PRELIMINARY FINDINGS ON THE EFFECT OF TREADING DAMAGE AND URINE APPLICATION ON N LOSSES IN MANAWATU HILL COUNTRY

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Hill country represents an important pasture base for sheep and beef grazing in New Zealand. Due to steep terrain, exposed slopes and sometimes fragile soils, traditional beef breeding and bull beef production can create significant areas of tread damaged soils with reduced pasture cover. In 2012, the extent of animal treading damage at the study location was mapped as part of an associated study. On average, approximately 43% of the 2 paddocks mapped, had varying degrees of treading damage. Animal treading can impact on nutrient transformations within soil and little is known about the quantitative impact of animal treading on soil N transformations, N uptake by pasture and N leaching in this steep hill country.

Animal treading commonly reduces the macroporosity of soils, affecting a plant's ability to take up water and nutrients and reducing plant growth. Reduced plant growth is likely to lead to a build-up of soil nitrate and ammonium concentrations. However, denitrification and nitrous oxide emissions have been shown to increase following treading and compaction in New Zealand lowland soils (Menneer *et al.* 2005; Bhandral *et al.* 2007). Elevated soil nitrate and ammonium concentrations due to reduced N demand by pasture, decreases in soil aeration and elevated soil water content are the likely reasons for higher denitrification rates. In addition, the concentrated deposition of urine is likely to increase denitrification rates due to increased soil nitrate concentrations. These processes are important as enhanced denitrification rates may lead to a reduction in soil nitrate concentrations and a lower risk of nitrate leaching. The physical damage cause by treading is likely to reduce water infiltration rate and could also lead to decreased nitrate leaching. However, to our knowledge, the effect of treading damage on nitrate leaching has not been widely studied. This paper presents a preliminary examination of the effect of urine application and treading damage on denitrification and nitrate leaching on a hill country soil in the Manawatu region.

Editor's Note: An extended manuscript has not yet been submitted for this presentation.