground.

First grazing is usually around 8 weeks after sowing. Actual timing can change depending on soil temperature, moisture and fertility.

Remove stock from Rocket Fuel® when crop height reaches around 7-8 cm (top of the toe of your boot).

Overgrazing will reduce plant population and persistence of your chicory or Rocket Fuel® sward.

➤ Second and Subsequent Grazings

Target grazing rotation is between 21 and 28 days.

- More frequent grazings (faster than 21 days) may reduce sward persistency.
- Less frequent grazings (slower than 28 days) may reduce feed quality, especially during the second year of grazing.

Prevent or minimise chicory reproductive development (second year swards only).

- Quality of stem and flowers is poor.
- Chicory stem development reduces plant populations. Rain water fills hollow chicory stems after grazing/topping, encouraging fungal infection, rotting out of stems and killing plants.

Grazing management ideas to control chicory quality include:

- Frequent grazing, e.g. a fast grazing round of every 21-24 days.
- Post-grazing residual targets of 7-8 cm.
- Leader/follower grazing - high performance stock classes (e.g. lambs) graze leaf followed by other stock classes (e.g. older cattle) cleaning up stems.
- Mechanical topping of reproductive stems.

CHICORY AND ROCKET FUEL®

FEEDING RECOMMENDATIONS

Starting stock on Puna II chicory or Rocket Fuel®

Assess amount of feed on offer (kgDM/ha).

This allows you to estimate feed allocation and/or stocking rate.

Kilograms of dry matter per hectare (kgDM/ha) – Ways to assess include:

➤ *PGG Wrightson Seeds Herb/Clover Sward Stick*

- Measures height of a dense sward, converts to an estimate of kgDM/ha for early spring, late spring, summer or autumn.
- Accuracy depends on sward density, plant population present and dry matter % of the sward. Actual kgDM/ha present may vary by up to 50%.

Note: The PGG Wrightson Seeds sward stick is for Rocket Fuel® only and won't provide an accurate kgDM/ha assessment for Puna II chicory when clovers aren't present.

➤ *Quadrat Cut*

Adapted from DairyNZ "Chicory Management 1-72b"

www.dairynz.co.nz/media/840469/1-72b-chicory-management.pdf

- Make a 0.25 m² quadrat by bending wire into a square 0.5 m x 0.5 m
- Take cuttings from four randomly chosen sites, cut to 5 cm height
- Bulk up four samples and weigh
- Multiply by 10,000 to get fresh weight (kg/ha)
- Take 200 g sub-sample of fresh Puna II chicory or Rocket Fuel®
- Dry in microwave or oven and re-weigh. Or send sample away for DM% analysis. Do not use book values for DM%!
- Calculate DM% (dry weight/fresh weight)
- Calculate DM/ha (kg fresh weight/ha x DM%)

Note: If sending forage away for DM% testing we recommend checking nitrate levels as well.

➤ *Rising Plate Meter (RPM)*

DairyNZ has an equation for converting RPM 'clicks' to kgDM/ha for first year chicory stands.

www.dairynz.co.nz/media/840469/1-72b-chicory-management.pdf

This equation may underestimate feed on offer for Rocket Fuel®, due to a greater density of mixed herb/clover stands compared with pure chicory stands.

CHICORY AND ROCKET FUEL®

ANIMAL NUTRITION

Why buy expensive, high quality supplementary feeds when you can grow your own at home?

High performing stock need nutritious, easy to consume forages. Summer pastures often fail to deliver enough energy and protein for growing and lactating animals.

Puna II chicory and/or Rocket Fuel® delivers exceptional quality forage for your very best classes of stock.

Highly digestible, high protein Puna II chicory and/or Rocket Fuel® delivers a very different nutritional profile from dryland ryegrass/white clover pastures. Compared to most summer pastures, Puna II chicory or Rocket Fuel® contains:

➤ Energy (MJME/kgDM)

- More energy
- More soluble sugars and pectins

➤ Fibre (ADF and NDF)

- Less fibre (ADF and NDF)
- Low levels of fibre are more rapidly and completely digested

➤ Protein

- Higher levels of protein compared to summer pasture.
- Protein is of excellent quality
- Chicory contains low levels of condensed tannins so can improve utilisation of chicory protein

Exceptionally high quality Puna II chicory and/or Rocket Fuel® matches the high demands of rapidly growing stock or lactating dairy cows through late spring, summer and autumn.



