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# PERENNIAL RYEGRASS

## Introduction

Throughout NZ, perennial ryegrass (*Lolium perenne*) is the grass of choice for permanent pastures. It establishes rapidly, yields well, tolerates a range of management practices and has a high nutritive value. It is also compatible with white clover offering an excellent all-round pasture for all grazing systems.

Perennial ryegrass cultivars differ in total yield, seasonal growth, and heading date and are available with different endophyte options. Endophytes are fungi that can assist plant survival (see page 66 for more details).

Ryegrass is naturally a diploid plant, meaning it has two sets of chromosomes. Some cultivars are tetraploids, artificially developed by plant breeders to have four sets of chromosomes. Tetraploids have fewer, larger tillers, and are more palatable but less robust (see page 93 and 187 for more details).

More persistent	Perennial ryegrass
↑ ↓	Long rotation ryegrass
	Hybrid ryegrass
	Italian ryegrass
	Annual ryegrass
Less persistent	

## Diploid cultivars

### *Trojan*

Sets a new standard of performance by combining exceptional DM yield with strong shoulder growth in both winter/early spring and autumn. *Trojan* provides a unique balance of features, including excellent persistence, good quality and late heading (+16 days), along with good resistance to rust and plant pulling. Available with *NEA2* endophyte. (Refer also to the *Trojan* sheet on pages 8 & 9).

### *Alto*

High performance, persistent, late heading (+14 days) ryegrass suitable for all farming systems. *Alto* is a fine leaved, robust cultivar with excellent persistence, along with high year-round yield and very good feed value, good resistance to rust and plant pulling. Available with *ARI*, *AR37* or *Low* endophyte. (Refer also to the *Alto* sheet on page 7).

### *Arrow*

Delivers high winter/early spring growth, while performing well in all seasons. *Arrow* combines early growth with a medium-late heading date (+7 days). It has a medium-erect growth habit allowing good clover compatibility, and has very good persistence. Available with *ARI* or *Low* endophyte. (Refer also to the *Arrow* sheet on page 10).

### *AberDart*

A UK-bred late heading (+15 days) cultivar. Good summer growth, but below average winter growth. Available with *ARI* or *Without* endophyte.

### *AberMagic*

UK-bred late heading (+19 days) perennial ryegrass. Good year round growth with a higher tolerance of rust. Available *Without* endophyte.

### *Ceres One50*

Late heading cultivar (+20 days) with good autumn and winter production. Available with *AR37*, *ARI* or *Low* endophyte.

### *Ceres Kingston*

Lower yielding type with standard heading date (-3 days) and good tolerance of, and recovery from hard grazing. Available with *Standard* or *Low* endophyte.

# PERENNIAL RYEGRASS CULTIVARS

## *Grasslands Commando*

Standard heading date (+1 day) cultivar with lower yields in winter and autumn. Suited to dairy, beef and high input sheep farms. Available with *AR37*, *AR1* or *Low* endophyte.

## *Expo*

Densely tillered, late flowering (+21 days) perennial ryegrass with good cool season growth suitable for all classes of livestock. Available with *AR1*, *AR37* or *Without* endophyte.

## *Extreme*

Cultivar with standard heading date (+3 days) and good yield. Can suffer plant pulling on problem soils. Available with *AR37*, *AR1* or *Without* endophyte.

## *Grasslands Hillary*

Re-selection from *Ruanui*, with standard heading date (+4 days). Bred for persistence under sheep grazing. Available with *AR1* endophyte.

## *Grasslands Kamo*

Cultivar with standard heading date (+2 days) for situations with medium to low soil fertility. Available with *AR37*, *AR1* or *Without* endophyte.

## *Grasslands Nui*

Common cultivar first certified in 1975. Now superseded in yield, palatability and rust resistance by many other cultivars. Poor persistence in summer dry areas. Available with *Low* endophyte.

## *Grasslands Pacific*

Older cultivar suited to soils with medium to lower fertility. Superseded in yield by many other cultivars. Available with *Standard* and *Without* endophyte

## *Grasslands Prospect*

Fine leaved productive variety (+12 days), selected for a good spread of seasonal growth and persistence. Available with *AR1* or *AR37* endophyte.

## *Grasslands Ruanui*

Oldest cultivar, first certified in 1936. Out-yielded by every other cultivar. Susceptible to rust. Does not contain endophyte.

## *Grasslands Samson*

Older medium leaved cultivar with good disease resistance. In National Forage Variety grazing trials has been out-yielded by *Arrow*. Available with *AR37*, *AR1* or *Low* endophyte.

## *SF Stellar*

Fine-leaved, mid-season maturing cultivar with low aftermath heading. Suitable for high production farming systems. Available with *AR1* or *Low* endophyte.

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# PERENNIAL RYEGRASS CULTIVARS

**Tetraploid cultivars** (For more information on tetraploids see page 93 or 187.)

## *Bealey*

*Bealey* perennial ryegrass boosts animal production by combining several key elements: high winter and summer growth; high ME; the palatability of a tetraploid; very late heading (+25 days); good persistence and clover compatibility. Has excellent resistance to rust and plant pulling. Available with *NEA2* or *Low* endophyte. (Refer also to the *Bealey* sheet on page 11).

## *Base*

Bred for improved persistence and yield. Low aftermath heading. Available with *AR37* endophyte.

## *Grasslands Halo*

Tetraploid that has a late (+25 days) heading date. Available with *AR37* and *AR1* endophyte.

## *Kai*

A late heading (+20 days) tetraploid cultivar. Available only in *Low* endophyte.

## Heading dates of perennial ryegrass cultivars\*

Cultivar	Days	Cultivar	Days
<i>Kingston</i>	-3	<i>Prospect</i>	+12
<i>Nui</i>	0	<b><i>Alto</i></b>	<b>+14</b>
<i>Commando</i>	+1	<i>Indiana</i>	+15
<i>Pacific</i>	+1	<i>AberDart</i>	+15
<i>Ruanui</i>	+1	<b><i>Trojan</i></b>	<b>+16</b>
<i>Kamo</i>	+2	<i>AberMagic</i>	+19
<i>Extreme</i>	+3	<i>One50</i>	+20
<i>Samson</i>	+3	<i>Kai (T)</i>	+20
<i>Hillary</i>	+4	<i>Expo</i>	+21
<i>Impresario (T)</i>	+6	<i>Base (T)</i>	+22
<b><i>Arrow</i></b>	<b>+7</b>	<b><i>Bealey (T)</i></b>	<b>+25</b>
<i>Stellar</i>	+8	<i>Halo (T)</i>	+25

\* Day 0 is typically around 22 October, but this can vary from year to year. See page 102 for more.

# ALTO PERENNIAL RYEGRASS

Endophyte

AR37, AR1, Low

Stock Type

Dairy, Sheep, Beef, Deer

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## High total yield

*Alto* is a persistent, late heading perennial ryegrass suited to all farming systems. It has excellent year round growth and has shown a very high level of persistence.

*Alto* delivers high total yield with excellent late spring and summer production.

2003-11 NZ AYT diploid ryegrass DM yields, trial mean = 100%\*

Entry	Winter	Early spring	Late spring	Summer	Autumn	Total
<i>Trojan NEA2</i>	112 a	105 a	103 ab	114 a	110 a	109 a
<i>Arrow AR1</i>	104 bc	104 ac	104 a	107 b	106 ac	106 ab
<b><i>Alto AR1</i></b>	<b>103 bc</b>	<b>100 bd</b>	<b>104 a</b>	<b>106 b</b>	<b>102 cd</b>	<b>103 bc</b>
<i>Matrix SE</i>	104 bc	97 cd	101 ab	107 b	108 ab	103 bd
<i>Extreme AR37</i>	103 bc	105 a	100 ab	101 bc	104 ac	103 bd
<i>One50 AR1</i>	107 ab	99 bd	99 b	107 b	104 ac	103 bd
<i>Extreme AR1</i>	97 cd	105 ab	98 b	103 bc	98 d	101 bd
<i>Revolution AR1</i>	104 bc	100 ad	101 ab	97 cd	98 d	100 cd
<i>Bronsyn AR1</i>	93 d	100 ad	100 ab	101 bc	103 bd	100 d
<i>Commando AR1</i>	84 e	97 d	100 ab	93 d	87 e	94 e
<b>100 =kgDM/ha</b>	<b>1067</b>	<b>1999</b>	<b>3595</b>	<b>4094</b>	<b>2545</b>	<b>13322</b>

\*Combined data from 16 AYT's: 2003-6 Waikato; 2003-6 Manawatu; 2003-6 Canterbury; 2003-6 Canterbury; 2004-7 Taranaki; 2005-8 Waikato; 2005-8 Manawatu; 2005-8 Canterbury; 2006-9 Taranaki; 2007-10 Waikato; 2007-10 Manawatu; 2007-10 Canterbury; 2007-10 Southland; 2008-11 Taranaki; 2008-11 Canterbury; 2008-11 Southland. Cultivars must be in at least 3 trials to be included. Significance lettering is given at the LSD 5% level, cultivars with the same letter are not statistically different.

## Robust

With its fine leaves and dense tillers, *Alto* handles treading and set-stocking well.

Finer leaved cultivars can be used on wetter soils to give better soil protection against treading damage.

## Persistent

*Alto* is very persistent, for better long term production. It has performed well in trials and on farm throughout NZ, across all climates, soil types, stock classes and management systems. *Alto* also has high resistance to rust and plant pulling.

