
GLOBAL SCIENCE, PROVEN LOCAL PERFORMANCE,
TO HELP FARMERS THRIVE
RGT18 NOVEL ENDOPHYTE
R·A·G·T
think
SOLUTIONS
think RAGT

At RAGT Australia, it's our mission to be the partner of the agricultural world, creating innovative solutions for the challenges of tomorrow.

As part of one of the world's leading seed groups, we're able to offer farmers comprehensive seed technology advancements that are the result of world-leading R&D and strenuous local trials and testing.

NOW, AFTER MANY YEARS' DEVELOPMENT, WE ARE EXCITED TO INTRODUCE OUR OWN UNIQUE NOVEL ENDOPHYTE!


IT'S HERE! RGT18 NOVEL ENDOPHYTE
TODAY, MANY OF AUSTRALIA'S FARMING ENVIRONMENTS SHOW BENEFIT FROM NOVEL ENDOPHYTES AS PART OF THEIR COMMERCIAL PERENNIAL RYEGRASS PACKAGE.
PEST PROTECTION
HIGH PERFORMANCE
OVERALL PERSISTENCE

WHAT IS AN ENDOPHYTE AND WHY DO I NEED IT?

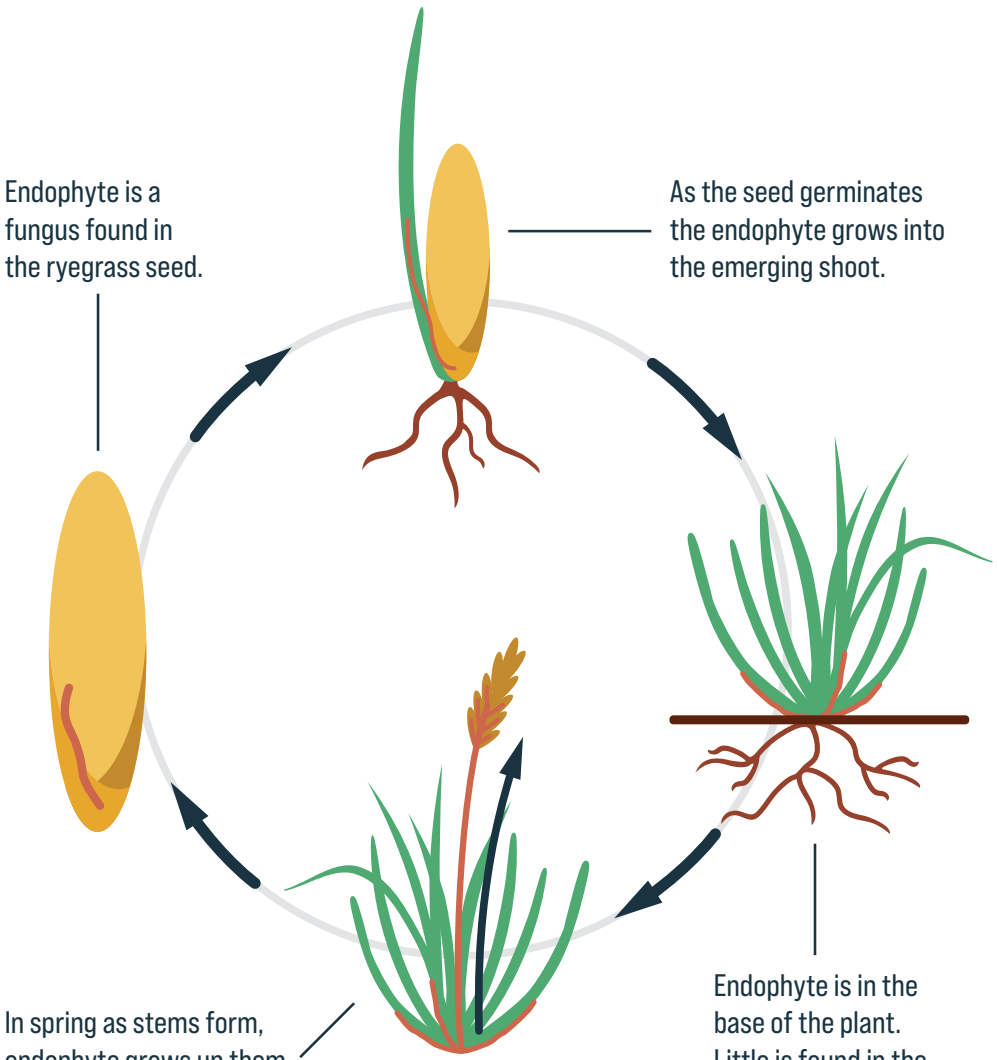
Endophytes are a type of natural fungus that is commonly found in grass, particularly ryegrass.

The grass offers the endophyte food and a place to live, and in return the endophyte produces chemicals (called alkaloids).

The good alkaloids provide the grass protection from insects so it persists and grows better with little or no impact on stock performance.

Some of these alkaloids are less helpful and significantly impact on animal performance, which is why pastures today come with specially-bred novel endophytes that ensure only beneficial chemicals from the endophyte and little or no harmful ones.

