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SHOGUN

HYBRID RYEGRASS

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Redefining hybrid ryegrass.

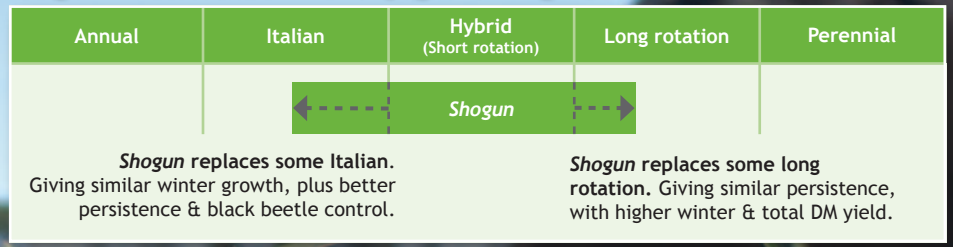
Shogun with *NEA* endophyte is no ordinary ryegrass.

In fact, it will create a new position in the market, and take hybrid ryegrass to a new level.

Winter growth from this new tetraploid cultivar is equal to that of many Italian ryegrasses, and *Shogun* out-yields most perennials during summer and autumn. Persistence is outstanding for a hybrid, and *Shogun* comes with its own unique endophyte for insect protection.

Because it is so advanced on many levels, *Shogun* will change the way New Zealand farmers renew their pastures.

Shogun redefines traditional ryegrass categories



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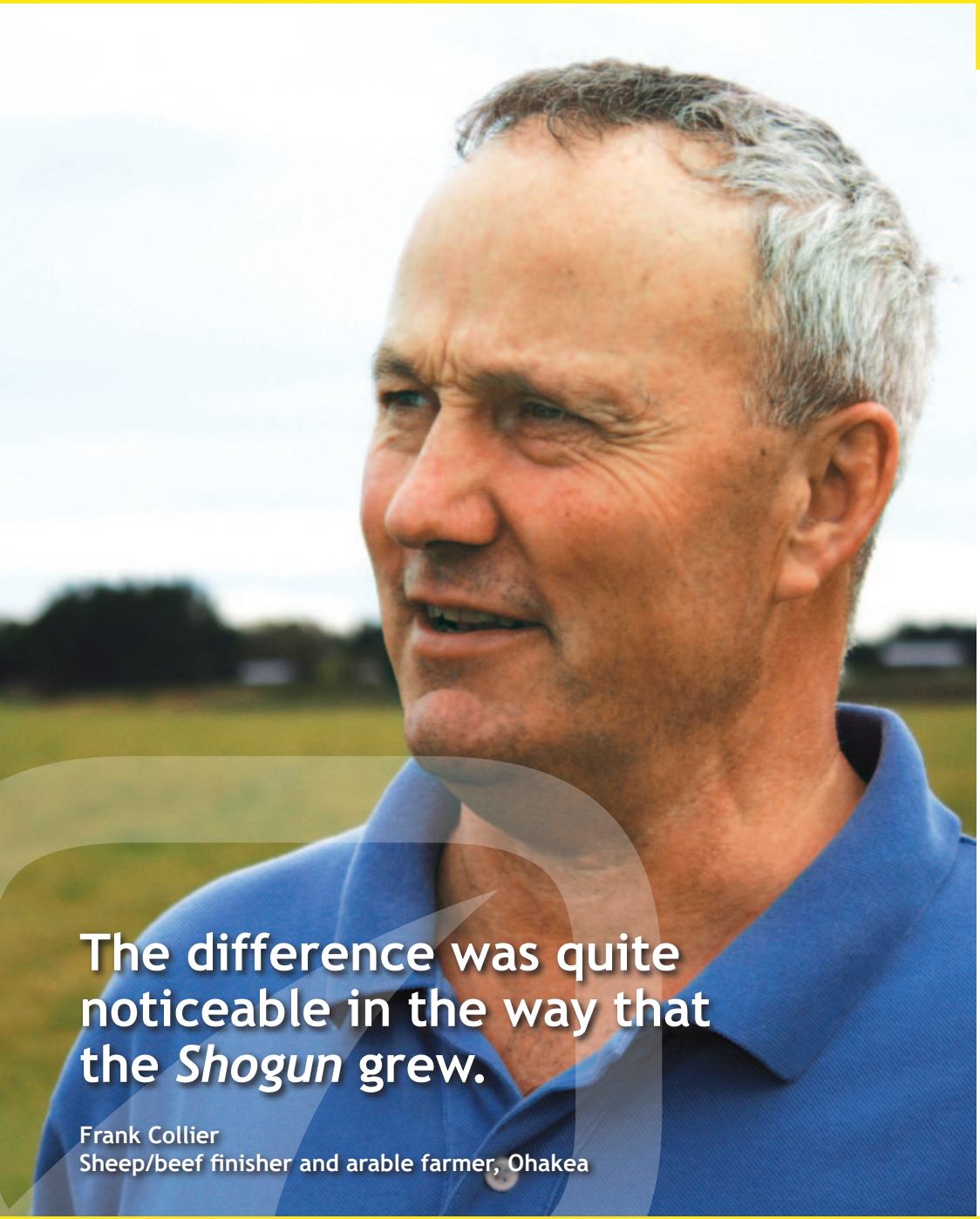

The difference was quite noticeable in the way that the *Shogun* grew.

