

## Soil microbial response to bovine urine

Dr Suzanne Lambie<sup>1</sup>, Dr Norman Mason<sup>1</sup>, Dr Paul Mudge<sup>1</sup>, Dr Phillipa Rhodes<sup>1</sup>, Dr Jackie Aislabie<sup>1</sup>

<sup>1</sup>*Landcare Research*

Soil microbes are an integral component in nutrient cycling in pastoral systems but there is little literature on the effect of bovine urine on microbes outside of the nitrogen cycle. We assessed catabolic function, functional diversity, community change and priming of soil C decomposition in response to urine addition. We sampled 27 dairy grazed pastures (from Allophanic, Gley, Brown and Recent soil orders) throughout the Waikato, Manawatu, Bay of Plenty and Taranaki regions of the North Island of New Zealand. We added urine or water to undisturbed cores, incubated the cores at 25°C for 21 days and compared the incubated cores to baseline “untreated” cores. We tested the hypothesis that urine addition would decrease catabolic function, functional diversity, community diversity and lead to priming of soil C. We assessed catabolic function and functional diversity using MicroResp™, a multi-substrate induced respiration system. We assessed community structure using sequencing of 16S RNA, and priming was measured using radio-labelling techniques. We found that catabolic function decreased in urine treated soils compared to water controls, but functional diversity increased. Indicating that while more substrates may have been degraded this was to an overall lower rate in the urine treated soils. There was no decrease in bacterial or fungal diversity in response to urine addition and no correlation between OTU diversity and catabolic function or functional diversity. Therefore microbial community diversity was not linked to functional changes exhibited in our soils. Priming of soil C decomposition was highly variable within soil and soil order, and positive priming was only exhibited in 6 out of 27 soils that we assessed. The remaining soils exhibited negative or no priming response to urine addition, but susceptibility of soils to priming by urine addition may be enhanced by prior soil disturbance.