ENDOPHYTE LIFE CYCLE



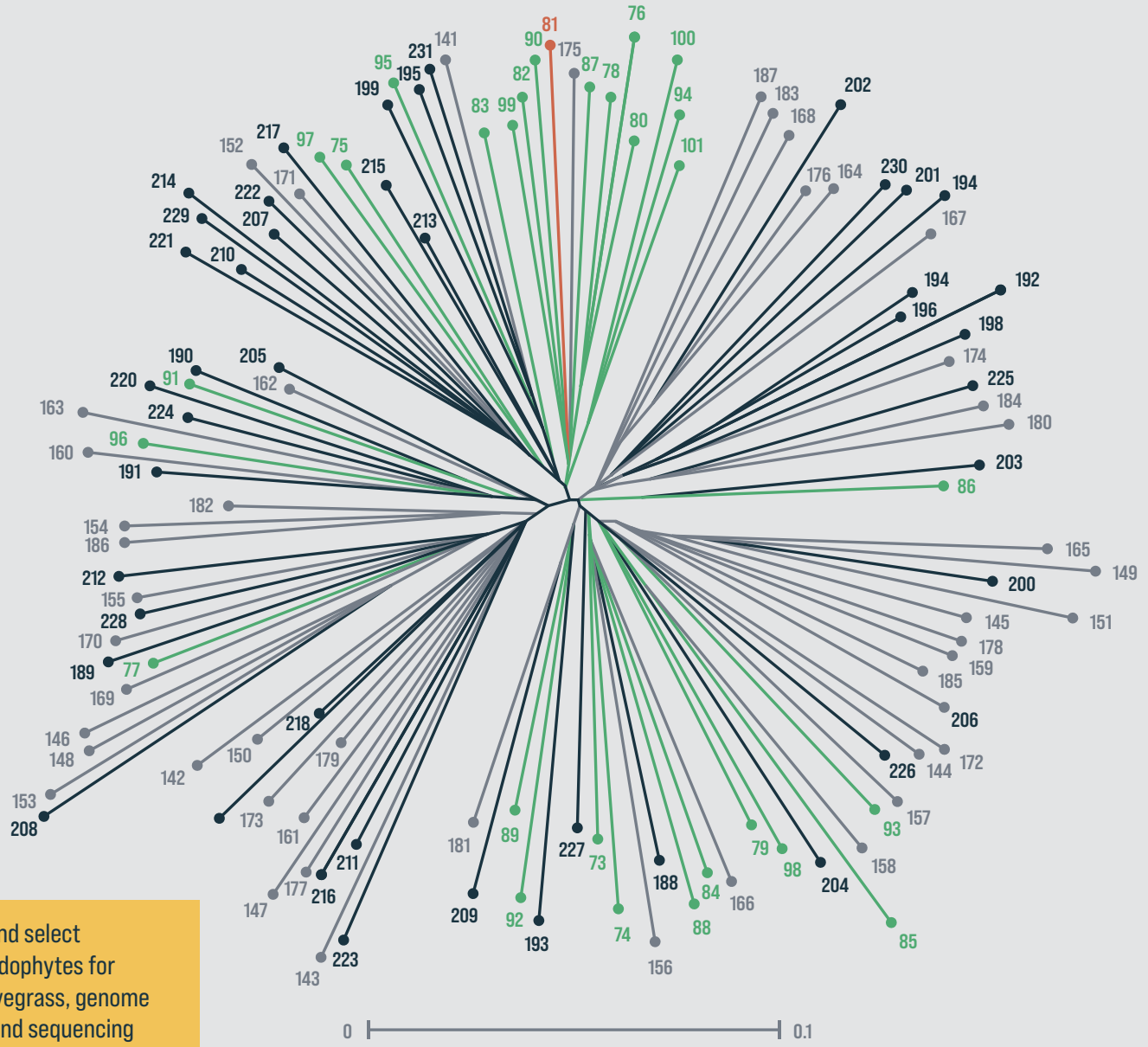
IT'S A LONG JOURNEY TO GET A NOVEL ENDOPHYTE TO MARKET, WITH LOTS OF RESEARCH, DEVELOPMENT, TESTING AND TRIALS TO PASS...

Discovery began in 2006: R2n (RAGT's research department) - in collaboration with INRAE (the French National Research Institute for Agriculture, Food and Environment) and Agriculture Victoria - identified and began classifying a number of new novel endophytes taken from a collection of perennial ryegrass germplasm in the wild.

AGRICULTURE VICTORIA INRAE RAGT

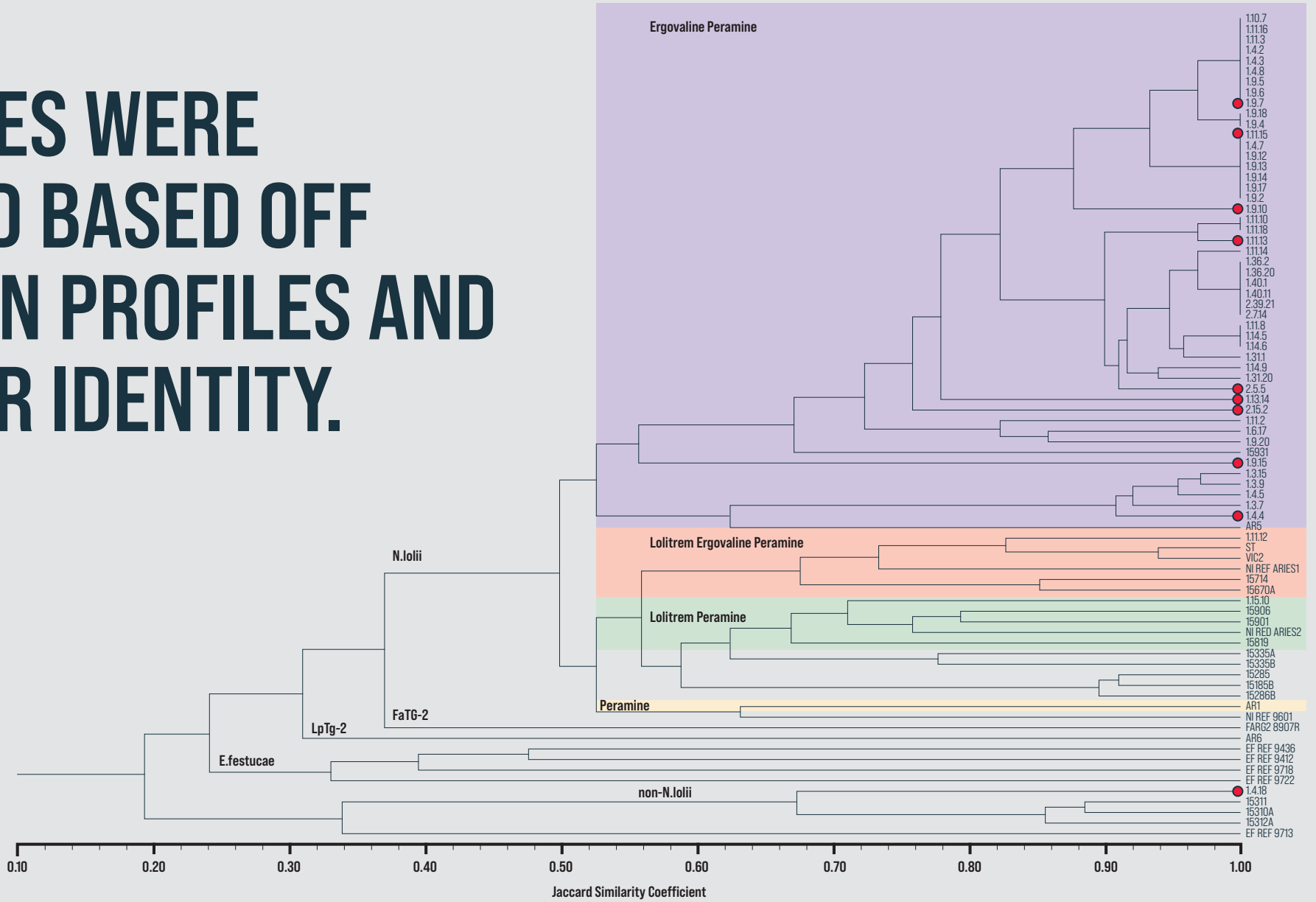
Since 2006 RAGT Global, via its research arm R2n, has funded Ag Victoria/AgriBio at La Trobe University to complete this component of our ongoing endophyte project. This demonstrates RAGT's commitment to significant investment in local R&D in Australia for an extended period of time.

RAGT SCIENTISTS WORKED OUT WHICH ENDOPHYTES OFFERED THE BEST BENEFICIAL ALKALOIDS ALONG WITH THE LEAST ‘BAD’ ONES.



To isolate and select the best endophytes for perennial ryegrass, genome surveying and sequencing was undertaken.

ENDOPHYTES WERE SEQUENCED BASED OFF THEIR TOXIN PROFILES AND MOLECULAR IDENTITY.



