EFFECTS OF SAINFOIN HAY ON GASTROINTESTINAL INFECTION WITH NEMATODES IN GOATS.

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Due to development of resistances to broad spectrum anthelmintics in parasitic nematodes combined with the increasing demand of public to reduce the use of chemicals in farm products, there is nowadays a growing interest to seek alternative, sustainable methods to control gastrointestinal trichostrongyles in ruminants. Among the different options, the positive effects of condensed tannins in parasitised hosts begin to be well documented in sheep (Athanasiadou and others, 2000a, 2000b; Niezen and others, 1998a,1998b). In contrast, data in goats are far less extensive (Kabasa and others, 2000). The consequences of ingestion of tannins on resistance and/or resilience of ruminants have been examined either in grazing conditions with tanniferous forages or indoors by feeding sheep with Quebracho, a natural substance with high concentrations of tannins. Surprisingly, studies on the possible use of dry forages (hay) as possible source of condensed tannins are lacking despite the advantages which could be associated with this option for distribution in farms. We therefore present preliminary results on the effects of sainfoin hay on gastrointestinal parasitism in naturally infected dairy goats.

Fourteen dairy goats, naturally infected with trichostrongyles, were divided into two groups according to the level of nematode egg excretion and the weight. On D0, Sainfoin (*Onobrychis viciaefolia*) hay was distributed to group 1, composed with 7 goats. The 7 goats composing group 2 received a hay of gramineous plants plus 40

grams of a commercial concentrate in order to make diets in both groups isoenergetic and isoproteic. Measurements of concentrations of condensed tannins in the sainfoin and gramineous hays (Butler and others, 1982) indicated levels which were 3 folds higher in sainfoin. Distribution of sainfoin hay was continued from D0 to D20. Thereafter, both groups received the gramineous hay plus concentrate up to D35.

Individual faecal samples were taken twice per week from D-7 to D35 to measure egg counts (FECs) and to perform larval cultures. Moreover, blood samples were taken weekly from D0 to D35 to measure pepsinogen and inorganic phosphate concentrations. Statistical comparisons of pathophysiological measurements between the 2 groups were performed date by date using non parametric Kruskall Wallis tests. Egg excretion values were log (x +1) transformed before comparison using repeated ANOVA for periods before (D-3 and D-7) and after sainfoin distribution (D3 to D35).

The levels of egg excretion were similar in the two groups before distribution of hay. After distribution of sainfoin hay, a decrease in egg excretion was observed in group 1 which persisted after distribution was stopped (Figure 1). No significant difference was found between the two groups in pepsinogen concentrations. In contrast, a significant rise in phosphate values was observed in group 1 on D28 and D35 which lead to significant differences (Table 1).

In sheep, the interactions between nematode infections and ingestion of tannins have been examined both in indoors and outdoors studies (Athanasiadou and others, 2000a; Niezen and others,1998a). These studies have usually shown that the consumption of tannins or tanniferous plants was associated with a decrease in nematode egg output and, less frequently, in worm burdens. Surprisingly, although

goats appear more adapted than sheep to feed on tanniferous plants, only one experiment, in rangeland environment, suggested a positive effect of tannins on nematode infections (Kabasa and others, 2000). Results from the current study confirm that tannin rich forages or plants might represent an alternative to anthelmintics in goats as in sheep.

In sheep, the grazing of pastures seeded with tanniferous plants has been proposed as a “natural” way to reduce nematode parasitism. However, several drawbacks can be evoked with this approach. Firstly, the effects of condensed tannins are related to their concentrations which vary with season in plants (Jean-Blain, 1998). Secondly, it might be difficult to achieve chronological concordance between the optimal stage of tanniferous plants and peaks of parasite infections. Thirdly, agronomical factors could also interact with the growth of tanniferous plants and impair their production when needed. There is therefore an interest for more flexible way to distribute tanniferous forages and hay might represent an option to overcome some of the difficulties previously evoked. However, no information was available on the use of hay from tanniferous plants on nematode infections. In the current experiment, sainfoin was selected due to reports on its positive effect against nematodes (Molan and others, 2002) and because of its appetency in goats. Our results suggest that dried tanniferous forages also induce a decrease in egg output from natural infections, which persisted after the arrest of hay distribution. These results could provoke major consequences on pasture contamination. Because our study was performed on naturally infected goats, it was inappropriate to kill goats for comparison of worm burdens and composition in the two groups. Nevertheless, analysis of the pathophysiological parameters suggest a positive effect of sainfoin hay on intestinal species, as assessed by restoring the

blood phosphate concentrations whereas the pepsinogen values, related to abomasal parasitism, did not change. Further studies in experimental conditions are needed to state more precisely these points. Nevertheless, these preliminary results suggest that distribution of dried forages, rich in condensed tannins, has to be considered as a potential, flexible alternative to anthelmintics in sheep and in goats.

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Figure 1: Comparison of trichostrongyle egg excretion in the 2 groups of naturally infected goats. The sainfoin hay was distributed from D-7 to D35

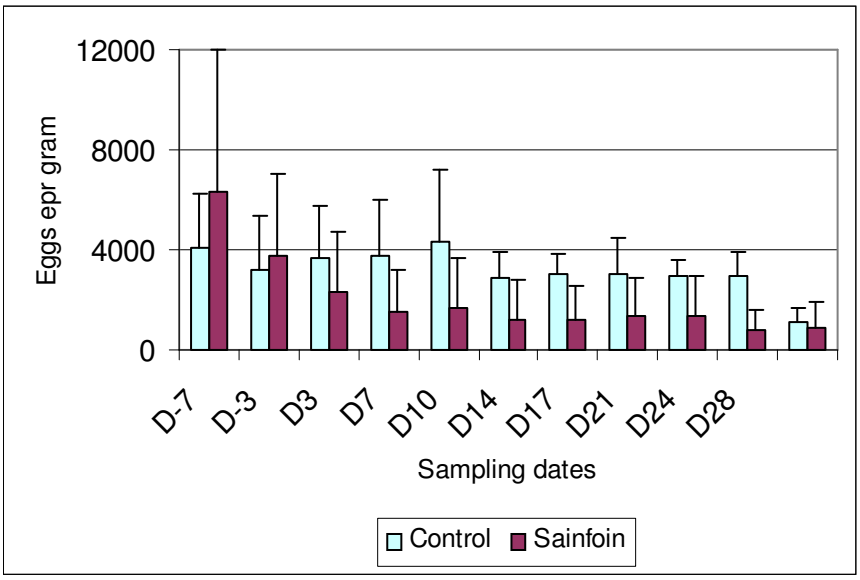

Table 1: Phosphate (mmol/l) and pepsinogen (mU Tyr) values in the 2 experimental groups. * indicate a statistical difference ($P < 0.05$)

	D0	D7	D14	D21	D28	D35
PHOSPHATE						
Control group	1.75	1.49	1.86	1.55	1.66	1.87
Sainfoin group	1.68	1.74	1.72	1.65	2.68*	2.44*
PEPSINOGEN						
Control group	968	1221	869	1022	1073	867
Sainfoin group	1091	1298	1094	852	980	900