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SUPPLEMENTARY PHOSPHATE AND PHOSPHATE ABSORPTION IN SHEEP

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It has previously been shown that an intravenous infusion of phosphate (P) in sheep over 10 d was completely recovered in the faeces. In order to achieve this effect the animal must either increase its secretion of P into the gut, probably via the saliva, or the intestinal absorption rate of P must decrease (Towns *et al.* 1978). The aim of the experiments described here was to test whether the absorption rate of P was decreased during P infusion.

Absorption rate was measured by kinetic analysis of the plasma decay curves of 32-P after trace doses of 32-P were given. Four separate experiments were performed on each of 3 sheep. Tracer was administered either via the abomasum or intravenously, and plasma was collected for analysis of 32-P content. Blood samples were taken at 2 min intervals for 30 min and then at increasing time intervals up to 700 min. The 2 tracer experiments were done whilst infusing the sheep either with saline or sodium phosphate solution which provided an extra 1.5g phosphorus/d.

32-P injected into the abomasum appears in plasma within 2 min, reaches maximum concentration after 10-60 min and then decreases. The plasma decay curves were analysed by conventional curve-peeling to find the exponential terms, and the estimates were refined using the computer program SAAM27 (Berman and Weiss 1977). Three exponential terms were necessary to describe the uptake of 32-P into plasma and significant differences were found between saline and P infusion.

When an isotope is injected into the abomasum and appears in the blood stream, processes in the blood and tissues immediately start to remove the absorbed tracer. In order to calculate absorption rate it is necessary to inject tracer into the blood stream and calculate the rate of its removal. The disappearance of 32-P from plasma after intravenous injection again showed curves which could be defined by 3 exponential terms, but the slope of the first was greater than the slope of the second. Deconvolution analysis was now performed using SAAM27 in order to obtain direct estimates of absorption rates over 120 min (Table 1).

TABLE 1. Absorption of P during saline and P infusion (% dose/min)

Time (min)	Sheep 1		Sheep 2		Sheep 3	
	Saline	P	Saline	P	Saline	P
2	9.4	5.2	1.8	1.0	4.9	1.6
8	5.4	4.1	2.4	1.1	5.0	1.9
16	2.4	2.6	2.3	1.0	3.8	1.8
30	0.65	1.0	1.7	0.9	1.9	1.3
60	0.15	0.09	0.73	0.49	0.50	0.75
120	0.04	0.009	0.12	0.14	0.13	0.29

All sheep receiving the P infusion had a slower absorption rate for P. Thus control of P absorption exists in the abomasum and/or small intestine, and this may be of importance when calculating P requirements of sheep and availability of P in foodstuffs.

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