Frank Collier
Sheep/beef finisher and arable farmer, Ohakea

1. Pasture renewal

The average rate of pasture renewal on New Zealand farms is only 3-4% a year, well below the 10% widely regarded as ideal. One reason for this is the way in which we renew our pastures. *Shogun*, with its unique combination of performance and flexibility, overcomes some of the limitations of existing pasture renewal techniques and makes higher rates of renewal a reality.

One of the most common factors stopping farmers renew more pasture is their high stocking rate (relative to a farm's pasture production), meaning only limited areas of the farm can be taken out of grazing for resowing. *Shogun* helps resolve this long-standing challenge.

Key benefits from *Shogun* with *NEA* for increased pasture renewal:

1. **Exceptional DM yield**
2. **Fast establishment**
3. **Ideal for undersowing**
4. **Winter growth with flexibility**

Exceptional DM yield

Over a 12 month period, *Shogun* has the highest DM yields of any ryegrass we've tested. It produces more than most perennial ryegrasses in summer and autumn, and in winter and early spring its growth is comparable to an Italian. Simply put, this level of feed supply frees up more paddocks for renewal.

The extra profitability *Shogun* can generate also helps fund investment in increased pasture renewal.

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. Less down time means larger areas of pasture can be renewed without compromising production.

For the same reason, *Shogun* lends itself to pasture renewal programmes which utilise staggered sowing dates - sown paddocks are ready for grazing quickly, allowing further paddocks to be dropped out of grazing for renewal.

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The *Shogun* advantage.

Undersowing

Shogun is ideal for undersowing (drilling seed into pasture without a herbicide spray). This is a key technique for reviving larger areas of pasture on some farms. See page 8 for more detail.

Winter growth with flexibility

Cool season feed is critical in most New Zealand farm systems, whether it is for early lactation, winter finishing, or for winter carrying capacity.

Traditionally, annual or Italian ryegrass cultivars have been used to achieve extra cool season pasture growth but the extent of their use in our farm systems is limited by their persistence.

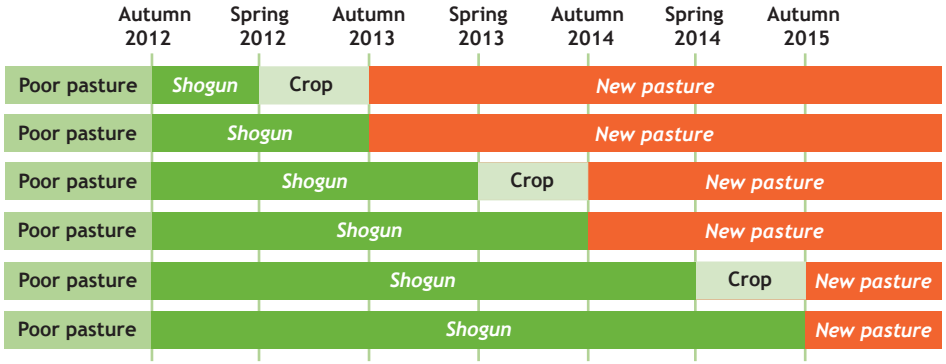
Shogun however provides similar levels of winter growth with the flexibility of a longer-lasting pasture, with typical persistence of three years.

For example, rather than having 10 ha of Italian ryegrass each winter, a farmer could have 30 ha of *Shogun* (10 ha new sowing; 10 ha one year old: 10 ha two years old), which would significantly improve winter feed supply.

This flexibility with *Shogun*'s persistence has significant value for farmers, as opportunities change.

Shogun also has the flexibility of being sown in a range of mixes (e.g. alone, with white clover, red clover, chicory, or plantain) as the situation requires.

Shogun flexibility - multiple options



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2. Undersowing

Undersowing can improve thin pastures for one to three years prior to full renewal. Over 99% of seeds in the soil on dairy farms are weeds[1], and these can quickly take over if thin pastures aren't thickened with ryegrass. *Shogun* is tailor-made for this purpose, offering a mix of attributes unlike any other cultivar.

Key benefits from *Shogun* with *NEA* for undersowing:

1. **Fast, reliable establishment**
2. **Exceptional DM yield**
3. **High winter yields**
4. **Three year option**
5. **Black beetle control**

Fast reliable establishment

Shogun establishes very rapidly, similar to Italian ryegrass, giving better, more reliable results from undersowing. This is the most important advantage of *Shogun* compared with undersowing perennial ryegrass, because seedlings must be able to compete well with existing pasture.