## High feed value

*Alto* has high ME (averaging 12.7 in well-managed pastures), and is late heading (+14 days) with reduced aftermath heading. This gives better feed quality in late spring.

## Sowing *Alto*

Dairy		kg/ha
For high performance, persistent pasture with easy management	<i>Alto</i> perennial ryegrass	18-22
	<i>Kotare</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	21-25
Sheep, Beef, Deer		kg/ha
For persistent pasture with high carrying capacity and stock performance	<i>Alto</i> perennial ryegrass	18-22
	<i>Weka</i> white clover	1.5
	<i>Apex</i> white clover	1.5
	<i>Tuscan</i> red clover	4
	<i>Safin</i> cocksfoot	2-3
Total	27-32	

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

*Alto* Perennial Ryegrass is owned and marketed by Agriseeds

*Alto* Perennial Ryegrass is protected under the NZ Plant Variety Rights Act 1987

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# 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 at the shoulders of the season, in winter/early spring and autumn.

### 2003-11 AYT diploid ryegrass DM yields, trial mean = 100%\*

Entry	Winter	Early spring	Late spring	Summer	Autumn	Total
<i>Trojan NEA2</i>	112 a	105 a	103 ab	114 a	110 a	109 a
<i>Arrow AR1</i>	104 bc	104 ac	104 a	107 b	106 ac	106 ab
<i>Alto AR1</i>	103 bc	100 bd	104 a	106 b	102 cd	103 bc
<i>Matrix SE</i>	104 bc	97 cd	101 ab	107 b	108 ab	103 bd
<i>Extreme AR37</i>	103 bc	105 a	100 ab	101 bc	104 ac	103 bd
<i>One50 AR1</i>	107 ab	99 bd	99 b	107 b	104 ac	103 bd
<i>Extreme AR1</i>	97 cd	105 ab	98 b	103 bc	98 d	101 bd
<i>Revolution AR1</i>	104 bc	100 ad	101 ab	97 cd	98 d	100 cd
<i>Bronsyn AR1</i>	93 d	100 ad	100 ab	101 bc	103 bd	100 d
<i>Commando AR1</i>	84 e	97 d	100 ab	93 d	87 e	94 e
100 =kgDM/ha	1067	1999	3595	4094	2545	13322

\*Combined data from 16 AYT's: 2003-6 Waikato; 2003-6 Manawatu; 2003-6 Canterbury; 2003-6 Canterbury; 2004-7 Taranaki; 2005-8 Waikato; 2005-8 Manawatu; 2005-8 Canterbury; 2006-9 Taranaki; 2007-10 Waikato; 2007-10 Manawatu; 2007-10 Canterbury; 2007-10 Southland; 2008-11 Taranaki; 2008-11 Canterbury; 2008-11 Southland. Cultivars must be in at least 3 trials to be included. Significance lettering is given at the LSD 5% level, cultivars with the same letter are not statistically different.

## Persistence

The persistence of *Trojan* has been excellent in AYT trials (see page 48). Presented below are results from two trials run under particularly testing conditions.

### 2005-08 Waikato persistence under dairy grazing

Entry	Ryegrass ground cover (%)*
<i>Trojan NEA2</i>	98.4 a
<i>Bealey NEA2</i>	98.4 a
<i>Alto AR1</i>	97.1 a
<i>Banquet</i>	97.1 a
<i>Bronsyn AR1</i>	90.6 ab
<i>Arrow AR1</i>	84.5 b
<i>Commando AR1</i>	84.4 b
<i>Extreme AR6</i>	69.9 c

\* Trial run by DairyNZ at Newstead, Waikato. Trial sown on 11/04/05, point analysis undertaken on 27/05/08 to calculate ryegrass ground cover.

### 2005-11 Canterbury persistence under sheep grazing

Entry	Ryegrass ground cover (%)*
<i>Trojan NEA2</i>	52 a
<i>Alto AR1</i>	45 ab
<i>Hillary AR1</i>	41 bc
<i>Bronsyn AR1</i>	40 bc
<i>Meridian AR1</i>	33 c
<i>Nui WE</i>	21 d

\* Trial run at Mt. Possession, Canterbury, sown on 31/10/05, point analysis undertaken on 26/04/11 to calculate ryegrass ground cover.

*Trojan* Perennial Ryegrass is owned and marketed by Agriseeds

*Trojan* Perennial Ryegrass is protected under the NZ Plant Variety Rights Act 1987

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

*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.

### Endophyte

*Trojan* contains *NEA2* endophyte, which is a mixture of two different endophyte strains. *NEA2* provides:

- No ryegrass staggers.
- High animal performance.
- Good control of adult black beetle (equal to *AR37*, see page 66).
- Good control of Argentine stem weevil and 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.

### Rust and plant pulling

*Trojan* has good resistance to rust, and very good resistance to plant pulling (see pages 51 & 52 for AYT data).

### 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* has been 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.	<i>Trojan</i> perennial ryegrass	18-22
	<i>Kotare</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	21-25
Sheep, Beef, Deer		kg/ha
Top performing, palatable pasture.	<i>Trojan</i> perennial ryegrass	18-22
	<i>Weka</i> white clover	1.5
	<i>Apex</i> white clover	1.5
	<i>Tuscan</i> red clover	4
	<i>Safin</i> cocksfoot	2-3
Total	27-32	



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# ARROW PERENNIAL RYEGRASS

Endophyte

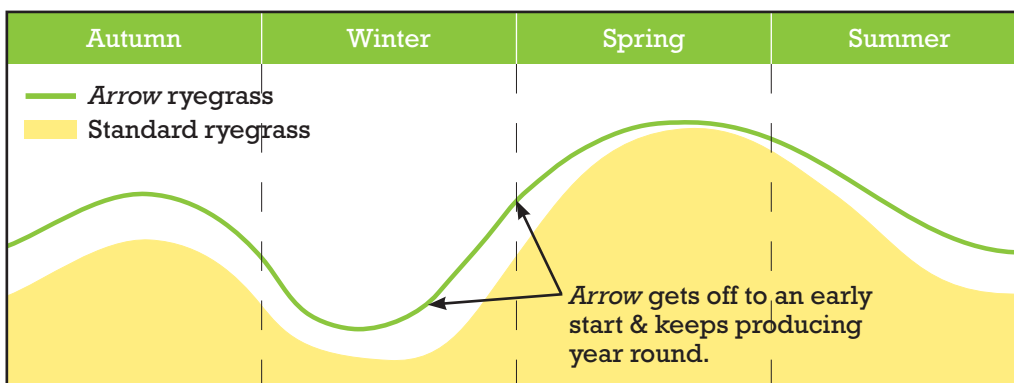
ARI, Low

Stock Type

Dairy, Sheep, Beef, Deer

## Seasonal growth

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 and 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. 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	1.5
	Weka white clover	1.5
	Total	21-25
Sheep, Beef, Deer		kg/ha
For systems requiring more winter & early spring feed	Arrow perennial ryegrass	18-22
	Weka white clover	1.5
	Apex white clover	1.5
	Tuscan red clover	4
	Safin cocksfoot	2-3
Total	27-32	



# BEALEY

## PERENNIAL RYEGRASS

Endophyte

NEA2, Low

Stock Type

Dairy, Sheep, Beef, Deer

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*Bealey* is a tetraploid perennial ryegrass that boosts animal performance by combining the key elements of high feed quality, palatability, high yield and excellent seasonal growth.

### Seasonal growth

2003-11 NZ AYT tetraploid ryegrass DM yields, trial mean = 100%\*

Entry	Winter	Early spring	Late spring	Summer	Autumn	Total
	Jun-Jul	Aug-Sept	Oct-Nov	Dec-Feb	Mar-May	
<i>Bealey NEA2</i>	106 a	95 a	97 a	104 a	104 a	100 a
<i>Banquet II Endo5</i>	104 a	96 a	96 a	105 a	103 a	100 a
<i>Quartet SE</i>	74 b	77 b	88 b	73 b	81 b	79 b
100 =kgDM/ha	1067	1999	3595	4094	2545	13322

\*Combined data from 16 AYT's: 2003-6 Waikato; 2003-6 Manawatu; 2003-6 Canterbury; 2003-6 Canterbury; 2004-7 Taranaki; 2005-8 Waikato; 2005-8 Manawatu; 2005-8 Canterbury; 2006-9 Taranaki; 2007-10 Waikato; 2007-10 Manawatu; 2007-10 Canterbury; 2007-10 Southland; 2008-11 Taranaki; 2008-11 Canterbury; 2008-11 Southland. Cultivars must be in at least 3 trials to be included. Significance lettering is given at the LSD 5% level, cultivars with the same letter are not statistically different.

### High lamb LWG

*Bealey* has grown lambs significantly faster in trials at Lincoln University.

Lamb liveweight gain (LWG) in Lincoln University Trials\* (*Nui* = 100%)

Measurement	<i>Bealey (NEA2)</i>	<i>Alto (WE)</i>	<i>Nui (WE)</i>
kg LWG/ha/day	5.2 a	4.6 b	4.2 b
Relative LWG/ha	123%	110%	100%

\*Trials run over five 8 week periods in summer 2003/04, autumn 2004, spring 2004, summer 2004/2005 & autumn 2005. Significance lettering is given for LSD (5%) level. WE = Without endophyte.

### High palatability & late heading

*Bealey* has the high palatability of a tetraploid. It is more upright than diploid cultivars, allowing good clover content, boosting animal performance. *Bealey's* very late heading (+25 days) improves spring feed quality.

### Persistence

*Bealey* is a perennial ryegrass selected for good persistence. Other factors contributing to this are its good tiller density, and *NEA2* endophyte for insect resistance.

