

A POSSIBLE EFFECT OF ZINC ON BLOOD SELENIUM IN SHEEP

D.W. PETER*, R.A. HUNTER* and D.J. BUSCALL*

At least ten minerals (Ag, As, Cd, Co, Cu, Fe, Hg, Mn, S, Zn) or essential nutrients (Vit.A, Vit.E) are recognised as having the potential to interact with selenium (Se) and alter its metabolism. Investigations to be described suggest that there may be a positive effect of zinc (Zn) on blood Se concentrations in sheep.

Twenty-six Merino weaner lambs were used to study the effects of Zn supplementation on productivity and the animals' Se status. Animals grazed pastures in which the mineral content declined during late spring and summer (Zn concentration declined from 20 ppm to 12 ppm D.M.). A selenium pellet, a cobalt pellet and a steel grinder were administered to all animals at weaning at 16 weeks of age in October. Half the animals (Zn+) received two Zn pellets at weaning and 57 and 119 days later. Pellets were composed of high purity Zn shot and iron filings and found to release approximately 10 mg Zn/pellet/day (Masters and Moir, unpublished). Blood samples were collected at weaning and 26, 93 and 138 days thereafter for Se and Zn analysis and for measurements of the activity of the seleno-enzyme, glutathione peroxidase (GSH-Px).

Whole blood concentrations of Se in both groups were similar but low at weaning and indicative of an inadequate Se intake. Administration of Se pellets resulted in an adequate Se status in both groups after weaning but whole blood concentrations of Se in the Zn+ group were significantly higher than those of the Control group (Table 1). Changes in GSH-Px activity in both groups were similar to those in Se concentration. Zn supplementation had no significant effect on whole blood concentrations of Zn, which were within the normal range (Table 1). Body weights of the Zn+ and Control groups at weaning were 28.0 and 28.7 kg respectively and increased by 3.1 and 2.0 kg respectively in the following 138 days.

TABLE 1. Selenium and zinc concentrations (Mean \pm S.E.) in whole blood

	(n=13) Treatment	Date of sampling			
		Oct 16 [#]	Nov 11	Jan 17	March 3
Selenium (ng/ml)	Zn+	9 \pm 4	180 \pm 13	187 \pm 9***	91 \pm 9
	Control	5 \pm 1	77 \pm 9	79 \pm 5	34 \pm 2***
Zinc (μ g/100 ml)	Zn+	224 \pm 9	219 \pm 8	230 \pm 9	244 \pm 5
	Control	230 \pm 7	219 \pm 6	219 \pm 6	221 \pm 8

[#] weaning

*** P<0.001 (Split plot, analysis of variance)

Although recent studies with rats (Walker and Kelleher, 1978) indicate that the lack of an effect of Zn treatment on blood Zn may not be unexpected, some doubt remains as to whether the Zn pellets functioned as intended. It is postulated however that they were functional and that differences in the rumen concentration of Zn led to an enhanced Se release from the Se pellets and/or an increased absorption resulting in higher blood levels. Further experiments are in progress to examine these effects in more detail.

WALKER, B.E. and KELLEHER, J. (1978). *J. Nutr.* 108: 1702

* CSIRO Division of Animal Production, Private Bag, P.O., Wembley, W.A. 6014