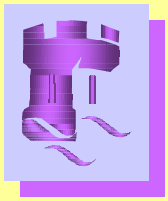
Dietary tannins acting as anthelmintic agents ?

N.L. Butter, J.M. Dawson, D. Wakelin & P.J. Buttery

School of Biological Sciences, University of Nottingham, Sutton Bonington Campus,Loughborough, Leicestershire LE12 5RD, UK.



Introduction

✧Browse plants often contain condensed tannins.
✧Gastrointestinal nematode infections in sheep have been shown to be reduced after feeding diets containing condensed tannins (CT).
✧CT could reduce nematode infections by increasing post-ruminal protein supply or by exerting toxic effects against the worm.
✧The objective of these studies was to determine if Quebracho tannin (QT) was toxic on contact with intestinal nematodes.

Materials and Methods

✧*Rat Trial.* 48 male Wistar rats fed a low protein diet (100g casein/kg) ±4% QT.
✧4 groups (2x control & 2x QT-fed) of 8 rats were orally infected with 1000 *T. spiralis* larvae.
✧2 groups (1 control & 1 QT-fed) were subcutaneously injected with 2500 *N. brasiliensis* larvae.
✧Worm burdens were recovered on days 2 or 5 post infection (pi) for *T. spiralis* infected rats and on day 5 only for *N. brasiliensis* infected rats
✧*In vitro.* Adult *N. brasiliensis* worms were recovered from an infected rat & incubated *in vitro* (x3) in Hanks balanced salt solution (HBSS) containing 0,0.01,0.05 & 0.125% QT ± 0.1% polyethylene glycol (PEG).
✧ The motility of the worms was used as an index of survival & assessed over 10h.

Figure 1 **Effect of QT on the survival of adult *N.brasiliensis* worms *in vitro***

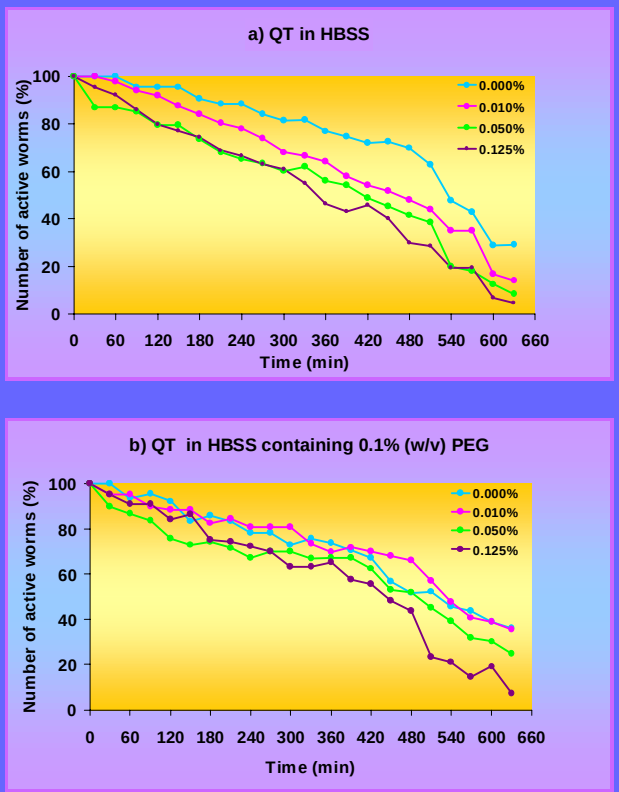


Table 1
Effect of QT on number of adult *T.spiralis* and *N.brasiliensis* recovered from the small intestine

	Control	+QT	sed
T.spiralis (2d pi)	935	930	84.9
T.spiralis (5d pi)	675	614	90.9
N.brasiliensis (5d pi)	1442[a]	1090[b]	82.8

(a,b - p< 0.001)

Table 2
Time for 50% of *N.brasiliensis* worms to die after incubation with QT +/- PEG

% QT in HBSS	- PEG (min)	+ PEG (min)
0.000	534 ± 42	523 ± 79
0.010	450± 79	541 ± 42
0.050	385 ± 26	456 ± 15
0.125	357 ± 38	413 ± 33

Results and Discussion

✧*Rat Trial.* Feeding QT did not significantly affect *T. spiralis* worm burdens ($p>0.1$) but significantly reduced ($p<0.001$) *N. brasiliensis* worm burdens (table 1) . QT appears to only affect parasites present in the intestinal lumen and in direct contact with digesta.
✧*In vitro.* *N. brasiliensis* activity was compromised at all levels of QT (Fig 1). Time taken for 50% mortality to be seen is shown in table 2. Nematode survival was higher in the presence of 0.1% (w/v) PEG at all QT levels. QT may increase parasite mortality by either affecting the cuticle or the digestive system of the worm.

Conclusions

✧Quebracho tannin and possibly other condensed tannins found in forages, may reduce nematode infection through a direct effect against the worm.
✧Further work is required to identify which parasites are susceptible and the mechanism through which toxicity occurs.

Acknowledgements

DFID

This work was jointly supported by DFID and the University of Nottingham.