Exceptional DM yield

Shogun has a significant advantage over Italian, perennial and other hybrid ryegrasses.

Shogun and Italian ryegrass (such as *Tabu*) both establish very rapidly, and provide excellent winter and spring season yield. However *Shogun* will produce significantly more growth over summer, increasing total feed supply over a 12 month period.

And with its low aftermath heading, *Shogun*'s ME in summer is significantly better.

Compared with perennials and other hybrids, *Shogun* will supply significantly more DM over three years, because it has both superior cool season growth and exceptional summer and autumn yields.

High winter yields

Shogun's extra winter growth over perennial and other hybrid ryegrasses makes it highly valuable as an undersowing option, helping with winter feed supply or getting the farm to target pasture covers at calving or lambing.

1 Recent work on determining what seeds are in the soils of North Island dairy farms found over 99% are weeds. Reference: Tozer et.al, NZ Plant Protection 64: 68-74 (2011).

Three year option

The better persistence of *Shogun* compared with Italian ryegrass can reduce farm costs. *Shogun* is up to a three year undersowing option, whereas using an Italian ryegrass often entails re-sowing costs to provide extended production.

Black beetle control

In black beetle problem areas, undersowing *Shogun* is highly recommended, because its *NEA* endophyte gives good black beetle control, limiting their numbers.
See page 25 for more detail.

Italian ryegrasses without endophyte should not be used for undersowing in areas where black beetle is a problem because they are a preferred feed of this costly pest.

Lambs graze it very evenly and do seem to do very well on it. We are very pleased with the weight gain and performance.

Brian Leadley
Seed grower and lamb finisher, Mid Canterbury

3. Finishing

Two pasture attributes are essential for achieving optimal liveweight gain in sheep and cattle – high feed quality, and high DM yield. This applies equally to both livestock finishing systems, and growing out flock and herd replacements. *Shogun* has both the feed quality and the yield, along with other key features, to enhance animal performance year-round in a variety of farm systems.

Key benefits from *Shogun* with *NEA* for finishing:

1. **Palatable tetraploid**
2. **High feed quality**
3. **Exceptional DM yield**
4. **Winter yield for winter finishing**
5. **Minimal risk of staggers**

Palatable tetraploid

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.

Shogun's palatability also improves pasture utilisation, leading to cleaner grazings and more even post-grazing residuals, which in turn set up higher pasture ME for subsequent grazings.

High feed quality

Shogun's very late heading (+26 days) and reduced aftermath heading (AMH) make it particularly well suited for finishing systems where high LWG and relatively easy pasture management are priorities.

Later heading (or seeding) pastures stay leafier longer into late spring, maintaining ME levels and reducing the need to top pastures to maintain quality. At +26 days, *Shogun*'s heading date is one of the latest available.

AMH, or further seeding over summer (following spring seeding) reduces summer feed quality, and is a traditional problem with Italian and some hybrid ryegrasses. *Shogun* shows little AMH, helping it maintain superior ME over summer.
See page 21 for details.

Exceptional DM yield

High DM yields combined with good feed quality support increased stocking rates and/or improved animal performance (e.g. meat grown/ha) in sheep or cattle finishing systems. In trials *Shogun* has set

a new standard of performance for total DM yield from hybrid ryegrass, standing head and shoulders above similar cultivars.

Winter growth for winter finishing

Cool season production is a major requirement for winter finishing. In trials *Shogun* has produced significantly more winter DM yield than other hybrid ryegrasses. See page 18 for details.

Shogun's cool season production is more similar to that of an Italian ryegrass than a hybrid. However, because it lasts longer than an Italian, it is an ideal alternative for winter finishing, with the financial benefit of not having to be possibly resown in years two or three (or longer in areas with mild summers).

For example, rather than sowing 10 ha of winter active Italian ryegrass each year, a farmer could instead have 30 ha of *Shogun* (10 ha new sowing; 10 ha one year old: 10 ha two years old). This would provide more opportunities for profitable cool season finishing.

Minimal risk of staggers

In trials to date no ryegrass staggers have been seen in animals grazing *Shogun* with *NEA* endophyte, nor have we observed any other animal health issues. See page 27 for more on *NEA* endophyte and ryegrass staggers.

Extreme palatability differences were 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.

Breeding.

Shogun with *NEA* endophyte is a step change in hybrid ryegrass breeding in New Zealand.

Shogun originated from the Agriseeds hybrid ryegrass breeding programme, which each year develops a range of new pipeline cultivars.

Specifically *Shogun* is an Italian ryegrass x perennial ryegrass cross, using parents selected for DM yield, cool season growth and persistence.

