Flystrike in lambs selected for resistance or susceptibility to ryegrass staggers, when challenged with high or low endophyte pastures

S. R. YOUNG, D.R. SCOBIE, C.A.MORRIS[1] AND N.C AMYES [1]

AgResearch, P O Box 60 Lincoln

ABSTRACT

Research has shown that incidence of flystrike is reduced in sheep grazing low endophyte ryegrass. This experiment was designed to test the hypothesis that where lambs are bred specifically for resistance to ryegrass staggers (RGS), their susceptibility to flystrike on the body should be correspondingly low, even when challenged with high levels of endophyte.

Ewe and ram lambs were sourced from two lines, one selected for resistance (n = 85) and the other for susceptibility (n = 143) to ryegrass staggers. A further group of lambs (n = 63) produced by intercrossing the two lines was included. The lambs were run in 2 mobs, on high and low endophyte pasture, and monitored daily for signs of flystrike on the body. During the course of the experiment, susceptible (n = 34) and resistant (n = 1) lambs suffering from clinical ryegrass staggers had to be removed from the high endophyte pasture. These were excluded from the analysis. Ram lambs made up the majority of animals removed.

Only ram lambs were flystruck on the body, particularly around the scrotal area. Significantly more resistant ram lambs (7 of 49) were flystruck than susceptible (3 of 85) or intercross ram lambs (2 of 27), regardless of pasture endophyte level ($P < 0.1$). More lambs ($P < 0.1$) were flystruck grazing ryegrass with high endophyte (n = 9) than low endophyte (n = 3). The only lambs flystruck while grazing non-endophyte pasture were RGS resistant rams.

In contrast to the hypothesis, this experiment indicates that selection of animals for resistance to RGS may exacerbate their susceptibility to flystrike. The evidence presented here supports the literature that sheep grazing high endophyte pasture are more susceptible to flystrike. The question for farmers is whether their selection priority should be for pasture with resistance to insect pests, or for stock with resistance to RGS, or both.

Keywords: myasis; body strike.

INTRODUCTION

Cutaneous myasis or "flystrike" occurs where flies lay eggs in the wool of an animal in response to skin exudates, in the presence of suitable environmental conditions. In the early stages, sheep will display signs of local irritation, which can be easily seen. Eggs hatch within a few days, and the larvae feed superficially on the epidermis and lymphatic exudates or on necrotic tissue, and cause poisoning of the animal with the ammonia they secrete. Affected sheep display a rapid increase in both temperature and respiratory rate, followed by loss of appetite and weight. They become anaemic and suffer severe toxaemia, which affects both heart and kidneys (Hall & Wall 1995; Raadsma, 2000). There will also be extensive tissue damage to the animal, including maceration and necrosis of the skin in the area struck. Urine and faecal soiling of the breech area, and under-belly in rams are strongly associated with attraction to strike flies, as are bacterial dermatoses caused by fleece and skin wetting over long periods, in humid conditions (Raadsma, 2000).

A good description of ryegrass staggers is provided by Mortimer (1983). Morris *et al.*, (1995) described the establishment of selection lines of sheep either susceptible or resistant to the disorder. Breeding sheep resistant to ryegrass staggers may be a profitable step, because ryegrass with its natural but toxic endophyte might still be a viable option. The benefits of endophyte to pasture should not be overlooked – in protection from invertebrate pest attack, degree of drought tolerance and improved dry matter production, and not all pasture endophytes are toxic to sheep. Lolitrem is an alkaloid produced by an endophytic fungus and has been shown to be the agent of ryegrass staggers (Fletcher & Harvey, 1981). The endophyte is found concentrated in the basal leaf sheath, and in the reproductive stem and inflorescence, while the levels are much lower in the leaf blade. Animal health problems caused by endophyte toxins include: reduced growth rates; ryegrass staggers; increased dags and flystrike; increased heat stress and reduced plasma prolactin levels (Fletcher *et al.*, 1999). Previous research has indicated a much lower incidence of flystrike in ewes and lambs grazing low endophyte pasture over the summer/autumn period when compared with similar stock grazing high endophyte pasture (Fletcher *et al.*, 1999).

Eerens *et al.* (1992), in a grazing experiment in a cool moist environment, noted that lambs grazing high endophyte pastures had a greater level of dags and reported that farmers had observed increased scouring. Fletcher (1993) observed that the incidence of flystrike is correlated to some degree with the presence of dags and/or faecal soiling and higher faecal moisture on sheep grazing high endophyte ryegrasses. Animals grazed on endophyte infected pasture where animal outputs were being monitored, showed a clear relationship between faecal moisture and soiling (Pownall *et al.* 1993).

[1]AgResearch, Ruakura Research Centre, Private Bag 3123, Hamilton, New Zealand

TABLE 1: Numbers of ryegrass staggers resistant, susceptible or intercross lambs succumbing to pasture toxins and to infestation of blowfly larvae during the experiment.

