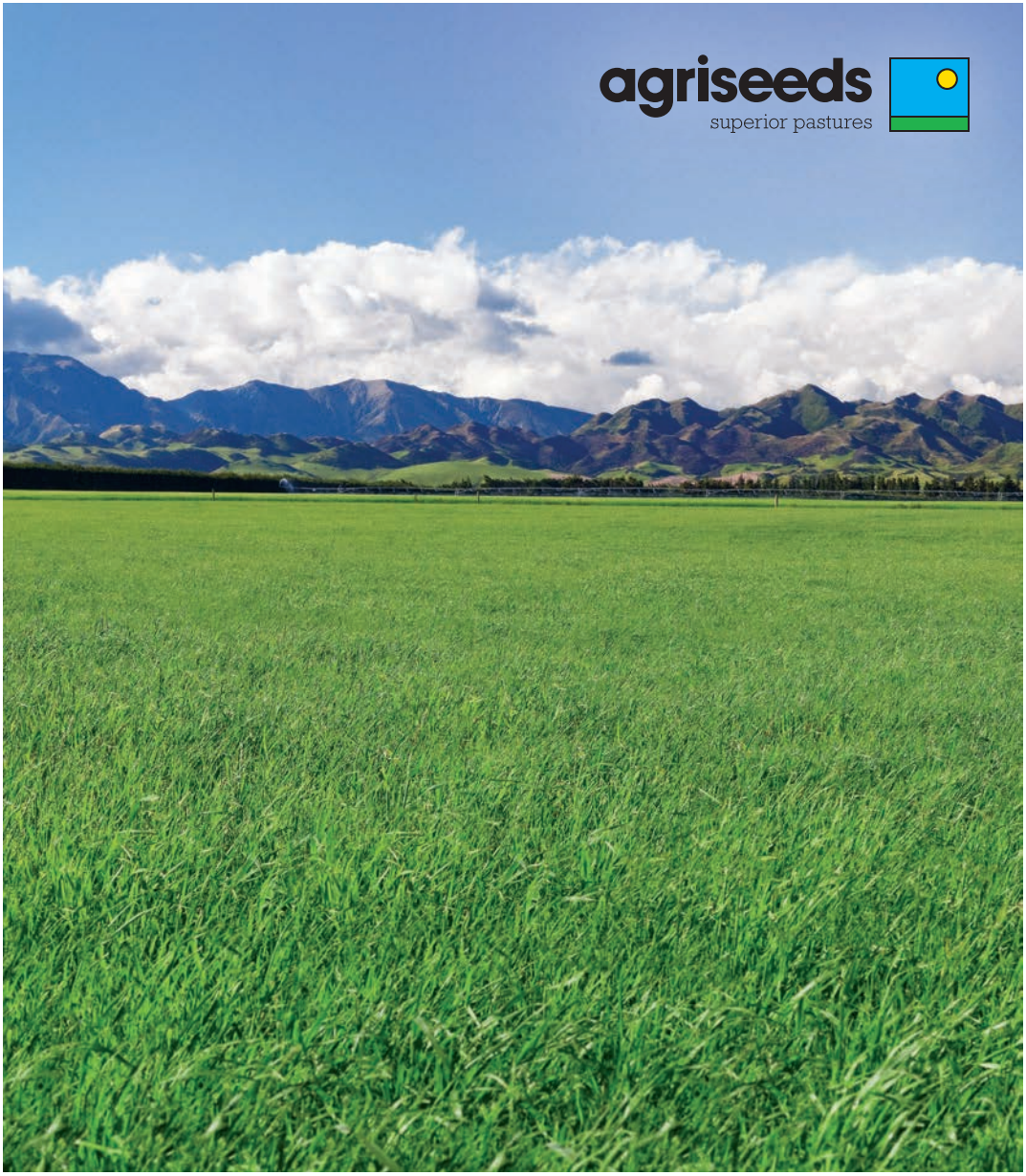
agriseeds
superior pastures



SHOGUN NEA

HYBRID RYEGRASS

SHOGUN HYBRID RYEGRASS

REDEFINING HYBRID RYEGRASS.

