Heterogeneous Nutrient Distribution Across Dairy Grazing Systems in Southeastern Australia

C. J. P. Gourley
Ellinbank Research Institute, Australia

I. Awty
Ellinbank Research Institute, Australia

P. A. Durling
Ellinbank Research Institute, Australia

J. Collins
Ellinbank Research Institute, Australia

A. Melland
Ellinbank Research Institute, Australia

See next page for additional authors

The XX International Grassland Congress took place in Ireland and the UK in June-July 2005. The main congress took place in Dublin from 26 June to 1 July and was followed by post congress satellite workshops in Aberystwyth, Belfast, Cork, Glasgow and Oxford. The meeting was hosted by the Irish Grassland Association and the British Grassland Society.

Proceedings Editor: D. A. McGilloway

Publisher: Wageningen Academic Publishers, The Netherlands

Presenter Information

C. J. P. Gourley, I. Awty, P. A. Durling, J. Collins, A. Melland, and S. R. Aarons

Heterogeneous nutrient distribution across dairy grazing systems in southeastern Australia

C.J.P. Gourley, I. Awty, P. Durling, J. Collins, A. Melland and S.R. Aarons
Ellinbank Research Institute, PIRVic Ellinbank, RMB 2460 Hazeldean Rd, Ellinbank, Victoria, 3821 Australia, Email: Cameron.Gourley@dpi.vic.gov.au

Keywords: dairy farms, soil nutrients, phosphorus, potassium

Introduction The Australian dairy industry is largely based on a grazed pasture system, although most cows also consume substantial amounts of imported feed (Fulkerson & Doyle 2001). This trend is expected to increase as the Australian dairy industry continues to intensify. Fertiliser inputs of nitrogen (N), phosphorus (P), potassium (K) and sulphur (S) are still viewed as necessary to maintain adequate pasture and milk production despite the fact that most dairy farms are in net positive balance for all of these nutrients (Reuter 2001). Nutrient losses from dairy farming regions and eutrophication of waterways has gained strong public and political attention and intensive pasture systems are no longer seen as 'clean and green'. An important aspect of a viable dairy industry in the future will be more refined nutrient management planning.

Materials and methods Soil samples (0-10 cm) were collected from paddocks on 30 commercial dairy farms (Victoria, Australia) and tested for P, K, S, and pH (water). Farm sizes and intensity of inputs varied, with between 14 and 54 paddocks tested per farm. Soil test information was spatial presented and simple nutrient budgets calculated for each paddock or set of paddocks on each dairy farm, using mostly readily available information such as milk production, purchased feed, harvested hay and silage, and feeding strategies.

Results Soil P, K and S levels were unevenly distributed across the farms. For example a soil phosphorus distribution is provided (Figure 1). In general higher nutrient levels were associated with night paddocks, calving paddocks, sacrifice paddocks and dairy effluent application areas. Low nutrient levels were associated with remote farm locations and hay and silage areas. The most spatially variable measure was K, particularly on farms where the dairy unit was at one end; least variable was soil pH. Farmer response to the spatial presentation of their soil test information and the description of nutrient flows within their farm was highly positive. In most instances, farmers recognised that imported nutrients in purchased fodder could offset fertiliser costs. Changes in fertiliser management included deciding to apply no fertiliser to high fertility areas, changing fertiliser blends to better balance nutrient requirements, or increasing rates to identified areas of nutrient deficiency.

Conclusions The improved adoption and application of tools, such as soil testing and nutrient budgeting can make substantial improvements in fertiliser decisions, increasing productivity and profitability, while reducing adverse environmental impacts. Advances in analytical methods and procedures are continuing to refine fertiliser recommendations and reduce costs, while GPS mapping can provide a greater capacity for 'whole-farm' nutrient planning. Nutrient budgets are gaining acceptance as an indicator of sustainable nutrient practices, and provide a useful educational tool to assist dairy farmers to more effectively account for nutrient inputs, redistribution and losses within the farm in Australia.

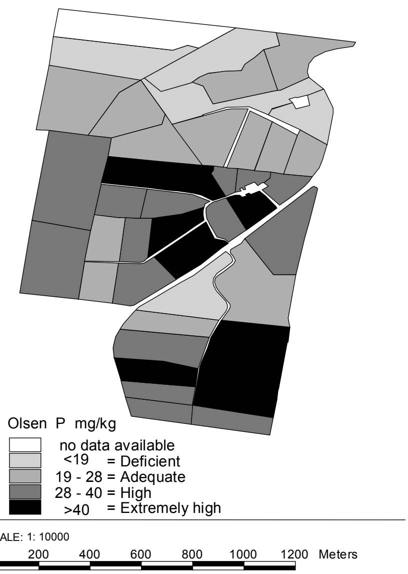

Figure 1 Soil phosphorus distribution across a dairy farm in Victoria

References

Fulkerson, B. & P. Doyle (2001). 'The Australian dairy industry.' (Dept. Natural Resources and Environment: Tatura, Victoria).

Reuter. D.J. (2001). Nutrients – farm gate nutrient balances. Australian national land and water audit 2001. Http://audit.ea.gov.au/ANRA/land/farmgate/Nutrient_Balance.pfd.