

Effects of short-term grazing on bioactive forages on lambs artificially infected with *Teladorsagia circumcincta*

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Introduction Ruminants grazing on forages that contain condensed tannins (CT) have lower parasite burdens compared to those grazing on similar quality, tannin-free forages (Min and Hart, 2003). Evidence from previous grazing studies suggested that chicory, which contains only traces of CT, could also reduce the size of the parasite population carried by ruminants (Hoskin et al. 1999). Such bioactive plants may have direct anthelmintic effect on different developmental stages of the worms or indirect effects through nutritional improvement of host immunity. The purpose of this study was to determine whether short-term grazing of bioactive forages could affect either the established adult population or incoming infective larvae of *Teladorsagia circumcincta* a common abomasal parasite of sheep. The bioactive species tested were chicory (*Chicorium intybus*) and the CT-containing plants: lotus (*Lotus pedunculatus*), sainfoin (*Onobrychis viciifolia*) and sulla (*Hedysarum coronarium*).

Materials and methods Sixty, parasite naive, three-month-old Texel × Scottish Greyface sheep (live-weight 29.4 ±0.59 kg) were dosed with 8,000 infective larvae of *T. circumcincta* on day 1 of the experiment. All sheep remained onto parasite-free grass/clover pastures until day 21, when they were allocated to ten groups (n=6) based on their faecal egg counts (FEC) and their bodyweight. Two groups were allocated to two control, grass/clover (*Lolium perenne*/*Trifolium repens*) plots (0.1 ha each), while the remaining groups were allocated to the bioactive forages (two replicate plots of 0.1 ha for each forage). On day 28 of the experiment a second dose of 8,000 infective larvae of *T.circumcincta* was administered to the sheep to investigate the effects of the bioactive forages on the establishment of infective larvae. The animals remained on the experimental plots until day 35, when they were slaughtered for worm recovery. FEC repeated measurements for each animal were plotted and the “area under curve” was calculated. The resulted FEC-area values and worm burdens were log-transformed ($\log_{10}(x+1)$) and analysed using ANOVA.

Results There were no differences observed between the two replicates for each forage species. FECs and areas under the curve were similar between sheep grazing on different forages (Fig.1). Lambs grazing chicory had the lowest adult worm burdens and significantly lower numbers of male worms compared to those grazing on grass/clover (P=0.022) (Fig.2). Female worm burdens were not different among the forage treatments. The feeding treatments also affected (P<0.001) the numbers of immature worms recovered from sheep; sulla-fed animals had the lowest immature burdens and lotus-fed the highest. Live-weight gains during this two-week period were not different among the groups and averaged 231±26 g/day.

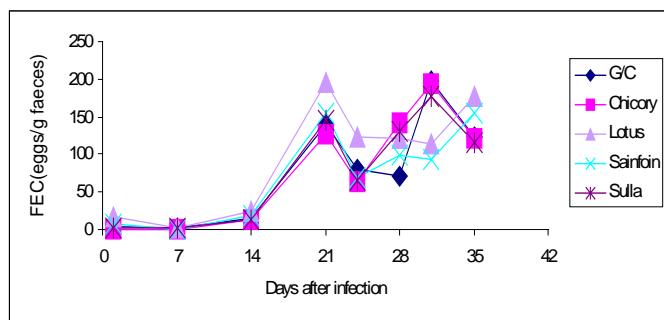


Figure 1: Faecal egg counts (eggs per g fresh faeces) of lambs grazing on five different forages (arithmetic means)

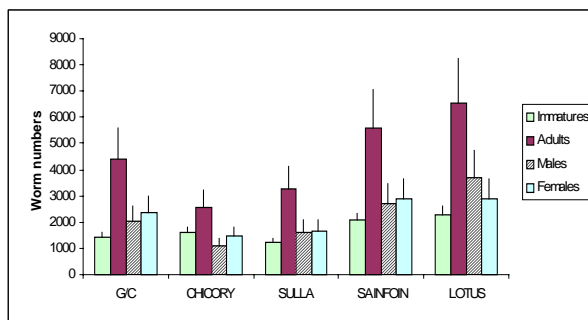


Figure 2: Immature, adult, male and female worm burdens recovered from lambs grazing on five different forages (backtransformed means with 95% CI)

Conclusions The results of this study provide some support to the view that short-term grazing on certain bioactive forages, such as chicory, could be used as a means of reducing *T. circumcincta* burdens. Given that there were no obvious effects of any of the forages on egg counts and that the sheep were infected twice, it is difficult to distinguish whether the reduction in adult *T. circumcincta* population seen in sheep grazing chicory was attributable to a direct anthelmintic effect and/or to an immunologically mediated indirect effect. Further studies are required to investigate the potential of bioactive forages and to elucidate the relative importance of directly and indirectly mediated effects on worm populations in growing lambs.

References Hoskin S.O., Barry T.N., Wilson P.R., Charleston W.A.G., & Hodgson J. 1999 Effects of reducing anthelmintic input upon growth and faecal egg and larval counts in young farmed deer grazing chicory (*Cichorium intybus*) and perennial ryegrass (*Lolium perenne*)/white clover (*Trifolium repens*) pasture. *Journal of Agricultural Science Cambridge* **132**, 335-345.

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