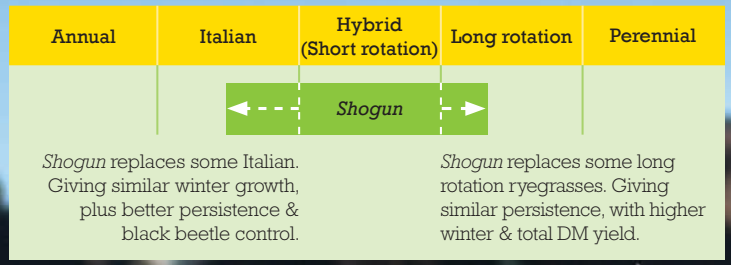
Shogun with *NEA* endophyte is no ordinary ryegrass.

In fact, it creates a new position in the market, taking hybrid ryegrass to a new place.

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, 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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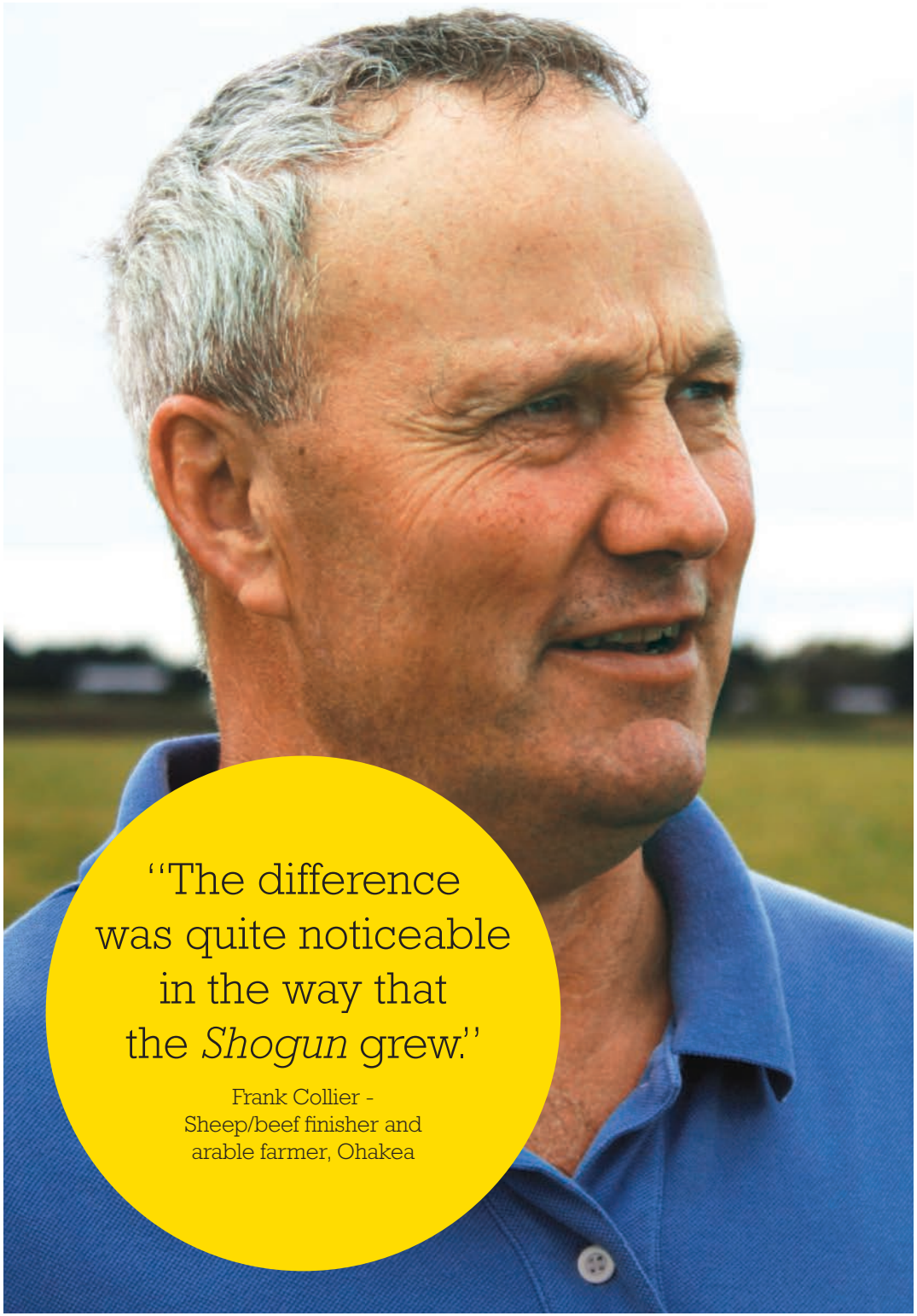


1. PASTURE RENEWAL

The average rate of pasture renewal on New Zealand farms is 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.

