

# Nitrate Leaching Loss and Crop Recovery of Labelled-<sup>15</sup>N Urinary Nitrogen Following Simulated Winter Forage Grazing

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Intensive winter forage grazing systems have a high risk of environmental impact, due to nitrate (NO<sub>3</sub><sup>-</sup>) leaching. The use of a catch crop sown after grazing could potentially reduce N leaching losses. We report the results of a field lysimeter study to measure the N balance (soil, plant, N<sub>2</sub>O, N<sub>2</sub> and leachate) of a winter application of labelled-<sup>15</sup>N urine (350 & 700 kg N/ha) after simulated winter forage grazing on kale and its capture by the sowing of either oats (*Avena sativa*) or Italian (It.) ryegrass (*Lolium multiflorum*) at recommended sowing dates.

Results showed the sowing of an oats catch crop reduced nitrate leaching by 25% compared with It. ryegrass. Total annual nitrate leaching loss comprised about 36-49% of total-N applied in the urine and was similar for both rates of urine-N application and plant species. Only relatively small amounts of the <sup>15</sup>N-labelled urine were retained in the urine treatments of both catch crops (3-4%) so it therefore appears that the increased evapotranspiration under the oats catch crop (and thus a reduced amount of drainage over the critical drainage period in late winter-spring) was the main factor that reduced the amount of nitrate leaching losses. The earlier sowing date and successful establishment of oats in late-winter provides an advantage to reduce nitrate leaching losses from winter forage grazing systems providing the retained nitrate can be recovered in a subsequent crop or pasture. The planting of an oats catch crop, therefore, provides a two-fold benefit in not only potentially increasing N recovery but also in limiting drainage at a critical time.