CHARLOTTE WESTWOOD'S TOP 10 TIPS FOR A HEALTHY BOTTOM LINE

Deciding to finish your own livestock, or to sell them store? Or to graze your own dairy replacements or send them away grazing? How about buying in someone else's store animals to finish? Whatever your decision, planning ahead improves the likelihood of making a healthy margin, or to reduce grazing costs.



1 *Gross margin analysis:*

Calculate expected income less expenditure. Run a range of scenarios with different purchase and sale prices.

2 *Feed budget:*

Knowing your feed supply and feed demand (kg dry matter/head/day) allows you to work out your ideal stocking rate.

3 *Vaccinate young:*

Young crop-fed animals and those eating high quality pasture require vaccination against common clostridial diseases.

4 *Anthelmintic (internal parasite) treatments:*

Well-fed animals on high quality pastures and summer crops cope better with parasite burdens than animals fed rough, low quality pasture. Discuss with your veterinarian the best approach for parasite control in your livestock.

5 *Trace mineral requirements:*

Most lambs need supplementation with vitamin B12 and selenium, cattle often need selenium and copper.

6 *Supplementary feed:*

Feeding small quantities of good quality hay or baleage will improve liveweight gains. Ensure a minimum of 20% of the diet is a good quality hay or baleage when grazing beef and dairy drystock.

7 *Stock water supply:*

Fresh, clean and easily accessible drinking water will improve stock performance.

8 *Choose the right lamb for crop finishing:*

Heavier livestock close to desired finishing liveweight should stay on pasture. Rumen adaptation time by livestock to crop mean lighter animals have more time to successfully transition and to reach high rates of liveweight gain.

9 *You can't manage what you don't measure:*

Invest in an electronic identification (EID) system. You'll get great feedback on both animal genetics and on your feeding management.

10 *Excellent stockmanship:*

Even with new technology, there's no replacement for top stockmanship. Monitor for tail ender, shy feeders and flystrike in lambs.

One of the benefits of cropping is that sheep and cattle that graze high quality, high MJME/kgDM crop need less kgDM/head/day than those grazing poorer quality low MJME summer pasture. We can grow high yielding/good quality forage crops but that is only half the job. Following these 10 points will help you achieve your liveweight gain goals. Matching stock demand and crop offered is one of the fundamental things to get right when finishing any stock class. More often than not poor liveweight gains can be related to incorrect feed allocation.

Introducing Veterinarian Nutritionist Charlotte Westwood:



Charlotte is a qualified veterinarian (BVSc, MANZCVS, PhD) with over 25 years of experience in vet science, animal nutrition and farm systems.

In her current role as Veterinary Nutritionist for PGG Wrightson Seeds she consults widely to a number of large corporate farming businesses and is involved in research and development and extension work with PGG Wrightson Seeds retail customers. Prior to this Charlotte has worked as a cattle veterinarian and as a farm consultant in both New Zealand and Australia.

Charlotte is particularly interested in interactions between nutrition, animal health and reproductive performance of cattle and sheep within pasture, crop or total mixed ration based farm systems. She has published a number of papers on these topics and is a regular presenter at farming related conferences.

Twitter and Facebook

Follow PGG Wrightson Seeds Facebook page and Charlotte's Twitter account @CharlottePGWS where there are regular updates and information giving you the latest advice, updates and occasionally chances to win!

Also join Charlotte's Facebook group "The Rumen Room"; a discussion forum focussing on the nutrition, health and management of ruminant animals.

GRAZING PLAN AND STOCK ALLOCATION SHEEP, BEEF AND DEER

➤ *Know your Rocket Fuel® yield*

Assess kgDM/ha yield of Rocket Fuel® (see page 12).

➤ *Calculate break size*

Match animal demand (kgDM/head x number of animals) with Rocket Fuel® yield. PGG Wrightson Seeds herb clover sward sticks are a useful tool to help with Rocket Fuel® allocation.

➤ *Reduce risk of animals gorging on crop*

Before introducing to the crop 'fill up' animals on pasture and/or supplements such as hay, baleage or silage.

➤ *Fibre supplements*

Rocket Fuel® contains low levels of 'effective fibre'. Grass based pasture or baleage are useful sources of additional fibre, important particularly during the first 7 -10 days of transitioning onto crop. A supplementary source of fibre should be offered to cattle grazing Rocket Fuel® at all times.

