RATE OF REACTIVITY AND PARTICLE SIZE OF SEVERAL LIMESTONE SOURCES IN EASTERN AUSTRALIA

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Limestones and other similar acid-neutralising materials have been used to correct the problem of lowered pH and impaired digestion in the gastro-intestinal tract of ruminants given high starch diets (Miller et al. 1965). Limestones from different sources give variable production responses when included in grain diets, and this is apparently related to solubility, velocity of dissolution and proton-combining ability of the various limestones (rate of reactivity) (Wheeler et al. 1981).

This study was undertaken to evaluate the variability in particle size and rate of reactivity of several limestone sources in Eastern Australia. Seven limestones from two commercial mines were compared in relation to particle size and rate of acid neutralisation. The limestones were Aglime, ground Aglime and Stonedust from Attunga, NSW, and Microfine, F99/200, Superfine and Aglime from Southern Lime, Moss Vale, NSW. The rate of reactivity was estimated by a pH stat titration procedure which determines the time required to add 50% (T_{50}) of the total 1.0 N HCl needed to neutralise the limestones at pH 3.0 (Steinberg et al. 1965).

Rate of reactivity and particle size of several limestone sources in Eastern Australia

Limestone Source	Type	Particle size (μm) % total >420	297	105	<53	Reactivity (s)
Attunga	Aglime	20	60	20		30
	Aglime ground			10	90	167
	Stonedust				100	310
Southern Lime	Microfine				100	180
	F99/20			2	98	330
	Superfine		13	24	63	355
	Aglime	9	21	20	50	505
Control	$CaCO_3$				100	278

These limestone sources varied greatly in particle size, distribution and rate of reactivity and the Southern Lime 'Microfine' had the greatest acid-neutralising capacity. Acid neutralising capacity was inversely proportional to particle size.

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