### Getting the best from *Bealey*

Due to its high palatability, to get the best from *Bealey* avoid continual hard grazing and/or prolonged set stocking through dry periods. In wet winter conditions avoid treading or pugging damage by cattle. (See page 93 for more information on managing tetraploids).

### Sowing *Bealey*

Dairy		kg/ha
For high feed quality, plus high yields	<i>Bealey</i> perennial ryegrass*	25-30
	<i>Kotare</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	28-33
Sheep, Beef, Deer		kg/ha
For high feed value pasture ideal for finishing	<i>Bealey</i> perennial ryegrass*	25-30
	<i>Weka</i> white clover	1.5
	<i>Apex</i> white clover	1.5
	<i>Tuscan</i> red clover	4
Total	32-37	

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

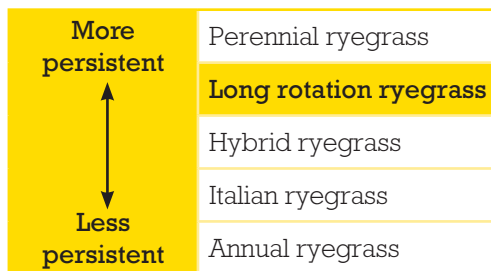
# LONG ROTATION RYEGRASS

## Introduction

Long rotation ryegrasses (*Lolium x boucheanum* Kunth) generally fall between perennial and hybrid ryegrass in terms of growth and persistence.

But long rotation cultivars vary widely in type, with some similar to hybrid ryegrass and others to perennial ryegrass.

In general, long rotation ryegrasses are best suited to summer wet areas where they can show good persistence.



## Heading dates of long rotation ryegrasses\*

Cultivar	Days
<i>Jeta (T)</i>	+7
<i>Ohau (T)</i>	+8
<i>Marsden</i>	+12
<i>Supreme<sup>Plus</sup></i>	+15
<i>Banquet II (T)</i>	+18
<i>Revolution</i>	+19
<i>Ultra</i>	+21
<i>Matrix</i>	+23
<i>Sterling (T)</i>	+25

\* Day 0 is typically around 22 October, but this can vary from year to year. See page 102 for more.

# LONG ROTATION RYEGRASS CULTIVARS

<b><i>Banquet II (T)</i></b>	Tetraploid late heading cultivar (+18 days). Available with <i>Endo5</i> or <i>Without</i> endophyte.
<b><i>Jeta (T)</i></b>	Tetraploid mid heading date cultivar (+7 days), with an 80% perennial, 20% Italian ryegrass parentage. Available with <i>AR1</i> endophyte.
<b><i>Grasslands Marsden</i></b>	Older cultivar bred from <i>Ariki</i> . It performs reasonably well in summer moist areas of the South Island. Trial performance in the North Island has been poor.
<b><i>Matrix</i></b>	Finer leaved late heading cultivar that is 8% meadow fescue in parentage. Heads 23 days later than standard. Available with <i>Standard</i> endophyte or <i>Low</i> endophyte.
<b><i>Grasslands Ohau (T)</i></b>	High yielding tetraploid cultivar with good winter and autumn growth. Low aftermath heading. Available with <i>AR1</i> , <i>AR37</i> or <i>Low</i> endophyte.
<b><i>Revolution</i></b>	Finer leaved cultivar that contains some meadow fescue in its parentage. Heads 19 days later than standard. Available with <i>AR1</i> or <i>Low</i> endophyte.
<b><i>Ultra</i></b>	Late flowering (+21 days) cultivar similar to <i>Revolution</i> , containing some meadow fescue in its parentage. Available with <i>AR1</i> or <i>Low</i> endophyte.
<b><i>Grasslands Sterling (T)</i></b>	Tetraploid cultivar, heads 21 days later than standard. Below average early spring growth. Available with <i>AR1</i> or <i>Low</i> endophyte.
<b><i>Grasslands Supreme<sup>Plus</sup></i></b>	A diploid ryegrass, 75% perennial ryegrass: 25% annual ryegrass in parentage, best suited to environments with consistent summer rainfall. Medium to fine leaved. Has poor rust resistance. Available with <i>AR1</i> , <i>Standard</i> or <i>Low</i> endophyte.

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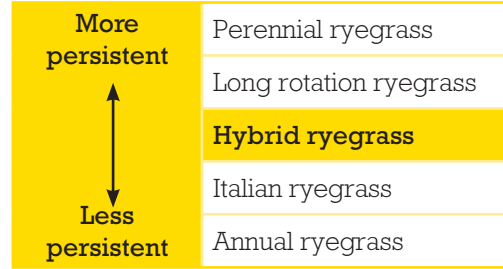
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# HYBRID RYEGRASS

## Introduction

Hybrid ryegrasses (*Lolium x boucheanum* Kunth), also known as 'short rotation' ryegrasses, are generally produced by plant breeders crossing Italian or annual ryegrass with perennial ryegrass. Hybrid ryegrasses fall between Italian and long rotation ryegrasses in growth and persistence.

Hybrid ryegrass gives better winter production than perennial or long rotation ryegrass, and in summer wet areas, most cultivars will persist for up to 5 years. In summer dry environments hybrids generally last for 2-3 years. Some cultivars are available with endophyte which enhances their insect resistance and persistence.



## Heading dates of hybrid ryegrasses\*

Cultivar	Days
<i>Delish (T)</i>	+11
<i>Perun (T)</i>	+12
<i>Maverick GII</i>	+17
<i>Storm (T)</i>	+18
<i>Shogun (T)</i>	+26

\* Day 0 is typically around 22 October, but this can vary from year to year. See page 102 for more.



*Hybrid ryegrass is intermediate to long rotation & Italian ryegrass in winter growth & persistence.*

# HYBRID RYEGRASS CULTIVARS

## Cultivar descriptions

### *Shogun (T)*

Creates a new level in performance for hybrid ryegrass, with exceptional year-round DM yield. Combines this with excellent feed quality being a very late heading (+26 days), tetraploid with low aftermath heading. Available with an *NEA* endophyte. (Refer also to the *Shogun* sheet on page 16).

### *Delish (T)*

Tetraploid cultivar with an intermediate heading date (+9 days) and low aftermath heading. Has good disease resistance and good persistence in summer moist areas. Available with *AR1* or *Without* endophyte.

### *Maverick GII*

Cultivar with better spring and summer yield than *Maverick Gold*. Does not contain endophyte.

### *Perun (T)*

Tetraploid, meadow fescue x Italian ryegrass cross, very early spring growth, heading date +12 days, winter hardy, with good disease resistance.

### *Storm (T)*

European cultivar with less winter and spring growth than standard cultivars. Does not contain endophyte.

PASTURE CULTIVARS

RYEGRASS TRIALS

RYEGRASS ENDOPHYTE

PASTURE RENEWAL

PASTURE MANAGEMENT

PASTURE PESTS & DISEASES

BRASSICA CULTIVARS

BRASSICA MANAGEMENT

BRASSICA PESTS & DISEASES

SEED TREATMENT

SEED INFORMATION

WEEDS

GLOSSARY

# SHOGUN HYBRID RYEGRASS

Endophyte

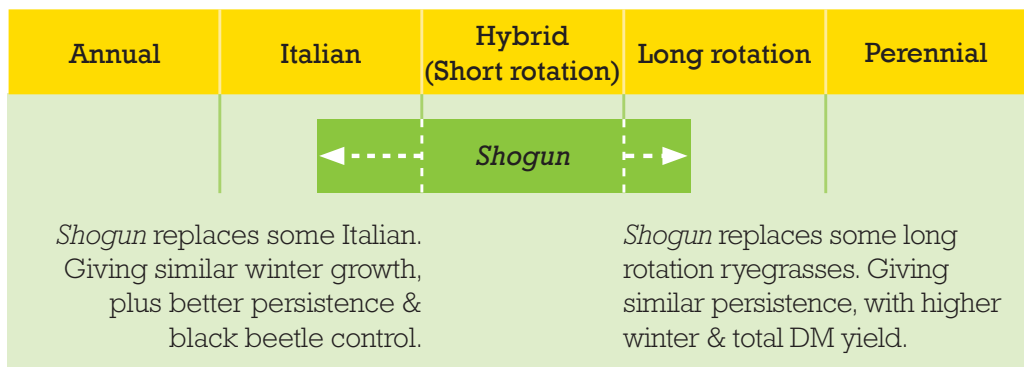
NEA

Stock Type

Dairy, Sheep, Beef

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

### Courtenay NFVT hybrid ryegrass DM yields after 3 years, trial mean = 100%\*

Entry	Winter	Early spring	Late spring	Summer	Autumn	Total
<i>Shogun NEA2</i>	150 ab	119 a	108 a	130 a	133 a	122 a
<i>Tabu</i> ▲	155 a	114 ab	106 ab	114 b	124 ab	116 b
<i>Feast II</i> ▲	142 b	107 bc	94 de	94 cd	122 b	104 c
<i>Ohau AR1</i>	66 f	96 d	110 a	97 c	87 e	98 d
<i>Supreme Plus AR1</i>	72 f	99 d	106 ab	95 cd	84 e	96 d
<i>Delish AR1</i>	113 c	106 c	92 de	89 d	85 e	94 de
<i>Maverick GII WE</i>	106 cd	95 d	91 df	76 e	102 d	90 e
<i>Sterling AR1</i>	40 g	78 e	101 bc	90 cd	67 f	85 f
<i>Momentum WE</i>	87 e	98 d	85 f	67 f	84 e	83 f
<i>Storm WE</i>	23 h	71 e	95 cd	79 e	69 f	78 g
<i>Perun WE</i>	33 gh	75 e	89 ef	67 f	72 f	75 g
Trial Mean	599	1545	3067	2032	1336	8579

\*Trial run at Courtenay, Canterbury under sheep grazing. Significance lettering is given at the LSD 5% level; cultivars with the same letter are not statistically different. ▲ = *Tabu* & *Feast II* have been included in the hybrid trial to show the comparative performance of Italian ryegrass with the hybrids.

