

Subsurface cadmium loss from a stony soil under a winter forage crop

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Cadmium (Cd) inputs and losses from agricultural soils are of great importance because of the potential adverse effects Cd can pose to food quality, soil health and the environment. A recent lysimeter study indicated Cd lost in subsurface pathways from a stony soil represented a potentially important loss pathway. Furthermore, the study suggested Cd losses may be increased with the application of cow urine to soil. Given the increasing expansion of dairying on stony soils in parts of New Zealand, an understanding of potential losses is important to help estimate Cd accumulation rates and compliance with soil guideline values. In this study we investigated Cd concentrations and loads lost from a stony soil under a winter dairy-grazed forage crop that was grazed either conventionally (24 hr) or with restricted grazing (6 hr).

Subsurface Cd concentrations were generally low, with occasional spikes above the water quality guidelines for a month after the 24 hr grazing event. Cadmium loads in drainage were on average 0.45 g Cd ha⁻¹, in line with previous estimates for New Zealand soils. The mean Cd concentration and load in drainage increased after grazing in the 24 hr grazed plots, although there was no significant change in the 6 hr plots.

It was hypothesised the higher Cd losses were a function of greater urine inputs increasing dissolved organic carbon (DOC) via an increase in soil pH, which may increase Cd mobility through the formation of Cd-organic carbon complexes. However we did not find any pH effect or subsequent increase in DOC in either treatment after grazing. We speculate that chloride, which is present in large amounts in cow urine and has previously been shown to increase Cd solubility in some soils was important. Further analysis is being undertaken to confirm this mechanism and will be presented.