agriseeds
superior pastures

PRODUCT GUIDE

The guide to Agriseeds pasture cultivars and management.

Now is the perfect time to consider your pasture sowing options.

Good pasture is the cornerstone of New Zealand farming. You cannot buy a cheaper, more efficient and more sustainable source of feed than your own grass and clover.

But not all pasture is equal. If you want to get the best out of your livestock and land, you need the right pasture for your situation. Inside this guide you'll find the information you need to help select and grow the best pastures for your farm.

CONTENTS

CULTIVAR CHOICE

Introduction

Investing in the correct plant genetics is a key decision in pasture renewal. Cultivar choice affects a wide range of things including cool season yield, the heading date and late spring quality of a paddock, its palatability, and its potential longevity.

How do you value this?

One way is to look at an old ryegrass cultivar like *Nui* which may at first glance look easier on the wallet than their newer counterparts but a quick cost:benefit analysis shows they are anything but.

It all comes down to performance. Comparative trials show a modern ryegrass like *Trojan* with *NEA2* endophyte will on average grow at least 2-3 t DM/ha a year more than *Nui*. On a sheep farm, that adds up to more ewes/ha, and more lambs too. On a dairy farm, *Trojan's* growth advantage means more milk in the vat.

Bottom line? The correct ryegrass cultivars, matched to the needs of the situation, pay for themselves surprisingly quickly, and after that, they're highly profitable.

New pasture genetics also have other economic benefits that old ryegrass like *Nui* simply cannot match. Palatability and feed quality are higher, so animals perform better. Winter and early spring growth is much better, giving you more feed when you really need it. Endophytes enhance animal health and pasture persistence.

You wouldn't use a 30 year old ram or bull in your business because today's choices are so much more productive. Pasture is no different.

Example

Cost vs benefit: Modern ryegrass/white clover seed mix

Cost	
Typical modern seed	$335/ha
Typical "cheap" seed	$125/ha
Extra cost*	$210/ha

* Estimated cost based on 20kg/ha ryegrass & 4kg/ha white clover.

Benefit - Sheep/beef	Benefit - Dairy
Extra 3 ewes/ha @ $110 GM** = $330	Extra 171kg MS/ha @ $6 = $1026/year◆
Faster lamb growth (10% faster) from better pasture quality*** = $62	Less cost production (30%◆◆) = $308/year
Extra benefit each year = $392/ha	Extra benefit each year = $718/ha

Assumptions:
**Extra 2 t DM/ha grown on sheep farm. Ewe Gross margin (GM) = Income $110/ewe (1.2 lambs @ $90, cull ewes @$12, $17.50 wool) less $27.50/ewe costs.
*** Lamb LWG from Lincoln University trials at Ashley Dene, Alto ryegrass grew lambs 10% faster than Nui (over 5 separate 8 week periods). $ benefit based on 15g/day faster LWG, 20 lambs/ha for 120 days = 36kgLW @$1.70/kg = $62.

◆Extra milk solids (MS) based on 3 t DM/ha/year extra pasture; 80% utilisation; conversion to milk at 14kg DM/kgMS.

◆◆ Variable costs of extra MS produced vary farm to farm, but assumed 30% of income.

IMPROVING RYEGRASS PERSISTENCE

Introduction

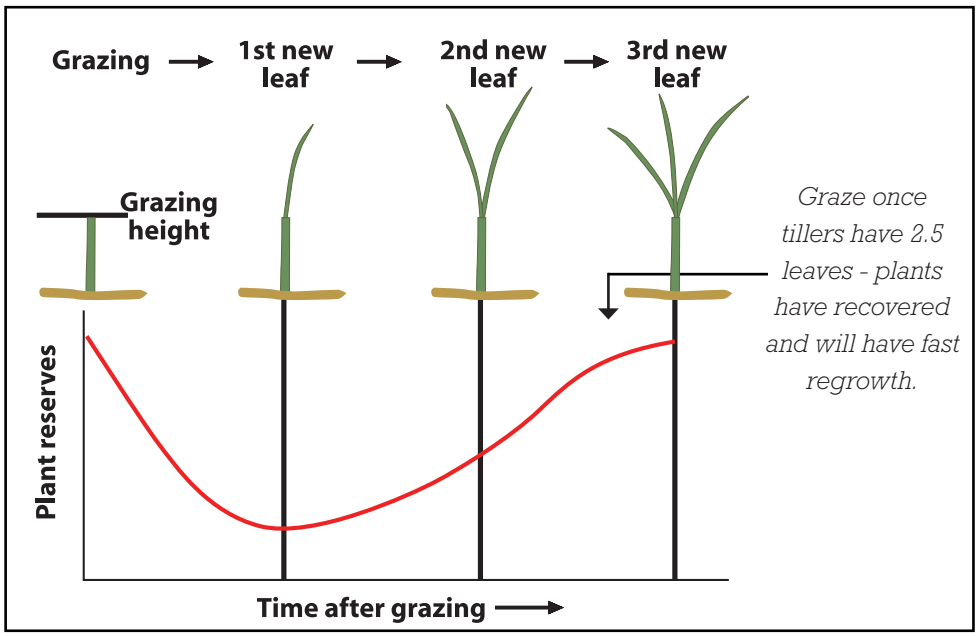
Modern ryegrasses are highly productive, so they need to be well cared for to persist, and perform. If you look after them, they will look after you.

How to get pasture persistence

1. Feed your pastures well. Soil phosphate and pH are particularly important for plant persistence. Ensure your soil fertility levels are correct, and keep them maintained.
2. Minimise plant death over summer. The most typical cause for plant death is a combination of moisture stress + overgrazing + insect feeding. For insect protection, use endophyte, combined with pasture cultivars bred for persistence. To avoid overgrazing in the dry a number of strategies help:

- Sow summer crop (e.g. chicory, rape) to take pressure off pasture.
- Have supplement on hand to feed out (or have access to supplement).
- Plan ahead for key stock policy decisions to reduce feed demand (e.g. selling lambs store, milking once a day, selling trading stock, culling poor performing animals).
- Look after the best pastures - you can't look after every pasture, but look after as many of your best and newest paddocks, as they'll grow fastest when rain comes.

3. Once it rains, don't change anything till pastures regrow. Grazing a pasture recovering from the dry too early can kill it – plants need 2-3 leaves per tiller so they have restored their reserves and will regrow quickly post-grazing.



4. Manage winter grazing to avoid damage from cattle. Spread stock out, or use a sacrifice area to keep them off your good paddocks. If damage is a continuing problem, use finer, denser ryegrass cultivars because they cover the ground and protect the soil better. Pick diploids rather than tetraploids for these situations.
5. Consider other options. In very dry areas, alternative pastures may be better than ryegrass. Options include *Bareno* pasture brome and *Safin* cocksfoot.

TROJAN PERENNIAL RYEGRASS

Endophyte *NEA2*

Stock Type Dairy, Sheep, Beef, Deer

Trojan provides a balance of features previously unseen in a perennial ryegrass: exceptional DM yield across all seasons; excellent persistence; *NEA2* endophyte for good animal health and insect control (including black beetle); high feed quality, and good resistance to rust and plant pulling.

High yield

Trojan NEA2 sets a new standard of DM yield, but more important is the way it produces this yield at the shoulders of the season, in winter/early spring and summer.

Perennial Ryegrass: All New Zealand trials (yields by season as percentage of mean)

Entry	Number of trials	Winter		Early spring		Late spring		Summer		Autumn		Total	
		% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI
Trojan NEA2	**14**	**116**	**3.3**	**108**	**2.9**	**106**	**2.6**	**110**	**3.0**	**106**	**3.5**	**108**	**2.4**
Base AR37	9	113	4.0	103	3.4	104	3.2	109	3.6	112	4.1	108	2.9
One50 AR37	22	112	2.7	98	2.3	101	2.1	111	2.5	114	2.8	107	1.9
Excess AR37	4	114	5.8	101	5.0	103	4.6	109	5.3	108	6.0	106	4.2
Arrow AR1	**13**	**108**	**3.4**	**108**	**2.9**	**105**	**2.7**	**105**	**3.1**	**105**	**3.5**	**106**	**2.4**
Alto AR37	**16**	**110**	**3.1**	**104**	**2.7**	**103**	**2.5**	**106**	**2.8**	**108**	**3.2**	**106**	**2.2**
Request AR37	8	105	4.2	112	3.6	101	3.4	103	3.9	110	4.4	105	3.0
Prospect AR37	10	112	3.8	101	3.3	101	3.0	108	3.5	107	4.0	105	2.7
Ansa AR1	4	112	5.8	107	5.0	103	4.7	103	5.4	102	6.1	104	4.2
Ultra AR1	16	110	3.0	101	2.6	101	2.4	105	2.8	106	3.2	104	2.2
Matrix SE	11	107	3.6	104	3.1	101	2.8	102	3.3	105	3.7	103	2.6
One50 AR1	19	109	2.8	96	2.4	99	2.2	106	2.6	104	2.9	103	2.0
Alto AR1	**27**	**105**	**2.4**	**102**	**2.1**	**103**	**2.0**	**103**	**2.2**	**102**	**2.5**	**103**	**1.8**
Bealey NEA2	**26**	**109**	**2.5**	**98**	**2.2**	**100**	**2.0**	**104**	**2.3**	**104**	**2.6**	**102**	**1.8**
Halo AR37	18	106	2.9	94	2.5	99	2.3	106	2.7	107	3.0	102	2.1
Expo AR1	10	106	3.7	103	3.2	101	3.0	102	3.4	100	3.9	102	2.7
Rely AR37	4	94	5.8	102	5.0	101	4.6	98	5.3	111	6.0	102	4.2
Expo AR37	4	104	5.8	98	5.0	100	4.6	101	5.3	103	6.0	101	4.2
Base AR1	3	106	6.7	102	5.8	103	5.4	99	6.2	97	7.0	101	4.8
AberMagic AR1	4	81	5.7	95	4.9	104	4.6	106	5.3	99	6.0	101	4.1
Excess AR1	3	98	6.7	105	5.8	99	5.4	103	6.2	96	7.0	100	4.8
Samson AR37	6	100	4.7	103	4.1	99	3.8	94	4.3	102	4.9	99	3.4
Ohau AR37	4	99	5.8	104	5.0	99	4.6	96	5.3	94	6.0	98	4.2
Rohan NEA2	**5**	**100**	**5.2**	**92**	**4.5**	**96**	**4.2**	**95**	**4.8**	**101**	**5.4**	**97**	**3.8**
Bronte AR1	4	103	5.8	97	5.0	98	4.7	97	5.4	91	6.1	97	4.2
Samson SE	17	95	3.2	100	2.7	96	2.5	93	2.9	96	3.3	96	2.3
Stellar AR1	8	80	4.2	101	3.6	96	3.3	94	3.8	90	4.3	94	3.0
Nui SE	27	91	2.4	100	2.1	95	1.9	89	2.2	91	2.5	93	1.7
Pacific SE	6	90	5.1	100	4.4	96	4.1	88	4.7	91	5.4	93	3.7
AberGreen WE	3	59	6.7	85	5.8	100	5.4	90	6.2	79	7.0	87	4.8
AberMagic WE	6	58	4.9	82	4.2	99	3.9	85	4.4	82	5.0	85	3.5
Uncertified LP	6	85	4.8	94	4.1	89	3.8	79	4.4	74	5.0	84	3.4
Mean (kg DM/ha)	**81**	**1091**		**2053**		**3565**		**3922**		**2742**		**13372**	

NFVT Summary 1991 – 2016 (December 2016).

LSI (Least Significant Interval) - If two means differ by more than the sum of their LSI, they are significantly different at the 5% level.