### 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.

### Persistence

For a hybrid ryegrass *Shogun* has shown excellent persistence, demonstrated in the ryegrass ground cover results below taken in January 2012. Part of the reason for *Shogun's* success 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
<i>Bealey NEA2**</i>	63 a
<b><i>Shogun NEA</i></b>	<b>55 b</b>
<i>Harper ARI</i>	39 c
<i>Delish ARI</i>	36 c
<i>Maverick GII WE</i>	23 d
<i>Feast II***</i>	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.

### Black beetle control

*Shogun* with *NEA* endophyte has shown good control of black beetle in testing, similar to *Bealey* (3 stars).

### 3-5 year option

*Shogun* is a three 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.



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

# ITALIAN & ANNUAL RYEGRASS

## Introduction



Italian ryegrass and annual ryegrass (*Lolium multiflorum*) are discussed together as they are often used for the same purpose. Most commonly they are sown as a high quality short-term winter crop, to provide multiple grazings in winter and spring.

Italian ryegrass is more persistent than annual ryegrass and can be sown for a 2-3 year pasture in summer mild areas (e.g. Southland) or under irrigation. In summer dry areas it generally persists 12-18 months.

Annual ryegrass has little persistence, and is generally used for a 6-8 month winter crop prior to sowing a summer crop.

Italian ryegrass is also widely used for undersowing into run out pasture to boost winter and early spring performance. Its rapid establishment makes it well suited to this role.

Including Italian/annual ryegrass in a permanent pasture seed mix is not generally recommended. Italian and annual ryegrasses tend to die out, allowing weeds to take over. They also establish rapidly and compete strongly with perennial ryegrass.

<b>More persistent</b>   <b>Less persistent</b>	Perennial ryegrass
	Long rotation ryegrass
	Hybrid ryegrass
	<b>Italian ryegrass</b>
	<b>Annual ryegrass</b>

## Heading dates of Italian and annual ryegrasses\*

Italian	Days	Annual	Days
<i>Cordura</i>	+12	<i>Winter Star II (T)</i>	+9
<i>Warrior</i>	+12	<b><i>Archie (T)</i></b>	<b>+13</b>
<b><i>Tabu</i></b>	<b>+14</b>	<i>Progrow</i>	+13
<i>Asset</i>	+14	<i>Tama (T)</i>	+14
<i>Accelerate</i>	+15	<i>Sultan</i>	+15
<i>Moata (T)</i>	+16	<i>Zoom (T)</i>	+16
<i>Feast II (T)</i>	+17		
<i>Crusader</i>	+18		
<i>Sonik</i>	+21		

\* Day 0 is typically around 22 October, but this can vary from year to year. See page 102 for more.  
(T) = tetraploid.



# ITALIAN RYEGRASS CULTIVARS

***Tabu***

The industry standard. Very fast establishing with high winter yields. In the Advanced Yield Trials (AYT) and National Forage Variety Trials (NFVT®) *Tabu* is unbeaten for total yield. It has also demonstrated high lamb liveweight gains and can be used to produce high quality silage. (Refer also to the *Tabu* sheet on page 21).

***SF Accelerate***

Diploid Italian with an upright growth habit. Has a high tiller density and resistance to disease.

***Grasslands Asset***

Diploid Italian with a +14 days heading date, selected for growth into the second year. Available with *AR37* and *Without* endophyte. *Asset* with *AR37* endophyte can cause ryegrass staggers and is only to be used for undersowing.

***Cordura***

Fast establishing older cultivar with good winter-spring yield.

***Ceres Crusader***

Diploid short-term ryegrass with good establishment speed and production.

***Feast II (T)***

Tetraploid cultivar with good establishment speed and production.

***Grasslands Moata (T)***

Older tetraploid cultivar released in 1981, with reasonable yield but limited persistence. Superseded by other cultivars in yield and performance.

***Sonik***

Fine leaved, late heading (+21 days), winter active cultivar.

***Grasslands Warrior***

Diploid short-term ryegrass with fast establishment and good spring-summer yield.

# ANNUAL RYEGRASS CULTIVARS

## *Archie (T)*

Tetraploid cultivar, with very fast establishment and high winter yield. Offers quality feed over a 6-8 month period, with excellent palatability. Ideal between maize, cereal or other summer crops. (Refer also to the *Archie* cultivar sheet on page 22).

## *Progrow*

Older diploid Westerwold\* cultivar, with fast establishment and good winter yield but poor persistence. Superseded by other cultivars.

## *SF Sultan*

Diploid Westerwold\* cultivar with strong growth in autumn, winter and spring.

## *Grasslands Tama (T)*

Old tetraploid Westerwold\* cultivar released in 1968. Superseded by other cultivars. Virtually no persistence.

## *Winter Star II (T)*

Tetraploid annual ryegrass with a medium heading date (+9 days). Suitable for quick winter feed production.

## *Zoom (T)*

Tetraploid Westerwold\* cultivar with late heading date (+16 days), dense tillering and good winter activity.

\*Westerwold is a type of annual ryegrass, that doesn't need vernalisation (cold period) to set seed. I.e. Westerwold cultivars go to seed straight away when sown in spring.



*Archie is a fast establishing annual ryegrass providing excellent winter feed.*

# TABU ITALIAN RYEGRASS

*Tabu* is nutritious, has explosive establishment speed, exceptional winter and early spring growth and produces high year round growth. *Tabu* is unbeaten in AYT and NFVT® trials for total yield, and is the industry standard for Italian ryegrass.

## 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

No other cultivar has beaten *Tabu* in NZ Advanced Yield Trials (AYT) for total yield or persistence.

### 2004-11 NZ AYT Italian ryegrass DM yields, trial mean = 100%\*

Entry	First autumn	Winter	Early spring	Late spring	Summer	Second autumn	Total
<i>Tabu</i>	105 a	106 a	106 b	109 a	126 a	152 a	112 a
<i>Warrior</i>	96 cd	97 b	101 c	108 a	121 b	151 a	108 b
<i>Crusader</i>	106 a	108 a	98 c	103 b	112 cd	135 bd	105 bc
<i>Feast II</i>	97 cd	96 b	99 c	103 b	114 c	149 ab	104 c
<i>Indulgence</i>	101 b	93 bc	107 ab	102 b	110 ce	123 ce	102 cd
<i>Accelerate</i>	97 bd	98 b	111 a	109 a	104 df	106 e	102 cd
<i>Sonik</i>	98 bc	92 bc	94 d	103 b	114 c	143 ac	101 d
<i>Jeanne</i>	100 b	90 c	102 bc	94 c	96 fg	117 de	94 e
<i>Velocity</i>	83 e	84 d	101 c	93 c	102 ef	100 e	93 e
<i>Moata</i>	93 d	93 bc	100 c	94 c	91 g	74 f	89 f
100 = kgDM/ha	933	1302	2352	3459	2654	1277	11198

\*Combined data from 21 AYT's: 2004-5 Waikato; 2004-5 Manawatu; 2005 Waikato; 2006-7 Canterbury; 2006-7 Hawke's Bay) 2006-7 Waikato; 2007-8 Waikato; 2007 Waikato; 2007 Taranaki; 2007-8 Southland; 2008-9 Waikato; 2008 Waikato; 2008-9 Manawatu; 2008-9 Canterbury; 2009-10 Southland; 2009-10 Hawke's Bay; 2009-10 Waikato (2 trials); 2010-11 Waikato; 2010-11 Manawatu; 2010-11 Canterbury. All cultivars have been in at least 4 trials. Significance lettering is given at the LSD 5% level. Cultivars with the same letter are not statistically different.

## 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*

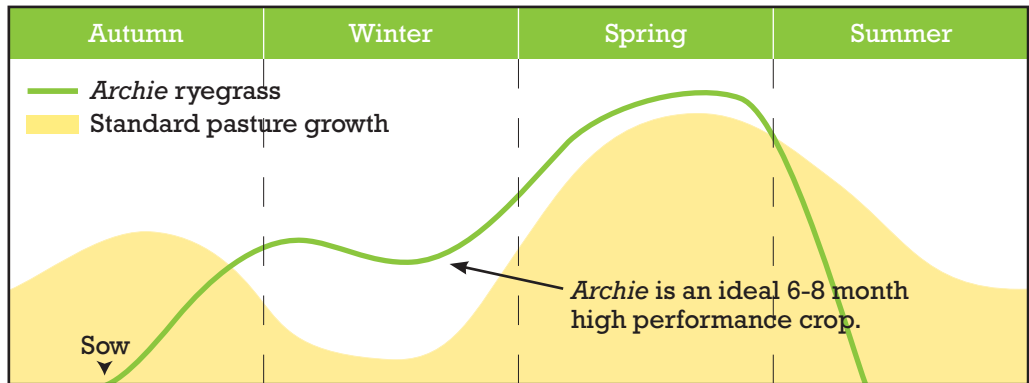
Dairy, Sheep, Beef, Deer		kg/ha
Winter crop	<i>Tabu</i> Italian ryegrass	18-22
Dairy, Sheep, Beef, Deer		kg/ha
For 2-3 year pasture option	<i>Tabu</i> Italian ryegrass	18-22
	<i>Tuscan</i> red clover	4
	<i>Kotare</i> or <i>Apex</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	25-29
Dairy, Sheep, Beef, Deer		kg/ha
For undersowing	<i>Tabu</i> Italian ryegrass	10-15
	<i>Kotare</i> or <i>Apex</i> white clover	1
	<i>Weka</i> white clover	1
	Total	12-17

# ARCHIE ANNUAL RYEGRASS

Stock Type Dairy, Sheep, Beef, Deer

## Seasonal growth

*Archie* is a tetraploid annual ryegrass for quick nutritious feed over a 6-8 month period. Ideal for use between maize and other summer crops.