A common factor 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:

- Exceptional DM yield
- Fast establishment
- Ideal for undersowing
- 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 means **paddocks resown with *Shogun* are 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.

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 their use in farm systems is limited by their persistence.

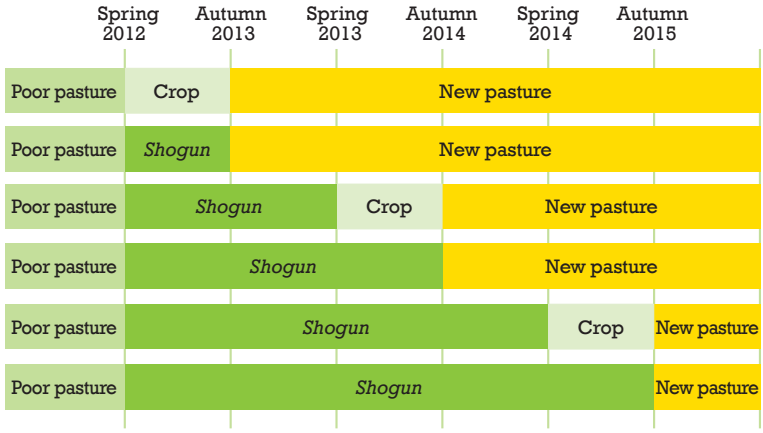
***Shogun* however provides similar levels of winter growth with the flexibility of a longer-lasting pasture,** with typical persistence of three years.

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), significantly improving 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 - multiple options in renewal programme



2. UNDERSOWING

Undersowing can improve thin pastures for 1 - 3 years prior to full renewal. Research has shown over 99% of seeds in the soil on dairy farms are weeds[1], and these can take over if thin pastures aren't thickened with ryegrass. *Shogun* is tailor-made for this purpose, with a mix of attributes unlike any other cultivar.

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

- Fast, reliable establishment
- Exceptional DM yield
- High winter yields
- Three year option
- 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 and Italian ryegrass (such as *Tabu*) both establish very rapidly, and provide excellent cool season yield. However ***Shogun* produces 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* supplies significantly more DM over three years, because it has both superior cool season growth and exceptional summer and autumn yields.

[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).

* Black beetle North Island only.

The *Shogun* advantage

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.**

Three year option

The better persistence of *Shogun* compared with Italian ryegrass reduces farm costs. *Shogun* is up to a three year undersowing option, whereas using an Italian ryegrass often means extra re-sowing costs (to provide the same 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 26 for more detail.

Italian ryegrasses without endophyte should not be undersown where black beetle is a problem because they are a preferred feed of this costly pest.

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:

- Palatable tetraploid
- High feed quality
- Exceptional DM yield
- Winter yield for winter finishing
- 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* is 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.**

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

AMH, or seeding over summer (following spring seeding) reduces summer pasture 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 22 for details.

Exceptional DM yield

High DM yields, combined with good feed quality, support 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, and *Shogun* produces significantly more winter DM yield than other hybrid ryegrasses. See page 19 for details.

Shogun's cool season production is more similar to that of an Italian ryegrass. 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 resown as often.

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).

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 28 for more on *NEA* endophyte and ryegrass staggers.

Extreme palatability differences were seen in animal 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 Standard endophyte ryegrass is in the front right and back left.

