The effect of optimum vs. deficit irrigation on nitrate leaching from late spring deposited urine

Miss Anna Carlton[1], Dr Keith Cameron[1], Dr Grant Edwards[1], Dr Hong Di[1], Dr Timothy Clough[1]
[1]*Lincoln University*

Urine patches are widely recognised as the primary source of nitrogen (N) loss from grazed pastures in New Zealand and present a significant environmental problem. Recent research has shown that the inclusion of plantain and chicory in the pasture mix (called "diverse pastures") can reduce the concentration and amount of N deposited in urine patches compared to standard perennial ryegrass and white clover pastures. However, few studies have compared diverse pastures and standard ryegrass and white clover pastures with respect to the effects of irrigation management on plant N uptake and nitrate (NO¬3-) leaching losses. The objective of this research was therefore to determine the effect of optimum vs. deficit irrigation management regimes on N uptake for diverse and standard pasture species and the subsequent effects of these irrigation regimes on annual NO3- leaching losses from soil.

An experiment, using soil monolith lysimeters (500 mm diameter, 700 mm deep), measured N leaching losses and plant N uptake following cow urine application at either 500 or 700 kg N ha-1 in late spring. Following urine application irrigation water was applied at optimum vs. deficit rates from November to March. Measurements were undertaken for a 10 month period following urine application.

The results from this study will increase our knowledge and understanding of irrigation management on grazed pastures and could be used to help determine best management practices to minimise NO3- leaching loss.