Endophyte

Trojan contains *NEA2* endophyte, a mixture of different endophyte strains providing:

- Good control of adult black beetle (equal to *AR37*) and Argentine stem weevil.
- Very good control of pasture mealy bug (provisional rating).
- Moderate control of root aphid.

Feed quality

Trojan is late heading (+16 days) with a low level of aftermath heading, giving it better feed quality in late spring and summer.

Persistence

The persistence of *Trojan* has been excellent in trials.

Trojan persisted well in the Waikato, and recovered well after the severe 2007-08 summer drought. It also showed excellent persistence after five and a half years in the tough dryland Canterbury conditions at Mt. Possession, under average soil fertility and normal set stocking management with sheep.

Rust & plant pulling

Trojan has good resistance to rust, and very good resistance to plant pulling

Fine leaved

Trojan is medium-fine leaved and densely tillered. It is intermediate in type between *Alto* (fine leaved) and the more upright medium leaved *Arrow*.

Species classification

Trojan was bred as a perennial ryegrass and performs as one. It has a low level of tip awns (hairs) on its seed so under the seed certification regulations this means it is classified as *Lolium boucheanum*. In terms of pasture performance it is a perennial ryegrass.

Sowing *Trojan*

Dairy		**kg/ha**
Top performing palatable dairy pasture.	*Trojan* perennial ryegrass	18-22
	Kotare white clover	2
	Weka white clover	2
	Total	22-26
Sheep, Beef, Deer		**kg/ha**
Top performing, palatable pasture.	*Trojan* perennial ryegrass	16-20
	Weka white clover	2
	Apex white clover	2
	Safin cocksfoot	2-3
	Total	22-27

ROHAN SPREADING PERENNIAL RYEGRASS

Endophyte	*NEA2, Low*
Stock Type	Sheep, Beef, Deer

Rohan spreading perennial ryegrass *(SPR)* was specifically bred to give sheep and beef farmers persistent, easy-care pasture. It is a diploid with a unique spreading ability, very fine leaves and a dense habit. It has good palatability, is late flowering and comes with *NEA2* endophyte for good animal performance.

Spreading habit

Rohan SPR has a spreading characteristic which provides two key advantages. First, it helps *Rohan SPR* fill bare areas in a pasture, that may otherwise be occupied by weeds as shown in the photo below. This means *Rohan SPR* competes against weed ingression.

Second, *Rohan SPR's* spreading habit helps pastures recover from adverse climatic events, particularly extended dry periods, because it spreads to fill space where ryegrass tillers may have died.

Rohan SPR is not indestructible. Like all ryegrasses it will perform best under reasonable management and soil fertility. But its spreading habit improves its persistence compared to other cultivars.

Sheep & beef system fit

Key with any pasture is matching a cultivar to the requirements of the particular situation. So where does *Rohan SPR* fit? Sheep and beef farmers often look for different pasture types across their properties, based on persistence.

Pasture type	Finishing pasture	High yield, persistent pasture	Persistence key requirement	Toughest, non-ryegrass situations
	Increasing persistence →			
Example	*Shogun Viscount*	*Trojan*	*Rohan SPR*	*Bareno Safin*
Description	High performance, palatable tetraploid ryegrasses are best suited for specialist finishing pastures.	*Trojan* provides an excellent balance of high DM yield and very good persistence, that will suit many situations.	*Rohan SPR* takes things a step further, as a very persistent ryegrass suited to tougher conditions.	Some situations are just too tough or dry for ryegrass. This is where *Bareno* pasture brome and *Safin* cocksfoot suit.

High yield in dry

Under ideal conditions *Rohan SPR* does not have the same yield potential as cultivars such as Trojan, producing about 10% less. But under tough, dry conditions Rohan will likely persist and yield more over the life of a pasture.

'Easy care' pasture

Under semi-intensive to semi-extensive farm systems it is not easy to maintain pasture quality in late spring. Late heading cultivars help, but *Rohan SPR* is more than this, and in on-farm trials is showing a 0.7 higher ME than some other cultivars in November and December.

A continual comment from farmers with *Rohan SPR* is that it 'always looks good'. It stays greener and leafier and is often preferentially grazed.

Persistence

Rohan SPR has consistently shown excellent persistence across our testing programme. The results of two trials below show its performance in areas with ryegrass persistence issues, on farms with known persistence problems.

2009-13 Okato persistence trial*

Entry	Ryegrass density after 4 years (4 Jul 13)*	
Alto AR37	6.8 a	Top ('a') statistical group
Trojan NEA2	6.7 a	
Commando AR37	6.7 a	
Rohan NEA	**6.6 a**	
Alto AR1	5.8 ab	
One50 AR1	5.3 bc	
Extreme AR37	5.2 bc	
Ultra AR1	4.4 c	
Commando AR1	3.2 d	
Alto LE	3.0 df	
Nui	1.6 e	
Trial mean	5.7	
LSD (5%)	1.2	

*Okato trial sown 31 March 2009. Ryegrass assessment scored visually on 1-9 basis, where 9=90%+ ryegrass cover. LSD (5%) lettering is given, and cultivars with same significance letter (e.g. 'a') are not significantly different.

In 2009 Rohan SPR was sown with NEA endophyte, one of the endophytes in the NEA2 mix. Performance of Rohan NEA2 and NEA wold be very similar. SE = Standard endophyte.

2009-13 Scargill persistence trial**

Entry	Ryegrass density after 4 years (18 Jul 13)*	
Rohan NEA	**62 a**	Top ('a') statistical group
Rohan SE	**60 ab**	
Kamo AR37	53 ac	
Samson AR37	53 ac	
Alto AR1	52 ac	
One50 AR1	51 ac	
Alto AR37	50 bc	
Ultra AR1	50 bc	
Samson AR1	49 bc	
Pacific SE	49 c	
Extreme AR37	47 c	
Hillary AR1	46 c	
Alto LE	34 d	
Nui	21 e	
Trial mean	50	
LSD (5%)	11.2	

**Scargill trial sown 9 March 2009. Ryegrass assessment taken by point analysis. LSD (5%) lettering is given, and cultivars with same significance letter (e.g. 'a') are not significantly different.

NEA2 & animal health

Rohan SPR with *NEA2* endophyte provides very low staggers risk pasture for sheep and staggers free pasture for cattle. In the 12 years we have sold *NEA2*, no ryegrass staggers have been seen in sheep or cattle on commercial farms. A low level staggers have been only seen once on a deer farm, in optimal staggers conditions (first short regrowth after a drought; grazed by elk which are particularly susceptible).

Sowing *Rohan*

Sheep, Beef, Deer		kg/ha
Top performing, palatable pasture.	*Rohan* perennial ryegrass	16-20
	Weka white clover	2
	Apex white clover	2
	Safin cocksfoot	2-3
	Total	22-27

NEW!

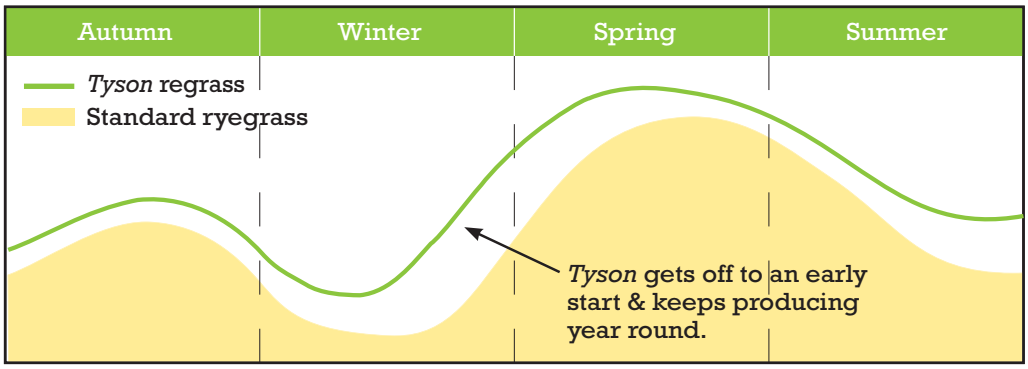
TYSON PERENNIAL RYEGRASS

Endophyte	*AR1, Low*
Stock Type	Sheep, Beef

Tyson is NZ's earliest heading (-7 days) perennial ryegrass, with tremendous early spring growth and excellent overall yield. This makes it an ideal fit for sheep and beef systems, where additional feed in early spring is critical through lambing and calving.

Seasonal growth

Tyson has excellent total DM yield, but it's in early spring that it really shines with 18% more yield than other perennial ryegrasses.



Sheep and beef system fit

Tyson provides exceptional early spring growth, which can be very valuable, not least because it allows more lambs to be finished off mum. This has always been a key goal for sheep and beef farmers as:

- Early lamb drafts usually fetch higher price schedules.
- The weaning check is avoided (and with it up to 2 weeks lost lamb LWG).
- Extra feed is freed up for other stock.

Grow more when you can.

Tyson is particularly suited to dryland farm systems that need to maximise animal growth before the possible arrival of summer dry conditions.

Managing *Tyson* to capture benefit

While *Tyson* has the genetic potential to grow outstandingly in early spring, the second part to farmers capturing this advantage is the right management. Like any pasture it should be set stocked at a minimum cover of 1500 kg DM/ha (or 4 cm) through lambing. Otherwise it won't have the leaves to capture enough sunlight to grow to its genetic potential, which is the science behind the saying 'grass grows grass'.

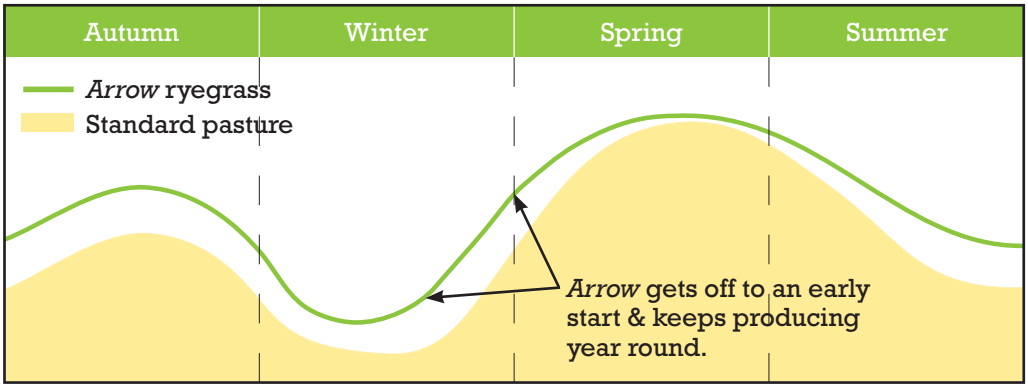
Suggested seed mix

Sheep, Beef, Deer		kg/ha
For systems requiring more early spring feed.	*Tyson* perennial ryegrass	16-20
	Apex white clover	2
	Weka white clover	2
	Tuscan red clover	6
	Total	26-30

ARROW PERENNIAL RYEGRASS

Endophyte	*AR1, Low*
Stock Type	Dairy, Sheep, Beef, Deer

Arrow delivers high winter-early spring growth, while performing well in all seasons. It combines its early growth with a medium-late heading date (+7 days) for good spring feed quality.



Winter & early spring

Arrow's improved winter and early spring growth helps farmers to start their season earlier by offering more feed when it is essential. It is ideal for early calving or early lamb finishing systems.

Feed quality

Arrow combines a medium-late heading date (+7 days) with high ME (averaging 12.6 in well managed trials).

Clover compatibility

Arrow has a medium erect growth habit allowing good clover compatibility, which gives improved feed quality and greater animal production.

Persistence

Arrow has shown excellent persistence in trials, with good rust resistance.

Sowing *Arrow*

Arrow can be sown in combination with *Alto* for a high yielding pasture in all seasons.