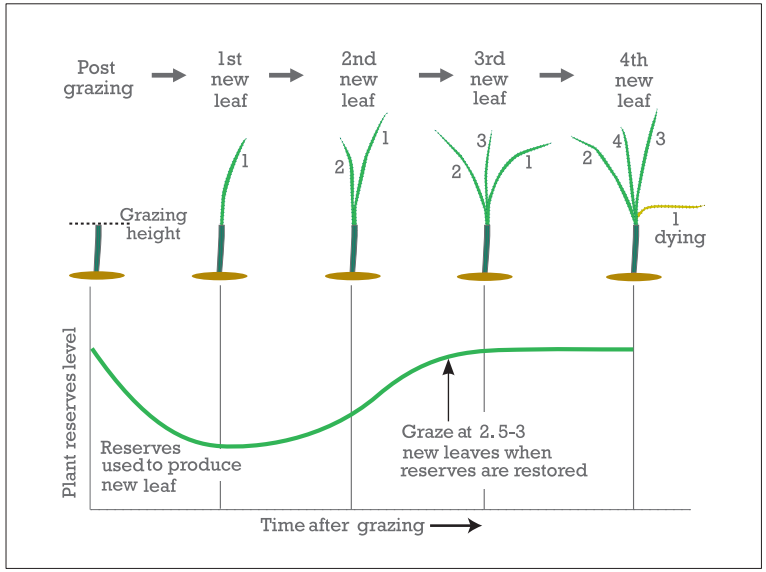
MANAGEMENT TO GET THE BEST OUT OF SHOGUN

***Shogun* is high performance and very palatable. To get the best from it treat it like a "crop" and focus on three things:**

1. Don't let *Shogun* get too long

This can easily happen with a ryegrass that can grow this fast! Focus on grazing at about 3000 kg DM/ha, <25cm pasture height for dairying, or <21cm pasture height for sheep. Or at the 2.5 - 3 leaf per tiller stage (see diagram below).

Grazing too late risks loss of tiller density, and slows regrowth speed.



2. Don't graze *Shogun* too hard

This is particularly important during summer dry conditions.

As a tetraploid hybrid ryegrass *Shogun* is very palatable. This supports excellent animal performance, but it also means *Shogun* is more easily over-grazed than normal pastures. For dairying, keep post-grazing residuals 8 clicks on the Rising Plate Meter (RPM) or a 6cm pasture height; for sheep/cattle take stock out when they hit >4cm height.

3. Don't damage *Shogun* in the wet

Tetraploids are more open, and more prone to treading damage. This can significantly reduce future DM yield.

Summary

Let *Shogun* get too much growth on it, or leave animals in the paddock too long, or pug it, and you will miss out on the huge potential *Shogun* offers.

TECHNICAL FEATURES

BREEDING

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

Shogun originated from the Agriseeds breeding programme, which each year develops a wide 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 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 has 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 ryegrasses without endophyte (right and back left) at Poukawa, Hawke's Bay 8 February 2011.

Technical features

EXCEPTIONAL YIELD

Shogun with *NEA* has exceptional total DM yield.

From its very first trials, *Shogun* has stood out, producing more than many other ryegrasses.

In the National Forage Variety Trial (NFVT) below, under rotational sheep grazing, *Shogun* out yielded all other entries over three years.

The second best hybrid ryegrass, *Harper AR1*, was 19% lower yielding.

2009-12 NFVT Courtenay, Canterbury DM yields over 3 years, trial mean = 100%*

Entry	Winter	Early Spring	Late Spring	Summer	Autumn	Total
Shogun NEA	**150 ab**	**119 a**	**108 a**	**130 a**	**133 a**	**122 a**
*Tabu***	155 a	114 ab	106 ab	114 b	124 a	116 b
*Feast II***	142 b	107 bc	94 cd	94 d	122 a	104 c
Harper AR1	111 c	103 cd	100 bc	105 c	102 b	103 cd
Ohau AR1	66 e	96 d	110 a	97 d	87 c	98 de
Supreme Plus AR1	72 e	99 cd	106 ab	95 d	84 c	96 e
Delish AR1	113 c	106 bc	92 de	89 d	85 c	94 ef
Maverick GII WE	106 c	95 d	91 de	76 e	102 b	90 f
Sterling AR1	40 f	78 e	101 bc	90 d	67 d	85 g
Momentum WE	87 d	98 d	85 e	67 f	84 c	83 g
Storm WE	23 g	71 e	95 cd	79 e	69 d	78 h
Perun WE	33 fg	75 e	89 de	67 f	72 d	75 h
Trial mean (kgDM/ha)	599	1545	3067	2032	1336	8579
LSD (5%)	12.0	8.7	7.1	8.0	11.0	5.1

Cultivars with the same letters are not significantly different. ***Tabu* & *Feast II* are Italian ryegrass cultivars. *WE* = Without Endophyte.

In this Hawke's Bay trial, run under rotational sheep grazing, *Shogun* significantly out yielded all other cultivars over three years.

