

Paper

Effects of dietary quebracho tannin on nutrient utilisation and tissue metabolism in sheep and rats

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Abstract

The effect of feeding quebracho tannin, a mixture of condensed tannins, on dietary nutrient utilisation and nitrogen (N) retention and its effects on the gastrointestinal (GI) tract was investigated in sheep and rats. Sheep ($n = 24$) were fed on a pelleted diet of dried grass alone (controls) or containing quebracho tannin at 50 g kg^{-1} diet dry matter (DM) (tannin-fed animals) at a level sufficient to achieve a daily liveweight gain (DLWG) of 100 g day^{-1} . Complete collections of faeces and urine were made for two seven-day periods after two and six weeks of feeding these diets ($n = 6$ per group). Apparent digestibilities of dry matter, N and neutral detergent fibre (NDF) were significantly ($P < 0.001$) reduced in tannin-fed animals at both measurement periods. No evidence was obtained to suggest that rumen micro-organisms can adapt to the presence of dietary tannins with prolonged feeding. Tannin-fed animals excreted significantly ($P < 0.01$) more N in faeces and less in urine than controls suggesting an alteration in N metabolism. Histological examination of samples of the GI tract obtained from pairs of sheep slaughtered after two, five and seven weeks of feeding the diets indicated ulceration and an increase in mucosal histiocytes, particularly in the jejunum and ileum of most tannin-fed animals. In a subsequent experiment, rats were fed *ad libitum* a ground chow containing either cellulose or quebracho tannin at 40 g kg^{-1} DM. Tannin-fed rats had significantly ($P < 0.05$) reduced feed intakes, DLWG, N retention and body fat deposition compared to controls. Protein synthesis rates in the duodenal mucosa were not increased in tannin-fed rats suggesting that enterocyte proliferation was not stimulated in this region of the GI tract.

These studies indicate that feeding quebracho tannin to ruminants has both ruminal and post-ruminal effects that, together, result in reduced nutrient

utilisation and impaired animal performance.

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