➤ *Frequency of shifting stock*

Move to a new break once to twice weekly. Stand persistence may be reduced by less frequent shifts.

➤ *Backfence*

Excluding stock from grazed areas improves regrowth and stand persistence.

➤ *Smaller, lighter finishing stock do best on Rocket Fuel®*

Best per head performance is seen when stock remain on crop for at least 3 weeks. Target smaller, lighter stock on crop for a considerable time (more than 3 weeks). Stock close to finishing weights are best left on pasture.

➤ *Animal health plans*

Plan for internal parasite, clostridial disease prevention (young stock), ruminal bloat prevention (cattle) and trace mineral requirements.

PLANNING EXAMPLE: LAMB FINISHING SYSTEM

- Assumption: Rocket Fuel® fed lamb
 - Average of 38 kg liveweight over finishing period
 - Dry matter intake of 1.5 kgDM utilised/lamb/day
 - 25 day grazing round.
 - Example Rocket Fuel® growth rates of 70 kgDM/ha/day (this varies with soil moisture, pH and fertility, grazing management and pest and disease challenges)
 - Pre-grazing cover of 4,150 kgDM/ha (20-21 cm, PGG Wrightson Seeds herb/clover sward stick; summer recommendation)
 - Post-grazing cover of 2,400 kgDM/ha (7-8 cm, PGG Wrightson Seeds sward stick; summer recommendation)
- Available feed = 1,750 kgDM/ha
(Pre-grazing 4,150 kgDM/ha – Post-grazing cover of 2,400 kgDM/ha)
- 1.5 kgDM utilised/lamb x 25 days = 37.5 kgDM per lamb for 25 days
- Available feed 1,750 kgDM/ha divide by 37.5 kgDM/lamb = **47 lambs/ha**



GRAZING PLAN AND STOCK ALLOCATION DAIRY COWS

➤ *Know your Rocket Fuel® yield*

Assess kgDM/ha yield of Rocket Fuel® (see page 12).

➤ *Calculate break size*

Match cow demand (kgDM/head x number of animals) with Rocket Fuel® yield.

➤ *Reduce risk of animals gorging on crop*

'Fill up' animals on pasture and/or supplements such as hay, baleage or silage. Don't let milking dairy cows drift from the dairy shed to a new break. Fill up with pasture first, then move to Rocket Fuel® once cows are full.

➤ *Fibre supplements*

Rocket Fuel® contains low levels of 'effective fibre'. Grass based pasture or baleage are useful sources of additional fibre, important particularly during the first 7 -10 days of transitioning onto crop.

➤ *Frequency of shifting cattle*

Move to a new break daily (dairy cows). Stand persistence may be reduced by less frequent shifts.

➤ *Backfence*

Excluding cattle from grazed areas improves regrowth and stand persistence.

➤ *In milk dairy cows*

If Rocket Fuel® stand is predominantly chicory, Rocket Fuel® should be restricted to no more than 33% of the daily DM intake to avoid potential milk taint.

➤ *Animal health plans*

Plan for internal parasite, clostridial disease prevention (young stock), ruminal bloat control and trace mineral requirements.

PLANNING EXAMPLE: MILKING DAIRY COWS

- Assumption: Rocket Fuel® intake of 5 kgDM utilised/cow/day as part of daily diet, for 100 cows on 25 day grazing round:
 - Pre-grazing cover of 4,150 kgDM/ha (20-21 cm, based on PGG Wrightson Seeds herb/clover sward stick; summer recommendation)
 - Post-grazing cover of 2,400 kgDM/ha (7-8 cm, based on PGG Wrightson Seeds sward stick; summer recommendation)
- Available (utilisable) feed = 1,750 kgDM/ha
(Pre-grazing 4,150 kgDM/ha – Post-grazing cover of 2,400 kgDM/ha)
- 100 cows x 5 kgDM utilised/cow/day = Require 500 kgDM/day
- Available feed 1,750 kg, need 500 kgDM utilised/day = **0.29ha offered per day for 100 cows.**
- 25 day rotation x 500 kgDM/day = 12,500 kgDM needed every 25 days.
Divide by available feed 1,750 kgDM/ha = **7.1 ha of Rocket Fuel® required per 100 cows to feed 5 kgDM of Rocket Fuel®/cow/day fed at 0.29 ha/day**



PROGRAMMED APPROACH™ OVERVIEW

Summer forage crops, while being an excellent source of high quality and quantity feed to cover feed deficits and improve animal productivity, are also a logical part of a pasture renewal programme.

