

ZINC IN WOOL AND THE ASSESSMENT OF ZINC NUTRITION IN SHEEP

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The signs of a marginal deficiency of zinc are nonspecific and therefore not easily recognised. Concentration of zinc in plasma is widely used for diagnosis but reflects only the recent dietary intake (Hurley et al. 1982). Also, factors other than the intake of zinc influence the amount of zinc in plasma (Underwood 1977). Under some conditions, zinc content of wool correlates with the intake of zinc and analysis of this tissue potentially offers a simple method of monitoring zinc status. The aim of this experiment was to evaluate the relationship between intake of zinc and the content of zinc in wool at two different levels of nitrogen intake.

Twenty-four, eight-month-old merino wethers were fed either 4.8, 8.8, or 26.5 $\mu\text{g Zn/g}$ and at each level of zinc, four sheep were fed a low nitrogen ration (1% N) and four an adequate nitrogen ration (3% N). Half the supplementary nitrogen was as urea and half as formaldehyde-treated sodium caseinate. Wool was collected from a 100 cm^2 patch on the midside of each wether at 0 and at 28 days. The wool was washed three times in Shell X4 solvent, dried, weighed and analysed for zinc. Consumption of the 3% nitrogen diet increased wool growth ($F=27.1$, $P<0.005$) and total zinc deposited in wool ($F=16.0$, $P<0.005$). Zinc intake also affected the total deposition of zinc in wool ($F=8.5$, $P<0.01$). Concentration of zinc in wool was also affected by zinc ($F=8.5$, $P<0.005$) and nitrogen ($F=5.6$, $P<0.05$). However, those sheep consuming 1% nitrogen tended to have a higher concentration of zinc in wool.

Effect of Zn and N intake on Zn concentration ($\mu\text{g/g}$) and total Zn deposited ($\text{mg}/100 \text{ cm}^2/\text{d}$) in wool and on wool growth ($\text{mg}/\text{cm}^2/\text{d}$). (Mean \pm SEM.)

	Treatment		
	4.8 $\mu\text{g Zn/g}$	8.8 $\mu\text{g Zn/g}$	26.5 $\mu\text{g Zn/g}$
Wool growth			
1% N	0.72 \pm 0.04 ^a	0.79 \pm 0.07 ^{ab}	0.74 \pm 0.08 ^{ab}
3% N	0.98 \pm 0.08 ^{ab}	1.01 \pm 0.09 ^b	1.34 \pm 0.12 ^c
Zinc concentration in wool			
1% N	97.9 \pm 6.1 ^a	102.5 \pm 3.5 ^a	122.6 \pm 5.1 ^b
3% N	94.0 \pm 4.9 ^a	96.6 \pm 4.9 ^a	105.6 \pm 2.5 ^a
Total zinc in wool			
1% N	7.0 \pm 0.55 ^a	8.1 \pm 0.64 ^{ab}	9.18 \pm 1.27 ^{ab}
3% N	9.1 \pm 0.60 ^{ab}	9.8 \pm 0.84 ^b	14.1 \pm 1.16 ^c

Means with differing superscripts are significantly different ($P<0.05$)

The results show that the amount of crude protein and zinc in the diet significantly affect the concentration and total deposition of zinc in wool. Clearly neither of these measurements are accurate indicators of zinc status.

HURLEY, L.S., GORDON, P., KEEN, C.L. and MERKHOFFER, L. (1982). Proc. Soc. exp. Biol. Med. 170: 48.

UNDERWOOD, E.J. (1977). 'Trace Elements in Human and Animal Nutrition' 4th edn (Academic Press: New York).