## Fast establishment

Results from an Advanced Yield Trial (AYT) at Cambridge in Waikato show *Archie's* establishment advantage, compared with two other tetraploid cultivars (below). *Archie's* rapid establishment and winter growth make it ideally suited for use as a winter crop. For feed into late spring and summer, we recommend *Tabu* Italian ryegrass.

AYT tetraploid annual ryegrass yields (relative to trial mean=100)\*

Cultivar	Establishment autumn	Winter
<i>Archie</i>	118	105
<i>Moata</i>	93	81
<i>Tama</i>	99	100
100 = kg DM/ha	1220	1864

\*AYT run at St Peter's School Farm in Cambridge 2004-2005 under dairy cow grazing.

## High animal performance

*Archie* provides high levels of animal performance. In winter lamb finishing trials at Poukawa in Hawke's Bay, lambs on *Archie* ryegrass grew at over 310 g/day through late winter-early spring, stocked at 50 lambs/ha.

## Sowing Archie

Dairy, Sheep, Beef, Deer	kg/ha
For winter crop	<i>Archie</i> annual ryegrass*
	Total
	25-30
	25-30

\**Archie* sowing rate 30% higher than standard ryegrass as it is a tetraploid with larger seed.

# WHITE CLOVER

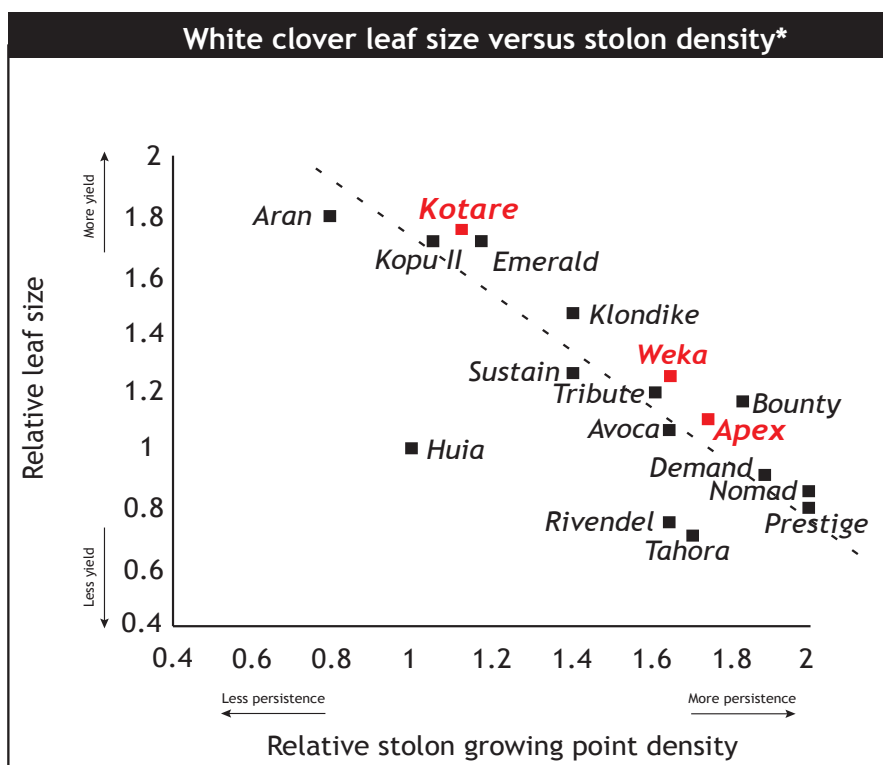
## Introduction

White clover (*Trifolium repens*) is the base legume of NZ's pastoral system. It is tolerant and persistent under a wide range of management systems, with a high feed value. Its ability to fix atmospheric nitrogen makes a substantial contribution to the growth of companion grasses.

White clover has little winter growth, is slower to grow in the spring than ryegrass and is susceptible to shading. Spring management aimed at keeping pastures short and leafy is therefore important to maintain good clover content and to capitalise on its good growth and feed value in summer.

## Leaf size versus stolon density

In white clover, there is a relationship between leaf size and stolon growing point density as seen on the graph below. A larger leaf size generally means more potential yield. However a high stolon density means that there's better tolerance of adverse conditions, such as drought, pests or pugging. The old variety *Huia*, first released in 1957, has a poor stolon density compared to modern cultivars of a similar leaf size (e.g. *Apex*). It's important to select the right clover for the situation based on these attributes.



\* 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.

# WHITE CLOVER CULTIVARS

## Large leaved cultivars

***Kotare*** *Kotare* is a large leaved very high yielding clover for dairy and beef grazing systems. It was bred to replace *Aran* with a higher stolon growing point density to give better tolerance to insects and pugging. (Refer also to the *Kotare* sheet on page 27).

***Aran*** High yielding clover with moderate stolon density.

***Grasslands Emerald*** Large leaved white clover bred for high production, stolon density and tolerance to clover root weevil.

***Grasslands Kopu II*** High yielding clover with good early season growth. Suited to dairying or rotational grazing.

***Klondike*** Large leaved cultivar with erect growth habit and good regrowth from grazing.

***Grasslands Mainstay*** High yielding with high stolon density and excellent persistence. Suited to dairy and rotationally grazed sheep and beef pastures.



*Kotare white clover in pasture.*

## Medium leaved cultivars

### **Apex**

*Apex* is a breakthrough in persistent, high yielding clover. It has a high stolon density, very good drought tolerance, resistance to leaf rust, pepper spot and clover rot, and has good clover root weevil tolerance. In AgResearch sheep grazing trials *Apex* out-yielded *Huia* by 23%, with better growth in all seasons. (Refer also to the *Apex* sheet on page 26).

### **Weka**

*Weka* is a medium-large leaved cultivar with a high stolon density, providing high DM yields. It has excellent persistence due to improved tolerance of clover root weevil, dry conditions, pugging and hard grazing. Suitable for all grazing systems. Bred to replace *Sustain*. (Refer also to the *Weka* sheet on page 28).

### **Avoca**

Medium leaved with high stolon density.

### **Grasslands Bounty**

Medium leaved cultivar, bred from *Demand* for greater autumn activity and increased leaf size.

### **Grasslands Demand**

Bred in Southland. Best suited to cool-temperate conditions. High stolon density with good summer growth. For sheep and beef.

### **Grasslands Huia**

Old cultivar, now superseded.

### **Grasslands Prestige**

Bred in Northland. High stolon density with good disease resistance and clover flea tolerance. For sheep and beef.

### **Grasslands Tribute**

Medium leaved stoloniferous clover from Australia-NZ joint venture breeding programme.

### **Grasslands Sustain**

High yielding, medium-large leaved clover. Suited to all farming systems.

### **SF Quest**

Medium large leaved clover suitable for multi-purpose use.

## Small leaved cultivars

### **Grasslands Nomad**

Smaller leaved clover bred from the Grasslands dryland programme.

### **Grasslands Tahora**

Persistent cultivar best suited to summer moist sheep and beef farming.

### **Rivendel**

Persistent small leaved cultivar, well suited to set stocking.

# 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. *Apex* was bred under a cooperative programme with AgResearch Grasslands.

## 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. An AgResearch trial over four years 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 AgResearch 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
<i>Apex</i>	156	139	108	127
<i>Huia</i>	100	100	100	100
LSD (5%)	22	18	15	18

\*Two trials run 1997-00 & 1996-99. Woodward & Caradus. NZ J. Ag. Res (2000) 43: 323-333

## Spreading growth



*Apex spreads strongly across bare ground, increasing legume content.*

## Sowing Apex

Sheep, Beef & Deer	kg/ha
For more clover in grazing systems	18-30
Perennial ryegrass	1.5
<i>Apex</i> white clover	1.5
<i>Weka</i> white clover	1.5
Total	21-33



# KOTARE WHITE CLOVER

Stock Type

Dairy, Beef

## High

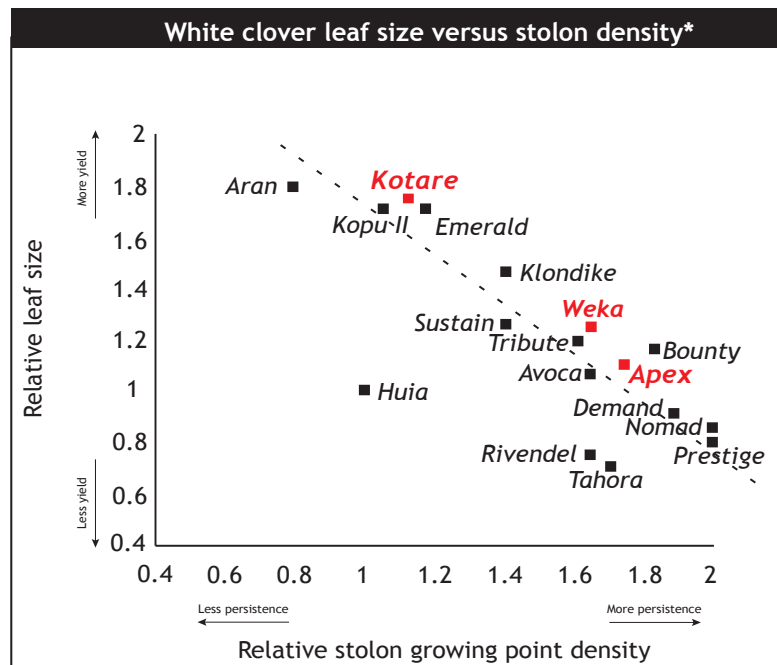
*Kotare* is a large leaved very high yielding white clover for dairy and beef grazing systems.