THE KEY TO ENDOPHYTES IS UNDERSTANDING THE ALKALOIDS (CHEMICALS) THEY PRODUCE IN THE GRASS/PLANT.

The evaluation phase highlighted a stable symbiota with multiple endophytes delivering novel chemistries (peramine, janthitrem and lower ergovaline).

Significant improvement has been made on the old standard endophyte (SE); however, there is no perfect endophyte. The main known alkaloids involved in insect protection and animal health are peramine, lolitrem B, ergovaline, janthitrems and lolines.

HOW DO RGT18 ALKALOIDS COMPARE TO OTHER ENDOPHYTES?

ENDOPHYTE	PERAMINE	LOLITREM B	ERGOVALINE	JANTHITREMS	LOLINES
STANDARD	✓	✓ (Very high)	✓ (high)		
NEA, NEA2, NEA4	✓	✓ (Very low)	✓ (low-medium)		
AR1	✓				
AR37				✓	
RGT18				✓	

NEXT, OUR ENDOPHYTE HAD TO GO THROUGH A RIGOROUS, MULTIYEAR PROCESS THAT INCLUDED AGRONOMIC (PLANT) TRIALS AS WELL AS TRIALS FOR INSECT PROTECTION AND ANIMAL SAFETY.

THE 5 KEY EVALUATION ACTIVITIES COMPLETED

1. Inoculation of candidate perennial ryegrass endophytes into commercially relevant germplasm
2. Assessment of the vegetative stability of endophytes in *planta*
3. Assessment of the intergenerational stability of endophytes in seed
4. Alkaloid profile of associations over a growing season under field conditions
5. Assessment of the varietal stability

IT PASSED!

THAT MEANS IT CAN NOW BE ADDED TO IMPORTANT INDUSTRY MEASUREMENT TOOLS.

It's also been granted Australian patent number

2019379795

'GRASS ENDOPHYTES'

Keeping in line with current industry practice, RGT18 continues its testing regime through the NZ Endophyte committee. Historically, this committee has provided stringent and up to date rigour to ensure endophytes released in Australia and NZ are both effective in their pest tolerance and have an understood level of stock safety.

Australian Government
IP Australia

NEW ZEALAND PBRA
PLANT BREEDING AND RESEARCH ASSOCIATION

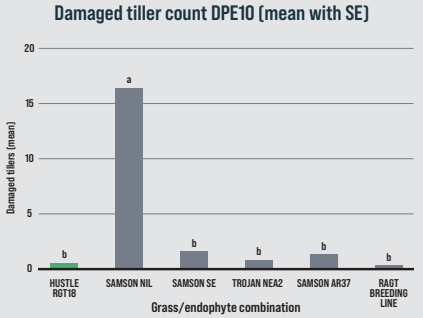
TRIALS PROVED THAT PESTS ARE NOT FANS OF RGT18...

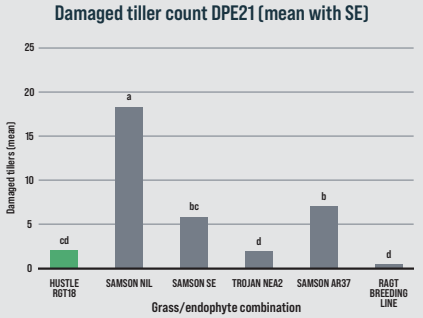
The Black Beetle (Heteronychus arator) is a pest commonly found in high rainfall ryegrass farming systems throughout Australia. It can cause significant damage to pastures.

Presence of endophyte RGT18 in host grasses was found to confer better resistance/ tolerance to Black Beetle (Heteronychus arator) feeding compared to nil endophyte varieties. The DPE21 results indicate that RGT18 endophyte confer a better vigour score and thus are more resistant to insect feeding compared to SAMSON Nil, SAMSON SE, TROJAN NEA2 and importantly provide a significant improvement over SAMSON AR37.

Conclusion extract for Black Beetle tolerance,

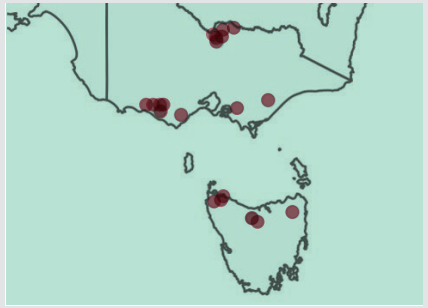
Standard protocol is for counts to be taken at 10 days post establishment; however, we have gone above and beyond taking another set of counts at 21 days post establishment.

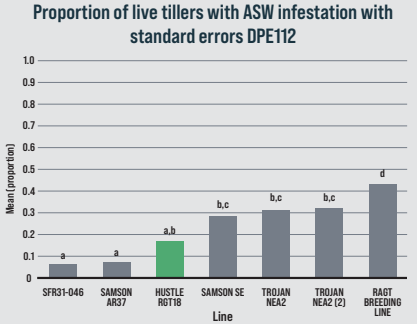




...ARGENTINE STEM WEEVIL DIDN'T LIKE IT EITHER

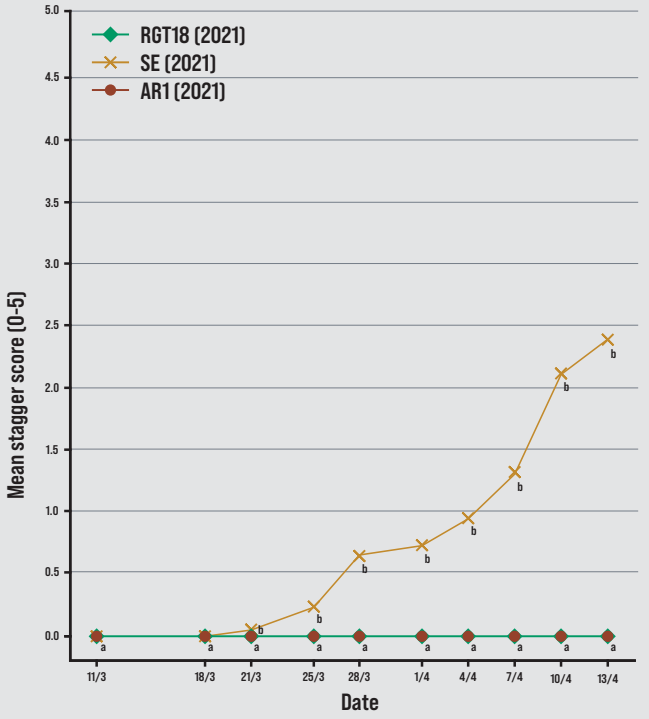
The Argentine Stem Weevil (ASW - Listronotus bonariensis) is a pest found in high rainfall ryegrass farming systems throughout Australia. It primarily targets short-term and perennial ryegrass.



