

# Components of Nitrogen Loss from a Hybrid Dairy Grazing/Housing System

Khadija Malik<sup>1</sup>, Dr Peter Bishop<sup>1</sup>, Dr Jay Howes<sup>1</sup>, Dr Surinder Saggar<sup>2</sup>, Dr Mike Hedley<sup>1</sup>

<sup>1</sup>Massey University, <sup>2</sup>Landcare Research

Dairy industry intensification in some areas of NZ has led to increased N loss to water. Practising duration controlled grazing; using temporary housing systems (naturally ventilated barns) can reduce urinary load to paddocks and N loss to water. There is concern that ammonia (NH<sub>3</sub>) loss to atmosphere during housing, manure storage and re-application to pasture simply results in pollution swapping i.e. decreasing N loss to water while, increasing the greenhouse gas emission footprint of dairying.

A longitudinal study has been undertaken to estimate nitrogen (N) losses associated with housing and manure management in a temporary housing system. This comprises of: N loss during the deposition of cow waste (urine and dung) on the floor (0-2 hr from deposition); transfer of cow waste to the collection channel (0-2.25 hr); total N loss from the channel (16-32 hr); total N loss from the storage pond (7- 120 days storage); and finally, N loss during the reapplication of the manure to the land.

The results show that NH<sub>3</sub> gas emission from a naturally ventilated barn system is highly dependent on of the fate of urea N contained in the urine and dung (slurry). In the first 16-32 hr 30% of total N (4.23 kgN/m<sup>3</sup> slurry) was lost while the slurry is being scraped to and retained in the channel, before gravitational flow delivers the slurry to the pond. During storage in the pond, loss of N continues. However, this represents less than 10% of total initial N and NH<sub>3</sub> losses. Re-application of slurry to the soil represents only 3%. The main output of this research will be reporting the percentage of NH<sub>3</sub> losses occurring in manure management and identifying where these losses can be mitigated.