Dairy		kg/ha
For high yield especially at calving	*Arrow* perennial ryegrass	18-22
	Kotare white clover	2
	Weka white clover	2
	Total	22-26
Sheep, Beef, Deer		**kg/ha**
For systems requiring more winter and early spring feed	*Arrow* perennial ryegrass	16-20
	Weka white clover	2
	Apex white clover	2
	Tuscan red clover	6
	Total	26-30

ALTO PERENNIAL RYEGRASS

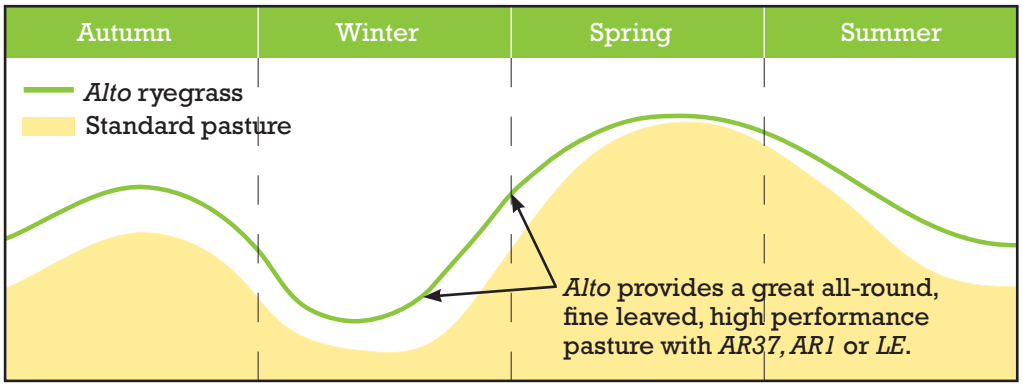
Endophyte *AR37, AR1, Low*

Stock Type Dairy, Sheep, Beef, Deer

Alto is a persistent, late heading perennial ryegrass suited to all farming systems. It has excellent year round growth and persistence.

High yield

Alto delivers high total yield with excellent year round production.



Robust & persistent

With fine leaves and dense tillers, *Alto* handles treading and set-stocking well. Finer leaved cultivars on wet soils give better soil protection against treading. *Alto* has high resistance to rust and plant pulling.

Endophyte

Alto is available with *AR37* endophyte, to give high levels of insect control where needed. *Alto* is also available with *AR1* and *Low* endophyte.

Sowing *Alto*

Dairy		kg/ha
For high performance, persistent pasture with easy management	*Alto* perennial ryegrass	18-22
	Kotare white clover	2
	Weka white clover	2
	Total	22-26

Sheep, Beef, Deer		kg/ha
For persistent pasture with high carrying capacity and stock performance	*Alto* perennial ryegrass	16-20
	Weka white clover	2
	Apex white clover	2
	Safin cocksfoot	2-3
	Total	22-27

* *AR37* endophyte is not recommended for deer and horses as it can cause staggers.

NEW!

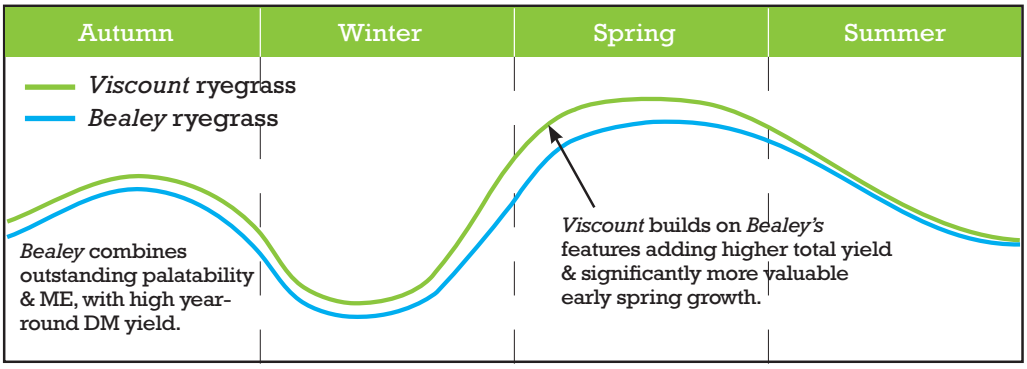
VISCOUNT PERENNIAL RYEGRASS

Endophyte	*NEA, Low*
Stock Type	Dairy, Sheep, Beef

Viscount has been a standout tetraploid perennial ryegrass in Agriseeds plant breeding programme, with significantly more early spring growth and better total yield than *Bealey*. Add to this improved rust resistance and better summer feed quality too.

Seasonal growth

Viscount has a flowering date of +19 days (6 days earlier than *Bealey*). The biggest gain with *Viscount* is in its early spring growth, coinciding with calving or lambing when feed is most valuable. For dairy farmers extra grass at this time of year has been valued at an average of $0.46/kgDM in the DairyNZ Forage Value Index.



Feed quality

Viscount has reduced aftermath heading and improved rust tolerance. It is more upright for ease of harvest, allowing good clover content and boosting animal performance.

Animal performance

In addition to providing high quality feed, *Viscount* comes with *NEA* endophyte, similar to that in *Bealey* and *Shogun*. This plays an important role in providing superior animal performance with a very low risk of animal health problems, such as ryegrass staggers. As a matter of caution we currently do not recommend *Viscount NEA* be used for horses or deer.

Suggested seed mix

Dairy		kg/ha
For high feed quality and high yields	*Viscount* perennial ryegrass*	30
	Kotare white clover	2
	Weka white clover	2
	Total	34

Sheep, Beef		kg/ha
For high feed value pasture ideal for finishing	*Viscount* perennial ryegrass*	30
	Weka white clover	2
	Apex white clover	2
	Tuscan red clover	4
	Total	38

Dairy, Sheep, Beef		kg/ha
For high palatability pasture with extra robustness.	*Viscount* perennial ryegrass*	15
	Trojan perennial ryegrass	10
	Kotare white clover	2
	Weka white clover	2
	Total	29

* Tetraploids are sown at a higher rate than diploids, because of their larger seed.

MIXING TETRAPLOID & DIPLOID RYEGRASS

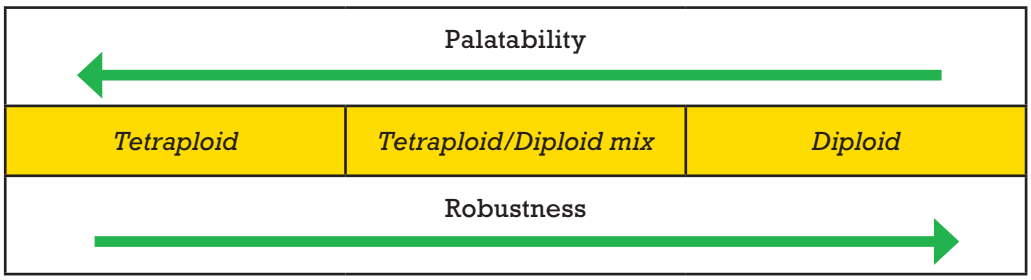
Summary

- Mixing *Viscount* with *Trojan* perennial ryegrass offers potential to produce higher animal performance with easier pasture management, than traditional pasture.
- This tetraploid/diploid mix fits a range of farm systems as it is much more persistent than a straight tetraploid pasture, because diploid plants protect the tetraploid.

Background

On many farms the tetraploid/diploid perennial ryegrass mix is now the norm striking a near-ideal balance between pasture palatability and robustness, growing more energy (MJ ME/ha) and being much easier to manage than straight diploid perennial ryegrass.

Tetraploid perennial ryegrass, like *Viscount* and *Bealey,* has excellent DM yield and year-round growth, but being so palatable, many farmers have struggled to avoid over grazing and achieve the persistence they want. Adding a denser, finer diploid ryegrass to the mix changes the dynamics.



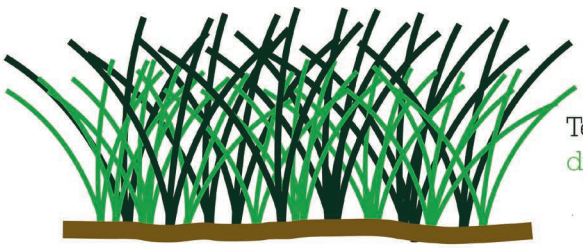
The tetraploid/diploid mix is an average of the two types, denser and more robust than a straight tetraploid, and much more palatable than a straight diploid.

Palatability & stems

The palatability of the pasture is due to *Viscount* or *Bealey's* soft stems, which give improved animal performance and hold quality even at high covers (e.g. 3500-3600 kg DM/ha) making them very easy to graze.

While straight tetraploid pastures are often overgrazed, reducing persistence, in the mix they protected by the denser, finer, diploid plants.

Diploid protects from overgrazing



Pre-grazing
Tetraploid plants (dark green) & diploid (light green) are mixed up.

Post-grazing
Tougher diploid stems help protect tetraploid plants from over-grazing.

Sowing rate

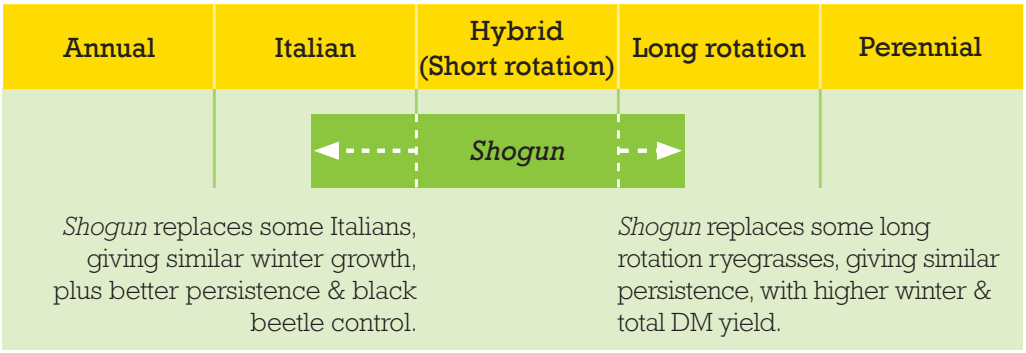
Agriseeds has tested different tetraploid/diploid perennial ryegrass mixes and recommends sowing half the normal rate of each cultivar, e.g.15 kg/ha of tetraploid *Viscount* (half of 30 kg) plus 10 kg/ha of diploid *Trojan* (half 20 kg).

SHOGUN HYBRID RYEGRASS

Endophyte	*NEA, Low*
Stock Type	Dairy, Sheep, Beef

Shogun has created a new position in the market, taking hybrid ryegrass to a new level. Winter growth is equal to many Italian ryegrasses, and *Shogun* outyields many perennials during summer and autumn. Persistence is excellent for a hybrid, and it has its own endophyte for insect protection.

Shogun redefines ryegrass categories



High yield

In trials *Shogun* has significantly out-yielded other hybrid cultivars. As well as excellent cool season growth, it has exceptional summer and autumn yield.

Hybrid Ryegrass: All New Zealand trials (yields by season as percentage of Mean and LSI)

Entry	Number of Trials	Winter		Early Spring		Late Spring		Summer		Autumn		Total	
		% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI
Shogun NEA	6	126	9.1	111	5.7	108	4.3	117	4.9	114	8.4	113	4.9
Ohau AR37	5	97	11.2	102	7.0	100	5.3	97	6.0	109	10.3	101	6.0
Ohau AR1	7	92	9.1	100	5.7	102	4.3	97	4.9	96	8.4	98	4.9
Jeta AR1	4	88	12.8	97	8.0	103	6.1	99	6.8	93	11.8	98	6.9
Asset AR37	4	98	12.8	91	8.0	88	6.1	90	6.8	88	11.8	90	6.9
Mean (kg DM/ha)	8	860		1936		3247		2548		1856		10446	

NFVT Summary 1991 – 2016 (December 2016).