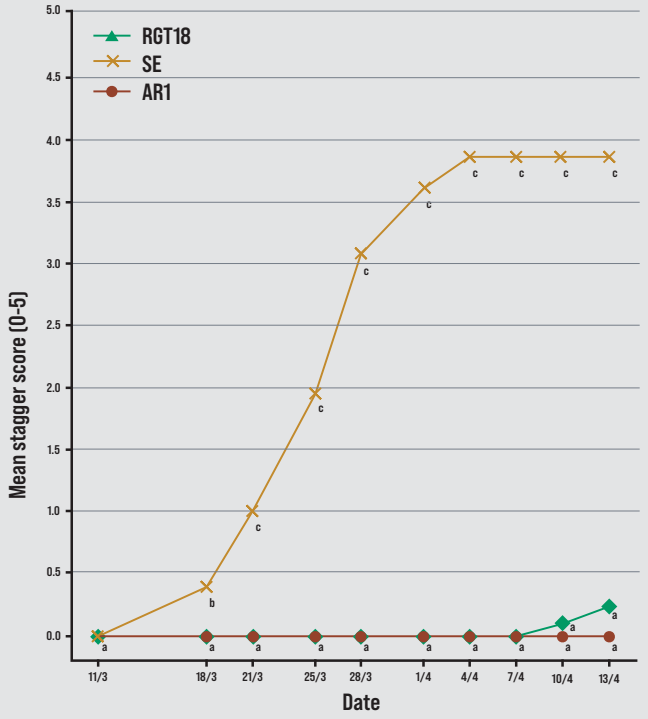


RGT18 SHOWED LITTLE TO NO RYEGRASS STAGGERS

MEAN STAGGER SCORE 2022



MEAN STAGGER SCORE 2022



Cumulative Mean Stagger Score (Keogh 1973) by treatment date.

Traditionally most Australian ryegrass pastures contained endophyte now called 'Standard' endophyte which on occasion has caused 'ryegrass staggers' in animals. Today there is a selection of new or 'novel' endophytes with superior animal health, such as RGT18. All trialling for ryegrass staggers occurs under simulated worst-case scenario management and does not represent normal farm practice, although the likely hood for 'ryegrass staggers' to occur is reduced, the risk still may exist if rated below the 4-star rating 'freedom from staggers'. The risk of ryegrass staggers can reduce if cows are supplied a mixed diet, such as other non-ryegrass species, clover, crops, or supplements.

NOW WITH RGT18 ENDOPHYTE HUSTLE PERFORMS EVEN BETTER!

HUSTLE RGT18

DIPLOID PERENNIAL RYEGRASS

- RGT18's stronger pest protection improves productivity and persistence.
- Stands out as one of Australia's top performing perennial ryegrasses.
- Upright growth habit provides more space for legumes and herbs to thrive.
- Extend production seamlessly into autumn with excellent late-season growth.

INSECT
KEY INSECT PEST TOLERANCE/ RESISTANCE

ANIMAL
MEETS ALL REQUIRED ANIMAL SAFETY REQUIREMENTS

FARM
HIGH PERFORMANCE WHEN PARTNERED WITH RAGT GENETICS

WHY HUSTLE?

ONE OF AUSTRALIA'S TOP PERFORMING PERENNIAL RYEGRASSES JUST GOT BETTER

Hustle is now available with a range of endophyte options, allowing for a tailored selection based on your specific requirements.

RGT18 should be used for regions dealing with Black Beetle challenges affecting pasture persistence.

AR1 is suitable for areas where Argentine Stem Weevil are present, or where grazing may include deer and horses.

PROVEN PERFORMANCE

Hustle has been tested nationally through numerous independent trials, as well as RAGT on-farm evaluations. Since its launch Hustle has continued to grow in popularity among farmers year after year, driven by shared positive experiences.

Don't just take our word for it, RAGT is a participant and major supporter of the PTN (Pasture Trial Network), which is an independent testing program that allows you to assess and compare the performance of more than 100 pasture varieties across the key pasture species for both the dairy & red meat industry.

HIGH LEVEL OF COMPATABILITY

Hustle's upright growth creates an ideal environment for legumes and other companion species to thrive. Increased legume content provides numerous animal and nutrient benefits.

Feed available	
Stock suitability	
Sowing rate	20kg/ha
Heading date	+10 days

HUSTLE PERENNIAL RYEGRASS RESULTS

GROW TOP TIER PERFORMANCE

NZ LOCATION TE AWAMUTU, WAIKATO
AUS EQUIVALENT WESTERN DISTRICTS PORT CAMPBELL & GIPPSLAND YARRAM
DATE SOWN 5 APRIL 2018

AVERAGE YIELD - YEAR 1-3 - kg DM/ha

VARIETY	WINTER	EARLY SPRING	LATE SPRING	SUMMER	AUTUMN	3 YEAR AVERAGE
GOVERNOR AR37	1890	3278	3617	2252	2219	13160
HUSTLE RGT18	**1807**	**2923**	**3606**	**2482**	**2033**	**12969**
PLATFORM AR37	1899	2918	3694	2341	2186	12826
HUSTLE AR1	1853	3057	3515	2155	1835	12095
TROJAN NEA2	1667	2688	3072	2266	1683	11712
ONE50 AR37	1707	2663	3304	2068	2050	11691
TRIAL MEAN	1784	2886	3362	2182	2003	12188
SIGNIFICANCE	*	**	*	***	**	***
LSD (5%)	197	296	433	279	342	846
%CV	7.7	7.3	9.0	10.4	8.5	5.9

SHADED VALUES INDICATE TOP STATISTICAL GROUP (9 BREEDING LINES REMOVED)

NZ LOCATION WAIKERIA, WAIKATO
AUS EQUIVALENT WESTERN DISTRICTS PORT CAMPBELL & GIPPSLAND YARRAM
DATE SOWN 23 March 2017

AVERAGE YIELD - YEAR 1-3 - kg DM/ha

VARIETY	WINTER	EARLY SPRING	LATE SPRING	SUMMER	AUTUMN	TOTAL
HUSTLE RGT18	**1944**	**2572**	**3933**	**3292**	**2577**	**14179**
BASE AR37	1771	2483	3879	3110	2447	13735
HUSTLE AR1	1850	2651	3897	3027	2244	13686
ONE50 AR1	1850	2599	3923	3042	2224	13581
ONE50 AR37	1657	2519	3759	3266	2368	13530
TROJAN NEA2	1835	2613	3805	2917	2221	13477
ROHAN NEA2	1735	2446	3922	2961	2171	13289
TYSON AR1	1818	2614	3796	2939	2107	13265
REQUEST AR37	1685	2519	3711	3085	2219	13224
VISCOUNT NEA2	1799	2597	3623	2862	2358	13142
TRIAL MEAN	1799	2575	3827	3051	2268	13517
SIGNIFICANCE	***	**	NS	***	***	***
LSD (5%)	102	186	258	176	136	447
%CV	5.2	6.0	5.6	4.3	4.3	2.9

SHADED VALUES INDICATE TOP STATISTICAL GROUP (14 BREEDING LINES REMOVED)

HUSTLE PERENNIAL RYEGRASS RESULTS (CONTINUED)