Using a summer crop is an integral part of a systematic approach to pasture renewal. The PGG Wrightson Seeds Programmed Approach® encourages the view that grass is a crop and by treating pastures as a crop, farmers ensure they have a good supply of quality feed all year round.

The Programmed Approach™ to pasture renewal allows a farmer to capture the full value of improved pasture genetics available in today's new grasses and clovers.

Consider using the Cleancrop™ Brassica System the year prior to assist in cleaning up hard to control weeds. e.g. thistles.

YEAR 1:
MARCH

ACTION 1

In the autumn spray out existing poor performing pasture with a good rate of glyphosate to control all pasture species, including clover.

ACTION 2

Drill an annual/ Italian ryegrass such as **Winter Star II**.
Always use Superstrike® treated seed for grass to grass drilling, to protect against Black Beetle and Argentine Stem Weevil. Monitor for slugs and snails and apply slug bait where required.

ACTION 3

Take the opportunity to build fertility prior to summer cropping, with applications of lime and capital dressings of fertiliser.

YEAR 1:
OCTOBER/EARLY NOVEMBER

Spray out the **Winter Star II** with glyphosate plus an insecticide to prepare for the summer crop.

Prepare a fine, firm clod-free seedbed and establish a summer crop of **Puna II** or **Rocket Fuel®**.

Manage the crop as per the best practice recommendations, applying good amounts of fertiliser and monitor weeds and pests.

YEAR 2:
FEBRUARY/MARCH

Option 1: Spray out summer crop with glyphosate to control all established perennial and annual weeds.

Option 2: Carry the **Puna II** chicory or **Rocket Fuel®** through for another year.

**Note this decision should be based on plant numbers.*

Select a pasture mix which suits the paddock, fertility and farming system.

High performance Sheep/ Beef and Dairy Mix:
E.g. 21 kg/ha of Excess AR37 + 2 kg/ha Legacy white clover + 2 kg/ha of Quartz white clover

Standard Sheep and Beef Mix:
E.g. 21 kg/ha of Rely AR37 + 2 kg/ha Hilltop white clover + 2 kg/ha of Quartz white clover

Always sow new pasture with fertiliser, broadcast DAP at 100-150 kg/ha.

YEAR 2:
MAY/JUNE

Graze quickly and lightly as soon as seedlings are firmly rooted and have passed the pull test.

Spray pasture weeds 5-6 weeks after sowing to ensure a clean productive paddock.

For second year chicory and Rocket Fuel® graze the sward hard during early spring to avoid chicory going to seed.



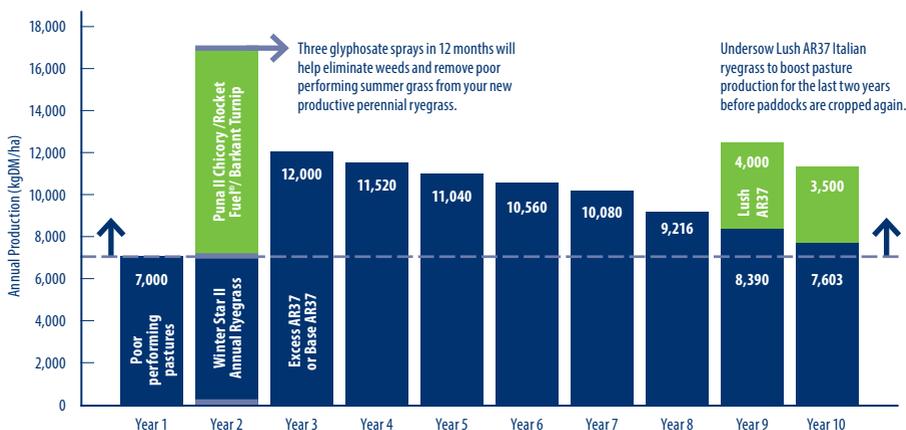
PROGRAMMED APPROACH™ BENEFITS

The PGG Wrightson Seeds Programmed Approach® offers these important benefits:

- Opportunity to break the perennial weed cycle using appropriate chemicals, leading to pastures free of difficult to control weeds.
- Opportunity to break the clover pest cycle (e.g. clover root weevil and nematodes), leading to better clover establishment and production.
- Opportunity to break the ryegrass wild endophyte cycle to allow summer-safe grazing with introduced novel endophytes.
- Encourages forward planning and the opportunity to address fertility and drainage issues earlier, resulting in more productive pastures and crops.

