

Effect of grazing management and fertiliser regime on the spatial distribution of available phosphorus, nitrogen, and potassium in soil

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Transfer of plant nutrients into sheep camps is a major source of nutrient loss, particularly in hill-country sheep pastures (Hilder, 1964). In most sheep grazing systems, high proportions of nutrients that are applied as fertiliser, taken up by the plant, and ingested by the animal are not effectively recycled back into the soil due to their transfer to small areas of the paddock. Managing sheep pastures with rotational grazing may reduce stock camping and encourage a more even distribution of nutrients (Warn, 2001). This research focused on the effect of grazing management and soil fertility on the efficiency of nutrient recycling. The study was conducted on hill-country pastures grazed by Merino wethers at the Broadford Grazing Experiment site in northeast Victoria.

The effects of three grazing management strategies and two phosphorus fertiliser application rates on the spatial distribution of available phosphorus (P), potassium (K), nitrate (NO_3^- -N), and ammonium (NH_4^+ -N) in soil were determined. Soil samples were taken on a 20-m grid on 18 0.65-ha paddocks (three replicates of each treatment), and dry weight was determined for all faeces collected within a 30-cm² radius of where the soil samples were taken. The grazing treatments had been in place for 4 years and included a set-stocked treatment, a simple (time-based) four-paddock rotation, and an intensive rotation based on pasture recovery. The two fertiliser input treatments

were high input (25 kg P/ha/year) and low input (6 kg P/ha/year).

High concentrations of all nutrients were found towards one side of each paddock in set-stocked and simple-rotation treatments. Nutrients were more evenly distributed in paddocks managed under an intensive rotation. There was no effect of phosphorus treatment on the distribution of any nutrients. The location of areas of high nutrient concentration, particularly in set-stocked and simple-rotation paddocks, appeared to be highly influenced by topography and the location of neighbouring stock.

Grazing method also had an effect on the overall nutrient concentration in the paddocks. Intensively grazed paddocks had higher available K and P levels but lower NO_3^- -N and NH_4^+ -N levels than the other two grazing treatments.

Overall, this study demonstrated that grazing strategy does have implications on the pattern of nutrient distribution and the overall nutrient concentration in paddocks grazed by sheep.

References

- Warn, L., McLarty, G., and Frame, H. 2001. Improving pasture and wool production with rotational grazing. *Grassland Society of Victoria Conference Poster Paper*, June 2001.
- Hilder, E. J. 1964. The distribution of plant nutrients by sheep at pasture. *Aust. J. Ag. Res.* 5:241-248.