Effects of Forage Chicory (*Cichorium Intybus*) On Farmed Deer Growth and Internal Parasitism

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The XX International Grassland Congress took place in Ireland and the UK in June-July 2005. The main congress took place in Dublin from 26 June to 1 July and was followed by post congress satellite workshops in Aberystwyth, Belfast, Cork, Glasgow and Oxford. The meeting was hosted by the Irish Grassland Association and the British Grassland Society.

Proceedings Editor: D. A. McGilloway

Publisher: Wageningen Academic Publishers, The Netherlands

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Keywords: deer, chicory, growth, lungworm, gastrointestinal parasites

Introduction Internal parasitism (particularly lungworm - *Dictyocaulus* sp) significantly limits post-weaning growth of deer. Endoparasite control using anthelmintics may be unsustainable, due to the increasing risk of anthelmintic resistance and the risk or perception of chemical residues in animal products. Chicory has a high feeding value and contains sesquiterpene lactones and low levels of condensed tannins, both with anti-parasitic activity (Molan *et al*., 2003). Grazing chicory during autumn may reduce the requirement for anthelmintic treatment of young deer compared with grazing ryegrass-based pasture (Hoskin *et al*., 1999). The objective of this study was to investigate the effect of withholding anthelmintic treatment of young deer grazing grass-based pasture or chicory on autumn growth and internal parasitism.

Materials and methods Newly weaned red and wapiti hybrid deer (*Cervus elaphus*) calves (n=68) were allocated to a 2x2 factorial design, rotationally grazing either perennial ryegrass (*Lolium perenne* cv Grasslands Nui, 90%) -based pasture or chicory (*Cichorium intybus* cv Grasslands Puna, 75%) *ad libitum* from March to May 2002 and receiving either the topical anthelmintic Moxidectin ("treated") monthly or remaining untreated ("control"), unless criteria for individual deer treatment were triggered on the basis of fortnightly monitoring (Hoskin *et al*., 2003). During May, when clinical parasitism became evident in the pasture-grazed control group, five sentinel deer were randomly selected for slaughter from each group. Adult lungworm recovered from the lungs and gastrointestinal (GI) nematodes recovered from the abomasum, small and large intestines were counted. Data were compared by ANOVA (GLM, SAS Institute Inc, USA) with forage type, anthelmintic treatment, animal sex and genotype and interactions as factors.

Results Growth of deer grazing chicory exceeded that of deer grazing pasture ($P<0.001$) and growth of treated deer exceeded growth of control deer on pasture ($P<0.001$), but not on chicory (Table 1). A significant type of forage by anthelmintic treatment interaction was found for deer growth ($P<0.05$). Clinical parasitism was not observed in deer grazing chicory, resulting in zero anthelmintic usage in control deer, whereas 35% of control deer on pasture required anthelmintic. Table 1 also shows that the control deer grazing chicory had half the lungworm population of deer grazing pasture and also harboured 18% fewer GI parasites (both $P<0.10$).

Table 1 Mean liveweight gain, percentage of control animals requiring anthelmintic and total lungworm and gastrointestinal (GI) nematode populations per animal of deer grazing either ryegrass-based pasture or chicory

Forage	Pasture		Chicory		SEM
Anthelmintic treatment	Treated	Control	Treated	Control	
Liveweight gain (g/d)	134[a]	60[b]	208[c]	175[c]	11.8[1]
Clinical parasitism (%)	-	35	-	0	[1]
Lungworm (no.)	1	643	0	311	115.2[2]
GI nematodes (no.)	0	2642	52	2240	373.7[2]

[abc] letters designate significant differences between treatments ($P<0.05$ or better). [1]n=17, DF=32, [2]n=5, DF=8.

Conclusions There is an important potential role for alternative forages in sustainable deer production systems. Further research is required on the relative contributions to endoparasitism of secondary-compound-mediated, direct anthelmintic effects, compared with indirect nutritional, plant morphological and sward structure effects.

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