	Resistant		Intercross		Susceptible		
	Ewes	Rams	Ewes	Rams	Ewes	Rams	Totals
Total starting trial	36	49	36	27	58	85	291
RGS - removed		1			11	23	35
Total no. flystruck	1	9		2	4	6	22
Total Finishing trial	35	39	36	25	43	56	234

This experiment was designed to test the hypothesis that resistance or susceptibility to ryegrass staggers will affect resistance or susceptibility to flystrike on the body of the sheep rather than around the breech.

MATERIALS AND METHODS

In mid March, 2003, 291 individually identified lambs were obtained from the ryegrass staggers selection lines (described by Morris *et al*., 1995; Amyes *et al.*, 2002). Ewe and ram lambs were sourced from two lines; one selected for resistance (n = 85) and the other for susceptibility (n = 143) to ryegrass staggers. A further group of lambs (n = 63) produced by intercrossing the two lines was included. The lambs were crutched, weighed and allocated into 2 treatment mobs that were balanced for sex, liveweight and selection line. The intercross line was allocated equally to both mobs (being lambs by first cross ryegrass staggers resistant x susceptible sires and from control ewes).

The high endophyte treatment group was grazed continuously on new ryegrass pasture, with reputedly high levels of endophyte toxin, while the low endophyte treatment was allocated to an older, low endophyte pasture. Daily inspections were made of both treatment groups to identify animals showing signs of flystrike, and/or incidence of ryegrass staggers.

Animals identified with flystrike were recorded and treated by clipping the wool to expose the larvae and applying a topical insecticide to control the infestation, and the animal was then removed from the experiment. Those animals unable to withstand the effects of endophyte toxicity were recorded and removed to a low endophyte paddock. Some animals suffered from both complaints, and were recorded, treated and removed as necessary. The animals removed from the experiment were monitored daily during recovery.

RESULTS

At the end of the trial, there were fewer lambs remaining on the high endophyte treatment than the low endophyte treatment, because 35 were removed when they showed signs of ryegrass staggers (Table 1). Of these, 34 came from the susceptible line, while only 1 was from the resistant line. Overall, 22 lambs suffered from flystrike (Table 1) but only 12 of these exhibited body strike (Table 2). The others were struck on the breech and were treated to remove the larvae. Since the treatment involved an insecticide, it was unlikely that flies would either be attracted to, or would re-establish a strike on these lambs so they were removed from the experiment.

Flystrike on the body was limited to ram lambs only (Table 2), with most struck around the scrotum and also the pizzle. Significantly more resistant ram lambs (n = 7) were struck on the body than susceptible (n = 3) or intercross lambs (n = 2), regardless of pasture endophyte level ($P < 0.1$). More lambs were struck grazing high endophyte ryegrass (n = 9) than low endophyte (n = 3) ($P < 0.1$).

Weather for the trial period was recorded at a nearby meteorological site. Rainfall was the highest recorded for that period over the past 5 years, at 99mm, with over a third of that falling on one day. Overall temperatures were marginally below the 5 year average. Total wind run for the period was also below average, and that combined with the long pasture and lower temperatures, ensured the grass was almost always wet. The pasture was long relative to leg length of the lambs, and their undersides were constantly damp.

DISCUSSION

Overall, the resistant lambs were struck more often than the susceptible lambs, with intercross animals intermediate between the two. Only ram lambs were struck on the body, particularly around the scrotal area. The long scrotal wool appeared to provide an ideal environment for larval development. In concert with the literature, the risk of flystrike was reduced in the low

TABLE 2: Incidence of body strike in ryegrass staggers resistant, susceptible or intercross lambs while grazing high and low endophyte pasture.

		Resistant		Intercross		Susceptible		
Pasture		Ewe	Ram	Ewe	Ram	Ewe	Ram	Totals
High	Body struck		4		2		3	9
Endophyte	Not struck	17	22	18	13	28	40	138
Low	Body struck		3					3
Endophyte	Not struck	19	20	18	12	30	42	141

endophyte pasture, but increased by the high endophyte grasses. The resistant ram lambs, while showing a greater tolerance to ryegrass staggers on the high endophyte pasture, were more susceptible to flystrike on the body. The susceptible lambs also suffered from flystrike while on the high endophyte pasture, and severely from ryegrass staggers but were less affected by both disorders on the low endophyte grasses.

The reason for the specific interest in body strike was the effect of endophyte on the body temperature of the animal. Theoretically, a change in temperature will change the ecosystem of the fleece and could therefore change attractiveness to flies. Breech strike on the other hand is simply related to the presence of wet dags. Breech strike was evident in many of these lambs, and Fletcher (1999) has previously shown that incidence of breech strike is increased by endophyte toxins. The present experiment suggests body strike is likewise increased by endophyte toxins, but both forms of strike could be dependent on the genotype of the animal. These preliminary results encourage further investigation into the pasture endophyte/animal/insect interactions that precipitate flystrike.

Farmers sowing new pasture must decide whether to opt for high endophyte grasses to increase plant protection against insect invaders and risk animal health problems with staggers; to sow low endophyte grasses to reduce the incidence of staggers and hope that pasture insect damage is minimal, or to sow a ryegrass which encompasses the benefits of endophyte without toxicity problems.

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