It not only combines the best traits of its parent plants, it also significantly out performs its parents in virtually every attribute. This is a rare result in any breeding programme, be it for pasture plants or livestock.

NEA is the natural endophyte of *Shogun*, which we believe is one reason for its outstanding performance.

It was in the first DM yield trials that *Shogun* started to shine, when it significantly out yielded all other hybrid ryegrass cultivars, first in winter, then in summer. Next it demonstrated superior persistence (for a hybrid), withstanding insect pressure including Argentine stem weevil, and black beetle in Waikato trials.

As we collected more data on *Shogun* it continued to perform at the same high level, setting a new standard for hybrid ryegrass in NZ pastoral farming.

Large differences seen due to insect damage. The NEA effect (left) versus a hybrid ryegrass without endophyte (right) at Poukawa, Hawke's Bay 8 February 2011.

Exceptional yield.

Shogun with *NEA* has exceptional total DM yield.

From its very first trials, *Shogun* has stood out for its ability to out produce many other ryegrasses.

In the trial below, run under rotational sheep grazing, *Shogun* significantly out yielded all other entries over two and a half years. The second best hybrid ryegrass, *Harper AR1*, is 22% lower yielding.

2009-11 Courtenay, Canterbury DM yields over 2 ½ years, trial mean = 100%*

Entry	Winter	Early Spring	Late Spring	Summer	Autumn	Total
Shogun NEA	**156 a**	**113 ab**	**104 ac**	**134 a**	**135 a**	**124 a**
*Tabu***	156 a	117 a	106 ab	112 b	119 b	115 b
*Feast II***	147 a	111 ab	95 de	92 c	119 b	103 c
Harper AR1	118 b	113 ab	94 ef	106 b	99 c	102 c
Ohau AR1	48 e	91 c	103 b	96 c	89 d	101 cd
Supreme Plus AR1	70 d	86 c	112 a	91 c	91 cd	96 de
Delish AR1	99 c	115 a	93 ef	91 c	88 d	95 e
Maverick GII WE	109 bc	108 ab	95 cd	72 de	95 cd	87 f
Sterling AR1	37 ef	72 d	107 ab	90 c	70 ef	85 fg
Momentum WE	98 c	104 b	85 f	64 e	78 e	82 g
Storm WE	24 f	66 d	100 b	77 de	65 f	76 h
Perun WE	33 ef	87 c	85 f	68 de	66 f	74 h
Trial mean	669	1460	3422	1939	1132	8112
LSD (5%)	19.9	12.1	10.8	12.1	11.3	6.2

* Yields for 2.5 years to end of 2011; summer & autumn = average of 2 years only. Cultivars with the same letters are not significantly different. ***Tabu* & *Feast II* are Italian ryegrass cultivars.

In this Hawke's Bay trial, run under rotational sheep grazing, *Shogun* significantly out yielded other cultivars over the first year.

2010-11 Poukawa, Hawke's Bay DM yields over first year, trial mean = 100%*

Entry	Winter	Early Spring	Late Spring	Summer	Autumn	Total
Shogun NEA	**125 a**	**117 a**	**109 a**	**135 a**	**124 a**	**119 a**
Ohau AR1	106 b	103 b	97 bd	116 cd	115 b	106 b
Ohau AR37	88 d	97 bd	99 bc	122 bc	117 b	105 bc
Supreme Plus AR1	90 cd	101 b	94 cd	103 e	114 b	101 cd
Harper AR1	102 b	90 d	106 ab	88 f	103 c	99 d
Delish AR1	106 b	96 bd	88 d	105 e	103 c	97 de
Storm WE	74 e	93 cd	103 ab	75 g	93 d	92 e
Maverick GII WE	106 b	99 bc	93 cd	48 h	81 e	85 f
Momentum WE	99 bc	99 bc	88 d	36 i	0 f	64 g
Trial mean	1162	2357	5111	2385	2898	13914
LSD (5%)	12.7	8.7	10.9	9.4	7.6	5.9

* Yields for first year to end of 2011. Cultivars with the same letters are not significantly different.

Extraordinary seasonal growth.

Shogun with _NEA_ sets new levels of summer and autumn production, while still producing similarly to Italian ryegrass during winter.

The table below presents the same data as on page 16, split and ranked on warm season and cool season growth respectively.

In the warm season *Shogun* significantly out yielded all other ryegrasses. The next best hybrid, *Harper AR1*, produced 29% less through this period.

In the cool season, *Shogun* produced similar yields to the Italian ryegrasses, and significantly out grew all other hybrids through winter.

