

# Choosing the right ryegrass endophyte.

Endophyte has a major impact on pasture persistence. There are several endophyte options currently available in the New Zealand market. Each has its own characteristics, so it's important to understand the differences between them, and which farm situations they are best suited to.

## **AR1**

The premier endophyte for many intensive farming situations throughout NZ. It provides very good resistance to ASW and mealybug, as well as excellent animal performance and health with no chance of ryegrass staggers. This endophyte is not suitable for areas where black beetle is a problem.

## **NEA2**

An ideal endophyte for most intensive farming situations through NZ. It provides good control of black beetle. *NEA2* also provides excellent animal performance and staggers-free pasture. It is only available in *Bealey* tetraploid perennial ryegrass.

## **Endo5**

Similar to *NEA2*, with good control of black beetle. *Endo5* provides staggers free pasture, although it may slightly reduce liveweight gain in lambs. Only available in tetraploid varieties.

## **AR37**

Provides the best overall insect resistance, and is ideal for situations where black beetle and porina are a problem. It also has excellent resistance to root aphid. It can cause ryegrass staggers in sheep (although less likely and usually less severe than *Standard* endophyte) and overall milksolids production is similar to *AR1*. It is not recommended for deer or horses.

## **Standard endophyte (SE)**

Not recommended for sowing in any situation. It is more likely to cause staggers, and of greater severity, than *AR37*. *Standard* endophyte can significantly reduce lamb and hogget growth over summer and autumn, and significantly reduce milk production in dairy cows. Its insect resistance is poorer than *AR37*.

## **Without endophyte (WE)**

A niche option for areas with cooler summers and good rainfall or irrigation (e.g. southern Southland). Removing endophyte eliminates any animal health problems, but insect resistance is also lost.

### **IMPORTANT NOTE:**

The ryegrass variety itself remains a critical part of seed choice. The variety genetics significantly affect ryegrass yield, seasonal growth, heading date, resistance to diseases or plant pulling, and persistence.



## Endophytes & pasture insects - how do they relate to each other?



### Argentine stem weevil

Argentine stem weevil (ASW) is a major pest throughout NZ. An introduced parasitoid wasp is helping to control ASW but outbreaks can still cause serious damage. The larvae are the most damaging. However adults can attack and kill seedling ryegrass at establishment, they are particularly common in grass to grass renewal or early autumn sowing in dryland environments.

**Endophytes:** All endophytes give good resistance in most situations.



### Black beetle

Black beetle (BB) can be a serious problem on light, free draining soils in Waikato, Bay of Plenty northwards and in parts of Hawkes Bay. Their numbers vary widely from year to year. Most damage is caused by the root-feeding larvae in late summer. Adults chew through the base of seedling grass plants after sowing, and high populations can cause failure in pasture establishment.

**Endophytes:** *Plus NEA2* (only in *Bealey* perennial ryegrass), *Endo5* and *AR37* endophytes give good control of black beetle.



### Pasture mealybug

Pasture mealybug can be a major problem in Canterbury and Hawkes Bay but is also found in Marlborough and Nelson, Manawatu, Waikato and Northland. Mealybugs kill ryegrass tillers, so affected pastures thin out. The insects are very small and hard to see, but white waxy spots in the base of plants (see photo) is evidence of their presence.

**Endophytes:** All endophytes are believed to give very good control of pasture mealybug.



### Porina

Porina is a pest mainly in southern North Island and throughout the South Island in summer wet areas. Management affects population levels, as porina eggs and young larvae need good protection within pasture. Longer or rank pastures and damp conditions improve survival.

**Endophytes:** Only *AR37* endophyte in diploid ryegrasses is believed to give good porina control.



### Root aphid

Root aphid occur throughout NZ but little is known about them. Its significance as a pasture pest is not yet understood, however they are believed to reduce ryegrass vigour and persistence. They are very small, live amongst white wax and are generally found lower in the soil than mealybug.

**Endophytes:** *AR37* endophyte gives the best control.

## Endophyte vs seed coating - what's the difference?

Endophytes naturally produce insecticide, however during the establishment phase of a new ryegrass pasture endophyte is not active in the seedlings, so little insecticide is present.

Seed coating provides a much higher level of insecticide and hence much better protection for seedlings, and should be used where insect attack could be a problem.

## Insect control rating for different endophytes.

These ratings are indicative and may vary slightly between cultivars. If Argentine stem weevil or black beetle are present at sowing, an appropriate seed treatment is recommended, to improve insect resistance during establishment. These tables were compiled by AgResearch, Agriseeds, Grasslandz, PGG Wrightson Seeds and Agricom.

Diploid ryegrasses				
Insect	AR1	AR37	Standard endophyte	Without endophyte
Argentine stem weevil	◆◆◆◆	◆◆◆◆ <sup>1</sup>	◆◆◆◆	-
Pasture mealybug	◆◆◆◆	◆◆◆◆	◆◆◆◆	-
Black beetle	◆	◆◆◆	◆◆◆	-
Root aphid	-. <sup>2</sup>	◆◆◆◆	◆◆	-
Porina	-	(◆◆◆) <sup>3</sup>	◆ <sup>3</sup>	-

Tetraploid ryegrasses <sup>4</sup>					
Insect	AR1	NEA2	AR37	Endo5	Without endophyte
Argentine stem weevil	◆◆◆	◆◆ <sup>1</sup>	◆◆◆ <sup>1</sup>	◆◆◆ <sup>1</sup>	-
Pasture mealybug	◆◆◆◆	(◆◆◆◆)	◆◆◆◆	◆◆◆◆	-
Black beetle	◆	◆◆◆	◆◆◆	◆◆◆	-
Root aphid	-. <sup>2</sup>	(◆)	◆◆◆◆	(◆◆) <sup>5</sup>	-
Porina	-	Not tested	Not tested	(◆) <sup>3</sup>	-

### Notes on tables:

<sup>1</sup> These endophytes control Argentine stem weevil larvae, but not adults. While larvae cause most damage to pastures, adults can cause damage to emerging grass seedlings, so use of an appropriate seed treatment is recommended for sowings in stem weevil prone situations.

<sup>2</sup> AR1 plants are more susceptible to root aphid than plants *Without* endophyte.

<sup>3</sup> Control of porina in pastures only applies to the ryegrass component. Other species that are palatable to porina (such as white clover) will still be damaged.

<sup>4</sup> There is much less information on their effect of endophyte in tetraploid ryegrasses on insects than for diploids. Tetraploids are generally more susceptible to Argentine stem weevil and the insect resistance provided by endophyte may not be as strong, although this may vary between varieties. These ratings are based on available data but require further confirmation.

<sup>5</sup> Control of root aphid by tetraploid cultivars with *Endo5* varies. *Banquet II Endo5* has moderate resistance (◆◆), whereas *Quartet II Endo5* has no control.

### Key to tables

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

For further information on endophytes please contact your local area manager:

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