Ultimately more feed is grown and as a result productivity has the potential to greatly increase if this extra feed is utilised

Programmed Approach™ Production (kgDM/ha) Benefits



Assumptions:

Assuming the poorest paddock on farm is producing 7,000kgDM/ha/yr and new perennial pasture is producing 12,000kgDM/ha/yr. These figures have been based on a case study from Owl Farm, St Peters School, Cambridge.

The change in relative yield over time is according to the Pasture Renewal Charitable Trust Calculator, assuming medium persistence. Assuming a 10% pasture renewal programme.

The year to be assumed is March to March.



CLOVERS

Clovers are an important component of pastoral farming in New Zealand. They are largely responsible for New Zealand's competitive ability to produce quality animal products on the world market.

Clovers are a very high quality feed for stock providing much higher animal performance than grass per kilogram of dry matter eaten. They also provide a source of nitrogen helping to support a sustainable pasture system.

White clovers have a strong genetic link between high stolon density, small leaf size and lower dry matter yield, however white clover breeders have made excellent progress in breaking this link. This has led to the development of breakthrough cultivars such as Grasslands Legacy large leaf white clover.

What Clover Should I Use in my Pasture Mix?





WHERE IT ALL BEGINS: LEGUME BREEDING

PGG Wrightson Seeds legume breeder John Ford shares an insight into breeding legumes and explaining the development of the PGG Wrightson Seeds clovers.

Forage breeding is a career rewarding those who have a vision for the needs of the end user, a very keen eye with an understanding of morphology and ecology, a great deal of patience and a little bit of luck too!

Breeding is an accumulation of knowledge, experience and innovation (science and genetics) in formulating crossing

combinations. No breeder can do this alone, there is an active team involved with agronomic evaluation through to seed production, all key to the release of a new cultivar into the market.

For me personally, I like to explore the large pool of genetic diversity we have in our world. White and red clovers have been used by farmers all over the globe and have adapted to a wide range of environmental conditions. These populations can offer numerous key traits to a breeders crossing programme.

The environment we test our breeding material in is highly managed and tested.



The three latest PGG Wrightson Seeds clover cultivars have been developed and tested using a part of or a combination of germplasm and environment, and retested at multiple locations in New Zealand using different management practices.



Legacy, a large leaf cultivar, which has a background of European germplasm, both temperate and Mediterranean crossed with very adaptive germplasm from New Zealand and tested in dairy grazed pastures. Legacy has shown to be both productive and persistent in intensive sheep, beef and dairy systems.



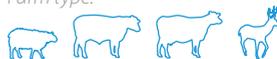
Quartz, a medium leaf white cultivar, which has a background of lines that have persisted in lower rainfall areas and warmer temperatures with ecotypes collected from the Waikato region of New Zealand. **Pastures known not to be renewed in 70 plus years!** Quartz is extremely adaptive across a wide range of conditions and farming systems.



Hilltop, a small-medium leaf cultivar developed from wide ranging germplasm that was screened in a browntop sward, selections crossed and retested and final selections crossed again to produce a cultivar that is persistent in both hill and high country environments.

Trials are run for three years minimum and often longer to assess the persistence and seasonal yield. Clovers specific to intensive dairy farming systems have to withstand a heavier animal, higher fertility levels including high nitrogen (N) application rates, shorter rotations and compete in a grass bias management system.

Conversely a cultivar to focus on moist hill country (extensive farming) is quite different. Lower fertility and generally poor structured soils with drainage issues and different grass species for example browntop, require a different type of clover cultivar.



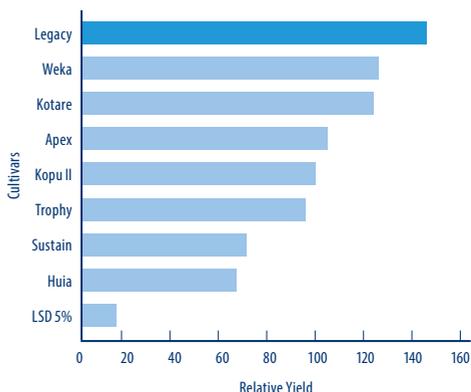
An exceptionally high dry matter yielding, large leaf clover

- Latest generation New Zealand bred white clover
- Bred to persist and perform in the modern pasture sward
- Dry matter yield that strengthens with time
- Large leaf to capture sunlight and drive yield
- More = more nitrogen (N) fixed, reduces need for nitrogenous fertiliser
- The perfect rotational grazing option

Grasslands Legacy is an exceptionally high yielding large leaf white clover.