LSI (Least Significant Interval) - If two means differ by more than the sum of their LSI, they are significantly different at the 5% level.

Fast establishment

Shogun's fast establishment is comparable to that of an Italian ryegrass. This allows paddocks resown with *Shogun* to be brought back into the grazing rotation more quickly than those renewed with perennial or other hybrid ryegrasses.

Black beetle control

Shogun with *NEA* endophyte has good control of black beetle, equal to *Bealey* (3 stars).

2-5 year option

Under good grazing management *Shogun* is a 2-3 year option in summer dry areas, 3-5 years in summer moist. Persistence is aided by its *NEA* endophyte.

Feed quality

Shogun has excellent summer quality, with a very late heading date (+26 days) and little aftermath heading (AMH) or seeding through the summer.

Palatability

When sheep or cattle like a pasture, they eat more of it, and liveweight gains (LWG) increase accordingly. *Shogun* has shown itself to be a very palatable tetraploid hybrid ryegrass that will deliver high animal intakes and growth rates.

Persistence

For a hybrid ryegrass *Shogun* has shown excellent persistence, demonstrated in the ryegrass ground cover results below. Part of the reason is its natural *NEA* endophyte, which limits insect damage.

2008 Cambridge, Waikato hybrid ryegrass persistence after 3.75 years*

Entry	Ryegrass ground cover 4 January 2012
*Bealey NEA2***	63 a
Shogun NEA	**55 b**
Harper AR1	39 c
Delish AR1	36 c
Maverick GII WE	23 d
*Feast II****	20 e
Trial mean	39
LSD (5%)	2.0

* Point analysis of ryegrass ground cover taken 4 January 2012, 3.75 years after sowing on 8 April 2008. Cultivars with the same letters are not significantly different. ** *Bealey* is a perennial ryegrass. ****Feast II* is an Italian ryegrass cultivar *Without* endophyte.

Sowing *Shogun*

Dairy		kg/ha
High performance 3-5 year pasture	*Shogun* hybrid ryegrass	30
	Kotare white clover	2
	Weka white clover	2
	Total	34
Undersowing as fast establishing 2-3 year pasture (with black beetle control)	*Shogun* hybrid ryegrass	13-20*
	Total	13-20*
Sheep, Beef		**kg/ha**
High performance finishing pasture	*Shogun* hybrid ryegrass	30
	Weka white clover	2
	Apex white clover	2
	Tuscan red clover (coated)	6
	Total	40

*Sowing rate depends on how thin pasture to be undersown is. Tetraploids are sown at a higher rate than diploids, because of their larger seed.

Extreme palatability differences in animal testing trials in spring, when there were no fences between plots set stocked with lambing ewes. Shogun NEA is front left and back right; Alto SE ryegrass is front right and back left.

TABU ITALIAN RYEGRASS

Stock Type Dairy, Sheep, Beef, Deer

Tabu is nutritious, has explosive establishment speed, exceptional winter and early spring growth and produces high year round growth.

Multi-use

Tabu is suitable as a winter crop, a 2-3 year pasture in areas with mild summers, or for undersowing into run out pasture to boost winter-spring growth. In dense pastures spraying before drilling is recommended.

High DM yield

Tabu is in the top ranking for Italian ryegrass in both the National Forage Variety Trials (NFVT) and DairyNZ Forage Value Index (FVI). It is only outyielded by *Shogun NEA* hybrid ryegrass.

Italian Ryegrass: All New Zealand trials (yields by season as a percentage of Mean and LSI)

Entry	Number of Trials	Establishment Autumn		Winter		Early Spring		Late Spring		Summer		Total	
		% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI
Shogun NEA	9	96	5.4	99	4.6	106	3.8	114	3.9	128	6.8	112	3.3
Tabu	44	103	2.6	104	2.2	103	1.8	102	1.9	105	3.3	104	1.6
Asset AR37	16	101	4.1	102	3.5	96	2.9	98	2.9	111	5.2	102	2.5
Supercruise	5	111	7.5	106	6.4	96	5.3	103	5.4	101	9.5	102	4.6
Lush AR37	13	107	4.8	104	4.1	99	3.4	95	3.5	109	6.1	102	2.9
Jackpot	6	100	6.9	102	5.9	102	4.8	102	5.0	98	8.7	101	4.2
Blade	6	108	6.3	102	5.4	101	4.4	99	4.6	94	8.0	100	3.9
Feast II	31	99	3.0	100	2.6	99	2.1	99	2.2	100	3.8	100	1.8
Sonik	9	97	5.6	100	4.8	102	3.9	98	4.0	94	7.1	98	3.4
Asset	5	94	7.3	97	6.3	97	5.2	99	5.3	100	9.3	98	4.5
Mona	7	98	6.4	97	5.5	101	4.5	101	4.6	92	8.2	98	3.9
Moata	24	85	3.5	89	3.0	97	2.5	90	2.5	67	4.4	85	2.1
Mean (kg DM/ha)	**78**	**1692**		**1751**		**2911**		**4202**		**3811**		**14367**	

NFVT Summary 1991 – 2016 (December 2016). Cultivars without endophyte unless stated.
LSI (Least Significant Interval) - If two means differ by more than the sum of their LSI, they are significantly different at the 5% level

High animal performance

Tabu provides high levels of animal performance. In winter lamb finishing trials at AgResearch in Hawke's Bay, lambs on *Tabu* grew at 316 g/day, with a stocking rate of 48 lambs/ha. On a per hectare basis, *Tabu* averaged 15.2 kg liveweight gain/day.

Sowing *Tabu*

Dairy, Sheep, Beef, Deer		kg/ha
Winter crop	*Tabu* Italian ryegrass	18-22
Dairy, Sheep, Beef, Deer		**kg/ha**
For 2-3 year pasture option	*Tabu* Italian ryegrass	18-22
	Tuscan red clover (coated)	6
	Kotare or *Apex* white clover	2
	Weka white clover	2
	Total	28-32
Dairy, Sheep, Beef, Deer		**kg/ha**
For undersowing	*Tabu* Italian ryegrass	10-15*
	Kotare or *Apex* white clover	1.5
	Weka white clover	1.5
	Total	13-18

*Sowing rate varies depending on how thin pasture to be undersown is.

Tabu Italian Ryegrass is owned and marketed by Agriseeds
Tabu Italian Ryegrass is protected under the NZ Plant Variety Rights Act 1987

HOGAN ANNUAL RYEGRASS

Stock Type Dairy, Sheep, Beef, Deer

Hogan sets a new standard for annual ryegrass. It produces 1 t DM/ha more than old, widely sown cultivars *Moata* and *Tama*, extra growth which is worth up to $380/ha.

High value

Hogan establishes rapidly and produces high DM yield, out-growing 30+ year old cultivars *Moata* and *Tama* by 1 t DM/ha. *Hogan's* yield advantage is valued by the 2016 DairyNZ Forage Value Index (FVI) at $380/ha extra profit. This represents a 10 fold return on investment for the extra $35-$45/ha it costs to sow *Hogan* over *Moata* or *Tama*.

Fast establishment

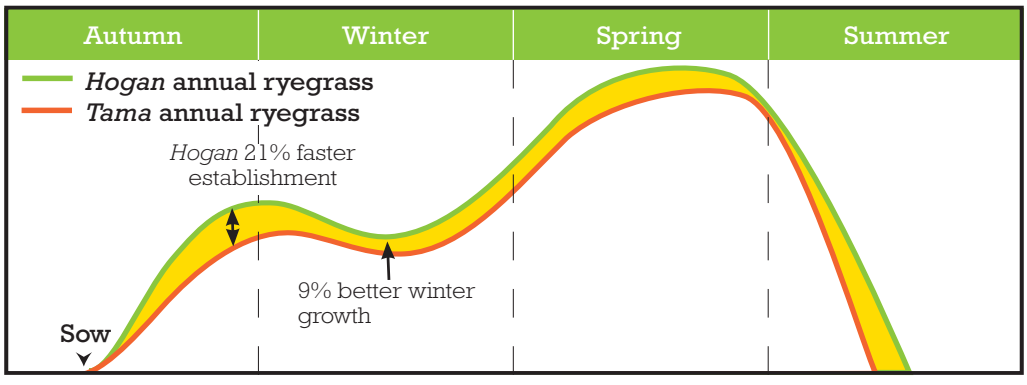
Hogan is a tetraploid ryegrass bred for rapid establishment (23% faster than *Moata* and *Tama*) to provide fast feed in autumn, critical for farm systems particularly following dry summers.

Hogan is in the top ranking for annual ryegrass in both the National Forage Variety Trials (NFVT) and DairyNZ Forage Value Index (FVI).

Annual Ryegrass: All New Zealand trials (yields by season as percentage of Mean)

Entry	Number of Trials	Establishment Autumn		Winter		Early Spring		Late Spring		Total	
		% of Mean	LSI	% of Mean	LSI	% of Mean	LSI	% of Mean	LSI		
Hogan	**7**	**108**	**6.6**	**106**	**5.5**	**102**	**4.6**	**108**	**5.2**	**106**	**3.7**
Zoom	5	100	7.8	103	6.5	102	5.4	106	6.2	104	4.3
Winter Star II	6	102	7.0	103	5.9	105	4.9	103	5.6	103	3.9
Tama	17	87	4.1	97	3.4	96	2.8	94	3.2	94	2.3
Progrow	9	102	5.9	91	5.0	95	4.1	89	4.7	93	3.3
Mean (kg DM/ha)	**78**	**1644**		**1735**		**2843**		**3703**		**9925**	
Benefit of *Hogan* over *Tama*		**21%**		**9%**		**6%**		**14%**		**12%**	

NFVT Summary 1991 – 2016 (December 2016).
LSI (Least Significant Interval) - If two means differ by more than the sum of their LSI, they are significantly different at the 5% level.



Sowing rate

Hogan annual ryegrass can be sown alone, or mixed with oats or turnips as a winter crop.

Dairy, Sheep, Beef, Deer		kg/ha
For winter crop	*Hogan* annual ryegrass*	30
	Total	30

* Tetraploids are sown at a higher rate than diploids, because of their larger seed.

Hogan annual ryegrass is owned and marketed by Agriseeds

BARENO BROME

Stock Type: Sheep, Beef, Deer

Bareno is persistent, high yielding and very palatable. Paddocks of *Bareno* are assets in a dryland farm system as they persist much better than perennial ryegrass, tolerating dry conditions and hard grazing.

Easy management

Bareno is quite different to other bromes, and is more flexible in its management. It is more persistent than prairie grass, and can tolerate both rotational grazing and set stocking. It should be noted that the persistence of *Bareno* may decline north of Taupo, therefore it is not as suited to northern North Island areas.

Highly palatable

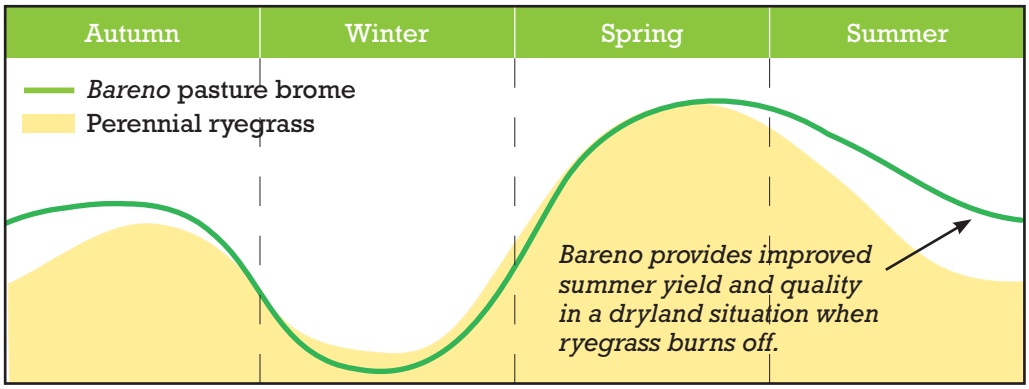
A strong feature of *Bareno* is its palatability through all seasons:

- It remains palatable, even when seed heads are present, and stays greener and leafier than ryegrass in summer.
- *Bareno* can support a high legume content (40% sub and white clover has been measured in spring).

