

Increasing the spread of urine to reduce nitrogen leaching risk

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The majority of nitrogen (N) in a grazed pastoral system is cycled through the urine patch. The N loading rate in the dairy cow urine patch can be greater than 600 kg N/ha which exceeds pasture requirements, leaving urine N vulnerable to leaching or gaseous N loss, particularly in autumn-winter when pasture growth is slow. It is important to understand N cycling processes in the urine patch for modelling and N management on farms. New technologies for reducing N losses include increasing the spread of urinary N via devices attached to the cow. It is hypothesised that increasing the spread of urine will lead to increased pasture uptake of urinary N and reduced risk of N leaching loss by (a) reducing the urine patch N loading rate (increasing patch size), and (b) increasing the potential diffusion of N out of the urine patch through a non-uniform pattern of return (patch shape).

A plot study was conducted comparing the effect of urine spreading (patch size and shape) on N leaching risk from urine applied in autumn to a volcanic soil in the Waikato region of New Zealand. Two litres of urine (6 g N/L) was applied in late April to three urine patch sizes (0.2, 0.6, 1.0 m²) and two urine patch shapes (square, rectangle). Urine patches were labelled with the stable isotope ¹⁵N to track the movement of N through the soil profile. Regular monitoring of pasture N uptake and soil mineral N measurements were undertaken from three urine patch zones: the wetted, edge (+20 cm) and outer areas, for approximately 5 months after urine application. The results from the study will be presented.