Its second and third year yields are outstanding compared to other cultivars. Its vigorous growth improves its tolerance to clover root weevil, while its tall growth habit ensures it competes with ryegrass in a sward making it easy to harvest by cattle.

Performance of white clover cultivars relative to "Kopu II" (100%) under beef cattle grazing in the Manawatu from 2011-2015



Trial conducted by AgResearch in Manawatu over four years (Nov 2011 - Oct 2015) under rotational grazing. Clovers were grown with diploid perennial ryegrass with AR37 endophyte.



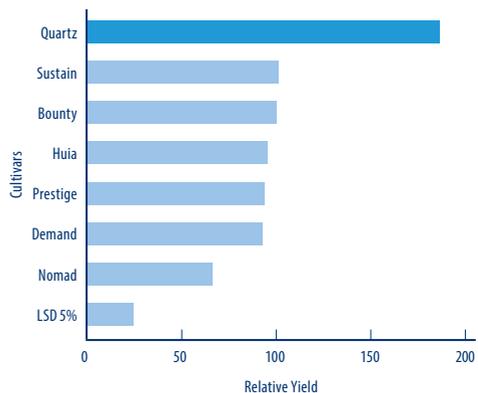
An excellent dry matter yielding, persistent white clover with broad adaptability.

- Excellent adaptability across farming systems
- Excellent dry matter yields
- Versatility to cope with a range of conditions
- Used in pasture, specialist and renovating mixes
- Excellent persistence from high stolon density (relative to leaf size)

Quartz medium leaf white clover is an excellent dry matter yielding, persistent white clover that had broad adaptability across environments and farm systems.

It performs well under both sheep and beef grazing management. It was bred to replace Bounty medium leaf white clover and is quite clearly an improvement with higher yield and increased stolon density resulting in even greater persistence than Bounty. Quartz medium leaf white clover has been trialled throughout New Zealand and performed well.

Performance of white clover cultivars relative to "Bounty" (100%) under beef cattle grazing in the Manawatu from 2011-2015



Trial conducted by AgResearch in Manawatu over four years (Nov 2011 - Oct 2015) under rotational grazing. Clovers were grown with diploid perennial ryegrass with AR37 endophyte.



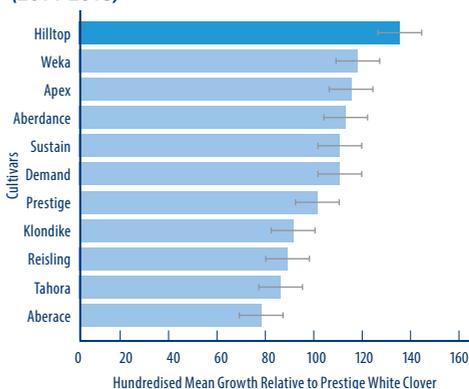
A small-medium leaf white clover bred for more challenging environments.

- Persistent due to very high stolon density
- NZ bred for competitiveness against invasive grasses such as Browntop
- Best option for drier, lower fertility conditions
- Ideally suited for hill and high country grazing systems
- Suited for oversowing with Prillcote seed treatment

Grasslands Hilltop small-medium leaf white clover was bred to cope with more challenging environments from variable fertility to variable moisture availability or combinations of the both.

It has a higher stolon density than Tahora II making it even more robust and persistent. A focus of Hilltop breeding was for competitiveness against invasive grasses such as Browntop to help it survive in the reverted pastures often found in New Zealand.

Agronomic Performance of Clover Cultivars in Dryland Canterbury under Sheep Grazing (2014-2018)



Trial conducted at AgResearch Lincoln (2014-2018) with clovers sown as part of a mixed sward under sheep grazing. L.S.D (5%) = 19%; differences between cultivars must exceed the LSD to be statistically significant.

WEBSITE AND OTHER PUBLICATIONS

Communication and information is vital to ensure the best possible results when relying on sown seeds to produce high quality forage for animal production.

At PGG Wrightson Seeds we understand the need to have this information on hand when required both day and night. Our aim is to offer a site that can deliver you all the information you require to make the best decision when it comes to pasture renewal and cropping.