GROW TOP TIER PERFORMANCE

NZ LOCATION MASSEY UNIVERSITY, PALMERSTON NORTH
AUS EQUIVALENT KING ISLAND TASMANIA
DATE SOWN 2 NOVEMBER 2017

AVERAGE YIELD - YEAR 1-4 - kg DM/ha

VARIETY	WINTER	EARLY SPRING	LATE SPRING	SUMMER	AUTUMN	TOTAL
HUSTLE RGT18	**2528**	**3400**	**1841**	**2485**	**2937**	**13577**
HUSTLE AR1	2437	3117	1831	2601	3038	13371
TROJAN NEA2	2350	3097	1866	2516	3014	13156
TYSON AR1	2308	2925	1781	2761	2842	13029
MOXIE AR1	2198	2955	1683	2560	2899	12562
ONE50 AR1	2288	2896	1750	2369	2874	12527
ONE50 AR37	2250	3076	1626	2280	2860	12431
REQUEST AR37	2276	3046	1595	2314	2878	12416
ROHAN NEA2	1988	3028	1709	2445	2906	12307
BASE AR37	2274	2959	1754	2226	2735	12248
VISCOUNT NEA2	2049	2684	1646	2277	2588	11497
TRIAL MEAN	2306	3057	1707	2502	2926	12838
SIGNIFICANCE	***	***	***	***	***	***
LSD (5%)	140.8	112.7	83.6	112.0	107.0	369.9
%CV	11.4	6.4	4.4	39.6	7.2	25.2

SHADED VALUES INDICATE TOP STATISTICAL GROUP (13 BREEDING LINES REMOVED)

NZ LOCATION LADBROOKS, CANTERBURY
AUS EQUIVALENT MARION BAY TASMANIA
DATE SOWN 1 APRIL 2016

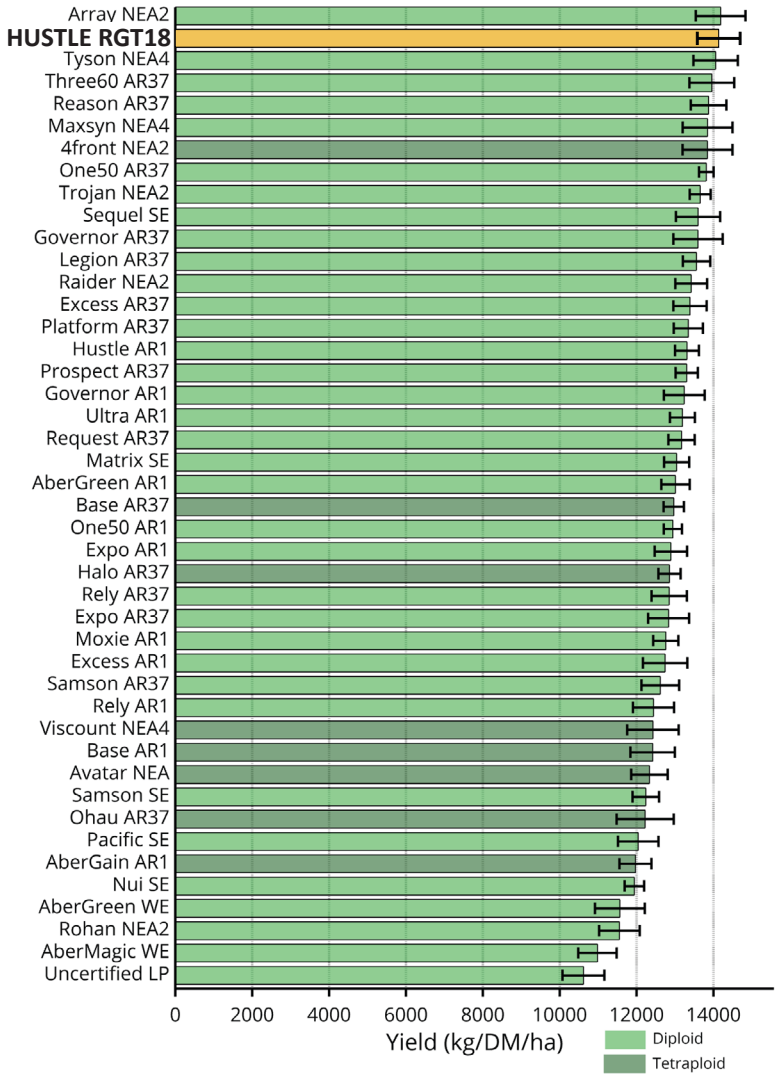
AVERAGE YIELD - YEAR 1-5 - kg DM/ha

VARIETY	WINTER	EARLY SPRING	LATE SPRING	SUMMER	AUTUMN	5 YEAR AVERAGE
HUSTLE RGT18	**1347**	**3176**	**2878**	**3848**	**2821**	**14111**
HUSTLE AR1	1186	3142	3063	3801	2139	13460
EXPO AR37	1263	2914	2701	3832	2704	13338
ONE50 AR37	1311	2798	2449	3839	2727	13205
TROJAN NEA2	1189	2974	2843	3536	2191	13060
ABERGREEN AR1	931	3016	3066	3639	2129	12807
MOXIE AR1	1075	3173	2841	3402	2110	12780
EXPO AR1	1130	2955	2931	3569	1998	12671
ONE50 AR1	1119	2877	2763	3643	2069	12590
24SEVEN HAPPE	1086	2854	2742	3559	2238	12398
ANSA AR1	1021	3028	3035	3283	1760	12293
BARRIER COBO GRUBOUT U2	632	2903	3285	3280	1832	12146
24SEVEN EDGE	1013	2991	2793	3414	1782	12065
TRIAL MEAN	1071	3055	2860	3611	2203	12872
SIGNIFICANCE	***	***	***	***	***	***
LSD (5%)	96	178	249	454	256	726
%CV	7.1	6.2	6.9	13.2	10.5	5.2

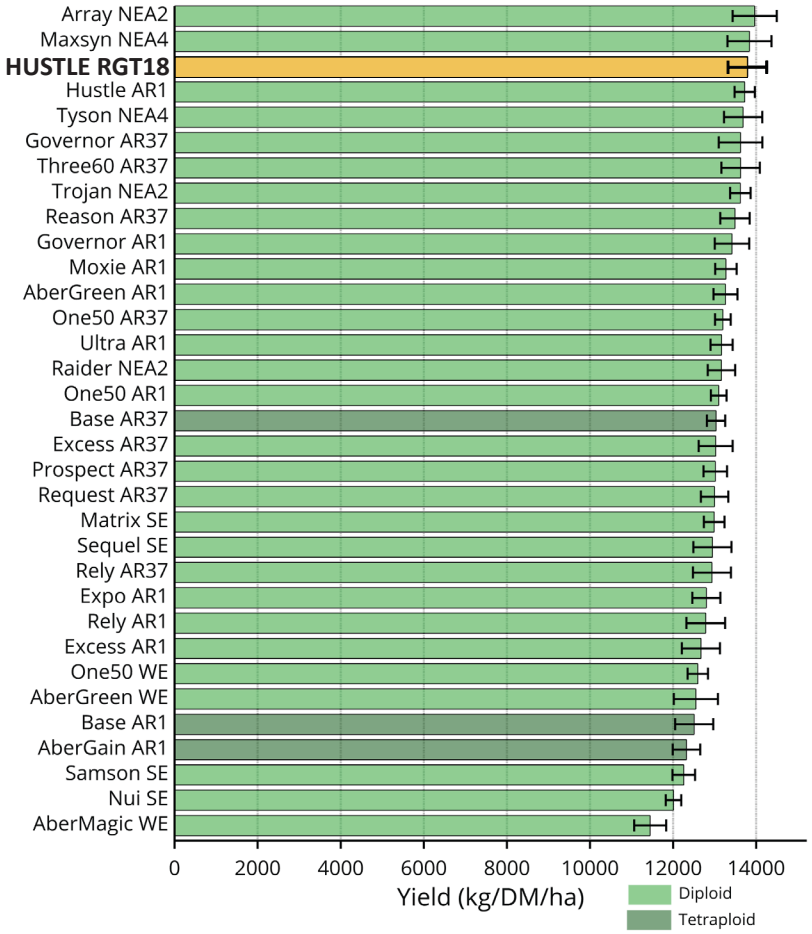
SHADED VALUES INDICATE TOP STATISTICAL GROUP (15 BREEDING LINES REMOVED)