2009-11 Courtenay, Canterbury DM yields over 2 ½ years, trial mean = 100%*

Warm season growth		
Entry	Summer	Autumn
Shogun NEA	**134 a**	**135 a**
*Tabu***	112 b	119 b
Harper AR1	106 b	99 c
*Feast II***	92 c	119 b
Ohau AR1	96 c	89 d
Supreme Plus AR1	91 c	91 cd
Delish AR1	91 c	88 d
Sterling AR1	90 c	70 ef
Maverick GII WE	72 de	95 cd
Storm WE	77 d	65 f
Momentum WE	64 e	78 e
Perun WE	68 de	66 f
Trial mean	1939	1132
LSD (5%)	12.1	11.3

Cool season growth		
Entry	Winter	Early Spring
*Tabu***	156 a	117 a
Shogun NEA	**156 a**	**113 ab**
*Feast II***	147 a	111 ab
Harper AR1	118 b	113 ab
Delish AR1	99 c	115 ab
Maverick GII WE	109 bc	108 ab
Momentum WE	98 c	104 b
Supreme Plus AR1	70 d	86 c
Ohau AR1	48 e	91 c
Perun WE	33 ef	87 c
Sterling AR1	37 ef	72 d
Storm WE	24 f	66 d
Trial mean	669	1460
LSD (5%)	19.9	12.1

* Yields for 2.5 years to end of 2011; summer & autumn = average of 2 years only. Cultivars with the same letters are not significantly different. ***Tabu* & *Feast II* are Italian ryegrass cultivars.

Normally it would be unfair to compare a hybrid against Italian ryegrasses, but *Shogun* measures up very well.

The table below presents yield data for the first eight months of the Agriseeds Italian ryegrass trial sown in the Waikato, at St Peters School dairy farm under dairy cow grazing, in March 2011.

Shogun showed excellent establishment speed and yield in the first autumn, on par with the other Italian ryegrass cultivars. In winter, *Tabu* pulled ahead, but *Shogun* was similar in yield to a range of Italian cultivars including *Assett AR37*.

In late spring the warm season advantage of *Shogun* starts to show, when it out yielded all other entries. Over the full eight months *Shogun* is on par with *Tabu* for total DM production.

2011 Cambridge, Waikato DM yields over 8 months, trial mean = 100%*

Entry	Establishment Autumn	Winter	Early Spring	Late Spring	Total
Tabu	95	115 a	109	112 b	109 a
Shogun NEA	**101**	**88 bc**	**99**	**131 a**	**109 a**
Feast II	106	99 b	106	100 bc	102 ab
Crusader	87	92 bc	106	97 bd	97 bc
Assett AR37	98	83 c	88	98 bd	93 bc
Winter Star II	103	97 bc	103	83 d	93 bc
Archie	95	90 bc	94	92 cd	92 bc
Tama	97	83 c	96	86 cd	90 c
Trial mean	1604	1746	2169	2838	8677
LSD (5%)	16.2	18.7	14.2	19.8	12.3

* Yields for 8 months to end of 2011. Cultivars with the same letters are not significantly different.

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High quality feed.

Shogun with _NEA_ combines a range of features to provide high feed quality for both sheep and cattle farm systems.

Shogun's palatability, very late heading, and reduced aftermath heading (AMH) all make it particularly well suited for delivering high animal performance, with relatively easy pasture management.

Shogun's palatability also improves pasture utilisation, leading to cleaner grazings and more even post-grazing residuals, which in turn set up higher pasture ME for subsequent grazings.

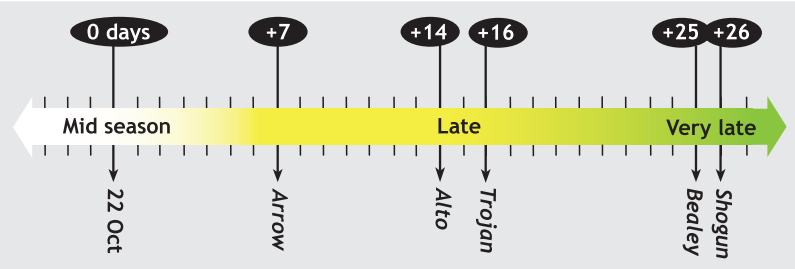
Palatable tetraploid

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, delivering high animal intakes and growth rates.

Very late heading

Later heading (or seeding) pastures stay leafier longer into late spring, maintaining ME levels and reducing the need to top pastures to maintain quality. At +26 days, _Shogun_'s heading date is one of the latest available.

Heading dates of Agriseeds ryegrasses*



* Day 0 is typically around 22 October, but this varies by 2-3 weeks. A cold early spring delays it, whereas a warm spring can bring heading on earlier.

Reduced aftermath heading

AMH, or a further seeding over summer (following spring seeding) reduces summer feed quality, and is a traditional problem with Italian and some hybrid ryegrasses. _Shogun_ shows low levels of AMH, helping it maintain superior ME over summer.

Aftermath heading scores, Courtenay, Canterbury.

Visually assessed on basis 9 = no seedhead; 1 = lots of seedhead.