2010-13 NFVT Poukawa, Hawke's Bay DM yields over 3 years, trial mean = 100%*

Entry	Winter	Early Spring	Late Spring	Summer	Autumn	Total
Shogun NEA	**130 a**	**118 a**	**115 a**	**138 a**	**122 a**	**123 a**
Ohau AR1	109 b	106 b	100 b	111 b	116 a	107 b
Ohau AR37	97 d	102 b	100 b	107 bc	115 ab	104 bc
Supreme Plus AR1	103 bd	103 b	103 b	103 bc	107 bc	104 bc
Harper AR1	104 bc	102 b	102 b	94 d	106 cd	102 c
Delish AR1	109 b	107 b	98 b	100 cd	100 de	102 c
Storm WE	100 cd	107 b	96 b	80 e	95 ef	96 d
Maverick GII WE	75 e	94 c	99 b	81 e	91 f	90 e
Momentum WE	31 f	36 d	45 c	15 f	0 g	27 f
Trial mean (kgDM/ha)	1246	2185	3336	1932	2126	10825
LSD (5%)	8.1	7.3	8.3	9.2	9.4	5.9

Cultivars with the same letters are not significantly different. WE = Without Endophyte.

EXTRAORDINARY SEASONAL GROWTH

Shogun with *NEA* sets new levels of summer and autumn growth, while producing similar to Italian ryegrass during winter.

The table below presents the same data as on page 17, split and ranked on warm season and cool season growth respectively.

In the warm season *Shogun* significantly out yielded all other hybrids. The next best hybrid, *Harper AR1*, produced 26% less through this period.

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

2009-12 NFVT Courtenay, Canterbury DM yields over 3 years, trial mean = 100%*

Warm season growth		
Entry	Summer	Autumn
Shogun NEA2	**130 a**	**133 a**
*Tabu***	114 b	124 a
*Feast II***	94 d	122 a
Harper AR1	105 c	102 b
Maverick GII WE	76 e	102 b
Ohau AR1	97 d	87 c
Delish AR1	89 d	85 c
Momentum WE	67 f	84 c
Supreme Plus AR1	95 d	84 c
Perun WE	67 f	72 d
Storm WE	79 e	69 d
Sterling AR1	90 d	67 d
Trial mean (kgDM/ha)	2032	1336
LSD (5%)	8.0	11.0

Cool season growth		
Entry	Winter	Early Spring
Shogun NEA	**150 ab**	**119 a**
*Tabu***	155 a	114 ab
*Feast II***	142 b	107 bc
Delish AR1	111 c	103 cd
Harper AR1	66 e	96 d
Supreme Plus AR1	72 e	99 cd
Momentum WE	113 c	106 bc
Ohau AR1	106 c	95 d
Maverick GII WE	40 f	78 e
Sterling AR1	87 d	98 d
Perun WE	23 g	71 e
Storm WE	33 fg	75 e
Trial mean (kgDM/ha)	599	1545
LSD (5%)	12.0	8.7

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 (kgDM/ha)	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.

HIGH QUALITY FEED

Shogun with *NEA* has a range of features to provide high feed quality for both sheep and cattle systems.

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

Palatable tetraploid

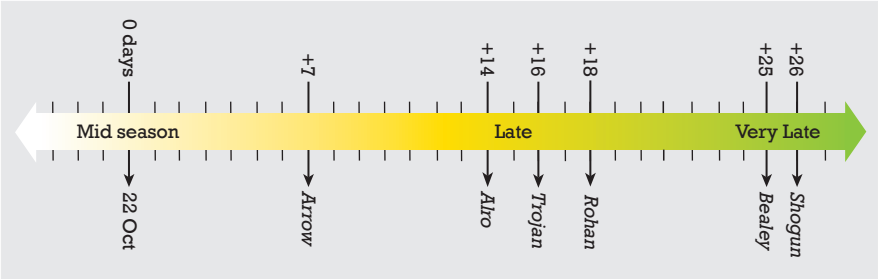
When sheep or cattle like a pasture, they eat more of it, and liveweight gains (LWG) increase accordingly. *Shogun* is very palatable tetraploid hybrid ryegrass, delivering high animal intakes and growth rates.

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.