NFVT SUMMARY RESULTS 2023-2024 - PERENNIAL RYEGRASS, TOTAL YIELD

ALL NEW ZEALAND



NEW ZEALAND SOUTH OF TAUPO



PERENNIAL RYEGRASS - YIELDS BY SEASON AS PERCENTAGE OF MEAN

ALL NEW ZEALAND

Entry	Trials	Winter		Early Spring		Late Spring		Summer		Autumn		Total	
Array NEA2	4	112.3	8.0	104.5	6.6	107.7	5.3	110.2	5.6	114.6	6.3	109.7	5.0
HUSTLE RGT18	5	116.3	7.2	105.4	6.0	104.4	4.7	112.7	5.0	111.3	5.6	109.4	4.5
Tyson NEA4	5	111.3	7.2	115.6	5.9	104.7	4.7	108.4	5.0	108.3	5.6	108.7	4.5
Three60 AR37	5	108.3	7.2	100.8	6.0	103.6	4.7	110.6	5.0	114.9	5.6	108.0	4.5
Reason AR37	8	112.0	5.7	109.7	4.7	104.4	3.8	104.2	4.0	111.9	4.5	107.3	3.6
Maxsyn NEA4	4	110.6	8.0	104.0	6.6	104.1	5.3	109.1	5.6	109.0	6.3	107.1	5.0
4front NEA2	4	112.5	8.1	105.4	6.7	106.2	5.3	107.0	5.6	107.5	6.3	107.1	5.0
One50 AR37	64	113.0	2.4	103.6	2.0	102.7	1.6	108.7	1.6	109.5	1.8	106.9	1.5
Trojan NEA2	25	112.3	3.4	106.4	2.8	104.7	2.2	106.8	2.3	102.0	2.6	105.6	2.1
Sequel SE	5	113.5	7.1	102.1	5.9	105.0	4.7	103.7	5.0	106.5	5.6	105.2	4.5
Governor AR37	4	99.0	7.9	105.7	6.6	103.6	5.2	106.1	5.5	108.1	6.2	105.2	5.0
Legion AR37	14	109.8	4.4	103.1	3.7	100.2	2.9	104.3	3.1	111.1	3.4	104.9	2.8
Raider NEA2	10	106.8	5.1	103.6	4.3	102.7	3.4	103.7	3.6	104.4	4.0	103.8	3.2
Excess AR37	9	108.4	5.4	100.5	4.4	100.0	3.5	105.0	3.7	106.5	4.2	103.6	3.3
Platform AR37	12	102.7	4.7	101.9	3.9	102.3	3.1	102.1	3.3	107.2	3.7	103.2	2.9
Hustle AR1	19	106.7	3.9	103.6	3.2	101.1	2.5	104.9	2.7	100.8	3.0	103.0	2.4
Prospect AR37	22	108.9	3.6	101.8	3.0	101.0	2.3	104.1	2.5	102.2	2.8	102.9	2.2
Governor AR1	6	105.8	6.6	107.6	5.5	100.4	4.3	101.5	4.6	101.2	5.1	102.4	4.1
Ultra AR1	17	107.2	4.0	99.6	3.3	100.2	2.6	103.7	2.8	101.9	3.1	102.1	2.5
Request AR37	15	100.9	4.2	106.7	3.5	99.2	2.8	100.4	3.0	104.3	3.3	101.9	2.6
Matrix SE	16	106.6	4.1	100.6	3.4	99.4	2.7	100.0	2.8	102.1	3.2	100.9	2.5
AberGreen AR1	13	83.1	4.6	104.1	3.8	107.2	3.0	99.6	3.2	98.3	3.6	100.7	2.9
Base AR37	26	102.7	3.3	96.9	2.7	98.6	2.2	102.5	2.3	101.0	2.6	100.3	2.0
One50 AR1	32	105.4	2.9	94.3	2.4	98.6	1.9	103.5	2.0	99.6	2.3	100.1	1.8
Expo AR1	10	102.8	5.2	102.1	4.3	100.8	3.4	99.2	3.6	96.2	4.1	99.7	3.3
Halo AR37	22	103.5	3.6	93.1	3.0	97.0	2.4	102.2	2.5	102.0	2.8	99.5	2.2
Rely AR37	8	93.4	5.7	100.3	4.7	99.4	3.7	95.9	4.0	105.9	4.4	99.4	3.6
Expo AR37	6	101.4	6.6	99.4	5.5	99.5	4.3	97.9	4.6	100.0	5.2	99.3	4.1
Moxie AR1	17	95.1	4.0	101.2	3.4	97.0	2.7	100.7	2.8	97.6	3.2	98.7	2.5
Excess AR1	5	96.6	7.2	100.7	5.9	97.8	4.7	101.2	5.0	95.2	5.6	98.6	4.5
Samson AR37	7	98.0	6.1	101.9	5.0	99.6	4.0	92.9	4.2	98.3	4.7	97.6	3.8
Rely AR1	6	92.6	6.6	95.6	5.5	97.3	4.3	97.9	4.6	94.5	5.2	96.2	4.1
Viscount NEA4	4	101.2	8.3	100.5	6.9	93.8	5.4	95.7	5.8	94.5	6.5	96.1	5.2
Base AR1	5	100.9	7.2	95.6	5.9	99.2	4.7	95.4	5.0	91.4	5.6	96.1	4.5
Avatar NEA	8	102.8	5.9	91.5	4.9	93.3	3.9	98.1	4.1	94.4	4.6	95.4	3.7
Samson SE	18	94.6	4.3	98.7	3.5	95.6	2.8	91.7	3.0	94.7	3.3	94.7	2.7
Ohau AR37	3	97.8	9.2	103.3	7.6	97.8	6.1	92.0	6.4	86.3	7.2	94.6	5.8
Pacific SE	7	90.1	6.5	99.9	5.4	96.4	4.3	88.8	4.5	91.3	5.1	93.2	4.1
AberGain AR1	10	76.4	5.2	88.9	4.3	98.0	3.4	95.2	3.6	91.3	4.0	92.6	3.2
Nui SE	30	90.5	3.1	99.2	2.6	95.4	2.1	88.3	2.2	90.0	2.5	92.4	2.0
AberGreen WE	4	61.5	8.0	84.6	6.7	102.2	5.3	92.5	5.6	83.6	6.3	89.5	5.0
Rohan NEA2	6	84.2	6.6	82.1	5.4	90.0	4.3	89.9	4.6	95.3	5.1	89.4	4.1
AberMagic WE	7	56.0	6.2	80.6	5.1	99.7	4.1	84.4	4.3	81.4	4.8	85.0	3.9
Uncertified LP	6	84.3	6.8	93.4	5.6	88.3	4.4	77.3	4.7	72.0	5.3	82.1	4.2
Mean (kg DM/ha)	105	1056		1983		3438		3747		2705		12929	

