

Fate of fertiliser nitrogen in a rainfed dairy pasture on a Tenosol in South Australia

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The efficiency of fertiliser nitrogen (N) applied into pasture systems is often measured based on a short term biomass response to fertiliser (e.g. every 28 days). However, the applied N could be immobilised and re-mineralised in the soil, providing longer term benefits to pasture production. A field trial was conducted on a rainfed dairy pasture on a Tenosol (15 cm depth over limestone) in south-eastern South Australia from May to October 2014 to determine how long the applied N (as 15N urea) could provide a productivity benefit to the pasture. Urea was applied at 3 rates (50, 67 and 84 kg N/ha) per application time, with 15N urea applied once (May) and unlabelled urea applied in 4 subsequent fertilisation events. Over the growing season a total of 28-33% of the 15N was recovered in the pasture, with greater recovery at the lower N rate (50 kg N/ha) and the first 2 harvests. At the end of the growing season 13-15% of the 15N was found in the soil (11-13%) and roots (2%), which could become available for the pasture via mineralisation under favourable conditions over time. In the soil, the majority of the 15N was recovered in the top 5 cm of soil (8-10%), with progressively less recovered in the 5-10 cm (2%) and 10-15 cm (1%) depths. More than 52-59% of the applied N was lost, presumably from ammonia volatilisation and denitrification. Less than 1% of the N applied in May was recovered in the pasture 6 months later, indicating that the pasture growth was supported primarily by the N applied at each fertilisation event. The results show that N remains available in the soil over time, and it is possible that this could be better utilised by manipulating N inputs.