ABSORPTION FROM THE SMALL INTESTINE OF SHEEP FED GRAIN LEGUMES

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When fed as supplements for a roughage diet, navy beans (Phaseolus vulgaris)and lablab beans (Lablab purpureus) were used with lower effieiency for liveweight gain and wool growth by sheep than were equivalent amounts of lupins (Lupinus angustifolius) or cowpeas (Vigna unguiculata). Lectins and protease inhibitors are known to be present in the former grain legumes, and reduce digestion in and absorption from the small intestine. Anti-nutritional factors (ANF) disappeared rapidly from nylon bags of ground grain legumes suspended in the rumen. Some ANF may have escaped microbial degradation to enter the abomasum and small intestine. Rate of absorption of d-xylose, a pentose sugar which is not found in mammals, has been used as a clinical test for malabsorption from the small intestine, and was used in these experiments to examine the effects of dietary grain legumes on absorption from the small intestine of sheep.

In Expt 1 six mature merino wethers fed an oat hay/lucerne hay (1:1) diet were injected on separate days with d-xylose either intravenously or into the abomasum via a cannula. Concentration of d-xylose was measured in blood at frequent intervals for 10 h, and in urine for 48 h. Following the i.v. injection, the concentration in the blood declined according to first order kinetics; 62±4.4% was recovered in urine over 48 hours showing that 38% was metabolised. When injected via abomasal fistula, concentration in blood peaked at two hours. In urine, 17 ± 6.2% was recovered, indicating absorption of 27.% of the dose.

In Expt 2 nine adult merino wethers were fed six diets consisting of oat chaff (0.5% of LW) supplemented with 1/lucerne chaff, 2/chickpeas, 3/navy beans 4/lablab beans, 5/cowpeas or 6/lupins at 1.5% LW for 17 days, according to a modified Latin Square design. D-xylose was injected into each sheep via the abomasal cannula, and measurements made of d-xylose concentration in blood 2-4h after injection, tended to be lowest in sheep fed navy beans, highest in sheep fed lupins. Excretion of d-xylose in urine was greater (P 0.05) for sheep fed lupins (34%) than for the other diets (16-22%) which were similar to the values observed in Expt 1. It appears that lectins and protease inhibitors present in the grain legumes were either inactivated by rumen fermentation or did not have a substantial effect on absorption from the small intestine of sheep. Lupins in the diet apparently enhanced absorption of d-xylose from the small intestine relative to the lucerne hay control diet.

	Diet 1	2	3	4	5	6	SEM	Probability
Peak d-xylose (mg/l)	214	229	163	181	219	239	29	0.102
D-xylose in urine (g)	3.7	4.3	3.7	3.1	3.4	6.8	1.35	0.028

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