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# Effects of facial eczema on ewe reproduction and ewe and lamb live weights

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## ABSTRACT

Ingestion of the spores of *Pithomyces chartarum* by sheep causes liver injury with a resultant rise in the blood concentration of the liver enzyme, gamma glutamyl transferase (GGT). This paper collates results concerning the effects of facial eczema (as determined by GGT levels) from 2 trials carried out in the autumn of 1981. Wash counts of spores in pasture ranged from nil to 130 000 for 45 days in February-March. Levels of GGT were determined about 1 month later.

Factors significantly associated with GGT levels included pre-mating shearing, age, nutrition level (erratic response), and ewe selection line.

High levels of GGT were associated with depressed ewe performance. For each 100 iu/l increase in GGT, ewe mating and subsequent weaning weights declined by up to 0.3 and 0.4 kg respectively. Litter birth and weaning weights declined by up to 0.15 and 0.6 kg/100 iu. Similarly the proportions of ewes lambing and lambing multiples were reduced by up to 2.5%. For a modest outbreak of facial eczema causing a rise in GGT of 200 iu/l, the loss in weight of lambs weaned could be as high as 13%.

**Keywords** Facial eczema; GGT levels; ewe productivity.

## INTRODUCTION

Ingestion of the spores of *Pithomyces chartarum* by sheep causes liver injury with a resultant rise in the concentration of the liver enzyme gamma glutamyl-transferase (GGT) in the blood (Towers and Stratton, 1978). Spore counts rise during warm moist weather — conditions which commonly occur in the early autumn.

The development of the GGT test has meant that liver damage induced by facial eczema can now be quantified (Towers and Stratton, 1978). The test assumes other factors that might cause GGT to rise are not concurrently occurring (e.g. other diseases). In 1981 a relatively serious outbreak of facial eczema occurred. Relationships between GGT and ewe performance traits were determined in 2 nutrition trials operating at the time.

## EXPERIMENTAL

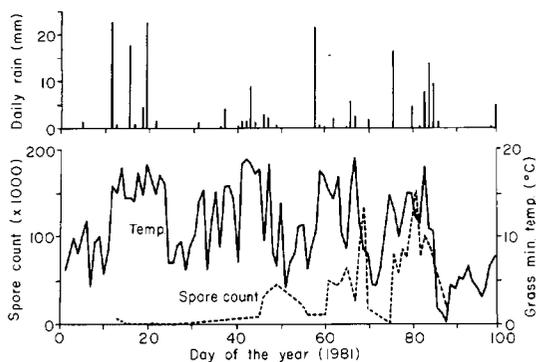
Trials 1 and 2 are described in detail by Smeaton *et al.* (1982) and Smeaton *et al.* (1985), respectively. Trial 1 compared the flushing responses of well and poorly reared 2-tooth ewes at 5 levels of nutrition over a 6-week period with the well and poorly reared ewes run separately. Trial 2 compared the flushing responses of 4 selection lines of ewes at 3 feeding

levels each replicated twice. The selection lines ran together within feeding level replicates except for 1 week at the end of the trial when the Border Leicester x Romney cross ewes (BL x R) were mated in separate nutrition groups. In both trials, half the ewes were shorn during flushing. Ewe live weights, ovulation rates, lambing results and weights were determined. *Pithomyces chartarum* spore numbers were measured, using the wash count method, in various paddocks during the flushing period (Fig. 1) until cold weather rendered pastures "safe". Parts of the trial areas were sprayed with Thibendazol via helicopter on 2 occasions, but because persistently moist weather at the time of spraying severely limited its effectiveness, spraying had little effect on the results below. GGT levels were determined in mid-April, 1981 (about day 105).

Data were analysed in a least-squares model using GENSTAT fitting main factors (GGT, shearing, rearing and nutrition in Trial 1 and GGT, selection line, age, nutrition, replicate and shearing in Trial 2) and interactions up to 2nd order. Discreet data were logit transformed for analysis.

## RESULTS AND DISCUSSION

Fig. 1 shows that spore counts rose and fell in at least 3 peaks roughly in synchrony with grass minimum



**FIG. 1** Values for sporidesmin spore counts, rainfall and grass minimum temperature by day of the year.

temperatures and rainfall. Spore counts did not rise with the high grass-minimum temperatures in mid-January (days 10 to 25), presumably because other conditions were limiting. The spore count pattern, although very variable, involved a small rise around day 50, followed by 2 periods of variable and dangerously high levels. This "potentiation" pattern, referred to by Smith *et al.* (1983) probably exacerbated the effects of the later high spore counts.

