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BRIEF COMMUNICATION

Susceptibility of the breeding ewe to parasitism

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ABSTRACT

Pregnant Coopworth ewes were allocated to four periods of parasitic challenge which commenced either -4, 0, 6 or 12 weeks from lambing. Within each period, ewes were further allocated to four groups (n=6) viz initial slaughter; treatment with anthelmintic followed by a single infection with 20,000 larvae of *Ostertagia (Teladorsagia) circumcincta* and slaughtered after 21 days; chronic infection with 4000 larvae per day for 30 days or no infection. Both these latter groups were again dosed with anthelmintic on day 50 and given 20,000 larvae on day 57 and slaughtered 21 days later. At the start of each period 6 non-breeding ewes were challenged with 20,000 larvae and slaughtered 21 days later. All ewes were housed indoors. Significantly higher worm burdens were found at all times in response to challenge in breeding ewes compared to non-breeding ewes, except during period 4 (12 weeks after lambing) where differences were non-significant. Host suppression of faecal egg output was seen during periods 2 and 3, with egg output being reduced by 50% and 95% respectively, compared to that seen during period 1. Faecal egg counts and worm burdens of previously infected ewes were lower than their initially non-exposed counterparts ($P<0.01$). Even though immunity was relaxed during late pregnancy and early lactation exposure to infection was nevertheless important in stimulating the re-establishment of immune competency.

Keywords *Ostertagia*, artificial, challenge, parturition, breeding ewes, nematode, parasites, susceptibility.

INTRODUCTION

The occurrence of a peri-parturient rise in faecal egg output is well documented (Reid and Armour, 1975b; O'Sullivan and Donald, 1973). The duration of this period of susceptibility to parasitic infection in ewes has not yet been clearly defined. This is critical in determining not only the extent of production losses which occur in the ewes (Leyva *et al.*, 1982; Thomas and Ali, 1983; Sykes and Juma, 1984), but also in determining when and whether the ewes should be given anthelmintics to reduce subsequent pasture larval contamination and production loss. The resistance of the ewe to re-infection following anthelmintic treatment during lactation has yet to be assessed.

This study compares the response of breeding and non-breeding ewes to artificial challenge at intervals from late pregnancy until late lactation and also examines the effect of prior larval exposure on the ewes' response to re-infection.

MATERIALS AND METHODS

Five-year old pregnant twin bearing and non-pregnant Coopworth ewes were allocated to four experimental periods in which challenge commenced either -4, 0, 6 or 12 weeks from lambing. Within each period, ewes were further allocated to four groups (n=6) viz initial slaughter (ISG) ; or treatment with anthelmintic (Ivermectin MSD Agvet NZ Ltd, 200 mcg/kg bodyweight) followed by a single infection with 20,000 larvae of *Ostertagia (Teladorsagia) circumcincta* and slaughtered after 21 days (SAI); chronic infection with 4000 larvae per day for 30 days (MCI) or no infection (NIC). Both these latter groups were again dosed with anthelmintic on day 50 and given a 20,000 larvae challenge on day 57 and slaughtered 21 days later. In each period non- breeding ewes (NBSAI) were treated as for group SAI. All ewes were housed indoors and offered a pelleted diet. Faecal egg counts were measured weekly and worm burdens determined at slaughter.

RESULTS

TABLE 1 Mean worm burden in breeding (SAI) and non-breeding (NBSAI) ewes 21 days after challenge with 20,000 *Ostertagia circumcincta* larvae on entry to the experiment.

Time of challenge		Mean total worm burden	
Period	Wks before or after lambing	SAI ewes	NBSAI ewes
1	-4 wk	1194**	224
2	0 wk	2564**	348
3	6 wk	1877**	385
4	12 wk	222	220

** P<0.01

Significantly higher worm burdens (P<0.01) were found at all times in response to challenge in breeding ewes (SAI) compared to non-breeding ewes (NBSAI), except during period four (Table 1).

TABLE 2 Effect of recent chronic exposure (MCI-4000 *Ostertagia circumcincta* larvae/d for 30 days) or non exposure (NIC) on the worm burdens of breeding ewes after challenge with 20,000 *Ostertagia circumcincta* larvae.

Time of challenge		Total worm burden	
Period	Wks after lambing	MCI ewes	NIC ewes
1	4-7	473	2040**
2	8-11	213	681**
3	14-17	22	25
4	20-23	275	56

** P<0.01

Maximum worm burdens occurred around parturition but by 12 weeks after lambing worm burdens in breeding ewes were similar to those found in non-breeding ewes throughout the experiment. The magnitude and duration of the rise in the mean egg production of MCI ewes, in response to a trickle challenge, decreased from period 1 to 4. Faecal egg counts of MCI ewes peaked 6 weeks after infection commenced, with maximum levels of 1330, 380, 80, and 16 epg recorded for periods 1 to 4 respectively. The time required for the infection to develop to patency, as gauged by faecal egg counts, increased during the course of the trial. Nematode egg production in MCI ewes was first recorded 14, 21, 35 and 42 day after infection commenced, for periods 1 to 4 respectively.

Both the worm burdens and faecal egg counts of previously infected ewes (MCI) were lower than their initially non-exposed counterparts (NIC) in response to challenge on day 57 during periods 1 and 2 (P<0.01; Table 2).

DISCUSSION

The worm burden which becomes established is a function of the larval challenge and the change in the susceptibility of the host. Non-breeding ewes clearly showed that the challenge experienced was within their capabilities to resist. On the other hand breeding ewes suffered loss of resistance prior to, as well as after parturition as judged by establishment of nematode populations in the field and as a result of artificial challenge, confirming observations of Connan (1968) and Reid and Armour (1975a,1975b). Maximum susceptibility appeared to be around or soon after parturition but a reduced immune response was still apparent 6 weeks after parturition, confirming previous suggestions of Reid and Armour (1975a), Leyva *et al.* (1982), Sykes and Juma (1983), and Thomas and Ali (1984), though by this stage host resistance to infection in this study was increasing.

The time required for patency of the infection to develop, as gauged by faecal egg count data from periods 2,3 and 4, increased over the experimental periods from 3 to 7+ weeks and the decline in faecal egg output in response to trickle infections, with time indicates increasing host resistance to parasitic challenge occurring after or about 6 weeks of lactation. Gibbs and Barger (1986) reported a similar suppression of egg output in lactating ewes despite worm burdens remaining constant.

Faecal egg counts (period 1) and worm burdens (period 1 and 2) of previously infected ewes (MCI) were lower than their non-exposed counterparts (NIC) after challenge on day 57, indicating that larval stimulus during late pregnancy and early lactation evoked a substantial immune response. Lactating ewes, with recent larval exposure during pregnancy, were found by Leyva *et al.* (1982) to be more resistant as judged by faecal egg count, food intake response and bodyweight than their non-exposed counterparts. Re-establishment of resistance after its loss around parturition may well be dependant on continuing larval challenge.

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