NFVT Summary 1991 – 2023 (September 2023)

If two means differ by more than the sum of their least significant intervals (LSI), they are significantly different at the 5% level

NEW ZEALAND SOUTH OF TAUPO

Entry	Trials	Winter		Early Spring		Late Spring		Summer		Autumn		Total	
Array NEA2	3	112.9	7.0	101.0	5.3	102.8	4.3	108.5	5.6	111.9	5.8	107.0	4.1
Maxsyn NEA4	3	108.6	7.0	101.1	5.3	103.3	4.3	108.7	5.6	107.9	5.8	106.0	4.1
HUSTLE RGT18	4	112.4	6.1	100.7	4.7	100.5	3.8	109.9	4.9	107.2	5.0	105.7	3.5
Hustle AR1	16	112.2	3.2	106.3	2.5	102.8	2.0	106.2	2.6	103.1	2.6	105.1	1.9
Tyson NEA4	4	103.9	6.1	113.7	4.6	101.5	3.8	103.7	4.9	104.7	5.0	104.8	3.5
Governor AR37	3	99.7	7.0	107.0	5.3	103.3	4.3	104.2	5.5	105.6	5.7	104.4	4.0
Three60 AR37	4	106.4	6.1	98.7	4.7	98.6	3.8	106.9	4.9	111.0	5.0	104.4	3.5
Trojan NEA2	15	111.4	3.3	103.9	2.5	103.2	2.0	106.0	2.6	101.1	2.7	104.3	1.9
Reason AR37	7	108.7	4.7	106.5	3.6	100.7	2.9	99.6	3.7	107.7	3.8	103.3	2.7
Governor AR1	5	107.7	5.5	107.5	4.2	99.7	3.4	101.4	4.4	103.6	4.5	102.8	3.2
Moxie AR1	14	100.1	3.4	106.6	2.6	99.1	2.1	102.6	2.7	100.6	2.8	101.7	2.0
AberGreen AR1	11	82.1	3.8	105.1	2.9	109.0	2.4	99.7	3.0	99.5	3.1	101.6	2.2
One50 AR37	27	105.4	2.5	94.5	1.9	98.7	1.5	103.9	2.0	103.0	2.0	101.1	1.4
Ultra AR1	13	108.4	3.5	98.7	2.7	99.6	2.2	101.3	2.8	100.6	2.9	100.9	2.0
Raider NEA2	8	103.8	4.4	101.6	3.3	100.2	2.7	101.0	3.5	99.8	3.6	100.8	2.5
One50 AR1	26	107.4	2.5	94.3	1.9	99.0	1.5	103.3	2.0	99.4	2.0	100.3	1.4
Base AR37	19	105.0	2.9	95.6	2.2	98.1	1.8	102.2	2.3	99.7	2.4	99.8	1.7
Excess AR37	5	109.3	5.4	97.8	4.1	97.5	3.4	99.0	4.3	101.7	4.4	99.8	3.1
Prospect AR37	11	109.1	3.8	97.5	2.9	97.2	2.3	100.9	3.0	99.2	3.1	99.7	2.2
Request AR37	8	101.3	4.4	109.2	3.3	95.8	2.7	96.9	3.5	100.7	3.6	99.6	2.5
Matrix SE	14	106.0	3.3	99.6	2.5	98.1	2.0	98.3	2.6	100.4	2.7	99.5	1.9
Sequel SE	4	108.2	6.1	98.1	4.6	99.2	3.8	97.3	4.8	99.3	5.0	99.2	3.5
Rely AR37	4	90.4	6.1	102.6	4.6	99.5	3.7	95.5	4.8	104.2	5.0	99.1	3.5
Expo AR1	8	102.4	4.5	99.7	3.4	99.8	2.8	97.8	3.5	93.6	3.7	98.0	2.6
Rely AR1	4	95.3	6.2	98.5	4.7	96.7	3.8	98.1	4.9	99.8	5.1	97.9	3.6
Excess AR1	4	97.5	6.1	98.6	4.6	96.1	3.8	98.2	4.8	95.4	5.0	97.0	3.5
One50 WE	15	104.7	3.3	96.6	2.5	94.9	2.0	96.6	2.6	95.3	2.7	96.5	1.9
AberGreen WE	3	64.2	7.0	91.9	5.3	112.2	4.4	96.8	5.6	89.5	5.8	96.1	4.1
Base AR1	4	102.1	6.1	95.7	4.6	98.1	3.8	94.4	4.8	92.7	5.0	95.8	3.5
AberGain AR1	8	75.9	4.4	90.7	3.3	100.1	2.7	97.0	3.5	92.6	3.6	94.4	2.5
Samson SE	14	94.1	3.6	98.2	2.7	94.9	2.2	90.8	2.9	93.8	3.0	93.9	2.1
Nui SE	27	89.1	2.5	98.7	1.9	94.5	1.5	88.5	2.0	90.3	2.0	92.0	1.4
AberMagic WE	6	54.4	5.1	83.3	3.9	105.3	3.2	84.8	4.1	84.8	4.2	87.7	3.0
Mean (kg DM/ha)	79	978		1929		3417		3954		2777		13055	

NFVT Summary 1991 – 2023 (September 2023)

If two means differ by more than the sum of their least significant intervals (LSI), they are significantly different at the 5% level