Entry	Seedheads 12 Jan 2010	Seedheads 21 Jan 2011	Average Score
Shogun NEA	**6.5 a**	**8.1 a**	**7.3 a**
Delish AR1	6.3 a	7.0 b	6.6 b
Maverick GII WE	6.2 a	6.0 bd	6.1 bc
Bealey NEA2	5.8 ac	6.2 bd	6.0 bc
Supreme Plus AR1	5.0 cd	6.2 bd	5.6 cd
Ohau AR1	4.5 d	6.5 bc	5.5 cd
Feast II	6.0 a	4.7 e	5.3 de
Sterling AR1	4.9 c	5.7 ce	5.3 de
Perun WE	5.2 b	5.2 de	5.2 de
Momentum WE	6.1 ab	3.6 f	4.9 ef
Storm WE	4.2 d	4.7 e	4.5 fg
Harper AR1	4.7 d	3.3 f	4.0 gh
Tabu	4.7 d	2.2 g	3.4 h
Trial mean	5.6	5.6	5.6
LSD (5%)	0.9	1.1	0.7

Persistence.

Shogun with _NEA_ shows very good persistence for a hybrid ryegrass, and will last three years in most regions (likely five years in areas with mild summer conditions).

Shogun's persistence data comes from the Agriseeds trialling programme, where the persistence of every ryegrass cultivar is assessed by measuring 'ryegrass ground cover' at the end of each trial.

To do this 100 nails are placed down in each plot of the replicated trials, and the percentage of times the tip of each nail touches or misses ryegrass is recorded. The results give an accurate measure of how many ryegrass plants have survived the length of the trial, which is typically just over three years.

Measuring ryegrass ground cover at the end of a trial.

Persistence results

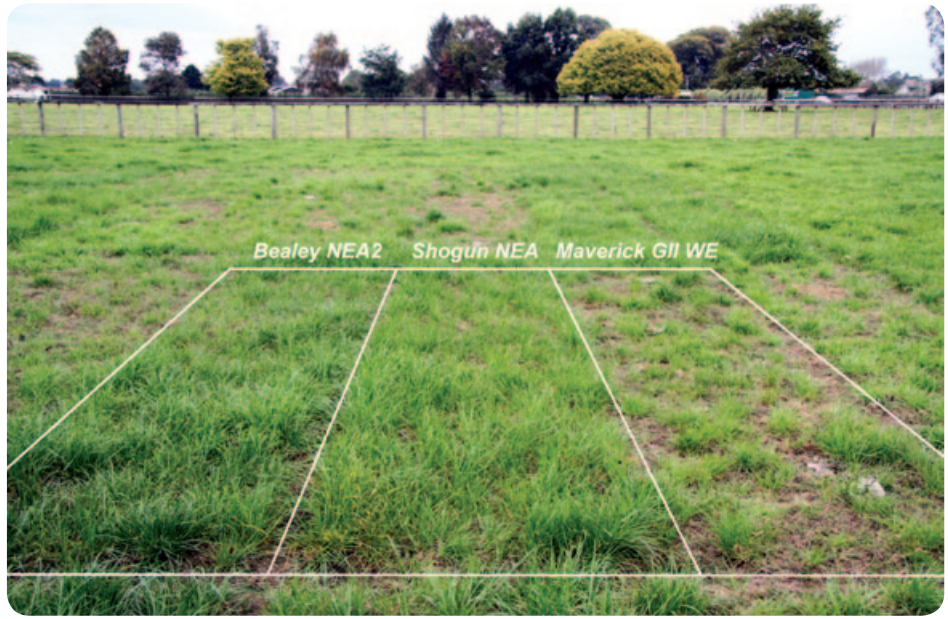
The oldest trial still running with _Shogun_ is at St Peters School dairy farm at Cambridge, which was sown April 2008. This trial was sown in a dry autumn, followed by two subsequent difficult summers.

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
*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.



Shogun with NEA set a new level of persistence for a hybrid ryegrass under the high insect pressures of the upper North Island. This photo was taken at St Peters School dairy farm in Cambridge three years after sowing.

NEA endophyte.

***NEA* endophyte is the natural endophyte with which *Shogun* was bred. It is, and performs very similarly to, the *NEA2* endophyte in *Bealey*.**

The *NEA* endophyte strain is one of the two endophytes in both *Bealey* and *Trojan* ryegrasses. Because of this, and because *Shogun* and *Bealey* are both tetraploids, the endophyte performance of *NEA* in *Shogun* is very similar to that of *NEA2* in *Bealey*.

For the past 10 years, most ryegrass cultivars and endophytes have not been selected together. Cultivars have been bred, tested, and prepared for commercial release, then they have been inoculated with a novel endophyte such as *AR1* or *AR37*. Different cultivars have been found to react differently to the same endophyte, and in the standard ryegrass development process often little account has been taken of this variable interaction between cultivar and endophyte.

