

THE AVAILABILITY OF FINELY DIVIDED IRON, ZINC AND MANGANESE
PROVIDED BY INTRARUMINAL CONTROLLED RELEASE DEVICES TO SHEEP.

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Controlled release devices (CRD'S) (Laby 1981) have been adapted to supply limiting trace elements to grazing ruminants. The size of the CRD and therefore the amount of material that it can contain is limited by the size of the animal. Supplements of limiting trace elements are usually given to ruminants as salts, but salts occupy more volume than metals and so in the present study iron, zinc and manganese were loaded in the CRD's as finely divided metal to increase the capacity and prolong the active life of the CRD. The objective was to compare the utilization of these elements supplied from CRD's with those supplied as salts in the diet.

Seven merino wethers were fed a basal diet containing 14 μ gZn/g, 10 μ gMn/g and 420 μ gFe/g, three of these were given CRD's to provide 10 mg zinc, 15 mg manganese and 40 mg iron per day. Four other wethers were fed the basal diet supplemented with zinc sulphate, manganous sulphate and ferric chloride to contain 24 μ gZn/g, 25 μ gMn/g and 460 μ gFe/g of diet. Sheep that had received CRD's and consumed 1.0 kg of diet should therefore have the same trace element intake as sheep that consumed 1.0 kg of basal diet supplemented with trace elements. The sheep were individually housed in plastic coated pens and provided with up to 1.0 kg of feed per day and deionized water. Plasma, liver and faeces were collected during the 28 day experimental period and analysed for iron, zinc and manganese.

Trace elements in plasma, liver and faeces (Mean \pm SEM)

		Control	CRD	Supplemented
Plasma (μ g/ml)	Fe	1.21 \pm 0.27 ^a	2.42 \pm 0.07 ^b	2.09 \pm 0.17 ^b
	Zn	0.73 \pm 0.04 ^a	0.83 \pm 0.05 ^a	0.81 \pm 0.04 ^a
	Mn	2.49 \pm 0.40 ^a	2.68 \pm 0.12 ^a	3.53 \pm 0.40 ^a
Liver (μ g/g fresh wt)	Mn	1.58 \pm 0.23 ^a	2.20 \pm 0.12 ^b	2.23 \pm 0.10 ^b
Faeces (μ g/g dry wt)	Zn	37.8 \pm 2.77 ^a	74.2 \pm 11.0 ^b	91.2 \pm 2.50 ^b
	Fe	1753 \pm 112 ^a	2109 \pm 124 ^a	2190 \pm 164 ^a
	Mn	33.1 \pm 2.0 ^a	60.9 \pm 9.2 ^b	77.8 \pm 3.5 ^b

Means with different superscripts are significantly different (P<0.05).

The sheep given CRD's had a significantly higher concentration of iron in plasma and manganese in liver (P<0.05) and a slightly higher concentration of zinc in plasma than the sheep fed the control diet. There were no differences between sheep given trace elements in the diet and those given trace elements in CRD's. The content of trace elements in faeces of CRD and supplemented sheep were similar as were dry matter intakes of the two groups. Therefore the CRD released trace elements at approximately the predicted value. These results indicate that CRD's are an effective method of providing zinc, iron and manganese to ruminants.

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