

Effect of the addition of zinc and manganese to the diet on efficiency of urea utilization by sheep.

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Several minerals were shown to inhibit rumen urease activity (Spears and Hatfield, 1978, J Anim Sci, 47, 1345.). Rodriguez *et al* (1993, Ciencia e Investigación Agraria, 20, 2, 110-111 ; 125-126) found that the addition of zinc (Zn) or manganese (Mn) plus Zn at high concentrations reduced by about 20 % urease activity of rumen liquor *in vitro*. The objective of this study was to evaluate the efficiency of urea utilization by adding maximum tolerable levels of these elements to the diet.

The experiment was carried out with nine Corriedale wethers placed in metabolism stalls. The basal diet was a mature wheat hay fed *ad libitum*, plus a supplement formulated as 35 % crude protein, with 40 % of total nitrogen (N) coming from urea ; the other components being : wheat grain, wheat midds and sunflower meal. The treatments were three mineral supplements containing Zn (Z) or Mn plus Zn (MZ) and control (C), in a 3x3 latin square design. All supplements included equal amounts of macrominerals from salt, bone ash and elemental sulphur. The treatments Z

and MZ provided 700 and 700 plus 525 mg/animal/d of Zn and Mn + Zn respectively. The mineral and protein supplements were offered together at the level of 147 g/d on a dry matter (DM) basis.

DM intake was measured by the difference between offered and rejected hay. Faeces and urine were collected to determine digestibility and N balance. Blood samples from jugular vein and rumen liquid via oesophagic tube were obtained to measure blood urea and rumen ammonia-N. Average daily gain (ADG) for each individual was also recorded. Hay DM intake and total diet digestibility were not affected by treatment. Supplements Z and MZ improved N balance ($P < 0.05$) by 16 and 19 % respectively. Also a trend in decrease of rumen ammonia-N 2 h after the supplement was fed, and an increase in ADG for ZM were detected, indicating an improvement in N use. In conclusion, ruminants consuming urea may improve N utilization efficiency by the addition of high levels of Zn and Mn to the diet.

Item	C	Z	ZM	SE
Rumen ammonia- N (mg/dl)	32.0	28.3	25.9	1.7
Blood urea (mg/dl)	0.28	0.24	0.27	0.01
N balance (g/d)	3.93	4.51	4.68	0.22
Wheat hay DM intake (g/d)	489.8	483.2	510.1	23.6
DM digestibility (%)	67.9	68.7	68.0	0.72
ADG (g/d)	-28.6	-4.3	41.7	15.2