NEW ZEALAND PBRA PLANT BREEDING AND RESEARCH ASSOCIATION

1. ENDOPHYTE INSECT CONTROL RYEGRASS, FESTULOLIUM & CONTINENTAL TALL FESCUE 2023

ENDOPHYTE BRAND	ARGENTINE STEM WEEVIL	PASTURE MEALY BUG	BLACK BEETLE	ROOT APHID	PORINA	GRASS GRUB	FIELD CRICKET
DIPLOID PERENNIAL RYEGRASS							
AR1	++++	++++	+	-[2]	-	-	NOT TESTED
NEA2	+++	(++++)	+++	++	NOT TESTED	-	NOT TESTED
NEA4	+++	(++++)	+++	++	NOT TESTED	NOT TESTED	NOT TESTED
AR37	++++[1]	++++	+++	++++	+++	+	NOT TESTED
RGT18	**(+++)**	**NOT TESTED**	**(+++)**	**NOT TESTED**	**NOT TESTED**	**NOT TESTED**	**NOT TESTED**
STANDARD ENDOPHYTE	++++	++++	+++	++	+	-	NOT TESTED
WITHOUT ENDOPHYTE	-	-	-	-	-	-	NOT TESTED
TETRAPLOID PERENNIAL RYEGRASS							
AR1	(+++)	(++++)	+	-[2]	-	-	NOT TESTED
AR37	(+++)[1]	(++++)	+++	++++	(+++)	+	NOT TESTED
NEA2	++	(++++)	+++	++	NOT TESTED	-	NOT TESTED
WITHOUT ENDOPHYTE	-	-	-	-	-	-	NOT TESTED
DIPLOID AND TETRAPLOID ITALIAN AND SHORT TERM (HYBRID) RYEGRASS							
AR1	++	(++++)	+	-[2]	NOT TESTED	-	NOT TESTED
NEA	NOT TESTED	(++++)	+++	NOT TESTED	NOT TESTED	-	NOT TESTED
AR37	+++[1]	(++++)	+++	++++	NOT TESTED	-	NOT TESTED
NEA12	(+++)[1]	NOT TESTED	(+++)	++++	NOT TESTED	-	NOT TESTED
WITHOUT ENDOPHYTE	-	-	-	-	-	-	NOT TESTED
FESTULOLIUM							
U2	++++	(++++)	++++[3]	++++	(++)	+++	+++
CONTINENTAL TALL FESCUE							
MAXP (AR584)	NOT TESTED	NOT TESTED	+++	(++++)	NOT TESTED	(++)	+++
WITHOUT ENDOPHYTE	-	-	-	-	-	-	-

Notes on table

- No control.
+ Low level control: Endophyte may provide a measureable effect, but is unlikely to give any practical control.
++ Moderate control: Endophyte may provide some practical protection, with a low to moderate reduction in insect population.
+++ Good control: Endophyte markedly reduces insect damage under low to moderate insect pressures. Damage may still occur when insect pressure is high.
++++ Very good control: Endophyte consistently reduces insect populations and keeps pasture damage to low levels, even under high insect pressure.
( ) Provisional result: Further results needed to support the rating. Testing is ongoing.
1 AR37 and NEA12 endophytes controls Argentine stem weevil larvae, but not adults. While larvae cause most damage to pastures, adults can damage emerging grass seedlings. In Argentine stem weevil prone areas it is recommended to use treated seed for all cultivars with novel endophyte.
2 AR1 plants are more susceptible to root aphid than plants without endophyte.
3 Active against black beetle adults and larvae.

2. ENDOPHYTE ANIMAL SAFETY RYEGRASS, FESTULOLIUM & CONTINENTAL TALL FESCUE 2023

The information in this table is based on animal safety trialling protocols designed to expose animals to simulated worst-case scenario management. This involves forcing them to graze deep into the base of pure perennial ryegrass pastures that have been allowed to grow for several weeks over late spring/summer (similar to a hay crop) where they will encounter the highest concentrations of harmful endophyte chemicals if these are present. This management does not represent normal farm practice although similar situations may arise on farms in in rare circumstances. Under normal farm grazing practices, the contribution of basal pasture material to total animal dry matter intake is relatively low and therefore the intake of harmful chemicals (if they are present) is diluted. Thus, the likelihood of adverse effects on animals is reduced, but the potential for problems to occur may still exist if the endophyte brand is rated < 4-star for 'freedom from staggers' and/or there are comments on animal performance
which flag potential issues. Comments on animal performance have been moderated based on information from other trials (in addition to the formal animal safety testing protocols), consideration of the 'normal' grazing management practices implemented on farm (see previous paragraph), and recognition that animal diets are very seldom pure ryegrass. Other dietary components such as clovers or non-ryegrass grass species, crops or supplements will dilute the intake of endophyte alkaloids.

	FREEDOM FROM STAGGERS		
ENDOPHYTE BRAND	SHEEP & LAMBS	CATTLE & DAIRY COWS	EFFECTS ON ANIMAL PERFOMANCE
AR1	++++	++++	High level of animal performance
AR37	+++	++++	Typically provides a high level of animal performance. Can cause ryegrass staggers in sheep and lambs in extreme circumstances. Lamb liveweight gain can be reduced during periods of severe staggers. While ryegrass staggers has not been observed in in cattle and dairy cows, it could occur on rare occasions.
NEA	++++	++++	High level of animal performance
NEA2	++++	++++	Typically provides a high level of animal performance. Lamb liveweight gain could be reduced in extreme circumstances. While no effects have been observed in cattle and dairy cows, body temperature could be elevated on rare occasions.
NEA4	++++	++++	Typically provides a high level of animal performance. Lamb liveweight gain could be reduced in extreme circumstances. While no effects have been observed in cattle and dairy cows, body temperature could be elevated on rare occasions.
RGT18	**+++**	**++++**	**Typically provides a high level of animal performance. Can cause ryegrass staggers in sheep and lambs in extreme circumstances. Lamb liveweight gain can be reduced during periods of severe staggers. While ryegrass staggers has not been observed in cattle and dairy cows, it could occur on rare occasions.**
U2	++++	++++	High level of animal performance
MAXP (AR584)	++++	++++	High level of animal performance
STANDARD ENDOPHYTE	+	++	Can cause ryegrass staggers in sheep and lambs, and significantly decrease lamb growth rates in summer and autumn, and significantly increase dags. In dairy cows, it has been shown to depress milksolids production through summer and autumn.
WITHOUT ENDOPHYTE	++++	++++	High level of animal performance

Key to ryegrass staggers ratings:

+ Likely to cause severe staggers in most years
++ Can cause severe staggers in some years
+++ Can cause severe staggers occasionally
++++ Very unlikely to cause staggers

NEW ZEALAND PBRA PLANT BREEDING AND RESEARCH ASSOCIATION

THINK PASTURE SOLUTIONS. THINK RAGT.

Australia's agricultural environments demand novel endophytes as part of any commercial perennial ryegrass. It's been a long but worthwhile journey to bring our own first novel endophyte to market.

Because at RAGT Australia, we're here to create innovative solutions for the challenges of tomorrow. Through this breeding and R&D programme, we're able to offer farmers comprehensive seed technology advancements aimed at helping them and their businesses thrive.

HUSTLE PERENNIAL RYEGRASS NOW EVEN BETTER WITH RGT18 ENDOPHYTE

- BRED SPECIFICALLY FOR AUSTRALIAN CONDITIONS
- BRED FOR HIGH PERFORMANCE AND PERSISTENCE
- BETTER PEST PROTECTION
- BETTER PERSISTENCE

IT'S HERE! RGT18 NOVEL ENDOPHYTE

THANK YOU

The technical data mentioned in this presentation comes from tests carried out by RAGT.
The results obtained may vary according to agronomic and climatic conditions, as well as specific cultivation techniques.
In any event, the technical data provided is for information purposes only and does not bind RAGT contractually.

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