

## DIURNAL CHANGES IN RUMEN AMMONIA IN SHEEP GRAZING CEREAL STUBBLES

M.H. ROUND<sup>A</sup>, D. HUBBARD<sup>B</sup> and A.S. FOTHERINGHAM<sup>A</sup><sup>A</sup> South Australian Research and Development Institute, Turretfield Research Centre, Rosedale, SA 5350<sup>B</sup> Primary Industries South Australia, Roseworthy Campus, Roseworthy, SA 5371

The use of a qualitative colour test to determine rumen ammonia concentration (RAC) to test for dietary nitrogen deficiency in sheep and cattle in the field was promoted in the early 1980s by Stephenson *et al.* (1984). The recent availability of ion specific electrodes and dedicated mV meters now makes it possible to accurately measure RAC in the field though the question that arises is whether the time of sampling may give misleading assessment of dietary nitrogen status. Diurnal changes in RAC were examined at four sites in sheep grazing cereal stubbles containing no green pick, a situation where sheep may be susceptible to nitrogen deficiency.

Small groups of adult sheep grazing 0.5 to 2.0 ha plots of cereal stubbles during summer were moved on one day only to small portable yards on two to four occasions between 0800 and 2000 hours. The plots were (1) a wheat stubble grazed by eight wethers, (2) an oat stubble grazed by six wethers, (3) a barley stubble grazed by six wethers and (4) a co-sown barley:oat stubble grazed by eight wethers and eight ewes nearing the end of lactation with lambs at foot. At each yarding approximately 50 ml of rumen fluid was collected from each sheep using a vacuum tube inserted via the oesophagus. The rumen fluid was strained and analysed for ammonia concentration. The sheep were immediately returned to grazing after each sampling.

Only in the wethers on the barley/oat stubble, but not in lactating ewes grazing the same area, was there a significant effect of sampling time on RAC though the effect was comparatively small (Table 1). The coefficient of variation (cv) for RAC in the lactating ewes was twice that of the wethers on the same stubble; this may have reflected differences in milk yield and hence protein demand, though the cv for the ewes was similar to the wethers grazing the other three stubbles. This general lack of response of rumen ammonia concentration to time of sampling is in agreement with the findings of Coombe and Mulholland (1983) and De Waal and Biel (1989) who found low diurnal variations for RAC in sheep grazing oat stubble and mature grass pasture respectively. Maximum daily temperatures in our study ranged from 20 to 28°C and sheep were observed grazing between yardings. Hotter weather might have resulted in sheep restricting more of their grazing to the cooler hours around sunrise and sunset and such a situation could possibly lead to wider diurnal changes in RAC. The results of studies of pen-fed sheep by Oldham *et al.* (1977) and of grazing cattle by Playne and Kennedy (1976) suggest however that such changes are likely to be small for diets low in soluble nitrogen.

**Table 1. Mean rumen ammonia concentration (mg N/L) in adult sheep grazing four types of cereal stubble**

Stubble	Sheep	Time of sampling (hours)					s.e.m.	P
		0800	1000	1200	1600	2000		
Wheat	wethers	71	-	71	84	54	7.3	n.s.
Oat	wethers	31	-	32	40	37	8.8	n.s.
Barley	wethers	52	-	41	45	54	8.6	n.s.
Barley/Oat	wethers	-	27	-	44	-	3.6	0.004
Barley/Oat	ewes	-	28	-	35	-	6.6	n.s.

We conclude that sampling time should not significantly affect the use of rumen ammonia concentration as an indicator of dietary nitrogen deficiency in sheep grazing dry pastures and stubbles.

COOMBE, J.B. and MULHOLLAND, J.G. (1983). *Aust. J. Agric.Sci.* **34**, 767-80.

DE WAAL, H.O. and BIEL, L.C. (1989). *S. Afr. J. Anim. Sci.* **19**, 156-64.

PLAYNE, M.J and KENNEDY, P.M. (1976). *J. Agric. Sci., Camb.* **86**, 367-72.

OLDHAM, J.D., BUTTERY, P.J., SWAN, H. and LEWIS, D. (1977). *J. Agric. Sci., Camb.* **89**, 467-79.

STEPHENSON, R.G.A., COBON, D., MCGUIGAN, K.R. and HOPKINS, P.S. (1984). *Proc. Aust. Soc. Anim. Prod.* **15**, 601-3.