High yield

On Lincoln University's Silverwood Farm, a dryland breeding property in inland Canterbury, *Bareno* produced 12.5 t DM/ha/year, 9% more than new sowings of perennial ryegrass (11.5 t DM/ha), with excellent spring, summer and autumn growth.

Seasonal growth



Sow early

Brome grasses are slower to establish than ryegrass, so make sure to:

- Sow when warm - soil temperature 12°C+.
- Prepare a good seedbed, preferably using a summer fallow (see page 37 for more).

Sowing *Bareno*

Sheep, Beef, Deer		kg/ha
Persistent dryland pasture	*Bareno* pasture brome	25-32*
	Can be added: *Safin* cocksfoot Sub clover *Apex* white clover *Tuscan* red clover	Inclusion of species depends on situation. Seek advice if unsure.

**Bareno* sowing rate high because brome grasses have large seeds.

BARENO MANAGEMENT

Growing *Bareno*

Brome grasses are slower to establish than ryegrass. If you spend a little extra time on correct sowing and early management, you'll be rewarded with good results.

Preparation

A summer fallow prior to late summer/early autumn sowing is the recommended best practice to establish *Bareno* pasture in dry areas. This allows moisture to be carried from the spring through to sowing, ensuring good results even in a dry autumn. Prepare a run-out paddock by spraying out or cultivating in spring (Oct/Nov) before pastures dry out. If there is a further weed strike, spray or cultivate lightly again before drilling.

If cultivating, prepare a fine, well compacted, weed-free seed bed to allow correct seed depth and soil moisture retention for fast germination. Direct drilling has proven to be very successful. This fits well with summer fallow management.

Timing

Bareno is best sown when soil temperatures are above 12°C, during late summer or early autumn. This gives plants time to adequately establish before winter. Establishment is much slower in cool conditions.

Drilling

Sow seed shallow, at 10-20 mm. Take care when drilling - the seed may not flow well through some drills.

Managing *Bareno*

Bareno should not be overgrazed in its first year to allow plants to fully establish. *Bareno* can set seed quickly, however seed heads are much more palatable than those of other pasture grasses.

In dry summer conditions, *Bareno* pastures should not be bared out (although they will tolerate this better than ryegrass). Post-grazing covers of 3-4 cm will ensure persistence and regrowth through summer. Remember the plant's reserves in grasses are above the ground (not in the roots).

Bareno pasture brome is a persistent, easy to manage pasture, seen here at Mt. Possession in Canterbury.

SAFIN SUPERFINE COCKSFOOT

Safin is an innovative super-fine leaved cocksfoot which will change farmers' perceptions about this type of grass. Traditional cocksfoot gained a bad reputation for becoming clumpy and unpalatable, eventually dominating swards. *Safin* sets a new standard, looking almost as fine as ryegrass. This is an exciting pasture development for dryland farmers in particular.

Early growth (with high total DM)

A key feature of *Safin* is its increased production in winter and early spring. DM growth is critical through lambing or calving for dryland farming systems, to finish stock prior to potential summer dry conditions. *Safin* has an advantage through this period, as shown below, and in the paddock it is noticeably faster to get away in spring.

Over the whole year total DM production of *Safin* is very good.

Cocksfoot yields in Canterbury*

Entry	Winter	Early spring	Late spring	Summer	Autumn	Total
Safin	**123 a**	**124 a**	**104 a**	**105 a**	**119 a**	**110 a**
Ella	90 b	101 b	100 a	114 a	111 a	106 a
Wana	82 b	117 ab	96 a	106 a	113 a	104 a
Vision	96 ab	108 ab	106 a	98 a	95 a	102 a
Kara	109 ab	107 ab	95 a	105 a	98 a	102 a
LSD (5%)	32	22	10	17	41	13

* Combined analysis of 2 trials run on Agriseeds Research farm, Courtenay, between 2004 and 2009.

Tiller density

Safin is a 'superfine' cocksfoot, which in fact looks very similar to ryegrass. It is finer and denser than other cocksfoots on the market, with significantly more tillers as shown in the table below. On its release *Ella* was considered fine leaved, but *Safin* sets a new benchmark, with 41% more tillers than *Ella.*

Cocksfoot tiller density in Canterbury dryland grazing trial

Entry	Tillers/m²	Relative to *Ella* at 100%
Safin	**431 a**	**141 %**
Ella	305 b	100 %
Tekapo	303 b	91 %
Greenly	270 b	81 %
Vision	270 b	81 %
Kara	245 b	73 %
Trial mean	334	95
LSD (5%)	70	23

SAFIN MANAGEMENT

Pest control

Once established *Safin* is tolerant to grass grub and Argentine stem weevil (ASW) attack. However, seedlings are susceptible at sowing and *AGRICOTE Grass* seed treatment is recommended where these pests are a risk.

Cocksfoot has no endophyte and is therefore safe to graze low over summer.

Managing *Safin*

Cocksfoot is slower to establish than ryegrass. In a ryegrass-based pasture little cocksfoot is often seen until the first summer after it has been sown, after which the content of cocksfoot will increase, especially under dry conditions.

If sowing a specialist cocksfoot-based pasture, sow early while soil temperatures are above 12°C. A summer fallow, to conserve moisture prior to a late summer/early autumn sowing, is recommended in (potentially) autumn dry conditions.

Cocksfoot is lower in feed value and palatability than ryegrass if it becomes long or rank, so it should be kept short and leafy through spring. Graze cocksfoot when it has 3-4 leaves/tiller to maintain good feed value. (This is the same concept as for ryegrass at 2.5 -3 leaves/tiller) The feed value of cocksfoot declines if it grows to 5 leaves/tiller, as older leaves die reducing feed value. In grazing trials, animal performance is reasonably good where cocksfoot has been kept leafy. Maintaining good legume content in cocksfoot pastures will also improve animal performance.

Cocksfoot is more tolerant of low-moderate soil fertility than perennial ryegrass. However, it is very responsive to nitrogen fertiliser, generally at higher response rates than ryegrass, and this can be a very useful tool to promote growth, as well as improving feed value and protein content.

Sowing *Safin*

Sheep, Beef, Deer		kg/ha
As component of pasture mix	*Safin* cocksfoot	3
For cocksfoot-based pasture	*Safin* Cocksfoot	8-10
	Sub clover	6-8
	Apex white clover	2
	Weka white clover	2
	Total	18-22

KOTARE WHITE CLOVER

Stock Type: Dairy, Beef

Kotare is a large leaved, very high yielding white clover for dairy and beef grazing.

High yield

Kotare shows very high total yield with excellent warm season yielding ability, the key growth period for white clover. Increased clover through summer also increases milksolids production, due to its comparatively high feed value through this period.

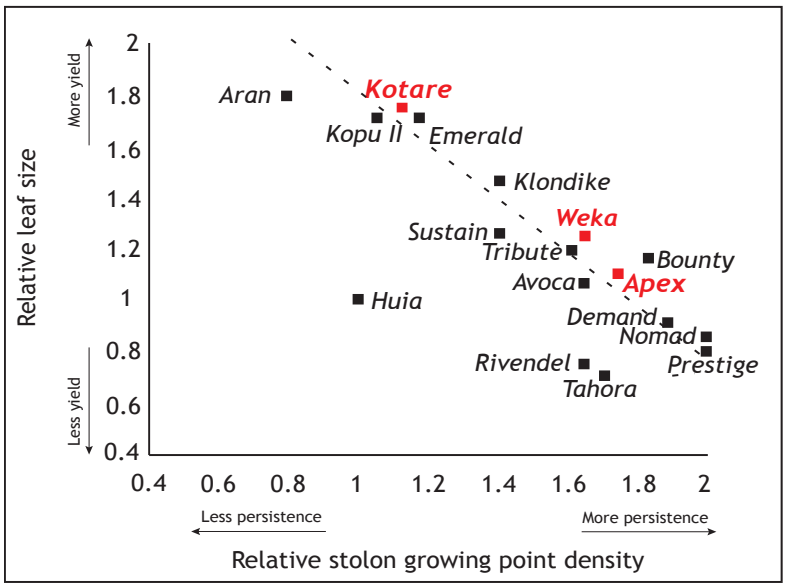
Large leaved white clover and ryegrass total DM yield*, trial mean = 100%

Cultivar	Autumn	Winter	Early Spring	Late Spring	Summer	Total
Kopu II	114 a	115 a	111 a	108 a	110 a	110 a
Kotare	**105 b**	**106 b**	**107 a**	**111 a**	**108 ab**	**107 ab**
Mainstay	111 ab	101 b	100 b	99 b	102 b	103 b
Trial mean (kgDM/ha)	1625	721	970	1659	3101	8509

*Trial sown in 2013 with 4kg of clover and 20kg/ha *Trojan* NEA2 ryegrass, Courtenay (Canterbury).

White clover leaf size versus stolon density

The stolon growing point density of *Kotare* is high for a large leaved clover. More growing points give clovers better recovery from damage caused by insects or pugging. When damaged, clover can regenerate from each growing point.



* Base data for graph produced by AgResearch. *Kotare* and *Weka* positions estimated on six stolon growing point density and leaf size measurements by Agriseeds 2005-08.

Sowing *Kotare*

Dairy & Beef		kg/ha
Productive, persistent clover combination	Perennial ryegrass	18-30
	Kotare white clover	2
	Weka white clover	2
	Total	22-34

WEKA WHITE CLOVER

Stock Type Dairy, Sheep, Beef, Deer

Weka is a medium-large leaved high yielding white clover suited to all grazing systems. It has a high stolon density, a strong spreading habit, and excellent tolerance to clover root weevil (CRW).

High yield

In trials *Weka* has shown very high total yield, with good growth in all seasons, particularly through autumn and winter.

Yield scores of medium-large leaved clovers 2003-08*

Cultivar	Autumn	Winter	Early spring	Late spring	Summer	Total
Weka	**6.1 a**	**5.2 a**	**5.8 a**	**6.0 a**	**5.8 a**	**5.8 a**
Tribute	5.6 ab	4.4 a	5.7 a	5.9 a	5.8 a	5.5 a
Sustain	4.6 b	4.5 a	4.8 b	5.2 b	5.2 a	5.0 b

*Combines yield scores over 4 trials in the Waikato 2004-08 & 2005-08, & Canterbury 2003-06 & 2005-08. Yield scored on 1-9 basis, where 9 = very high yield. Yields with same letter not significantly different at 5% LSD level.

Persistence

Weka has excellent persistence because of its high tolerance to CRW, dry conditions, pugging and hard grazing, and its strong spreading habit.

Yield scores under high levels of CRW attack show *Weka* is a very good choice for these conditions.

Yield of medium-large leaved clovers under CRW attack*

Cultivar	Yield under CRW attack
Weka	**5.5 a**
Tribute	4.9 b
Sustain	4.1 c

*Combines 5 yield scores over 2 Waikato trials in 2006 & 2007 in periods of high CRW damage. Yield scored 1-9, where 9 = very high yield. Yields with same letter not significantly different at 5% LSD level.

Sowing *Weka*

All systems		kg/ha
Productive, persistent clover combination	Perennial ryegrass	18-30
	Weka white clover	2
	Kotare or *Apex* white clover	2
	Total	22-34

Weka's strong spreading habit helps it persist.