In contrast *NEA* and *Shogun* have been selected together. We believe one reason we are seeing such good performance from this combination is because of their natural association with each other.

Alkaloid levels

NEA in *Shogun* produces lolitrem B, ergovaline and peramine, all at lower levels than *Standard* endophyte (SE). Note that alkaloid levels quoted are indicative only, as they vary widely both within and between seasons, influenced by climate, environmental and management factors.

Lolitrem B:

The lolitrem B level produced by *NEA* in *Shogun* is very low, with tests showing it is typically 5-10% of the level of *SE*. Animal safety testing in Lincoln University has shown this is unlikely to cause staggers (see page 27 for more information).

Ergovaline:

Tests show the ergovaline level produced by *NEA* in *Shogun* is typically 40-50% of the level produced by *SE*.

This level of ergovaline has been shown to give good control of black beetle (see page 25).

Peramine:

Tests show the peramine level produced by *NEA* in *Shogun* is typically 30% of the level produced by *SE*.

Control of Argentine stem weevil has not yet been tested, however we would expect it to be very similar to *Bealey* with *NEA2*, which is rated at moderate control, at 2 stars (out of 4 stars).

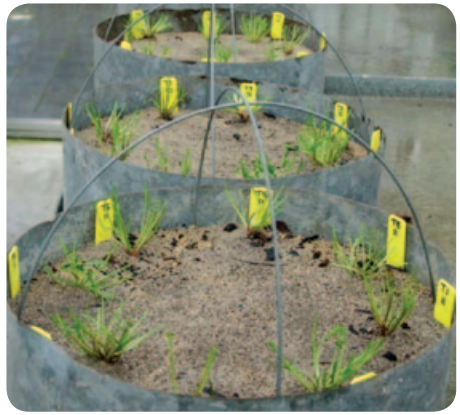
Black beetle control.

***Shogun* with *NEA* provides good black beetle control. We have rated it '3 stars', as it has shown the same level of control as *Bealey* with *NEA2* (also 3 stars).**

Data supporting this rating comes from a replicated trial carried out by AgResearch in 2011, to assess the affect of black beetle (BB). *Bealey* with *NEA2* was included in the trial as the control cultivar, with a known rating for BB control of 3 stars out of 4.

In the trial:

- One plant from each line tested was placed around the edge of a circular pot, with pots replicated 15 times.
- Eight BB *(Heteronychus arator)* adults were added to each pot, and the pot was covered. Beetles then had a choice of feeding on all the test lines.
- BB damage was measured after 2 and 4 weeks, with 4 week results presented, as it is believed these are the better assessment, due to the longer feeding period.



Test plants were put in circular pots, with adult BB added.

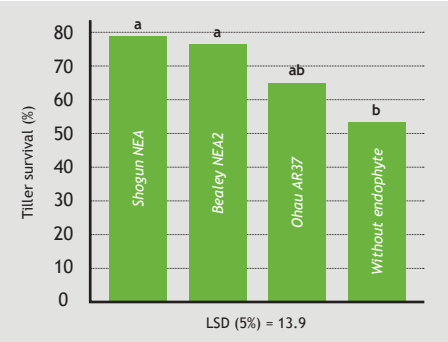
Mesh was used to keep the same BB numbers on each pot.

Black beetle control.

BB damage results.

The tiller death caused by BB in the trial is presented in the graph below.

Percent of live tillers/plant after 4 weeks of BB feeding*



Shogun with *NEA* had the same level of tiller survival as *Bealey* with *NEA2*. Both of these cultivars had significantly better tiller survival than the *Without* endophyte treatment.

BB adult feeding, shredding 2 tillers at the base of this plant.

Animal safety.

Results to date give us confidence that *Shogun* with *NEA* endophyte is unlikely to cause staggers.

As a matter of caution, we currently do not recommend *Shogun* with *NEA* is used for horses or deer.

Presently we are pretty confident that *Shogun* with *NEA* is staggers free, based on animal testing undertaken to date. However we are awaiting results from a second trial to be 100% sure. In the meantime *Shogun* is not recommended for horses or deer.

Lincoln University trial results

A staggers trial was conducted at Lincoln University in which *Shogun* was compared to a *Standard* endophyte *(SE)* control cultivar. An *SE* cultivar is used to show when ryegrass staggers occurs.

This trial was run under "poor" management, designed to cause high levels of ryegrass staggers, to simulate a worst case senario. Plots are pure ryegrass (no clover), and grown up to a high herbage mass, before being set-stocked for typically an eight week period over late summer.

During February and March 2011, the replicated *Shogun* and *SE* plots were grazed with hoggets at 12 and 10/ha respectively, and a high level of ryegrass staggers was seen in the sheep grazing the *SE* ryegrass.