*Kotare* has shown very high total yields in trial, with excellent summer and autumn yielding ability.



## Stolon density

The stolon growing point density of *Kotare* is high for a large leaved clover. More growing points gives 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
	<i>Kotare</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	21-33

*Kotare* White Clover is owned and marketed by Agriseeds  
*Kotare* White Clover is protected under the NZ Plant Variety Rights Act 1987

# 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
<i>Weka</i>	6.1 a	5.2 a	5.8 a	6.0 a	5.8 a	5.8 a
<i>Tribute</i>	5.6 ab	4.4 a	5.7 a	5.9 a	5.8 a	5.5 a
<i>Sustain</i>	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

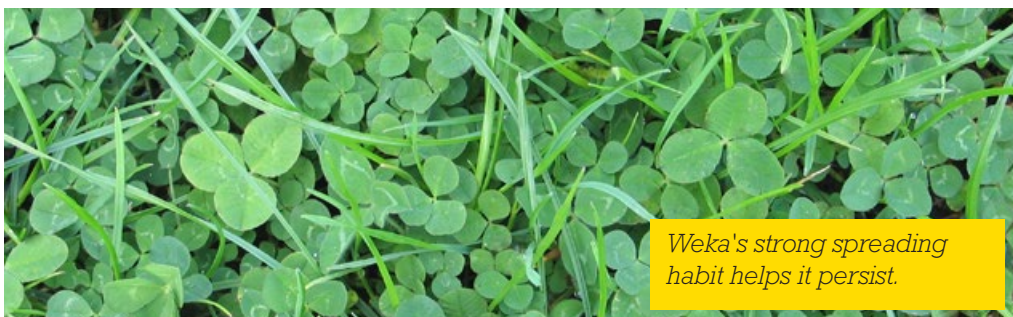
*Weka* has excellent persistence because of its high tolerance to clover root weevil, dry conditions, pugging and hard grazing, and its strong spreading habit.

Yield scores under high levels of clover root weevil 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
<i>Weka</i>	5.5 a
<i>Tribute</i>	4.9 b
<i>Sustain</i>	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.



*Weka's strong spreading habit helps it persist.*

## Sowing *Weka*

All systems		kg/ha
Productive, persistent clover combination	Perennial ryegrass	18-30
	<i>Weka</i> white clover	1.5
	<i>Kotare</i> or <i>Apex</i> white clover	1.5
	Total	21-33

# RED CLOVER

## Introduction

Red clover (*Trifolium pratense*) is a tap rooted legume with high feed value. It has good summer growth and drought tolerance, but little winter growth. It performs best on free draining soils under moderate stocking rates, long summer grazing rotations or hay production. Under high stocking rates or fast summer grazing rotations its persistence is reduced.

Red clover is commonly sown as a component of a perennial pasture in summer dry areas, to boost summer growth and feed quality.

Red clovers contain phyto-oestrogens so care should be taken if feeding to breeding stock during mating. (This mainly applies in the late summer and autumn periods when red clover is growing well). Phyto-oestrogen levels vary between red clover cultivars.

# RED CLOVER CULTIVARS

## Cultivar descriptions

### *Tuscan*

*Tuscan* was bred for persistence, good summer growth and improved grazing tolerance. It provides a source of excellent quality feed over summer and autumn, and is suited to all farm types. Contains moderate-high phyto-oestrogen levels. (Refer also to the *Tuscan* sheet on page 30).

### *Ceres Colenso*

An early flowering diploid cultivar with improved cool season production. More prostrate than *Pawera* giving better tolerance of hard grazing. Contains moderate phyto-oestrogen levels.

### *Grasslands Pawera (T)*

A late flowering, erect, tetraploid cultivar best suited to rotational grazing. Has superior summer-autumn growth but little winter growth. Contains high phyto-oestrogen levels.

### *Grasslands Sensation*

Early flowering upright cultivar bred for persistence under grazing. Contains moderate phyto-oestrogens.

### *Grasslands Turoa*

Old, late flowering, diploid cultivar first certified in 1937, traditionally known as "Montgomery Red". Contains high phyto-oestrogen levels.

### *Rajah*

European red clover with an intermediate to late flowering date giving good flexibility in spring.

### *SF Rossi*

Red clover bred for persistence and disease tolerance.

# TUSCAN

## RED CLOVER

Stock Type Dairy, Sheep, Beef, Deer

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

### High yield

*Tuscan* shows excellent summer and autumn growth, and high total yield.

#### Agriseeds red clover yield - mixed sward grazing trials, Canterbury 2000-06\*

Cultivar	Spring	Summer	Autumn	Total
<i>Tuscan</i>	5.8 a	6.2 a	5.6 a	6.0 a
<i>Sensation</i>	5.4 a	5.6 a	5.0 a	5.2 ab
<i>Colenso</i>	5.2 a	4.1 b	5.2 a	4.9 b
LSD (5%)	1.0	1.4	1.3	0.9

\*Combines data from three trials run under sheep grazing in Canterbury 2000-06. Trials were visually scored where 9 = excellent yield and 1 = poor yield.

### 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/m <sup>2</sup> (Feb 2005)
<i>Tuscan</i>	17.1
<i>Sensation</i>	10.0
<i>Colenso</i>	9.5
LSD (5%)	5.3

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



### System fit

*Tuscan* is suitable for all farms 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 20% higher than *Colenso*, which is considered moderate. This is not a problem in most farm situations because animal grazing of red clover around mating time can be managed.

### Sowing *Tuscan*

*Tuscan* should be included in pasture mixes at a rate of 4 kg/ha.

# BROME GRASSES

(pasture brome, prairie grass, grazing brome)

Brome grasses are species suited to free draining soils of moderate fertility, particularly in lower rainfall areas. They do not persist well on poorly drained soils.

They are palatable, including their seed heads, and offer good quality feed. Bromes are slower than ryegrass to establish and should be sown in warm conditions (late summer/early autumn or spring), into a well consolidated seedbed.

Brome grasses are all quite different species (not just different cultivars). They range from the erect prairie grass (*Bromus willdenowii*) which is the least persistent and best suited to rotational grazing, through to the very persistent pasture brome (*Bromus valdivianus*).

Brome grasses do not contain endophyte.

# BROME GRASS CULTIVARS

Pasture brome

## *Bareno*

*Bareno* pasture brome is a standout persistent pasture for summer dry free-draining soils. In these situations it is more persistent than perennial ryegrass, is palatable, high yielding and legume-friendly. *Bareno* can be rotationally grazed or set stocked, and is 19 days later heading than *Gala*, with better late spring quality and summer growth. (Refer also to the *Bareno* sheet on page 33).

Grazing brome

## *Grasslands Gala*

*Gala* grazing brome, (*Bromus stamineus*) is a fine leaved, densely tillered species with good winter production. *Gala* performs best under set stocking systems.

Prairie grass

## *Ceres Atom*

*Atom* is a prairie grass, the same species as *Matua*. *Atom* was bred for a greater tiller density than *Matua*, improving its persistence under grazing.

## *Grasslands Matua*

*Matua* prairie grass is an erect broad leaved cultivar which has limited persistence under intensive grazing, and should only be used in rotational grazing or cutting systems. *Matua* has good winter production.

# BARENO MANAGEMENT

## Growing *Bareno*

*Bareno* is a real asset in dryland pasture systems. However, it is 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 weedstrike, 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.

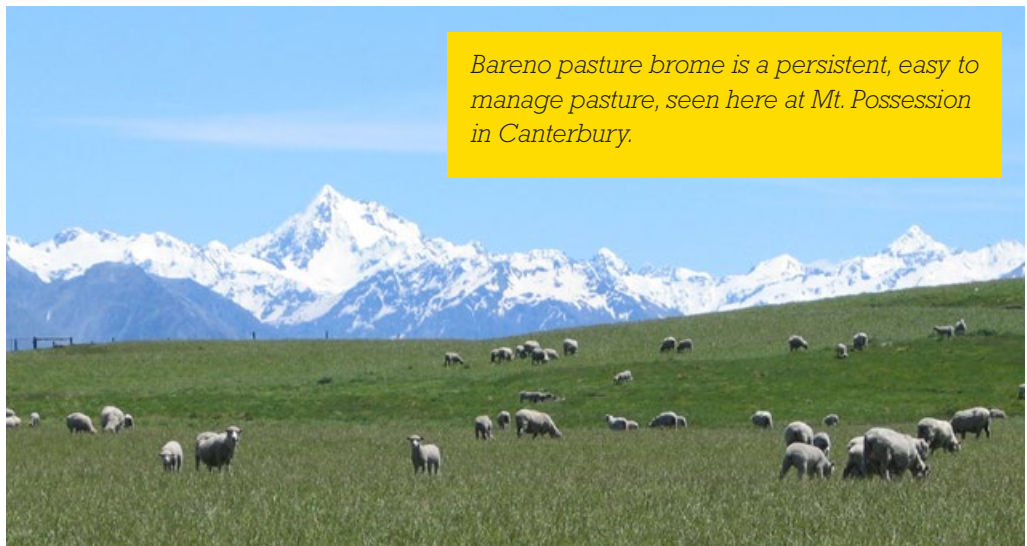
## Drilling

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.