APEX WHITE CLOVER

Stock Type: Sheep, Beef, Deer

Apex is a breakthrough in persistent high yielding clover, adapted to summer dry conditions, with good clover root weevil tolerance.

Medium leaf size

Apex has a medium leaf size, the same as *Huia*, but has significantly more stolon growing points, for improved drought and pest tolerance.

Good persistence

A key feature of *Apex* is its improved persistence. A four year trial under grazing in the Waikato showed *Apex* has excellent persistence into the fourth year, with the highest fourth year yields.

High yield

Apex has shown high yields in sheep grazing trials, particularly in the winter-spring and autumn periods.

Yield in three Manawatu sheep grazing trials (*Huia* = 100)*

Cultivar	Winter	Spring	Summer	Autumn
Apex	**156 a**	**139 a**	**108 a**	**127 a**
Huia	100 b	100 b	100 a	100 b
LSD (5%)	22	18	15	18

* Woodfield et al. NZ Grassland Association 63: 103-108

Spreading growth

Apex spreads strongly across bare ground, increasing legume content.

Sowing *Apex*

Sheep, Beef & Deer		kg/ha
For more clover in grazing systems	Perennial ryegrass	18-30
	Apex white clover	2
	Weka white clover	2
	Total	22-34

Apex White Clover is marketed by Agriseeds
Apex was bred under a cooperative programme with AgResearch Grasslands
Apex White Clover is protected under the NZ Plant Variety Rights Act 1987

TUSCAN RED CLOVER

Tuscan has high yield with improved persistence under grazing. It provides excellent quality feed during summer and autumn. It is an early flowering diploid cultivar with medium leaf size.

High yield

Tuscan shows excellent late spring and summer growth, and high total yield.

Red clover yield-mixed sward trials, Canterbury 2012-14*, trial mean = 100%

Cultivar	Autumn	Early spring	Late spring	Summer	Total
Tuscan	**90 a**	**92 b**	**111 a**	**122 a**	**109 a**
Sensation	100 a	100 a	100 b	100 b	100 ab
Rossi	91 a	98 a	100 b	92 b	97 b
LSD (5%)	18.7	6.3	8.3	17	9.6

*Fresh weight data from one trial run in Canterbury from 2012 - 2014. Cultivars with the same statistical significance letter are not significantly different at the LSD 5% level.

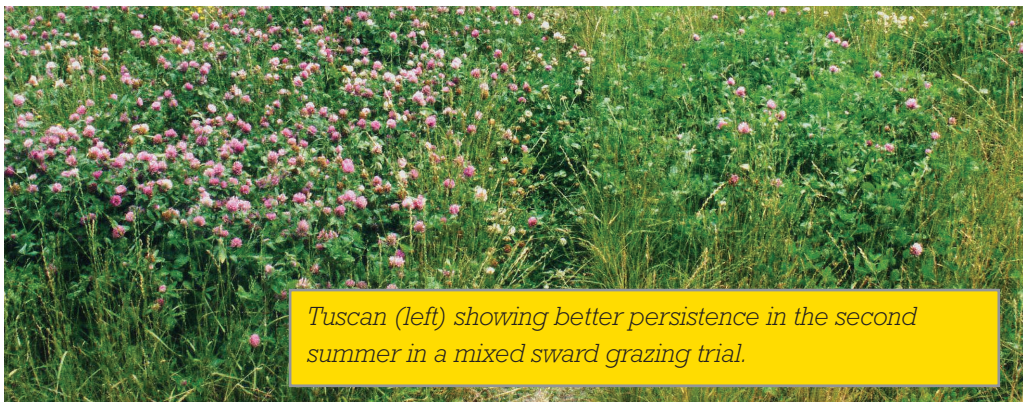
Good persistence

After two years under sheep grazing, plant count measurements showed *Tuscan* had improved persistence.

Agriseeds red clover density-mixed sward trial, Canterbury 2003-05*

Cultivar	Plants/m² (Feb 2005)
Tuscan	**17.1 a**
Sensation	10.0 b
Colenso	9.5 b
LSD (5%)	5.3

*Trial run under sheep grazing in Canterbury 2003-05.



Tuscan (left) showing better persistence in the second summer in a mixed sward grazing trial.

System fit

Tuscan is suitable for all farm types. Red clover persists best under less intensive stocking rates or a long grazing rotation over summer.

Phyto-oestrogen levels

Tuscan's oestrogen levels are medium. This means care needs to be taken to avoid grazing red clover with ewes or hoggets 3-6 weeks either side of mating.

Sowing *Tuscan*

Tuscan should be included in pasture mixes at a rate of 6 kg/ha of Agricote coated clover seed or 4 kg/ha bare seed.

501 CHICORY

Stock Type Dairy, Sheep, Beef, Deer

501 Chicory is best suited as a 6-8 month summer crop, with rapid establishment and excellent re-growth, to give very high DM yield and an extra grazing over some other cultivars. It also has an erect growth habit, which provides high utilisation, and a low crown to reduce *Sclerotinia.*

Rapid establishment

501 Chicory establishes very quickly, meaning less down time before the first grazing. In replicated trials and on-farm demonstration trials across a wide range of different soil types *501 Chicory* has stood out right from the start, particularly in challenging dry conditions.

Excellent DM yield

501 Chicory has shown very high DM yield in North Island trials conducted on four different soil types, over three separate seasons.

Chicory DM yield combined analysis 2011-2013

(Relative to trial mean = 100%)*

Entry	Establishment	Summer	Autumn	Total
501	**114 a**	**113 a**	**104 a**	**109 a**
501 + Tuscan	**98 b**	**110 a**	**106 a**	**106 ab**
Puna II	115 a	109 a	99 ab	103 ab
Chico	111 ab	108 a	93 b	102 b
Choice	103 ab	106 a	101 a	102 b
Trial Mean	1245	3458	2084	7859
LSD (5%)	18	9	10	7

*Results combined over two trials at Cambridge 2011-12, and Canterbury 2012-13.

Advantage of *501 + Tuscan*

The combination of *501 + Tuscan* performs well. Like *501, Tuscan* red clover has a deep taproot giving it a significant advantage in summer dry conditions. *Tuscan* grows well between the chicory plants filling gaps often otherwise taken up by weeds. *Tuscan* also fixes nitrogen reducing fertiliser requirements for the crop.

Note that in the mix *Tuscan* does not look as tall or 'flashy' as *501*. However, *Tuscan* has a much higher DM percentage than chicory, so provides more feed than you might think.

Reduced *Sclerotinia*

501 Chicory has been bred for a low crown position reducing susceptibility to treading damage and *Sclerotinia* fungus (or root rot) infection. However, it is recommended to avoid grazing chicory in wet conditions to reduce the chance of damage to plant crowns.

High ME

Both chicory and red clover are highly palatable to livestock and are both high in ME. During summer dry conditions, *501 Chicory* and *Tuscan* red clover will maintain an ME of around 12, whereas ryegrass pastures generally maintain an ME of 8.5-10.5. The high digestibility allows the rumen to process the crop more quickly making space for stock to eat additional DM. Chicory is able to take up important trace elements from deeper in the soil profile, helping keep stock healthy.

Management

Sow chicory into a firm, fine, weed-free seed bed where soil temperatures are consistently above 12°C in spring. Roll before and after sowing to help get a uniform germination. First grazing should occur when plants reach the seven leaf stage. Targets for grazing are:

- Pre-grazing targets: 3000 kg DM/ha or 25-35 cm height.
- Post-grazing residual target: 5 cm.

How many ha?

For dairy farms, sow 3 ha of *501 Chicory* per 100 cows to provide 3 kg DM of chicory/cow/day. Area to be sown can be calculated from the following table:

Chicory/cow to be fed	Area of chicory to sow	Daily area of chicory*
2 kg DM/day	2 ha/100 cows	0.1 ha/100 cows
3 kg DM/day	3 ha/100 cows	0.15 ha/100 cows
4 kg DM/day	4 ha/100 cows	0.2 ha/100 cows

*Assuming 21 day grazing rotation.

When to resow pasture

501 Chicory will look great going into autumn. In spite of this it is more important to get new pasture established early, rather than continue to graze chicory into late autumn.

Sowing *501 Chicory*

Use		kg/ha
For a chicory crop	*501 Chicory*	8-10
	Total	8-10
Chicory/red clover crop	*501 Chicory* *Tuscan* red clover	6-8 4
	Total	10-12

CALEDONIAN KALE

Stock Type: Dairy, Beef

Caledonian is a tall, high yielding kale with softer stems that provides excellent winter feed for cattle. Its higher stem quality increases animal performance and crop utilisation over older tall cultivars. It has good winter hardiness and, like all kales, has good club root tolerance.

High yield

In trials *Caledonian* has shown excellent yield for a high ME kale.

Total DM yield*

Cultivar	Mean = 100%	t DM/ha
Gruner	111 a	15.5 a
Regal	101 b	14.2 b
Caledonian	**100 b**	**14.1 b**
Fuel	98 bc	13.7 bc
Coleor	95 bd	13.4 bd
Sovereign	90 cd	12.6 cd
Voltage	89 de	12.4 de
Kestral	83 e	11.6 e
Trial mean	14.0	14.0

*From 10 trials in Southland (5), South Otago (1) & Canterbury (4) from 2007/08 to 2014/15

◇= provisional results. *Inka* was in 2 of the 10 trials.

High utilisation

The results below are from a Lincoln University trial. Cows grazing *Caledonian* had the same crop utilisation (88-91%) and achieved the same body condition score (BCS) gain as the intermediate height kale *Regal*. However, the 1.5-1.6 t DM/ha higher yield of *Caledonian* allowed more cow grazing days i.e. a 12% higher stocking rate.

Measurement	Sown 1 November		Sown 15 November	
	Caledonian	*Regal*	***Caledonian***	*Regal*
Yield (t DM/ha)	**17.3**	15.8	**14.4**	12.8
Utilisation (%)	**88**	88	**91**	89
Intake (kg DM/cow/day)	**9.4**	9.4	**9.7**	9.5
Cow grazing days (days/ha)	**1620**	1479	**1351**	1199
BCS* gain of cows	**0.45**	0.47	**0.48**	0.47

Cows were grazed for a 6 week period during winter 2008. *BCS = Body condition score.

Sowing rate 5 kg/ha

We recommend sowing *Caledonian* at 5 kg/ha (in good conditions where >10 t DM/ha is expected). Trials show an increased yield of 1.3 t DM/ha (or 9%) over sowing 4 kg/ha*.

DM yield of *Caledonian* at two sowing rates

Sowing rate	DM Yield (t DM/ha)
Caledonian @ 5 kg/ha	15.7
Caledonian @ 4 kg/ha	14.4

*Based on REML analysis of 3 trials (Winton, Telford & Darfield) in 2006/07 over 3 cultivars (*Gruner, Caledonian* & a breeding line).

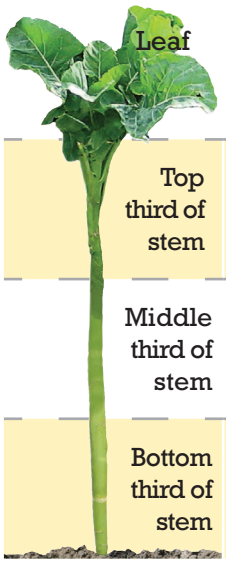
Caledonian kale is marketed by Agriseeds

Quality stems

Caledonian is a marrow stem cultivar with significantly better stem ME than traditional tall cultivars like *Gruner* or *Rawera*. The main difference in feed quality is in the bottom third of stems - this is important as they make up 30% of total yield, and cattle knock a significant amount of leaf to the ground where it is wasted.

Crops with poor stem quality create a dilemma. Grazing well, to get higher crop utilisation, will reduce weight gain, while achieving good liveweight gain means accepting poorer utilisation.