Very late heading

Later heading (or seeding) pastures stay leafier longer into late spring, maintaining ME levels and reducing the need to mow 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

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 (kgDM/ha)	5.6	5.6	5.6
LSD (5%)	0.9	1.1	0.7

Visually assessed on basis 9 = no seedhead; 1 = lots of seedhead. WE = Without Endophyte. *Italian ryegrass.

PERSISTENCE

Shogun with *NEA* shows very good persistence for a hybrid ryegrass. Managed well (see page 13). it will last three years in most regions (possibly five years in 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 measure of how many ryegrass plants have survived.

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.

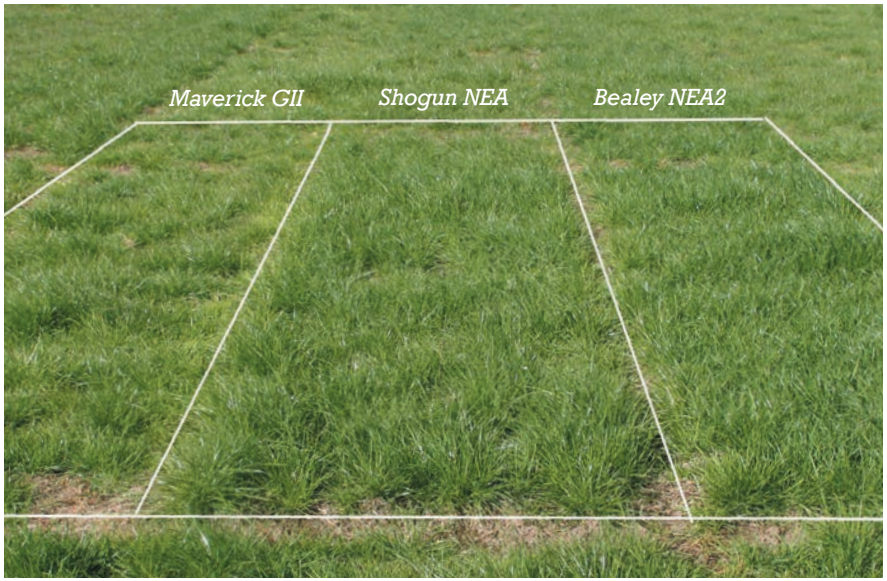
For a hybrid ryegrass *Shogun* has shown excellent persistence, demonstrated in the ryegrass ground cover results below taken in January 2012. Part of the reason for *Shogun's* success is its natural *NEA* endophyte, which limits insect damage.

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 (kgDM/ha)	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.

Good persistence is acheived with good grazing management (see page 13).



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 nearly four years after sowing.

Technical features

NEA ENDOPHYTE

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

The *NEA* endophyte strain is one of the 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 artificially inoculated with a novel endophyte such as *AR1* or *AR37*. Cultivars 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* were 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 28 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 26).

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).

BLACK BEETLE CONTROL

Shogun with *NEA* provides good black beetle control, and is rated at '3 stars'.

Testing was carried out in a replicated trial carried out by AgResearch, 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 these are the better assessment, due to the longer feeding period.

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

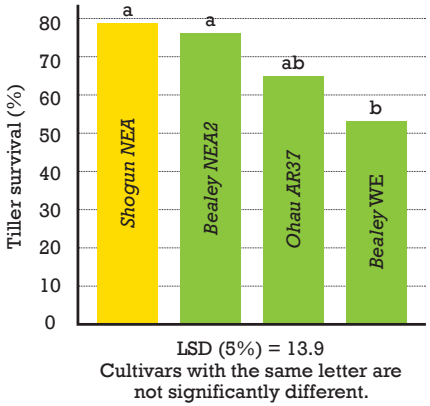
Mesh was used to keep the BB on each pot.

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*



LSD (5%) = 13.9
Cultivars with the same letter are not significantly different.

Shogun with *NEA* had the same level of tiller survival as *Bealey* with *NEA2* (rated at 3 stars). Both of these cultivars had significantly better tiller survival than the Without endophyte (WE) 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* is staggers free, based on animal testing undertaken to date.

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 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.

Technical features

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 where 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, 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 Argentine stem weevil damage seen in the front of this newly sown pasture.

SEED MIXES

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 30% higher than for diploid ryegrass.

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
Total	29 - 34

Because red clover is tap rooted (and does not spread via stolons like white clover), a 4kg/ha sowing rate is required to ensure good plant numbers.

Cultivation

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

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

Technical features

QUICK COMPARISON

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

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