

AVAILABILITY OF BARIUM SELENATE ADMINISTERED ORALLY TO SHEEP

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An alternative method for providing selenium to livestock is a subcutaneous injection of barium selenate suspended in a viscous excipient. This method has been shown to be safe for the supplemented animals (Cawley and McPhee 1984) and long-acting (Judson *et al.* 1991). Deposits of barium selenate persist at the site of injection for at least 56 and 119 days in sheep and cattle respectively (Mallinson *et al.* 1985; Archer and Judson 1994) and may be dangerous to human health if consumed. It has been suggested that the low solubility of barium selenate would mean that it would not be absorbed from the digestive tract (Cooper 1987; Judson *et al.* 1991) and hence would present no danger to human consumers. However, barium selenate is soluble in hydrochloric acid (Anonymous 1976) and so may be solubilised in the stomach. The purpose of this experiment was to determine whether barium selenate is available when given orally to sheep.

Eight 1 year old sheep were given nil, 100 or 250 mg of barium selenate orally. After 27 days the sheep were slaughtered and samples of blood, liver, kidney cortex and medulla, cardiac and skeletal muscle were collected for selenium assay as described by Archer and Judson (1994). The effect of treatment on selenium concentration in tissues was tested by analysis of variance. Results are presented in Table 1.

Table 1. Concentration of selenium ($\mu\text{mol/kg}$ dry matter) in tissues of sheep 27 days after nil (3 sheep), 100 mg (2 sheep) or 250 mg (2 sheep) of barium selenate was given orally

Treatment	Nil		100 mg		250 mg		AOV
	mean	sd	sheep 1	sheep 2	sheep 3	sheep 4	
Blood	0.74	0.41	3.50	3.27	5.03	3.93	***
Plasma	0.29	0.06	2.76	2.55	3.12	3.80	***
Liver	2.7	0.6	114.4	80.3	207	323	***
Skeletal muscle	1.30	0.50	3.05	3.78	3.62	3.63	**
Cardiac muscle	3.17	1.07	16.8	16.9	17.0	21.3	***
Kidney cortex	48	8	96	88	99	122	**
Kidney medulla	8.6	3.9	23.8	27.4	27.7	34.4	**
Analysis of variance (AOV). ** $P < 0.01$, *** $P < 0.001$.							

The marked increase in selenium concentration of tissues indicates that the barium selenate was absorbed from the intestinal tract. This availability of selenium from barium selenate is of concern as it suggests that residues of the supplement in meat ingested by humans may be a significant source of selenium.

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