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Dagginess and flystrike in lambs grazed on *Lotus corniculatus* or ryegrass

D.M. LEATHWICK AND D.S. ATKINSON

AgResearch, Flock House Agricultural Centre, Private Bag 1900, Bulls, New Zealand.

ABSTRACT

Lambs grazing the tannin containing pasture species *Lotus corniculatus* (cv Goldie) were compared with lambs grazing a high endophyte ryegrass (cv Nui) in order to assess the effectiveness of lotus at reducing dags and flystrike. Two trials of the same design were run consecutively, between January and April 1994. Each of 4 paddocks, 2 of lotus and 2 of ryegrass, were set stocked for 32 and 42 days (respectively for trials 1 and 2) with 62 lambs. Half of the lambs in each paddock were drenched fortnightly with a combination anthelmintic. Lambs were examined for flystrike three times each week and samples were collected for fly identification before strikes were treated with insecticide.

Lambs which grazed lotus suffered less flystrike than those grazed on ryegrass in both trials (32% cf 51%; $P < 0.01$ and 1.5% cf 7.4%; $P < 0.05$ for trials 1 and 2 respectively). Drenching reduced flystrike in trial 1 (from 57% to 26%; $P < 0.01$), but not in trial 2 (4.8% cf 4.1%; NS). Flystrike was strongly correlated with dagginess ($R^2 = 97\%$). Mean dry weight of dags was reduced by grazing lotus rather than ryegrass (79g cf 108g; $P < 0.01$ in trial 1 and 9.7g cf 14.3g; NS in trial 2) and by drenching (68g cf 118g; $P < 0.001$ in trial 1 and 8.8g cf 15.2g; NS in trial 2). Lambs grazing lotus had significantly ($P < 0.01$) higher faecal dry matter content than those grazing ryegrass. We conclude that lotus has considerable potential for a future role in the integrated management of flystrike and dags.

Keywords: *Lotus corniculatus*; ryegrass; white clover; dags; flystrike.

INTRODUCTION

A number of trials have assessed the potential of pasture species containing condensed tannins to enhance animal performance (Wang *et al.*, 1994) and to reduce the detrimental effects of gastrointestinal nematode parasites (Waghorn & Shelton, 1992, Niezen *et al.*, 1993; 1994). An incidental finding from some of these trials has been a reduction in faecal moisture content, dag formation and an apparent decrease in flystrike associated with the grazing of tannin containing pastures (Niezen *et al.*, *in press*). This trial set out to formally test whether a reduction in dag formation and/or flystrike would result when lambs grazed the tannin containing pasture species *Lotus corniculatus* as opposed to a conventional high endophyte perennial ryegrass/white clover pasture. In addition, the relationship between internal parasites, dagginess and flystrike was investigated in an attempt to quantify the benefits of drenching as a means of reducing dags and/or flystrike.

MATERIALS AND METHODS

Four adjacent 2.5 ha paddocks were sown in either *L. corniculatus* cv Goldie (lotus) or in a ryegrass (cv Nui)/white clover (cv Tahora) mixture. However, due to poor establishment of the white clover, the pasture comparisons were more realistically between lotus and ryegrass rather than lotus and a ryegrass/white clover mix.

Two replicates of a 2 x 2 treatment experimental design were established. Lambs grazing lotus were compared with lambs grazing ryegrass with half the lambs in each paddock being drenched fortnightly with a combination (Bz/Levamisole) anthelmintic. The experiment was run twice, using different lambs each time; the original intention being to pool the data sets to give a 4 replicate trial (*i.e.*, 2 reps x 2

times). However, because of differences in the pre-trial treatment of lambs and the amount of herbage available, it was not in the end considered valid to pool the data from the two trials for much of the analysis. For each trial thirty one lambs were randomly allocated to each treatment in each replicate on the basis of live-weight and faecal nematode egg count (FEC). For trial 1 the lambs used were newly weaned and previously undrenched and uncrutched, but, for trial 2 the only lambs available had been crutched at weaning and shorn some weeks prior to coming onto the trial. The first trial commenced on 21 January, running 32 days until 21 February 1994. The second trial ran 42 days from 8 March - 18 April 1994. Three times each week (Monday, Wednesday and Friday) all lambs were examined for flystrike. The lamb tag number, as well as the position and severity of all strikes was recorded prior to localised treatment with a 0.25% solution of cypermethrin (Cypor: Young's Animal Health (N.Z.) Ltd).

