Effects of periparturient metabolizable protein nutrition on ewes subjected to different infection pressures with the abomasal nematode *Teladorsagia circumcincta*

A. Kidane[1], J.G.M. Houdijk[1], S. Athanasiadou[1], B.J. Tolkamp[1], I. Kyriazakis[1,2]
[1]Animal Nutrition and Health Team, SAC, Edinburgh EH9 9JG,, United Kingdom, [2]University of Thessaly, Karditsa, Greece
Email:alemayehu.kidane@sac.ac.uk

Introduction Nematode egg excretion by periparturient ewes is the main source of infection for their immunologically naïve lambs. It has been shown that periparturient metabolizable protein (MP) supplementation can reduce nematode egg excretion (Houdijk *et al*, 2003). The latter experiment used a single moderate level of infection, but effects of MP supply on periparturient parasitism may depend on the level of infection. The objective of this study was to investigate the effects of MP supplementation on parasite control, ewe and lamb performance in ewes trickle infected with the abomasal nematode *Teladorsagia circumcincta* at three different infection levels. We hypothesised that the magnitude of beneficial effects of MP supplementation will be higher at the highest level of infection due to the expected nutrient drain on the host.

Materials and methods Seventy-two Greyface ewes, scanned for twin pregnancy at 9 weeks before mean achieved lambing (day_{-63}), were infected with either 1000 (n=12), 5000 (n=12) or 10,000 (n=48) infective *T. circumcincta* larvae, every Mon-Wed-Fri from day_{-42} until day_{25}. From day_{-24}, ewes of each group were restrictedly fed at 0.9 times their metabolizable energy requirement and either 0.8 (LP) or 1.3 (HP) times their assumed MP requirement (MPr), as per AFRC (1993) recommendation. Diets consisted of 1/3 chopped hay and 2/3 concentrates. Ewes and their lambs were weighed weekly and within 12h post lambing. Ewe faecal egg count (FEC, eggs per gram fresh faeces) was assessed twice weekly, and were transformed via log(FEC+1) for statistical analyses through repeated measures ANOVA. Post parturition ewe and litter body weight (BW), and litter body weight gain were analysed using ANOVA with ewe initial BW as a covariate.

Results Immediately post parturition, HP ewes were heavier than LP ewes (67.9 *vs* 65.4kg; s.e.d. 0.7kg; P=0.001) but this was not affected by level of infection or nutrition x infection interaction. These effects were maintained throughout lactation, with HP and LP ewes weighing 67.1 and 64.6 kg by day_{25} (s.e.d. 0.9kg; P=0.007). Litter birth weight was not affected by the level of maternal MP nutrition, level of infection or their interaction and averaged (±s.d) 9.8±1.2kg. HP litters grew faster than LP litters (708 *vs* 651 g/d; s.e.d. 15g/d; P<0.001), but litter growth was not affected by level of infection or nutrition x infection interaction. Figure 1 shows the back-transformed mean FEC (with back transformed S.E.) during periparturient period. The effect of time on FEC tended to be significant both during pregnancy (P=0.091) and early lactation (P=0.055). The interaction effects between MP and level of infection were not significant for FEC during late pregnancy and early lactation. All first order and second order interactions with time were not significant during periparturient period. Late pregnancy FEC was affected by level of infection (P<0.001) but not by MP nutrition. In contrast, increased MP supply reduced FEC during lactation (P=0.015) but the level of infection only tended to be significant (P=0.097). Throughout the study, FEC decreased with increasing level of infection.

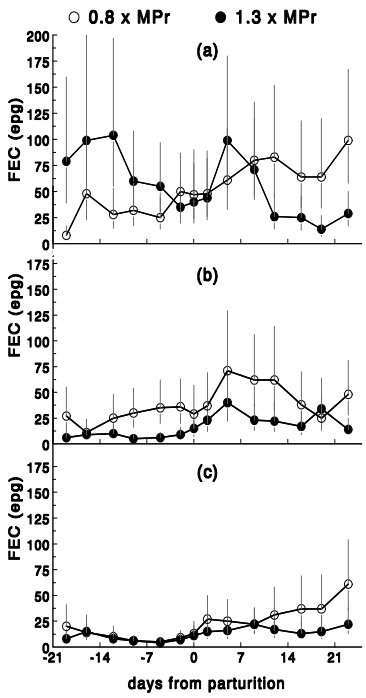

Figure 1 Back transformed faecal count (with 95% confidence interval) at (a) 1000, (b) 5000 and (c) 10000 L_3 of *T. circumcincta* per day for ewes fed at 0.8 (○) or 1.3 (●) times metabolizable protein requirement (MPr)

Conclusion Protein supplementation improved BW of both ewes and lambs. It reduced FEC during lactation which has an important implication for reducing pasture larvae contamination and thereby reducing infection risk for their naïve lambs during their early life. In contrast to our hypothesis, MP supply did not interact with level of infection, whilst the reverse relationship between FEC and the level of infection could be due to density-dependent effects elicited by the level of infection on parasite establishment and fecundity (Paterson and Viney, 2002).

Acknowledgements
The Meat and Livestock Commission and Scottish Executive Rural Directorate supported this work.

References AFRC, 1993. Energy and protein requirements of ruminants. CAB International, Wallingford, Oxon, England.
Houdijk, J. G. M., Kyriazakis, I., Jackson, F., Huntley, F., and Coop, R. L. 2003. International Journal for Parasitology. 33, 327-338.
Paterson, A. and Viney, M. E. 2002. Host immune responses are necessary for density dependence in nematode infections. Parasitology. 125, 283-292.