

EFFECT OF TANNIN ON DIGESTION OF LOTUS CORNICULATUS BY SHEEP

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Condensed tannins (CT) bind to proteins forming a stable complex in the pH range 3.5-7.0, but dissociate at pH below 3.5 (Jones & Mangan, 1977), therefore proteins in plants containing tannin should be protected from microbial degradation in the rumen, and in theory be released in the abomasum for absorption in the small intestine. Sheep fed legumes containing low (< 4% of DM) concentrations of CT have a higher retention of nitrogen (N) than comparable tannin free forages (Egan & Ulyatt, 1980).

The nutritional consequences of CT were evaluated in Lotus corniculatus L. (2.2% CT) by comparing four control ("tannin") sheep with four sheep receiving an intraruminal infusion of 50 g/day polyethelene glycol (PEG) to preferentially bind CT, and free plant proteins ("no tannin" group). Sheep were fed about 1400 g DM/day in hourly increments. The apparent digestion of energy, neutral detergent fibre (NDF), nitrogen (N), and amino acids (AA) were determined pre abomasum (rumen) and in the small and large intestine, by using dual markers in conjunction with abomasal sampling, and terminal ileal sampling at slaughter. Nutritional parameters relating the two treatments are summarised in the table.

Intake, nutrient concentrations, digestibility and apparent absorptions for sheep fed lotus with and without tannin (mean  $\pm$  SEM), fluxes adjusted to equal (1 400 g/day) DM intakes.

	Tannin	"No Tannin"	Significance
DM intake (g/day)	1400 $\pm$ 42.2	1461 $\pm$ 34.7	NS
DM digestibility (%)	68.5 $\pm$ 0.75	70.8 $\pm$ 0.66	NS
Rumen:			
NH <sub>3</sub> concentration ( $\mu$ g/ml)	367 $\pm$ 12.1	504 $\pm$ 28.7	P<0.001
Energy digested (% of intake)	41.8 $\pm$ 1.12	47.4 $\pm$ 2.47	P<0.05
NDF digested (% of intake)	47.7 $\pm$ 1.70	48.7 $\pm$ 1.59	NS
Abomasal NAN flux (g/d)	29.5 $\pm$ 0.33	25.9 $\pm$ 1.00	P<0.05
Ileal N flux (g/d)	13.4 $\pm$ 0.71	9.2 $\pm$ 0.42	P<0.01
Apparent Digestion of N (% of intake):			
Total	70.1 $\pm$ 0.44	78.1 $\pm$ 0.84	P<0.001
Rumen	11.7 $\pm$ 1.47	21.0 $\pm$ 2.98	P<0.05
Small intestine	52.6 $\pm$ 1.59	55.6 $\pm$ 3.85	NS
Amino acid fluxes (g/day):			
Abomasal essential AA	84.6 $\pm$ 4.49	58.4 $\pm$ 4.90	P<0.01
Abomasal non essential AA	68.5 $\pm$ 2.98	59.1 $\pm$ 2.60	P<0.10
Ileal essential AA	25.8 $\pm$ 2.18	19.2 $\pm$ 0.91	P<0.05
Ileal non essential AA	31.1 $\pm$ 2.56	18.7 $\pm$ 0.20	P<0.01
Apparent absorption of AA in small intestine (g/d):			
Essential AA	58.8 $\pm$ 3.01	36.1 $\pm$ 4.24	P<0.01
Non essential AA	37.4 $\pm$ 2.07	41.3 $\pm$ 3.14	NS

Despite the lower N digestibility of the tannin treatment, the apparent absorption of essential AA was 62% higher than the "no tannin" sheep. Apparent digestibilities of essential AA were not affected by treatment so the differences are a consequence of plant protein protection pre abomasum and/or a reduction in microbial growth. The mechanism for specific protection of essential AA compared to non essential AA needs to be determined.

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