

# FIELD TRIALS OF A COPPER, COBALT AND SELENIUM SOLUBLE GLASS BOLUS

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Three field trials were carried out to evaluate the performance of a sintered soluble glass copper, cobalt and selenium bolus (Cosecure®, Telsol Ltd,  $33 \pm 3$  g) for maintaining adequate levels of the three trace elements. The first trial used 34 growing lambs, trial 2 used 36 growing lambs whilst trial 3 used 50 gimmer sheep (year old females). In each trial, the sheep were split into two groups by restricted randomisation according to day 0 live weight and one group bolused (bolus) and the other group left untreated (control). Blood samples were taken on day 0, immediately prior to bolusing and then at regular intervals throughout each trial. The samples were analysed for copper status (serum caeruloplasmin activity (CP), plasma copper concentration (PICu), erythrocyte superoxide dismutase activity (SOD) and the ratio between the CP and PICu (CP/PICu)), cobalt status (serum vitamin B<sub>12</sub> concentration (vit B<sub>12</sub>)) and selenium status (erythrocyte glutathione peroxidase activity (GSHPx)) using the methods of Kendall *et al* (1999). Liver samples were collected from Trial 1 lambs at slaughter (day 86 / 121) and analysed for copper concentration. Statistical analysis was carried out using ANOVA with day 0 as a covariate (where applicable) using GLM on MINITAB 11.

Table 1: Selenium and cobalt status. significance indicated by <sup>a,b</sup> = (p<0.05), <sup>a,d</sup> = (p<0.001).

Day		Trial 1				Trial 2					Trial 3			
		0	20	42	63	0	28	51	69	91	0	21	51	105
GSHPx (U/ml PCV)	Bolus	78	111 <sup>a</sup>	112 <sup>a</sup>	121 <sup>a</sup>	55	77 <sup>a</sup>	100 <sup>a</sup>	125 <sup>a</sup>	144 <sup>a</sup>	40	53 <sup>a</sup>	109 <sup>a</sup>	176 <sup>a</sup>
	Control		80 <sup>d</sup>	60 <sup>d</sup>	54 <sup>d</sup>		49 <sup>d</sup>	45 <sup>d</sup>	37 <sup>d</sup>	35 <sup>d</sup>		43 <sup>b</sup>	73 <sup>d</sup>	107 <sup>d</sup>
	SE	23	2	3	3	16	2	4	5	4	16	3	6	8
Vit. B12 (pg/ml)	Bolus	441	2379 <sup>a</sup>	1863 <sup>a</sup>	2310 <sup>a</sup>	440	1285 <sup>a</sup>	1807 <sup>a</sup>	2115 <sup>a</sup>	2204 <sup>a</sup>	496	1444 <sup>a</sup>	2608 <sup>a</sup>	1251
	Control		611 <sup>d</sup>	247 <sup>d</sup>	560 <sup>d</sup>		403 <sup>d</sup>	934 <sup>d</sup>	766 <sup>d</sup>	914 <sup>d</sup>		1052 <sup>d</sup>	1890 <sup>d</sup>	749
	SE	277	140	135	92	282	66	77	128	129	306	88	144	239

The bolused group had significantly increased GSHPx at every post bolusing sampling. The bolused group had significantly increased vit B12 on all samplings except for trial 3 on day 105. The copper status of the sheep in all three trials was adequate and there was no significant difference for any blood copper status parameter at any sampling. However, there was a significant increase in liver copper concentration of the bolused lambs, irrespective of slaughter date (con: 153, bolus: 466, SE 38 mg Cu/ kg DM ,p<0.001). ). From bolus recoveries in trials 1 and 2 the overall mean dissolution rate was calculated as  $126 \pm 51$  mg glass/ day which equates to a mean daily release rate of  $16.9 \pm 6.9$  mg Cu,  $0.63 \pm 0.26$  mg Co and  $0.20 \pm 0.08$  mg Se. The bolus at the average dissolution rate would last for over 8 months and release enough copper, cobalt and selenium to fulfil the daily requirements of the sheep.

The bolus was able to correct deficiencies of selenium and cobalt consistently throughout these trials. The bolus had little measured effect on the already adequate copper status, although the liver copper concentrations of the bolused sheep were higher in the trial in which they were analysed.

Reference

Kendall, N. R., Middlemas, C., Maxwell, H., Birch, F., Illingworth, D.V., Jackson, D.W., and Telfer, S.B., 1999, A comparison of the efficacy of proprietary products in the treatment of molybdenum induced copper deficiency. *Proceedings of TEMA-10, in press*