Leaf and stem ME of medium-tall cultivars*



Plant part	Cultivar					
	Kestrel	***Caledonian***	*Sovereign*	*Regal*	*Gruner*	*Rawara*
Leaf	12.9 a	**12.7 ac**	12.9 a	12.8 ac	12.8 ab	12.5 c
Top third of stem	13.6 a	**13.4 ab**	13.0 c	13.3 ab	13.2 bc	13.4 ab
Middle third of stem	12.9 a	**12.0 bc**	12.2 ab	11.6 c	11.8 c	11.8 bc
Bottom third of stem	12.5 a	**10.6 b**	10.5 bc	10.4 bc	9.9 c	9.8 c

*From 3 trials in Southland (1) & Canterbury (2) from 2006/07 & 2007/08. Average yield from these trials was 13.1 t DM/ha. Statistical significance lettering given for 5% LSD level, cultivars with the same letter are not signigicantly different.

Using *Caledonian*

Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Sow						Graze			

Maturity date:	150-220 days
Typical yield:	15-20 t DM/ha summer moist; 9-12 t DM/ha dryland
ME:	11-12 MJ/kg DM
Sowing rate:	4-5 kg/ha

Caledonian kale is marketed by Agriseeds

INVITATION SWEDE

Stock Type Dairy, Sheep, Beef, Deer

Invitation is a late maturing, yellow-fleshed swede, with very high bulb and leaf yield. It provides winter feed with excellent animal health for sheep, cattle and deer.

High yield & disease tolerance

Invitation produces excellent total DM yields with good dry rot tolerance and resistance to club root and powdery mildew. *Invitation* is not recommended as a second crop.

Total DM yield, dry rot tolerance and club root infection level.

Cultivar	Total DM yield* (Trial mean =100)		Dry rot tolerance** % of bulbs not infected		Dry rot tolerance** % bulbs badly infected		Clubroot*** % of bulbs not infected	
Invitation	**112**	**a**	**57**	**a**	**5**	**a**	**97**	**a**
Winton[1]	104	b	49	a	21	a	100	a
Aparima Gold	103	b	36	ab	11	a	100	a
Keystone	101	bc	NT	NT	17	bc	17	bc
Highlander[1]	100	bc	7	c	58	b	7	c
Major Plus	96	cd	10	bc	56	b	18	bc
Dominion	92	d	6	c	71	b	23	b
Domain ◇	74	e	NT	NT	NT	NT	NT	NT
Trial mean	12.6 t DM/ha		21%		41%		60%	

*From 8 Southland trials, from 2006/07 to 2011/13. **From a Southland trial in 2008/09 under moderate to high dry rot pressure in a 2nd crop paddock. *** From a Southland trial in 2010/11 under moderate to high club root pressure in a 2nd crop paddock. NT = Not tested. Statistical significance lettering given for 5% LSD level, cultivars with same letter are not significantly different. ◇= Provisional results. *Domain* was in 2 of the 8 trials. NT = not tested.

[1] No longer marketed

Late flowering

Invitation is very late flowering, meaning the crop stays vegetative longer into spring than other cultivars. This minimises the chance of animal health problems associated with 'bolting' swede crops, as seen in spring 2014 in Southland. No issues were reported on *Invitation* swedes.

Swede flowering scores*

Cultivar	Flowering score	
Invitation	**7.2**	**a**
Major Plus	6.7	ab
Keystone	6.5	ab
Domain	6.5	ab
Highlander	5.4	bc
Dominion	4.8	c
HT Swede	3.4	d
Aparima Gold	3.1	d
Winton	2.1	d
Trial mean	6.1	

*Results from 2 trials in Southland sown 2008 and 2012. Statistical significance lettering given for 5% LSD level, cultivars with the same letter are not significantly different. Scored on a 1 - 9 basis. Where 1 = full flowering swede crop, 4 = stem elongation, green seed head appeared, 7, small degree of elongaton, 9 = no sign of stem elongation.

Invitation swede is marketed by Agriseeds

Good leaf yield

Invitation produces high leaf yields showing a significantly higher leaf percentage than other cultivars in trials. This lifts the overall protein level of the crop and is helpful when introducing swedes into an animal's diet, particularly for younger stock.

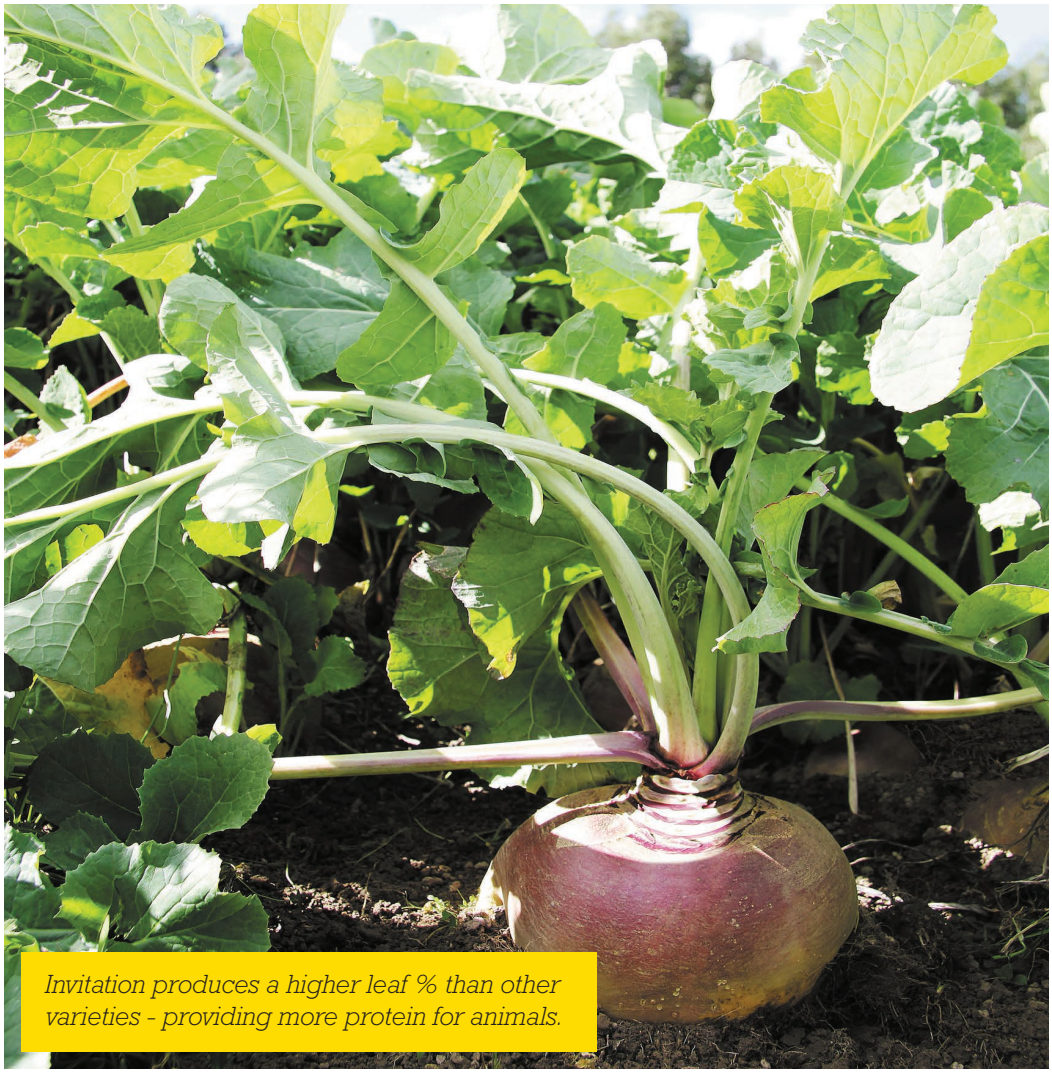
Bulb & leaf keeping

Invitation has shown high bulb keeping ability and leaf retention in trials, helping maintain its feed quality and quantity through to the end of winter.

Using *Invitation*

Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Sow						Graze			

Maturity date:	170-250 days
Typical yield:	10-18 t DM/ha (depending on season)
ME:	12-14 MJ/kg DM
Sowing rate:	0.5-0.8 kg/ha ridged 0.8-1.5 kg/ha drilled



Invitation produces a higher leaf % than other varieties - providing more protein for animals.

Invitation swede is marketed by Agriseeds

INTERVAL RAPE

Stock Type Dairy, Sheep, Beef, Deer

Interval is a tall, fast establishing rape ideal for summer, autumn and winter feed. It offers very high yield for all stock types.

Interval is a rape-kale cross, giving high yield with regrowth ability.

Flexible sowing date

Interval can be sown from spring through to early autumn to provide a bulk of high quality feed typically in 90-110 days. Spring sowings can be grazed in summer/early autumn then left to regrow for winter feed.

High yield

Interval has performed well in trials, providing excellent DM yield.

Total winter DM yield*

Cultivar	Trial mean = 100%	
Interval	**126**	**a**
Goliath	125	a
Greenland	118	a
Winfred	92	b
Titan	88	b
Trial mean (t DM/ha)	5.3	

*Results from 2 trials in Canterbury during 2008 and 2009 (February sown, June/July harvested). Statistical significance lettering given for 5% LSD level, cultivars with the same letter are not significantly different.

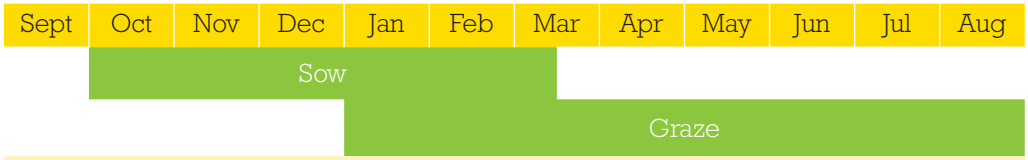
Winter utilisation

Compared to kale, rape typically has higher stem feed quality, and is better utilised by stock.

Other characteristics

Interval has excellent tolerance of dry conditions. It also has strong frost tolerance and resistance to powdery mildew.

Using *Interval*



Maturity date:	90-110 days
Typical yield:	5-8 t DM/ha (depends on sowing time & no. of grazings)
Typical ME:	12 MJ/kg DM
Sowing rate:	4 kg/ha

Interval rape is marketed by Agriseeds

FODDER BEET

Stock Type Dairy, Sheep, Beef, Deer

Fodder beet types

It's important to choose the correct fodder beet variety for your feed requirements and intended use (grazing, lifting or both). Good starting points for this decision are bulb DM content, and whether the crop is only intended to be lifted. Fodder beet can be largely divided into three groups based on these factors:

Low bulb DM% (12-15%)

Lower yield potential, usually with a high % of bulb above ground (50%+). Only suited to grazing in situ.

Medium-high bulb DM% (16-20%)

Higher yield potential than low DM % types, and can be grazed in situ.

e.g. *Robbos*. Some can also be successfully lifted or grazed

e.g. *Ribondo*. Bulbs are generally 43-50% above ground.

Lifting types

Bulbs sit lower in the ground, generally not suitable for grazing in situ. Very high DM % types (e.g. *Blizzard*) are best for maximum yield potential and increased storage life.

System fit

Thanks to its ability to grow a large volume of high quality, high utilisation feed that can be used from autumn to spring, fodder beet suits several different farm systems. Its high yield potential also frees up land for other uses, which is a major plus. Alternatively you can increase daily allowances for improved live weight gains.

This crop provides flexible winter grazing and can also be used to extend dairy cow lactation by either grazing in situ or lifting and feeding to stock on pasture. Successful grazing entails correct stock transition.