# 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

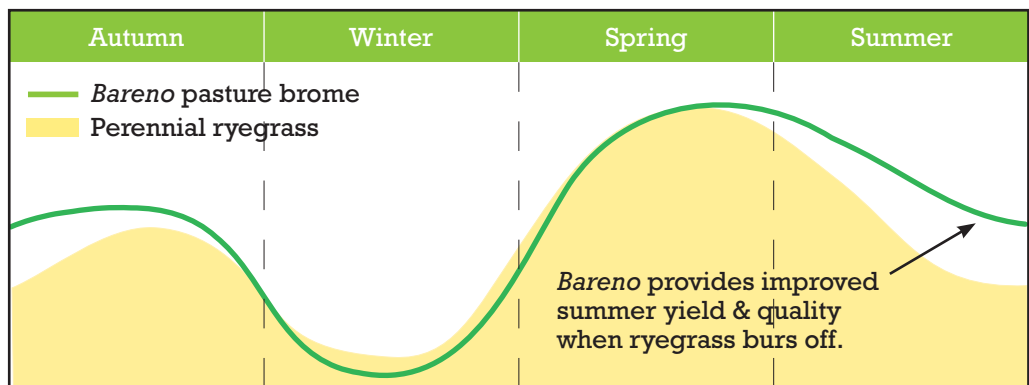
A strong feature of *Bareno* is its palatability through all seasons:

- 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 32 for more)

## Sowing Bareno

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

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

# COCKSFOOT

## Introduction

Cocksfoot (*Dactylis glomerata*) is a very persistent perennial grass that tolerates summer dry conditions, moderate soil fertility, insect attack and continual set stocking.

Cocksfoot is used to enhance the growth and persistence of permanent pastures in summer dry areas. It also adds variety to the stock diet.

Traditionally seeding rates of cocksfoot were kept low in a mix, because old cocksfoot cultivars would dominate pastures, reducing clover levels and digestibility. New fine leaved cocksfoot cultivars are much more compatible with ryegrass, giving better long term pastures.

Cocksfoot is quite slow to establish and has lower digestibility than most other grasses. Cocksfoot has limited winter growth but good summer growth.

# COCKSFOOT CULTIVARS

## *Safin*

A new type of 'superfine' cocksfoot, significantly finer leaved than *Ella*. It has high total DM yield, with significantly better early spring growth - critical for dryland farm systems for lambing or calving.

## *Grasslands Kara*

More upright cultivar that establishes faster than *Wana*. Has improved winter growth and disease resistance. Suited to dairy, beef and rotational sheep grazing.

## *Grasslands Tekapo*

Densely tillered fine leaved cultivar with good drought tolerance. Has similar production to *Wana* but heads 2 weeks earlier, giving slightly improved early spring growth. Suited to hard rotational grazing or set stocking with sheep.

## *Grasslands Vision*

Medium erect cultivar bred for high yield. *Vision* is suitable for both sheep and cattle farming.

## *Grasslands Wana*

Low crowned and densely tillered cultivar with very good persistence. Best suited to sheep grazing on free draining soils. Can dominate a pasture.

## *Greenly*

Fine leaved cocksfoot with an upright growth habit. Bred for quick establishment and good performance in dry conditions.

## *Kid*

Cocksfoot with good growth from spring till late autumn. Has good disease resistance.



# SAFIN

## SUPERFINE

## COCKSFOOT

### Introduction

*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 early spring production. 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
<i>Safin</i>	123 a	124 a	104 a	105 a	119 a	110 a
<i>Ella</i>	90 b	101 b	100 a	114 a	111 a	106 a
<i>Wana</i>	82 b	117 ab	96 a	106 a	113 a	104 a
<i>Vision</i>	96 ab	108 ab	106 a	98 a	95 a	102 a
<i>Kara</i>	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/m <sup>2</sup>	Relative to <i>Ella</i> at 100%
<i>Safin</i>	431 a	141 %
<i>Ella</i>	305 b	100 %
<i>Tekapo</i>	303 b	91 %
<i>Greenly</i>	270 b	81 %
<i>Vision</i>	270 b	81 %
<i>Kara</i>	245 b	73 %
Trial Mean	334	95
LSD (5%)	70	23
%CV	12	12
Significance	***	***

# SAFIN MANAGEMENT

## Pest control

Cocksfoot is tolerant to grass grub and Argentine stem weevil (ASW), but seedlings are susceptible to ASW adult attack. *AGRICOTE* Grass seed treatment is recommended where ASW problems are likely at establishment.

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 you often see little cocksfoot until the first summer after it has been sown.

If sowing a specialist cocksfoot-based pasture, sow early while soil temperatures are above 12°C. A summer fallow prior to a late summer/early autumn sowing is the recommended practice to establish Safin pastures in autumn dry conditions.

Cocksfoot is lower in feed value than ryegrass, and needs to be kept short and leafy through spring to maintain good feed value. In grazing trials, where cocksfoot has been kept short and leafy, animal performance is reasonably good. Maintaining good legume content in cocksfoot pastures will improve animal performance.

Cocksfoot is tolerant of low-moderate soil fertility. However, it responds well to nitrogen fertiliser, generally at higher response rates than ryegrass.

## Sowing Safin

Sheep, Beef, Deer		kg/ha
As component of pasture mix	<i>Safin</i> cocksfoot	3
For cocksfoot-based pasture	<i>Safin</i> Cocksfoot	8-10
	Sub clover	6-8
	<i>Apex</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	17-21



*Older, traditional cocksfoot (left) can form unpalatable clumps in a pasture, compared to superfine Safin cocksfoot (right).*

# TALL FESCUE

## Introduction

Tall fescue (*Festuca arundinacea*) suits some situations but not others. It is a perennial grass more tolerant of hot summers and poorly drained soils than perennial ryegrass. It is sensitive to soil temperature so must be sown when soil temperatures are above 12°C. It is slower to establish than ryegrass, so it is more important to have a good weed free seedbed.

In recent years, with the development of new ryegrass endophytes, tall fescue has become less popular.

In NZ it is mainly sown in dry areas for its summer growth and good clover content, performing best on clay soils, where its deeper rooting ability can utilise more soil moisture than ryegrass. It requires different pasture management than ryegrass, and this has been its main limitation in NZ. It needs to be grazed at the correct time in spring, more frequently than ryegrass, to prevent a loss of feed quality.

Tall fescue performs best under cattle grazing and can struggle to persist well under sheep grazing, where pastures are grazed very short during periods of set stocking.

## Tall fescue cultivars

### Grasslands Flecha

Persistent, fine leaved, winter-active cultivar. *Flecha* persists through drought by becoming dormant during summer. Well suited to summer dry areas, where persistent pastures are required. Available with *Max P* endophyte.

### Grasslands Advance

Bred for improved establishment speed over the old cultivar *Grasslands Roa* (no longer available) while attempting to maintain the palatability of *Roa*. Has good rust resistance. Available with *Max P* endophyte.

### SF Finesse Q

Densely tillered, softly leaved fescue with an intermediate heading date. Does not contain endophyte.

### Quantum II

Selected for improved rust tolerance and softer leaves. Available with *Max P* or *Without* endophyte.

### Easton

New tall fescue developed from *Advance* for increased production and persistence. Available with *Max P* endophyte.

# GREENFEED OATS

## Introduction

Greenfeed oat (*Avena sativa*) crops are easy to manage, providing a large quantity of good quality winter feed quickly. Oats are usually grazed once or twice. For extra production and grazings into spring *Hattrick* oats are usually sown with an Italian or annual ryegrass (e.g. *Tabu* or *Archie*).

Oats are often compared to ryegrass as a winter crop. Oats produce a larger bulk of winter feed. Italian or annual ryegrass is higher in feed value and can be grazed more times into spring.

## Oat cultivars

### *Hattrick*

*Hattrick* is a well proven cultivar with excellent rust resistance, high yield and good regrowth. When leafy, *Hattrick* has 80% digestibility (or ME = 12 MJ/kg DM) and a 13-15% protein content. Suitable for grazing or making into silage. (Refer also to the *Hattrick* sheet on page 39).

### *Coronet*

High yielding cultivar that can be either autumn or spring sown. Has a fine stem, high leaf content and good disease and frost tolerance.

### *Hokonui*

*Hokonui* is suited to a single grazing in autumn or for cutting as silage in the spring. Has a good leaf:stem ratio and is winter hardy. *Hokonui* oats are resistant to crown rust in the South Island.

### *Magnum*

A tall cultivar with good feed quality, suited to conservation as hay or green chop silage. It has rapid stem elongation with an upright habit.

### *Milton*

Establishes rapidly, suited to autumn planting for a single winter grazing, or as green chop silage in the autumn or spring. Has a high leaf:stem ratio and good yield and disease resistance.



Greenfeed oats provide a high quantity of winter feed.

# HATTRICK GREENFEED OATS

*Hattrick* is an easy to manage winter crop. It is most often sown mixed with Italian or annual ryegrass, to extend growth into spring.

