

EFFECTS OF SALT INTAKE ON RUMEN AND RENAL NITROGEN DYNAMICS IN SHEEP

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High sodium intakes commonly occur in sheep grazing in many parts of Australia, deriving the salt either from drinking water or halophytic plants. High levels of salt given to animals fed a protein-concentrate diet have the advantageous effect of rumen bypass and subsequently increased wool growth (Hemsley et al. 1975). Increased salt intake is also accompanied by an increased urine flow rate and renal loss of urea (Godwin and Williams 1983), an effect that would reduce the amount of urea recycling to the reticulo-rumen. This study was performed to examine the effects of high levels of salt on animals fed a low-protein roughage, a diet upon which the above effects would probably be deleterious. Eight Merino ewes (39.2 ± 2.1 kg BW), fitted with rumen cannulae, were fed a low-protein chaff (6.8 g N and 127 mmol Na/d) at 2-hourly intervals and were infused intra-ruminally with increasing levels of salt. Rumen and renal dynamics were determined by standard procedures using CREDTA and inulin. Digestibility and some indices of N metabolism were also determined and are presented in the following table.

Salt Infused (mmol/d)	Dry Matter Digest. (%)	N Digest. (%)	Rumen Liquid Outflow (L/d)	Rumen Volume (L)	Rumen NH ₃ -N (mg%)	Urine Flow Rate (mL/min)	GFR (mL/min)	Urea-N Excretion (g/d)	Fractional Urea Excretion (%)	Plasma Urea-N (mg%)
0	65 a	62 a	3.42 a	5.1 a	7.2 a	0.42 a	58.3 ab	0.60 a	9 a	11.40 a
500	65 a	63 a	3.81 ab	5.2 ab	8.3 a	0.95 b	57.4 ab	0.63 a	11 a	9.97 a
750	63 ab	65 a	4.01 ab	5.2 ab	8.0 a	1.24 c	49.2 a	0.71 a	13 ab	11.10 a
1000	60 b	55 b	4.88 bc	5.3 ab	5.1 b	1.99 d	59.1 ab	0.52 ab	19 b	4.63 b
1250	59 b	53 b	5.61 c	5.4 ab	3.8 c	2.52 e	64.2 ab	0.44 bc	22 bc	3.11 b
1500	57 bc	51 b	6.90 d	5.3 ab	3.9 c	3.11 f	68.9 bc	0.44 bc	23 c	2.78 b
2000	53 c	46 c	8.12 e	5.5 b	3.1 c	4.07 g	71.2 c	0.39 c	26 c	2.11 b

Values with different identifying letters are significantly different ($P < 0.05$)

The data indicate that up to 750 mmol/d (19.1 mmol/kg/d) of NaCl appears to have little effect on the animal but levels above this value cause reductions in nitrogen digestibility, as a result of increased rumen outflow rate. Although fluid outflow only was measured particulate outflow was almost certainly increased as well. Urea excretion was decreased by the salt but fractional urea clearance was increased despite a reduction in the filtered load of urea. Rumen ammonia levels were decreased probably as a result of decreased protein degradation and reduced recycling of plasma urea to the reticulo-rumen.

If possible animals fed low-protein diets should have their intake of salt kept below 877 mmol/d (22.4 mmol/kg/d).

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 HEMSLEY, J. A., HOGAN, J. P. and WESTON, R. H. (1975). *Aust. J. agric. Res.*
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