

## Mineralization of pasture residues

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Recycled nutrients make a major contribution to the mineral economy of pasture (1,2). Under grazing, nutrient cycling shifts predominantly to the microbial domain where it depends primarily on the supply and mineralization rates of dead plant and animal residues (3). This paper reports the variation between residues in their apparent mineralization rates, along with associated chemical, and biological attributes. The potential of residue management to enhance the cycling economy is summarized.

### Methods

The litter bag technique was used for mineralization estimates for pasture residues; for faeces a modification was used. The rates are "apparent" because they represent net changes and include combination and burying. Details of all methods are reported elsewhere (3).

### Results and Discussion

**Table: Apparent mineralization rates for phosphorus (P) residues expressed as half-times (T<sub>0.5P</sub>). Chemical and microbiological attributes are given**

Source of residues	T <sub>0.5P</sub> (days)	P%	C/N	Colonizers (mm <sup>3</sup> /gdm)		Respiration 15°C (mlO <sub>2</sub> /g dm/24h)
				Bacteria	Fungi	
<i>Themeda australis</i>	1150	0.05	61	0.8+0.3	8.3+1.9	2.4+0.1
<i>Poa sieberana</i>	900	0.06	52	0.9+0.3	11.7+3.9	3.3+0.5
<i>Phalaris aquatica</i>	850	0.11	45	1.4+0.2	14.0+5.8	4.9+0.3
<i>Trifolium repens</i>	195	0.30	14	8.9+1.7	58.0+55	13.0+1.0
Sheep faeces (np)	230	0.35	37	nd	nd	nd
Sheep faeces (sp)	120	1.00	29	nd	nd	nd

np = native pasture                      sp = sown pasture                      nd = not determined

Data show that mineralization rates are strongly associated with mineral and microbial attributes. Agronomic and grazing management can enhance cycling by altering the mix of residues. Ruminants provide a favourable environment in the gut for mineralization and deliver microbially processed plant material to the ground surface (faeces) and soil (urine). The progression from standing dead to litter enhances the environment for biological mineralization (two-fold) and the soil environment provides a similar increase (4); abscission and lodging can be accelerated by mob stocking and mowing. Conserving a favourable habitat for comminuting, burying and microbivorous invertebrates should also be a management objective for increasing mineralization rate.

Enhancement of cycling involves improving the quality of residues, modifying their spatial distribution and sustaining a favourable habitat for decomposer biota. Such goals correspond with good agronomic management.

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