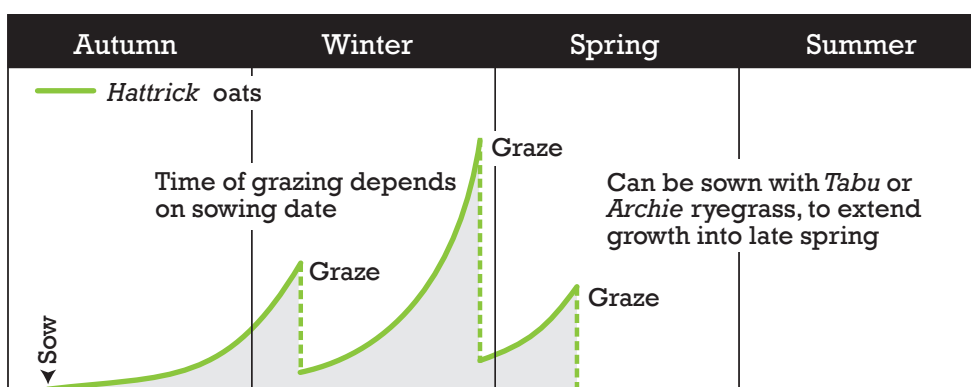
## Management

*Hattrick* is leafy, high yielding, and more adapted to multiple grazings than some other oat cultivars. It can usually be grazed 2-3 times depending on management. For best regrowth graze at 30 cm height, leaving a 7-10 cm residual. Growth can be boosted by strategic use of nitrogen fertiliser, for example applying 30 kg N/ha after grazing.

## Feed value

Leafy *Hattrick* oats have a digestibility of 80% (ME = 12 MJ/kg DM) and contain 13-15% protein.

## Growth curve



## Sow early

For maximum winter production *Hattrick* oats should be sown early (February/March). Insecticide protection against Argentine stem weevil may be necessary in some areas.

*Hattrick* oats can be sown alone, but are most commonly sown with Italian or annual (e.g. *Tabu* or *Archie*). Mixing *Hattrick* with a ryegrass increases feed value and extends growth through spring.

## Sowing *Hattrick*

Dairy, Sheep, Beef, Deer		kg/ha
For a large bulk of winter feed	<i>Hattrick</i> forage oats	100
	Total	100
For extended feed into late spring	<i>Hattrick</i> forage oats	50
	<i>Tabu</i> Italian ryegrass	20
	Total	70
For increased early spring yield	<i>Hattrick</i> forage oats	50
	<i>Archie</i> annual ryegrass*	25
	Total	75

\**Archie* sowing rate 30% higher than standard, because it is a tetraploid with larger seeds.

# TIMOTHY

## Introduction

Timothy (*Phleum pratense*) is a late heading perennial grass suited to summer wet areas, particularly heavy soils. It persists poorly in dry areas. Timothy is mainly sown as a minor component of permanent pasture at 1-2 kg/ha. It has high feed value and performs best under rotational grazing. It has a summer growth peak with little winter or early spring production.

## *Dolina*

Medium leaved cultivar that is densely tillered with good spring production.

## *Grasslands Charlton*

Bred to supersede *Kahu*. Finer leaved cultivar that is late heading with high spring and summer production.

## *Grasslands Kahu*

Old NZ cultivar with limited winter production.



Timothy plant (left) & seedhead (right).

# CHICORY & PLANTAIN

## Chicory

Chicory (*Cichorium intybus*) is a broad leaved, tap-rooted, drought tolerant herb. It is normally sown as part of a pasture mix at 1-2 kg/ha, or as a summer crop at about 6 kg/ha. Chicory gives high stock performance, and has good summer but little winter growth. It is usually used as a 6 month or 18 month crop, or in a pasture seed mix where it may last 2-3 years.

Where broadleaf pastoral herbicides must be used (e.g. for thistle control) damage may occur to plants and chicory may not be able to be sown.

### 501 chicory

A high quality multigraze summer crop option. Has excellent DM yield with excellent insect tolerance and can be sown as a summer crop alone alone, in a mix with *Tuscan* red clover, or as part of a pasture mix. (Refer also to 501 chicory on page 42).

### Chico

Upright cultivar selected for improved winter activity.

### Choice

Cultivar selected for improved establishment vigour and persistence.

### Grouse

Upright cultivar selected for greater cool season activity.

### Grasslands Puna II

Semi-erect cultivar bred for improved utilisation and regrowth.

### SF Punter

Cultivar with strong summer and autumn growth.

## Plantain

Plantain (*Plantago lanceolata*) is a deep-rooted, mineral rich herb with good drought and pest tolerance. Plantain is generally sown in a mixture with grasses, legumes and other herbs at 0.5-2 kg/ha.

### SF Boston

An erect type with broad, dark green leaves. Is quick to establish and remains vegetative longer into summer due to late flowering. Has a small seed which allows for a lower sowing rate than other plantain varieties.

### Ceres Tonic

Establishes rapidly and has good winter growth, suitable for rotational grazing.

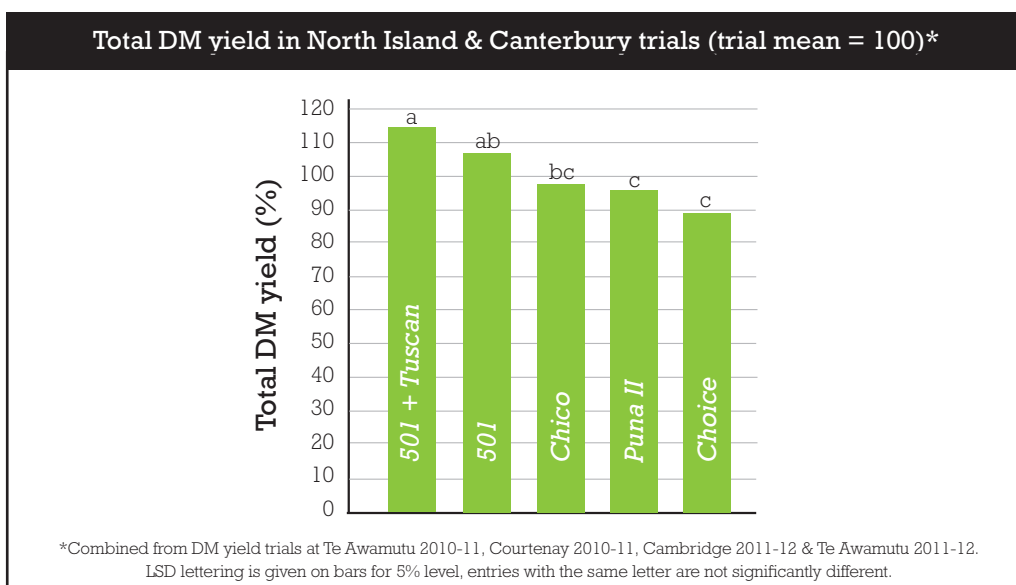
# 501 CHICORY

Stock Type Dairy, Sheep, Beef, Deer

*501* is a new chicory cultivar which has shown excellent DM yield. It was selected for an erect growth habit providing high utilisation, and low crown to reduce susceptibility to treading damage and *Sclerotinia*.

## Excellent DM yield

*501* chicory has shown very high DM yield in North and South Island trials conducted on four different soil types, over two separate seasons.



## Advantage of 501 + Tuscan

The combination of *501 + Tuscan* performed best in DM yield. 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 percent 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, the *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.



## Persistence

501 chicory and *Tuscan* red clover have both shown good persistence in the Waikato, better than *Choice* or *Puna II*.

North Island persistence scores at end of the trial (0-9; 0=least persistent, 9=most persistent)\*

Entry	Persistence score (9 = good)
<i>Tuscan red clover</i>	8.2 a
<i>Punter</i>	7.7 a
501 + <i>Tuscan</i>	7.2 ab
501 <i>chicory</i>	7.0 ab
<i>Chico</i>	6.0 bc
<i>Choice</i>	4.7 cd
<i>Puna II</i>	4.0 d
Significance	*

\* Scored at end of trial at Eureka, Waikato in March following November sowing. To provide cows with a third of their diet in chicory sow 5-6 ha/100 cows. Fed at 0.4ha/100 cows/day this gives about a 25 day round.

## Management

Sow chicory into 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 six leaf stage. Targets for grazing are:

- Pre-grazing targets: 3000 kg/DM/ha or 25-30 cm height.
- Post-grazing residual target: 1500 kg/DM/ha or 5-10 cm.

## 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.

## Taking 501 into a second season

Assess crops in autumn, as chicory plant populations need to be >30 plants/m<sup>2</sup> to justify taking the crop into a second summer. Avoid grazing chicory in wet conditions and through winter months to reduce plant death from *Sclerotinia*. Chicory has a tendency to bolt in the second spring, quickly going to seed and becoming unpalatable. Graze down chicory before seed heads become tall (over 40cm) and woody.

## Sowing 501 chicory

Use		kg/ha
For a chicory crop	501 <i>chicory</i>	8
	Total	8
Chicory/red clover crop	501 <i>chicory</i>	6
	<i>Tuscan</i> red clover	3
	Total	9
Two year crop	501 <i>chicory</i>	6
	<i>Tuscan</i> red clover	3
	<i>Weka</i> white clover	3
	Total	12
In a perennial pasture	<i>Trojan NEA2</i> perennial ryegrass	18-22
	501 <i>chicory</i>	2
	<i>Kotare</i> white clover	1.5
	<i>Weka</i> white clover	1.5
	Total	23-27