A LONGITUDINAL STUDY TO ESTIMATE NH₃.N LOSSES ASSOCIATED WITH TEMPORARY HOUSING OF DAIRY COWS AND MANURE MANAGEMENT

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Duration controlled grazing systems for dairy cows to reduce N loss to water involves temporary housing (naturally ventilated barns) to reduce urinary load on paddocks. However this temporary housing system results in N loss as NH₃ during housing and at subsequent stages of manure management (housing, storage and land application). Methods appropriate for estimating these losses from each stage have been developed and used to undertake a longitudinal study to quantify NH₃ losses associated with partial grazing/housing and manure management system. This comprises measurement 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 NH₃ 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 few hours (2, 4 and 8 h) between excreta deposition and lane scraping NH₃-N emission accounted for 0.05%, 0.34 % and 0.78% of total slurry N. For the 16-32 h of slurry retention in the channel the loss is approximately 0.62% of the slurry N before gravitational flow delivers the slurry to the pond. During storage in the pond, loss of N continues and over 120 days storage this represents up to 24% of total initial N lost. During re-application of slurry to the paddock by tanker using spray or trailing shoe injection NH₃ emissions made up only 2.35% and 1.57% of the total slurry N. Overall NH₃ loss accounted for 27.13% of the urine and dung N deposited in the barn, storage pond and land application. This work clearly identifies that pond storage needs to be minimised or ponds covered if NH₃ losses occurring in manure management are to be reduced.

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