

Appendix J

Modelling nitrogen losses from a sheep grazing system with different spatial distributions of excreta

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Abstract. The aim of this study was to assess the effect that the randomised versus even distribution of excreta (dung and urine) may have on modelling nitrogen (N) losses by leaching, volatilisation and denitrification from a grazing system. A range of stock densities (from 200 to 2000 sheep/ha, equivalent to an annual stocking rate of 3 to 33 dry sheep equivalent (DSE)/ha respectively) were simulated to represent an increasing application of N excreta to a grazed 1 hectare area either distributed randomly or uniformly. This study found that the proportion of annual N inputs lost by denitrification were significantly lower and leaching N losses were higher at high stocking densities compared to if excreta was distributed uniformly. The results of this study indicate that N losses from a sheep grazing system could be adequately modelled assuming uniform distribution of excreta at stocking densities up to 1200 sheep/ha (equivalent to an annual stocking rate of 20 DSE/ha). But at higher stock densities, when N loads are high, the spatial distribution of excreta is important and models need to explicitly deal with the distribution of dung and urine N returns.

See Bell M.J., Cullen B.R., Johnson I.R., Eckard R.J. (2012). Modelling nitrogen losses from a sheep grazing system with different spatial distributions of excreta. *Agriculture*, 2, 282-294; doi:10.3390/agriculture2040282