

UNDERSTANDING NITROGEN FLOWS THROUGH GRAZED WINTER FORAGE CROPS: OBSERVATIONS FROM NEW ZEALAND RESEARCH

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Grazing winter forage crops in situ in winter means that a large proportion of the consumed nitrogen (N) will be returned as excreta, on to bare soil, at a time when rainfall generally exceeds evaporation and is therefore susceptible to N leaching loss. A number of studies on winter forage crops have now been completed, most recently under the Pastoral 21 (P21) research programme, but also in other projects. The completion of the P21 programme provided opportunity for collation of experimental data and identification of the key messages from the data.

The dataset comprised of experiments that measured N leaching at the paddock-scale (using porous cups or measuring drainage from a pipe and mole system) or urine patch-scale (lysimeters or small plots).

At the paddock-scale, there were, in total, about 15 experiment years of leaching data covering a range of circumstances. The majority of measurements in paddocks were made with grazed brassicas, with only three years of fodder beet data. Nitrogen leaching losses were variable, but the trends appeared to be: on free-draining soils, mineral N leaching losses from brassicas were >80 kg N/ha and fodder beet <45 kg N/ha; generally, mineral N leaching loss from grazed brassicas on the heavier textured Pallic soils was <45 kg N/ha, i.e. about half that of free-draining soils.

The lysimeter studies showed that an amount of N equivalent to 52% of the applied urine N was lost by leaching, although this was highly variable (range 26-80%). Thus, even though the lysimeters represent the worst case situation (i.e. loss directly under a urine patch on a bare soil) only half was apparently lost by leaching. There was no obvious explanation for the difference in the range of reported losses, although the dataset was too small to test for direct relationships. The lysimeter studies demonstrated the effect of grazing date on N leaching (with less N leached from grazing events later in the drainage period), and indicated scope for a catch crop to capture some of the leachable N if established soon after grazing.

Further research is required to develop greater understanding of nitrogen flows through the winter forage crop system, and implications for losses to the environment and for developing mitigation strategies.

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