

Persistence of immunity to *Nematodirus battus* infection in lambs

ABSTRACT

Fifty-four Greyface Suffolk lambs aged 3 months were allocated to six groups of seven and one group of 12. Three groups were infected continuously with *Nematodirus battus* larvae (L3) over a 7-week period and three groups remained worm-free. One week after the last larval dose all six groups were treated with anthelmintic and challenged with a single dose of 30 000 *N. battus* L3 either 1, 6 or 12 weeks post-treatment (PT) and killed 10 days later. A seventh continuously infected and treated group ($n = 12$) was segregated into four sub-groups of three lambs which were used as tissue cell count controls and provided data on local cellular responses prior to challenge. Lambs in the first sub-group were killed immediately after anthelmintic treatment and those in the other sub-groups were killed on the same day that the lambs in the other main groups were challenged. Overall post-challenge worm burdens did not differ significantly between previously infected and challenge control groups although they were significantly reduced in both treatment groups by Week 12 PT. The principal manifestation of acquired immunity that was maintained throughout 12 weeks without further infection was retardation in larval development. There was also evidence of preferential rejection of male worms from immune lambs. Local mast cell, but not eosinophil, responses were significantly enhanced by previous infection and persisted up to Week 12 PT. The numbers of bone marrow eosinophils were significantly increased as a result of previous infection and this response persisted up to Week 12 PT. During primary infection anti-L4 and anti-adult worm IgG responses were significantly increased in the previously infected lambs by Day 42 post-infection. Eosinophil responses during this period did not differ between groups. The inflammatory cell responses, coupled with the parasitological observations, suggest that immunity to previous infection is maintained for up to 12 weeks PT without further antigenic stimulation. This 'immunological memory' may have waned partially after 6 weeks PT although the superimposition of age resistance may have masked the effect.

Keyword: *Nematodirus battus*; Sheep-Nematoda; Immunity-Nematoda