No staggers were seen on animals grazing *Shogun*, and as a result we are confident that we are very unlikely to see any staggers on *Shogun* on farms. At the same time, 75% of hoggets grazing *Standard* endophyte *Alto* showed staggers, with 55% of them showing severe staggers (a score of 4).

Percentage of hoggets with staggers grazing *Shogun NEA* or *Alto SE*.

Cultivar/endophyte	% of hoggets at each Staggers score					Mean staggers score
	0	1	2	3	4	
Shogun NEA	100	0	0	0	0	0.0
*Alto SE**	25	0	10	10	55	2.7

*Scored on a 0 - 4 scale, with 0 = no staggers and 4 = severe clinical staggers in animals. *SE* = *Standard* (also known as "High") endophyte.

Pasture management.

The key to getting the best performance from *Shogun* is the same as for any tetraploid – avoid treading damage in the wet, and overgrazing in extended dry periods.

Tetraploid ryegrasses have real advantages in animal performance and easy pasture management. However, they are less robust than diploids, as they are more palatable, have fewer tillers, and are more susceptible to Argentine stem weevil.

Because of this, they do not suit all situations, particularly where persistence is the key requirement for a pasture.

For best persistence out of tetraploids, such as *Shogun*, care is needed with pasture management in two areas.

Firstly, during extended dry periods as their palatability makes them more susceptible to being overgrazed.

Ryegrass plant reserves are above the ground in the base of the plant tillers, and through dry periods best management practice is to keep a minimum of 2-3cm of cover on a pasture (around 1500 kgDM/ha), to maintain these reserves, for survival and autumn regrowth. While this management is no different for tetraploids or diploids, tetraploids are more easily overgrazed to very low covers.

Secondly, during periods of wet weather the more open habit of tetraploids makes them more susceptible to treading or pugging damage with cattle. Care is needed in wet conditions, particularly where break fencing is being used, with animals at a high stock density.

Seed treatment.

***AgriCOTE* seed treatment protects new sowings from pests and disease reducing the risk of losing a pasture at establishment.**

By protecting newly emerged seedlings from pests and disease, *AgriCOTE* seed treatment acts as an insurance policy against paddock failure. Such losses, and associated costs, can be substantial. But in most cases they can be easily avoided.

Seed treatment is the process by which individual grass or clover seeds are coated with a mix of chemicals (and sometimes nutrients) to protect and enhance their establishment.

These coatings contain enough insecticide and fungicide to last for approximately six weeks post-sowing, coinciding with the time that young plants are most vulnerable to insect attack and disease. The active ingredients are systemic, so as well as protecting the seed itself, they 'grow' through the plant tissue of the seedling as it emerges from the ground.

Severe insect damage seen in the front of this newly sown pasture.

Seed mix suggestions

Shogun **with *NEA* can be mixed in a range of ways. Because it is a tetraploid, with a larger seed, sowing rates are approximately 30% higher than those for diploid cultivars.**

Undersowing

Mix	kg/ha
Shogun hybrid ryegrass (with NEA)	12 - 20
Weka white clover	2 - 3
Total	14 - 23

Rates for undersowing vary. Use higher rates when undersowing into thinner pastures.

Hybrid ryegrass/red clover

Mix	kg/ha
Shogun hybrid ryegrass (with NEA)	25 - 30
Tuscan red clover	4 - 5
Total	29 - 35

Because red clover is tap rooted (and does not spread via stolons like white clover), a higher sowing rate is required to ensure sufficient plant numbers at sowing.

Cultivation

Mix	kg/ha
Shogun hybrid ryegrass (with NEA)	25 - 30
Weka white clover	3 - 4
Total	28 - 34

Other - Chicory or plantain can be added to *Shogun* based mixtures. Chicory can be particularly useful in finishing pastures.

Key features of Agriseeds ryegrasses.

Character		*Trojan*	*Alto*	*Bealey*	*Shogun*	*Tabu*
Species		Perennial	Perennial	Perennial	Hybrid	Italian
Type		Diploid	Diploid	Tetraploid	Tetraploid	Diploid
Total DM yield	First 8 months (E.g. winter crop)	***	***	***	****	*****
	First year (E.g. undersow for 12 months)	***	***	***	*****	****
	Up to 3 years (E.g. 3 year pasture)	****	****	****	*****	**
	Over 8 years (E.g. Permanent pasture)	*****	****	****	**	*
Feed value		****	****	*****	*****	****
Heading date		+16 days (late)	+14 days (late)	+25 days (very late)	+26 days (very late)	+14 days (late)
Endophyte		*NEA2*	*AR1/AR37*	*NEA2*	*NEA*	None

Key: * = poor; ** = reasonable; *** = good; **** = very good; ***** = excellent

agriseeds
SHOGUN
HYBRID RYEGRASS

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