

AR1 Endophyte

Grasslands scientists have developed a novel endophytic fungus that protects ryegrass against insect pests but does not cause the animal disorder ryegrass staggers. It is called AR1.

Endophytes are fungi that grow intercellularly within the host for mutual benefit. In a ryegrass trial in 1980, AgResearch scientist Lester Fletcher suspected that striking differences in ryegrass staggers incidence in sheep grazing his pastures might be caused by endophyte in the ryegrass plants. Alkaloids, especially lolitrems, were later identified as the cause of ryegrass staggers, lolitrem B being the major cause. Recent research has identified endophyte strains that produce the insect deterring peramine but no lolitrem B or ergovaline, the animal toxic compounds. One strain, AR1, has been inoculated into several established perennial ryegrass cultivars, thoroughly tested for animal safety and pasture productivity and is now commercially available in a number of ryegrass cultivars.

Sheep grazing trials
Initial testing on AR1 involved trial pastures containing *Nui* perennial ryegrass with AR1 novel endophyte; common toxic endophyte and no endophyte. Coopworth ewe hoggets or lambs grazed these pastures for four week periods in spring, summer and autumn. Pastures and animals were measured for performance and the animals scored for dags and ryegrass staggers at weekly intervals.

AR1 and endophyte-free pastures gave no animal differences, but on

the common toxic endophyte pastures, lamb liveweight gains were 82% lower than on the other pastures during summer/autumn when endophyte toxins are highest. In spring, when endophyte toxin levels are much lower, lamb liveweight gains were 17% lower on the common endophyte pastures.

Dairying trials

Indications of the potential negative effects of common endophyte on dairy production were evident in the late 1990's at Wellsford in Northland. In a split-herd comparison, up to 20% more milk-solid production could be achieved by reducing endophyte toxins through the use of AR1, low-endophyte, tall fescue and clover. Further farmlet scale trials for two years in Northland (Northland Agricultural Research Farm) and three years in the Waikato (Dexel), have confirmed improved dairy production when grazing pastures based on AR1 endophyte.



The effects of AR1 on dairy production are as follows:

- Up to 5-10% higher milk production from AR1 compared to wild type
- Greatest effect in summer/autumn
- Difference greatest in hot humid conditions with high night temperature
- No ryegrass staggers
- Cows more relaxed in the shed

- AR1 advantage over wild type = \$225/ha per annum (at 3 cows/ha)
- Over 5 years a return of \$1085/ha for a \$40/ha investment in seed



If cultivars with AR1 are used, care is needed with new sowings to ensure that the soil is free of ryegrass contaminants including seed containing wild endophyte.

AR1 endophyte in ryegrass gives:

- Better liveweight gains and milk production
- No ryegrass staggers
- No heat stress
- Less dags and flystrike
- No prolactin depression
- Excellent control of Argentine Stem Weevil
- Pasture productivity similar to common endophyte
- Better pasture persistence than endophyte-free ryegrass

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