COPPER RECYCLING IN SHEEP

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Distinct seasonal cycles of the concentration of Cu in the liver of grazing animals have been observed in both Western Australia and South Australia. An explanation of these cycles may include changes in dietary Cu, changes in other dietary factors, such as Mo and S, or a change from body weight gain to body weight loss by the animals.

To gain some understanding of the factors that might influence such changes, an animal house trial was carried out in which dietary copper concentration was the sole variable. Alkali treated wheat stubble was used as the feed source and appropriate mineral and nitrogen supplements were added. Five diets of differing copper concentration were fed to wethers with rumen and abomasal fistulae. Animals received each diet in equal quantities 8 times per day. Flow of copper and other nutrients was estimated using ^{51}Cr-EDTA and ^{103}Ru-phenanthroline infused per rumen. (Faichney 1980.)

TABLE 1 Effect of varying dietary copper concentration upon the flow and absorption of copper from the stomach and intestines

	Treatment					Residual Standard Error
Feed Concentration mg/kg	3.2	6.0	8.2	12.8	16.0	
Intake (mg/kg DOM)	6.6[1]	12.6[2]	17.0[3]	28.0[4]	34.9[5]	1.36
Ex Abomasum (mg/kg DOM)	17.1[1]	14.4[1]	16.5[1]	28.0[2]	33.0[3]	2.69
Absorption-Stomach (mg/kg DOM)	-10.5[1]	-1.8[2]	0.5[2]	0.1[2]	2.0[2]	3.23
Absorption-Intestine (mg/kg DOM)	9.1	4.5	6.6	13.3	14.7	3.65
Retention (mg/kg DOM)	-1.9[1]	2.0[1]	5.5[2]	12.8[3]	16.1[3]	2.21
Animals per Treatment	3	3	3	3	3	

Values within each row with differing superscripts are significantly different ($p<0.05$).

Copper retention was linearly related to copper intake, while flow from the abomasum did not increase until the two rations highest in dietary copper concentration were fed. Copper was either absorbed from or secreted into the stomach. Zero flux into or out of the stomach occurred when the dietary concentration was about 8 ppm. Sheep consuming feed with the lowest dietary copper intake secreted 3 mg/d into the stomach. If, under grazing conditions, this 3 mg of copper was excreted via the feces, then only two weeks would be needed to reduce a liver copper concentration of 600 ppm to 300 ppm. Provided that liver copper can be mobilized and secreted into the stomach, such a mechanism may explain at least part of the seasonal fluctuations observed in liver copper concentrations of grazing sheep.

FAICHNEY, G.J. (1980). J. Agric. Sci., Camb. 94:313.

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