

FEED DIGESTIBILITY IN SHEEP INCREASED BY SODIUM BICARBONATE BUT NOT LIMESTONE

M.H. ROUND

South Australian Research and Development Institute, Turretfield Research Centre, Rosedale, SA 5350

Limestone and sodium bicarbonate are included in grain diets fed to ruminants with the expectation that their respective neutralizing and buffering capacities will reduce rumen acidity and its associated adverse effects on animal production but responses are variable (Ha *et al.* 1983). The value of these compounds was examined in relation to pelleted diets fed to sheep.

In a factorial design with five replicates, 50 adult Merino wethers, individually penned and harnessed for faeces collection, were randomly allocated to treatments within liveweight strata. The sheep were introduced over three or seven days from 1000 g milled hay to 900 g of one of five pelleted diets and were then fed the pellets *ad libitum* as sole diet for 20 days. The diets contained 12% crude protein and consisted of 60% wheat, 35% oat hull, molasses-urea-minerals, 0.5% salt, 0.5% limestone and either nil, 2.0% or 4.0% finely ground limestone ('Stocklime') or 1.5% or 3.0% sodium bicarbonate. Feed dry matter intake (DMI) was recorded daily and dry matter digestibility (DMD), water intake and faecal DM content were recorded on days 14 to 20 of *ad libitum* feeding.

Table 1. Mean pellet DMI (g/day) on days one to seven and days 14 to 20 and DMD, water intake, faecal DM content and time taken to eat 900 g pellets on day seven of introductory feeding

Treatment	MV ^A	DMI days 1-7	DMI days 14-20	DMD (%)	Water intake ^B (L/day)	Faecal DM (%)	Meal time ^C (hours)
Diet							
Control	2	947 ^a	1220 ^b	64.9 ^b	2.93 ^a	46.1 ^a	19.2 ^a
2 % limestone	1	1076 ^a	1465 ^{ab}	63.5 ^b	2.89 ^a	45.1 ^a	16.4 ^{ab}
4 % "	2	1005 ^a	1207 ^b	63.8 ^b	2.60 ^a	48.0 ^a	18.4 ^a
1.5 % sod. bicarb.	2	920 ^a	1397 ^{ab}	64.5 ^b	2.58 ^a	45.7 ^a	7.4 ^c ***
3 % "	1	1042 ^a	1568 ^a	69.9 ^a	2.85 ^a	47.0 ^a	13.0 ^b
s.e.d.		132	154	1.75	0.226	2.0	1.64
Adaptation rate							
3 days	3	1016 ^a	1403 ^a	64.6 ^a	2.56 ^a	46.1 ^a	
7 days	5	980 ^a	1340 ^a	66.0 ^a	2.98 ^a	46.6 ^a	
s.e.d.		83	98	1.11	0.142	1.3	

^A Missing values due to inappetant sheep - see text. ^B Analysed with DMI as covariate. ^C 24 sheep
Different superscripts within main treatment groups in the same column differ (P<0.05).

*** indicates P<0.001.

Sheep took longer to accept pellets containing 4% limestone than the other diets, while pellets containing 1.5% sodium bicarbonate were initially eaten much faster than the other diets (Table 1). Eight sheep suffered prolonged inappetance and were excluded from the analysis. These sheep ate at least 1 kg and two ate more than 2 kg of pellets on day 1 of *ad libitum* feeding but only two, both fed diets containing sodium bicarbonate, regained any appetite during the study. Sodium bicarbonate had no early effect on *ad libitum* feed intake but later on, 3% sodium bicarbonate significantly (P< 0.05) increased feed intake, markedly increased DM digestibility (Table 1) and increased digestible DMI (days 14 to 20) by 23% compared with the other diets. Limestone at 2% tended (P<0.10) to increase feed intake on days 14 to 20 (Table 1) but had no other significant effect.

Response to buffering compounds might be expected where diets and feeding regimens produce conditions that challenge but do not overpower the rumen environment. Due to small fibre length, pelleted diets have inherently low buffering capacity and in the present study the inclusion of sodium bicarbonate but not limestone, apart from its inclusion as a source of calcium, seemed worthwhile. This study was done in relation to the export sheep industry but the results may not fully apply where pelleted diets contain less cereal grain than used in the current study.

HA, J.K., EMERICK, R.J. and EMBRY, L.B. (1983). *J. Anim. Sci.* **56**, 698-706.