

## Effect of maternal exposure to nematode parasites in ewes on performance and parasite resistance in their lambs

J G M Houdijk, L A Jones, B J Tolcamp, S Athanasiadou, M R Hutchings  
SAC, Edinburgh, United Kingdom

Email: jos.houdijk@sac.ac.uk

**Introduction** There is some evidence to suggest that exposure of ewes to parasites reduces weight gain in their lambs (Zaralis *et al.*, 2008), although these effects are not observed when exposure is limited to late pregnancy only (Leyva *et al.*, 1982). However, maternal exposure to parasites throughout pregnancy may affect off-spring performance and its resistance and resilience to parasites, as this may program offspring to better cope with parasite infections (Kristan, 2002). Here, we assessed effects of exposure of ewes to abomasal nematode parasites on ewe and lamb performance and on lamb resistance to the same parasites.

**Materials and method** Thirty-two 4-5 year old housed Mule ewes were either trickle infected with 10,000 *Teladorsagia circumcincta* infective larvae (I, n=16) or sham infected with water (C, n=16) from one week before synchronised mating with Suffolk rams until parturition (day<sub>0</sub>). Ewes weighed (69.9±0.9kg) on day<sub>-158</sub> and were commercially fed throughout. At scanning (day<sub>-88</sub>), 2 single-, 9 twin- and 1 triplet-bearing ewes were selected from each experimental group. Ewes were drenched at lambing to terminate the parasitic infection with Levacide (levimasole) and Oramec (ivermectin), and their lambs were trickle infected from day<sub>38</sub> until day<sub>77</sub> with 2,000 *T. circumcincta* larvae. Lambs had access to creep feed from day<sub>31</sub> onwards and were weaned on day<sub>66</sub>. Ewes were weighed on day<sub>-88</sub>, and ewes and lambs were weekly weighed from lambing onwards. Ewe faecal egg counts (FEC, in eggs per gram, epg) were assessed during pregnancy to monitor the infection; lamb FEC were assessed twice weekly between day<sub>56</sub> and day<sub>77</sub>. FEC were transformed via log(FEC+1) for statistical analyses, and reported as back-transformed means with a 95% confidence intervals range. Obtained data were averaged per lamb reared, and were analysed using ANOVA, with ewe body weight at day<sub>-158</sub> as covariate for ewe performance, lamb birth weight as covariate for lamb performance, and a repeated measure analysis for lamb FEC.

**Results** The number of barren ewes were similar in the C and I treatments (2/16 and 3/16, respectively). Mean FEC of I ewes gradually increased from 1 (1-2) epg on day<sub>-84</sub> to 129 (66-251) epg on day<sub>0</sub>. All FEC were 0 on day<sub>18</sub>. I ewes lambed on average 1.4 days later than C ewes (s.e.d. 0.66; P<0.05), but reared similar number of lambs (1.9±0.1). Table 1 shows that I ewes were lighter than C ewes during pregnancy and at parturition. This difference was smaller by day<sub>31</sub> due to weight loss from C ewes, and disappeared by day<sub>66</sub> due to a higher weight gain of I ewes. Ewe exposure to parasites did not affect mean lamb birth weight, but reduced lamb weight gain until day<sub>38</sub> and increased lamb weight gain during lamb exposure to parasites. Ewe exposure did not affect lamb FEC, which increased from 25 (22-29) to 242 (223-263) epg on day<sub>62</sub> and averaged 116 (105-128) epg on day<sub>77</sub>.

**Table 1** Effect of maternal exposure to parasites on ewe and lamb performance and lamb faecal egg counts (FEC).

	Control (C)	Infected (I)	s.e.d.	P-value
Ewe body weight (kg)				
day <sub>-88</sub>	70.1	65.8	1.00	<0.001
day <sub>0</sub>	70.3	65.1	1.29	<0.001
day <sub>31</sub>	68.5	65.3	1.91	0.114
day <sub>66</sub>	68.4	68.4	1.29	0.991
Ewe body weight gain (g/d)				
day <sub>0-31</sub>	-45	16	63.5	0.342
day <sub>31-66</sub>	15	109	42.5	0.039
Lamb body weight (kg)				
day <sub>0</sub>	5.0	5.1	0.37	0.887
day <sub>38</sub>	19.7	18.2	0.60	0.020
day <sub>73</sub>	35.3	35.2	1.15	0.923
Lamb body weight gain (g/d)				
day <sub>0-38</sub>	382	342	16.4	0.020
day <sub>38-77</sub>	372	412	17.1	0.031
Lamb FEC (log(epg+1))				
mean (day <sub>56-77</sub> )	1.95	1.98	0.087	0.805

**Conclusion** These data support the view that expression of immunity to parasites in immune ewes is nutritionally expensive and that body reserves may be sacrificed over reproductive effort to account for this. The reduced body reserves may be the basis for the reduced lamb weight gain observed during the immediately post lambing period. The data are consistent with the view that maternal exposure to nematode parasites may increase offspring resilience rather than resistance to infection with the same parasite.

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