Lamb live-weights were measured at the beginning and end of each experiment. Mid side patches for wool growth were cut on 30 lambs in trial 1 and 20 lambs in trial 2 and the dry weights of wool cut from patches at the end of each trial were adjusted for individual patch size to give a dry weight of wool per unit area. Rectal faecal samples for FEC were collected from all the undrenched lambs at the beginning, midpoint and end of each trial. Nematode eggs per gram of faeces (epg) was determined using a modified McMaster technique with a precision of 1 egg counted equals 50 epg. Dry matter content of faeces was determined by weighing samples before and after 48 hrs oven drying. Lambs were scored on a 0-5 scale (0 = no dags, 5 = most dags) for dagginess, twice in trial 1 and three times in trial 2. At the end of each trial all lambs were crutched and crutchings were weighed, oven dried and reweighed. The mean dry weight of crutchings taken from lambs considered to have no dags was subtracted from each

weight to estimate dag weight. Pasture availability was estimated at irregular intervals throughout both trials using an electronic pasture probe calibrated for each pasture type.

Statistical Analysis

The proportion of lambs struck in each treatment group was compared using a Chi-square test. All other comparisons were made using ANOVA with Least Squares means compared by t-test. FECs were transformed by $\text{Log}_{10}(x+1)$ before analysis.

RESULTS

Trial 1: The lambs used in this trial were newly weaned, undrenched and uncrutched. Mean visual dag score in the first week of the trial was 0.9. Pasture availability at the start of the trial was approximately 2400 kg/ha DM on the lotus and 1300 kg/ha DM on the ryegrass, declining to approximately 1800 and 1100 kg/ha respectively at trial completion. Treatment means and the results of statistical analysis are presented in Table 1.

TABLE 1: The effect of pasture species and drenching on the incidence of flystrike, dag weights and production parameters for trial 1. (21 Jan. - 21 Feb.)

	Lotus	Ryegrass	Drenched	Undrenched
Flystrike (% lambs struck)	32	51**	26	57**
Dry weight of dags (g)	79	108**	68	118***
Live-weight gain (g/day)	110	64***	108	65***
Wool growth (mg/cm ² /day)	2.02	1.87 NS	2.04	1.86 NS

(** P<0.01, *** P<0.001, NS not significant)

Lambs grazed on lotus suffered less flystrike, had fewer dags and had higher live-weight gains than those grazed on ryegrass. Lambs drenched fortnightly suffered less flystrike, had fewer dags and had higher live-weight gains than undrenched lambs. There was no interaction between pasture species and drenching. Struck lambs had lower live-weight gains than unstruck lambs (64 g/day (N=104) vs 105 g/day (N=146) respectively; P<0.001). The struck and unstruck lambs did not differ in live-weight at the beginning of the trial (22.7 vs 22.0 kg respectively; NS). There was no difference in mean FEC of the undrenched groups at any point during the trial (final FECs of 1231 vs 1159 epg, NS for lambs grazed on lotus and ryegrass respectively).

Trial 2: Because the lambs used in this trial had been crutched and shorn prior to coming onto the trial they had fewer dags and shorter wool than the lambs in trial 1 (mean dag score of 0.1). Protracted dry conditions over the duration of this trial resulted in herbage dry matter declining to approximately 700 kg/ha D.M. on both pasture types under the continuous grazing. Treatment means and the results of statistical analysis are presented in Table 2.

Lambs grazed on lotus suffered less flystrike and had higher faecal dry matter content than those grazed on ryegrass.

TABLE 2: The effect of pasture species and drenching on the incidence of flystrike, dag weights, production parameters and faecal dry matter content for trial 2. (8 Mar.- 18 Apr.)