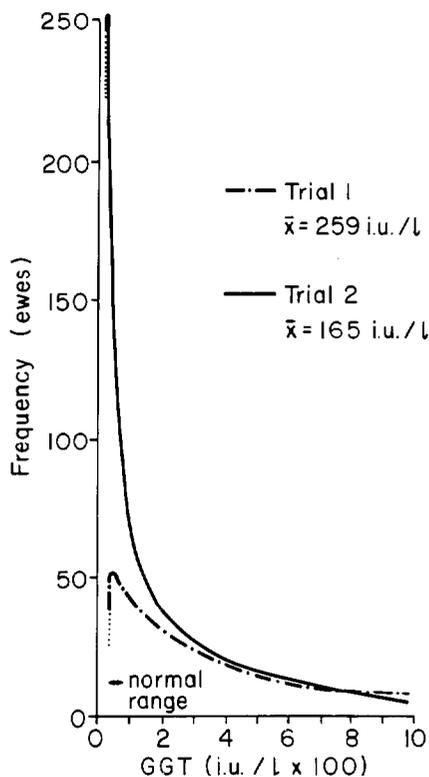
Because the distribution of GGT levels was skewed (Fig. 2), values were log-transformed before analysis. Mean values presented are back-transformed from fitted log values.

**TABLE 1** Effects of nutrition treatment and flock on GGT levels (iu/l) in Trial 2.

	GGT
Pasture allowance (kg green DM/d)	
1.1	61
1.9	118
2.6	114
Flock	
Random Romney	174
Fleece Romney	82
Weight Romney	96
Border Leicester x Romney	55

Nutrition level during flushing and GGT levels were associated in Trial 2 ( $P < 0.001$ , Table 1). There was a flushing level x rearing treatment interaction in Trial 1 ( $P < 0.05$ ) but there were no consistent trends in the data. Presumably, wide variation in spore counts between paddocks (coefficients of variation of up to 100%) accounted for much of the variation in this response. Smith (unpublished results) observed that lax grazing can reduce spore intake. Hard grazing can also limit DM intake and hence

spore intake. Moderate grazing can be the worst if sheep graze down to the bottom of the pasture; pasture intake is quite high and spore intake very high. The present results suggest that paddock variation can be at least as important a factor.



**FIG. 2** Distribution of GGT levels in the ewes in Trials 1 and 2.

Flock, age and shearing also affected GGT ( $P < 0.001$ ). The BL x R ewes appeared to be more resistant to racial eczema damage than the Romney lines which in themselves showed apparently variable resistance between strains (Table 1). Smith *et al.* (1980) noted that Merino rams were considerably more resistant to sporidesmin dosing than Romney and BL x R rams. In fact, resistance to facial eczema varies within breeds also and is quite highly heritable (Campbell *et al.*, 1975).

In Trial 2, the 2-tooth ewes had GGT levels 25 iu higher than the mixed-age ewes ( $P < 0.001$ ). These latter animals presumably had more exposure to natural culling. In Trial 1, shearing on day 98, after exposure to toxic pasture, had no effect whereas in

Trial 2, shearing on day 76, during exposure, reduced GGT levels by 25 iu/l compared to unshorn ewes ( $P < 0.001$ ). Smith *et al.* (1979) noted that if ewes were shorn prior to exposure to high *P. chartarum* spore counts they had lower GGT levels than unshorn ewes.

GGT was negatively related to all ewe performance traits (Table 2). This is not surprising given that facial eczema is a disease which can cause considerable liver injury. A noteworthy result, however, is the long-lasting nature of the effects with ewe and lamb weaning weights and the proportion of ewes lambing all being significantly affected. Yet all these traits were observed months after sporidesmin exposure. Similar effects were observed by Moore *et al.* (1983) on hogget live weight and the proportion of hoggets and 2-tooth ewes lambing. Ewe and lamb survival were not significantly affected although 1 or 2 of the most severely affected ewes died. Partial failure of multiple ovulation was not associated with GGT levels.

**TABLE 2** Effects of GGT levels on ewe performance traits, expressed as change in trait units  $\pm$  SE/100 iu increase in GGT.

Trait	Trial 1	Trial 2
Ewe mate weight (kg)	-0.3 $\pm$ 0.05 **	-0.1 $\pm$ 0.05 *
Ewe wean weight (kg)	-0.03 $\pm$ 0.1 NS	-0.4 $\pm$ 0.2 *
Litter birth weight (kg)	-0.05 $\pm$ 0.03 NS	-0.15 $\pm$ 0.04 **
Litter wean weight (kg)	-0.2 $\pm$ 0.09 *	-0.6 $\pm$ 0.2 **
EO/EP (%)†	-1.9 **	- NS
EOM/EO (%)	-1.6 NS	-3.0 *
EL/EPL (%)	-1.9 NS	-2.4 **
ELM/EL (%)	-2.2 †	-2.6 *

†Coefficients for all the proportionate traits are approximate as they are derived from non-linear logit models.

† $P < 0.10$

### Concluding Remarks

From the above associations with GGT, the effects of a facial eczema outbreak can be estimated. In a moderate outbreak of facial eczema where GGT levels are elevated by 200 iu on average, ewe mating and weaning weights could be reduced by up to 0.6 and 0.8 kg respectively. Litter birth and weaning weights could be reduced by up to 0.3 and 1.2 kg

respectively. The proportion of ewes lambing could decline by nearly 5% and the multiple lambing rate in those ewes lambing could also decline by 5%. Hence, in a 1000 ewe flock including 10% dry ewes and normally weaning 1000 lambs, the above effects could reduce the number of lambs weaned to 913. Assuming a litter weight reduction of 1.2 kg, there would be a total reduction in weight of lamb output of about 13%.

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