



Grazing systems and less N leaching: plantain trials look promising



Reducing nitrate leaching by adapting grazing systems to alternative plant species and cultivars is a major focus of the DairyNZ-led Forages for Reduced Nitrate Leaching (FRNL) research programme, as DairyNZ forage scientist Mike Dodd reports.



DairyNZ's Forages for Reduced Nitrate Leaching (FRNL) research programme is a six-year programme which aims to reduce nitrate leaching losses by 20 percent through delivering proven, adoptable and profitable pasture and forage crop options.

One plant that has emerged as a prime candidate from lab and field studies over the last decade is the pasture herb, plantain (*Plantago lanceolata*).

Its main effect in dairy cows is to reduce the concentration of nitrogen (N) in the urine, reducing soil N concentrations under their urine patches, allowing plants to take up a greater proportion of the N, which in turn reduces leaching. Two recent grazing trials we carried out in the Waikato (early and mid-lactation) looked at specific forage combinations in mixed pastures for their effect on dairy cow milk production and urinary N excretion.

We compared ryegrass and tall fescue-based pastures with and without plantain (cultivar Tonic), using lucerne as the legume to support mid-season forage production in this summer-dry environment. Measured over a year, the pastures with plantain grew 1.6-2.6 tonnes more dry matter (DM). While plantain tended to suppress the grass component in winter and spring, this didn't lower pasture nutritive quality.

During both trials, half of the herds were consuming between 40 to 50 percent of their DM intake as plantain. Total DM intake and milk production of all the herds was similar, but there was a significant decrease in urine N concentration in the herds grazing plantain – 38 percent in summer and 21 percent in spring. Because plantain is a low DM percentage forage, the cows were consuming more water, which was only partially offset by them drinking less trough water.

This indicates that dilution via increased water intake does appear to be a factor in reducing urine N concentration in cows grazing pastures with high plantain content. On these pastures, lucerne intake was lower, which also resulted in lower N intake, so this was likely another contributing factor to lower N excretion.

DairyNZ will be carrying out further FRNL research to determine the minimum quantity of plantain needed in the cows' diet to achieve a significant effect on urinary N concentration.

Key points



1. Spring-sown Waikato pastures containing 40-50% plantain grew 1.6-2.6t DM/ha more than pastures without plantain in the year following sowing.
2. Grazing these pastures containing plantain reduced urinary N concentration by 38% in summer and 21% in spring.
3. Both N intake and total water intake are key factors affecting N leaching risk from grazed pastures, influencing the total amount of N excreted in urine per cow per day and the concentration of the urine.

*The FRNL research outlined in this article has been conducted with the plantain cultivar Tonic, because this is the most used cultivar in New Zealand. FRNL has not looked into differences between cultivars.



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