

Mechanism of Action of Tannins against Gastrointestinal Nematodes

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Summary

Parasitic infections with gastrointestinal nematodes (GINs) remain a major pathological threat in outdoor production systems of various livestock species. Up to now, the control of these parasitic diseases essentially relied on the use of commercial, anthelmintic (AH) drugs. However, resistance to these anthelmintics is now widespread amongst worm populations in sheep and goats across the world.

Recent results indicate that bioactive, tanniferous plants represent a valuable option as an alternative to commercial drugs for the control of GINs. A well-targeted use of tannin containing fodders as nutraceuticals requires a better understanding of their modes of action against worms. This means that we need to understand (1) how to analyze the changes caused at the various parasitic stages and (2) to identify the nature and concentration of the active tannin molecules that are most appropriate for anthelmintic activity.

The effects on the various nematode stages (third stage larvae and adult worms) of *Haemonchus contortus* and *Trichostrongylus colubriformis* will be presented using data from two different models of tannin-containing plants, i.e. a temperate forage legume, sainfoin (*Onobrychis viciifoliae*), and a tropical legume tree (*Lysiloma latisiliquum*). These descriptions will mainly rely on results from scanning or transmission electron microscopy. The discussion will focus on the role of tannin concentrations *versus* tannin structures in terms of their AH properties. Besides condensed tannins, the possible role of some other polyphenols (i.e. flavonoids) against GI nematodes will be explored.

We will illustrate how information on the mode of action of tannins and flavonoids against GIN may prove useful for improved field/farm applications under entirely different environmental and epidemiological conditions within the context of small ruminant production systems. In the future, it will be also important to understand other factors that could lead to optimize the use of this type of nutraceuticals. These aspects that need further consideration include the feeding behaviour of infected and non-infected ruminants, the effect of ruminant species, etc. This needs to be explored with the animal breeds and the parasite isolates present under the different conditions of temperate and hot humid environments.