Visit our website for:

- Brassica and pasture crop management
- Product information
- Farming news and testimonials
- What you need to know about endophytes



www.pggwrightsonseeds.com

PGG Wrightson Seeds have developed a number of other publications to assist you on your farm. The following publications are available:



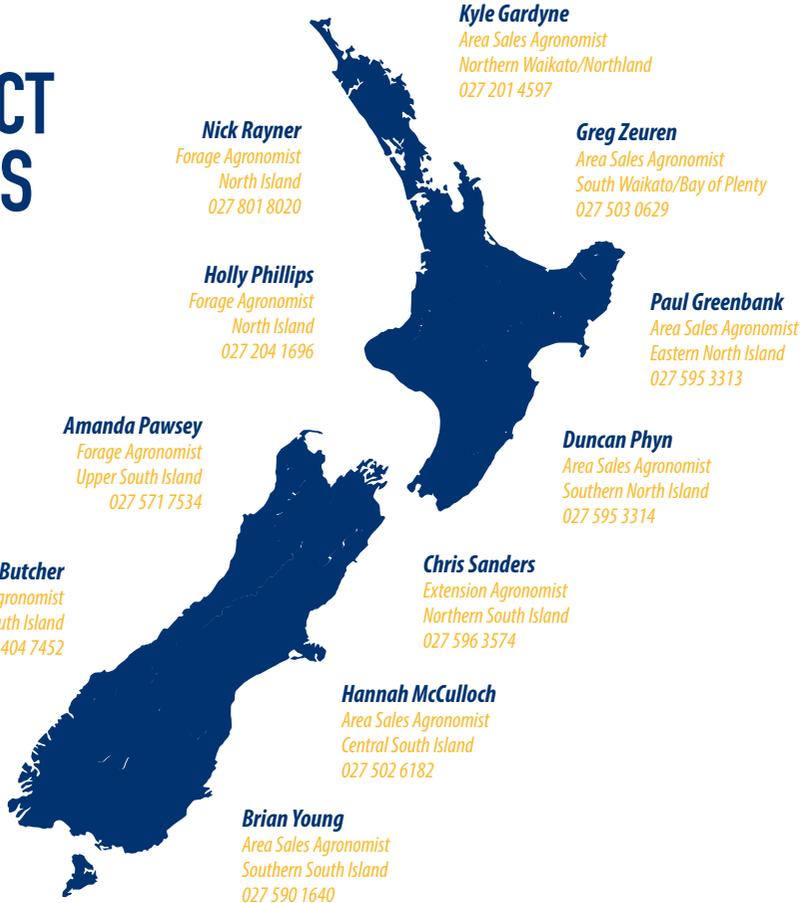
DISCLAIMER:

Results will vary depending on the circumstances. PGG Wrightson Seeds Ltd including its licensors of intellectual property (together, PGG Seeds) provide no assurances, guarantees or warranties about any advice, information, cultivar, hybrid, product or endophyte mentioned, including as to accuracy, quality or fitness for any purpose, and exclude all statutory and implied warranties to the maximum extent possible. PGG Seeds is not liable in any way (including negligence, tort and equity) to you or any other person in connection with this advice, information, cultivar, hybrid, product or endophyte mentioned for any errors, omissions, indirect or consequential loss, costs, profits, savings, goodwill or damages. If PGG Seeds has any liability then it is limited to the cost of the advice, information, cultivar, hybrid, product or endophyte received by PGG Seeds in respect of which the liability arises. No part of this information may be reproduced, stored, or transmitted without our prior written permission. PGG Seeds' Terms of Trade located at www.pggwrightsonseeds.com apply to this advice and information and to the sale of products listed here unless specified otherwise.

Superstrike and the PGG Wrightson Seeds Programmed Approach are registered trademarks of PGG Wrightson Seeds limited.

©PGG Wrightson Seeds Ltd 2018

STAFF CONTACT DETAILS



Hugh McDonald
Sales and Marketing
Manager
027 380 6668

Hamish Mulcock
Portfolio Manager
027 569 4229

Charlotte Westwood
BVSc, MACVSc, PhD
Veterinary Nutritionist
027 554 4541

Wayne Nichol
M.Ag.Sc (Dist)
Extension Agronomist & Nutritionist
027 596 3975

For more information on chicory and clover cultivars or the information contained within this brochure, contact your local seed retailer or talk to one of our Sales Agronomists above.

Freephone: 0800 805 505

www.pggwrightsonseeds.com