For further information see Agriseeds Fodder Beet Product Guide or download the guide from www.agriseeds.co.nz

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep
Robbos/Ribondo												
Dairy	Precision sown.						Extend lactation, start winter transition.		Winter feed.		Supplement spring pasture covers.	
Beef/Sheep/Deer	Precision sown.						High ME feed for liveweight gain or maintenance from autumn to spring.					
Blizzard/Ribondo												
Lifting fodder beet	Precision sown.						Mechanically lifted and fed to stock for a high ME supplement from autumn through to early summer.					
Maturity:	Once herbicide withholdings are met. 170 days+ to maximise yield.											
Typical Yield	18-24 t DM/ha average. 25 t DM/ha+ possible with good summer moisture and fertility.											
Sowing rate:	80,000 seeds/ha grazing. 100,000 seeds/ha lifting.											

FODDER BEET CULTIVARS

Robbos

- Best feeding method — Grazing (but can be lifted)
- Bulb DM content — Medium (16-18%)
- Sowing rate — 80,000 seeds/ha

Robbos should be used where high utilisation is required when grazing in situ, as well as increased DM yield/ha. *Robbos* is a true mono germ with a medium DM content (16-18%), so it can produce more DM/ha than lower DM types. With an orange-yellow bulb which sits 45-50% above ground, it suits grazing by all stock types.

Robbos has very good leaf keeping ability through autumn, winter and early spring. This is important because the leaf comprises a high percentage of the crop's protein.

Ribondo

- Best feeding method — Grazing and lifting (dual purpose)
- Bulb DM content — Medium-high (18-20%)
- Sowing rate — 80,000 seeds/ha if grazing 100,000/ha if lifting

Ribondo is a true mono germ with very even bulb shape and size and erect leaves, so it is ideal for lifting or grazing. The even height of bulbs above ground means little bulb is wasted when leaves are chopped off in the mechanical harvesting process. This dual purpose characteristic gives *Ribondo* flexibility, e.g. the crop can be both mechanically lifted or grazed as required from the same paddock, with little wastage.

Ribondo has a yellow root and a medium-high DM content of 18-20% so high yields can be achieved.

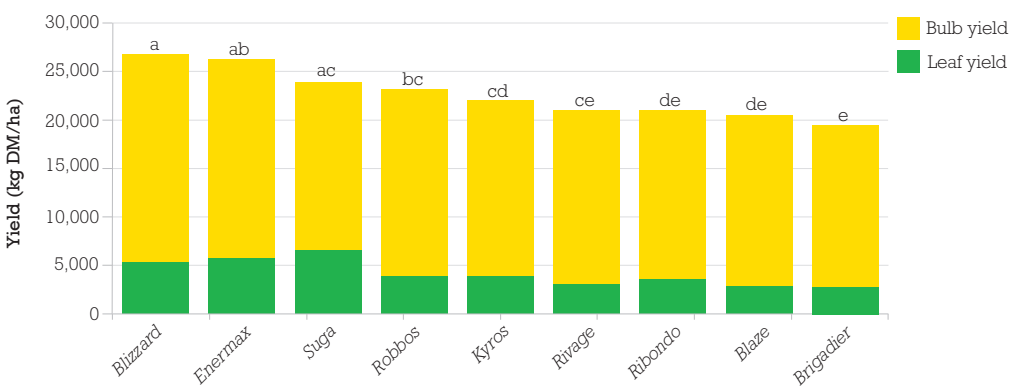
Blizzard

- Best feeding method — Lifting only
- Bulb DM content — High(20-22%)
- Sowing rate — 100,000 seeds/ha

Blizzard is a white skinned lifting fodder beet with high DM content (20-22%). It can produce very high DM yields, and should be used when maximum yield/ha is sought from a lifted crop. Because of its high DM content, *Blizzard* will store longer in a windrow than lower DM types when leaves are removed.

It has shown excellent leaf holding ability and disease resistance to help maximise yield potential before bulbs are lifted. Grazing *Blizzard* is not advised because a high proportion of the bulb is in the ground, reducing utilisation when fed in situ.

DM yield/ha of all types



Combined data of five trials from 2008-2016: Canterbury (4), Southland (1). Statistical significance lettering (LSD 5%) given. Cultivars with the same letter are not significantly different.

INSECT CONTROL RATING FOR DIFFERENT ENDOPHYTES

Summary

These ratings are indicative and may vary slightly between cultivars. If Argentine stem weevil or black beetle are present at sowing, an appropriate seed treatment is recommended to improve insect resistance during establishment. The ratings in this table are based in part on glasshouse studies where test plants are 100% infected with endophyte, whereas commercial seed must meet minimum standards of 70% of seeds infected. These tables were compiled by AgResearch, Agricom, Agriseeds, Cropmark, Grasslanz and PGG Wrightson Seeds.

Endophyte insect control for perennial ryegrass, festulolium & short-term (hybrid) ryegrass.

	Argentine stem weevil	Pasture mealy bug	Black beetle adult	Root aphid	Porina	Grass grub	Field cricket
Diploid perennial ryegrass							
AR1	♦♦♦♦	♦♦♦♦	♦	-[2]	-	-	Not tested
NEA2	♦♦♦	(♦♦♦♦)	♦♦♦	♦♦	Not tested	-	Not tested
AR37	♦♦♦♦[1]	♦♦♦♦	♦♦♦	♦♦♦♦	♦♦♦	♦	Not tested
SE	♦♦♦♦	♦♦♦♦	♦♦♦	♦♦	♦	-	Not tested
WE	-	-	-	-	-	-	Not tested
Tetraploid perennial ryegrass							
AR1	(♦♦♦)	(♦♦♦♦)	♦	-[2]	-	-	Not tested
NEA2	♦♦	(♦♦♦♦)	♦♦♦	♦♦	Not tested	-	Not tested
AR37	(♦♦♦)[1]	(♦♦♦♦)	♦♦♦	♦♦♦♦	(♦♦♦)	♦	Not tested
WE	-	-	-	-	-	-	Not tested
Festulolium							
U2	♦♦♦	Not tested	♦♦♦[3]	Not tested	(♦♦)	♦♦♦	♦♦♦
Italian and short term (hybrid) ryegrass							
AR1	♦♦	(♦♦♦♦)	♦	-[2]	Not tested	-	Not tested
NEA	Not tested	(♦♦♦♦)	♦♦♦	Not tested	Not tested	-	Not tested
AR37	♦♦♦[1]	(♦♦♦♦)	♦♦♦	Not tested	Not tested	-	Not tested
WE	-	-	-	-	-	-	Not tested

Notes on table:

[1] *AR37* endophyte controls Argentine stem weevil larvae, but not adults. While larvae cause most damage to pastures, adults can damage emerging grass seedlings. In Argentine stem weevil prone areas it is recommended to use treated seed for all cultivars with novel endophyte.

[2] *AR1* plants are more susceptible to root aphid than plants *Without* endophyte.

[3] Also active against black beetle larvae

Key to tables

-	**No control.**
♦	**Low level control:** Endophyte may provide a measurable effect, but is unlikely to give any practical control.
♦♦	**Moderate control:** Endophyte may provide some practical protection, with low to moderate reduction in insect population.
♦♦♦	**Good control:** Endophyte markedly reduces insect damage under low to moderate insect pressure. Damage may still occur when insect pressure is high.
♦♦♦♦	**Very good control:** Endophyte consistently reduces insect populations and keeps pasture damage to low levels, even under high insect pressure.
( )	**Provisional result:** Further results needed to support the rating. Testing is ongoing.

ENDOPHYTE ANIMAL SAFETY

Summary

These ratings are indicative. Animal performance and health can vary under different management systems and between seasons.

Sheep & lambs

	AR1	*NEA2*	*AR37*	*U2*	*Standard* endophyte	*Without* endophyte
Freedom from ryegrass staggers	♦♦♦♦	♦♦♦♦	♦♦♦[2]	♦♦♦♦	♦♦[1]	♦♦♦♦
Animal performance	♦♦♦♦	♦♦♦♦	♦♦♦♦[3]	♦♦♦♦	♦♦[1]	♦♦♦♦

Notes on sheep & lambs table:

[1] *Standard* endophyte can cause severe ryegrass staggers, can significantly decrease lamb growth rates in summer and autumn, and significantly increase dags.

[2] Ryegrass containing *AR37* endophyte can cause severe ryegrass staggers, but the frequency of ryegrass staggers is much lower than for ryegrass with *Standard* endophyte. *One50 AR37* may give rise to higher instances of ryegrass staggers than other *AR37* cultivars in some situations.

[3] Lambs grazing ryegrass containing *AR37* endophyte can have reduced LWG during periods of severe staggers.

Dairy cows & beef cattle

	AR1	*NEA2*	*AR37*	*U2*	*Standard* endophyte	*Without* endophyte
Freedom from ryegrass staggers	♦♦♦♦	♦♦♦♦	♦♦♦♦[2]	♦♦♦♦	♦♦[1]	♦♦♦♦
Animal performance	♦♦♦♦	Not tested	♦♦♦♦[3]	♦♦♦♦	♦♦♦[1]	♦♦♦♦

Notes on dairy cows & cattle table:

[1] *Standard* endophyte can cause ryegrass staggers, and has been shown to depress milksolids production through summer and autumn.

[2] While ryegrass staggers has not been observed on cattle and dairy cows, it could occur on rare occasions.

[3] In dairy trials overall MS production from ryegrass containing *AR37* endophyte is not significantly different from that with *AR1*. A small reduction in MS was observed over summer on ryegrass containing *AR37*. A contributing factor to this was the lower clover content in *AR37* pastures.

Key to tables

♦♦	**Moderate animal performance and health:** This endophyte is known to regularly cause significant problems.
♦♦♦	**Good animal performance and health:** This endophyte can cause problems from time to time.
♦♦♦♦	**Very good animal performance and health.**

AGRICOTE SEED TREATMENT

AGRICOTE helps ensure good even establishment of new pastures and crops.

Best possible start

Establishment is a critical time for a new pasture or crop as its potential performance is determined in this early stage. Different *AGRICOTE* seed coatings aid establishment by helping protect your seedling plants from insects and fungal diseases and by supplying nutrients to clovers.

If you have a pasture or crop that fails, the main cost (usually 75-80%) is the lost feed. There is also an additional cost in resowing as the example below shows.

Example - cost of a pasture failure.

What happens	Autumn pasture fails to establish
Cost of lost DM	Loss of 5 t DM/ha production (from April – September) = $1500/ha (valued at 30c/kg DM*)
Cost of resowing spring	= $500/ha (to re-spray, light cultivation, buy seed & resow)
TOTAL COST FAILURE	**= $2000/ha**

*April – September pasture has a high value of 30c/kg DM as this is a feed deficit period.

Order your seed with *AGRICOTE* coating to get the following (Y=Yes):

Grass seed treatment

Seed treatment	Insect protection			Fungal pathogens		Other	Sowing rate
	Argentine stem weevil	Black beetle	Grass grub	Fusarium	Pythium	Weight build up	
AGRICOTE GRASS	Y	Y	Y	Y	Y	Nil	Same as bare

Clover seed treatment

Seed treatment	Insect protection	Fungal pathogens			Additives		Other	Sowing rate
	Nematodes	*Fusarium*	*Pythium*	*Rhizoctonia*	Lime	Nutrients	Weight build up	
AGRICOTE CLOVER	Y	Y	Y	Y	Y	N, P, Mn, Zn, Mo	75%	4kg*

Brassica seed treatment

Seed treatment	Insect protection			Fungal pathogens		Additives	Other	Sowing rate
	Nysius	Spring tails	Aphids	*Fusarium*	*Pythium*	Molybdenum	Weight build up	
AGRICOTE BRASSICA	Y	Y	Y	Y	Y	Y	Nil	Same as bare

Member of the Royal Barenbrug Group

* *Trojan* is a perennial ryegrass certified under the New Zealand seed certification scheme as *lolium boucheanum.*

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