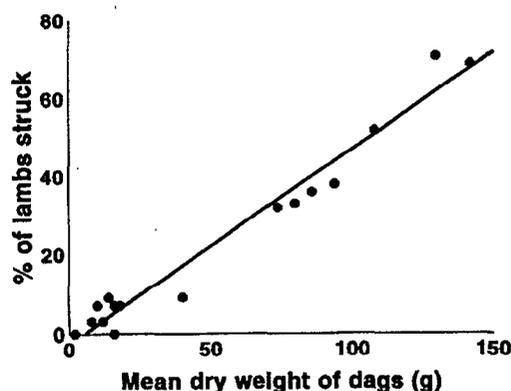
	Lotus	Ryegrass	Drenched	Undrenched
Flystrike (% lambs struck)	1.5	7.4 *	4.1	4.8 NS
Dry weight of dags (g)	9.7	14.3 NS	8.8	15.2 NS
Live-weight gain (g/day)	-13.5	-31.3 NS	-13.2	-31.5 NS
Wool growth (mg/cm ² /day)	1.06	0.95 NS	1.03	0.99 NS
Faecal % D.M. (18/494)	29.7	22.1 **	-	-

(* P<0.05, ** P<0.01, NS not significant)

Due to the limited feed available to the lambs, live-weight gains were negative. Grazing lotus and drenching tended to give better live-weight gains, but differences were not statistically significant (Table 2). Again there was no interaction between pasture species and drenching. As in trial 1 struck lambs tended to have lower live-weight gains than unstruck lambs (-32 g/day (N=11) vs -12 g/day (N=236) respectively), but this difference was not statistically significant. There was no difference in mean FEC of the undrenched groups at any point during the trial (final FECs of 982 vs 864 epg, NS for lambs grazed on lotus and ryegrass respectively).

Trials 1 and 2 combined: When the proportion of lambs struck in each of the 16 treatment groups was plotted against the mean dag weight for each group (Fig.1) a strong relationship between the incidence of flystrike and the level of dagginess in lambs was indicated. There was no correlation between dag weight and FEC, either within the undrenched treatment groups ($R^2 = 14\%$ for lotus, trial 1; 1% for ryegrass, trial 1; 2% for lotus, trial 2; 0.4% for ryegrass, trial 2) or when the undrenched treatment groups were pooled ($R^2 = 23\%$).

FIGURE 1: The percentage of lambs struck plotted against mean dry weight of dags for each of the 16 treatment groups ($y = -2.83 + 0.50 x$, $R^2 = 0.97$).



DISCUSSION

These results confirm the observations of Niezen *et al.*, (*in press*) in demonstrating a reduction in dags and flystrike associated with grazing lambs on pastures containing con-

densed tannins rather than on more conventional ryegrass/white clover swards. The results are consistent with evidence of considerable production advantages from grazing animals on pastures containing condensed tannins (Wang *et al.*, 1994) and of an ability of animals grazing such pastures to grow well in spite of internal parasite burdens which would normally cause significant losses (Niezen *et al.*, 1993,1994). However, the live-weight gain values from this work must be interpreted with caution due to the lambs grazing the different pastures having different feed allowances. The original intention was to keep pasture dry matters as high as possible so that the lambs would be grazing essentially *ad libitum*, but the very dry conditions over the duration of the trials prevented this. The effect of the pasture species on growth rates is therefore potentially confounded with the effect of pasture allowance.

The difference in growth of struck and unstruck lambs is surprising given that almost all strikes were terminated at an early stage of development (ie., no more than 48-72 hours after initiation) and in most cases there were none of the outwardly visible indications, such as tail twitching, lethargy or staining of the wool, normally associated with animals having been struck. While we have not demonstrated conclusively that the loss of production was a direct result of flystrike, such a conclusion would be consistent with other more rigorously derived data (Heath *et al.*, 1987) and no other causal factor was apparent.

The high correlation between mean dag weight and the incidence of flystrike indicates that the presence of dags is a prerequisite for flystrike, or at least significantly influences the suitability of the host for oviposition by the flies. Such data indicates that control of dags should be of the highest priority in the management of flystrike, and also suggests a mechanism for the influence of lotus on flystrike, *ie.*, lambs grazed on lotus had fewer dags and therefore suffered less flystrike. Such a mechanism is supported by the results of drenching which in the first trial reduced dags and flystrike but in the second trial reduced neither.

The low correlation between FEC and dags indicates a poor relationship, if any, between dags and the number of worms within the host. Similar results have been found previously (McEwan *et al.*, 1992, Larsen *et al.*, 1994) although Douch *et al.* (1994) recorded a significant negative relationship between lines of sheep selected for high or low FEC. Recent work by Larsen *et al.* (1994) suggests that dag formation is related to the host's immune response to the ingestion of parasite larvae off pasture and this is supported

by recent indoor trials (Green and Douch, *pers. comm.*). If dag formation is primarily a response to challenge by larval parasites off pasture and not a response to established worm burdens then the question remains as to why drenching is effective at reducing dags?

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