# MARGINAL ZINC DEFICIENCY IN PREGNANT MERINO EWES

C.L. WHITE, H. J. KYME* and M.J. BARNES

It has been shown that weaned ram lambs require more than 3 mg Zn/kg diet and less than 17 mg/kg for the maintenance of normal testicular development, growth of wool and somatic tissue and the prevention of clinical signs of deficiency (Martin and White 1992; White et al. 1994). The following work was aimed at determining the zinc requirement for pregnancy and lactation in ewes and preweaned lambs, with particular attention to the development of immunocompetence in lambs. Measurements were made of feed intake, growth, plasma zinc concentration and cell mediated immunity. Ewes and lambs were monitored daily for clinical signs of deficiency.

Sixty ewes on day 35 of pregnancy were allocated to five dietary zinc treatments. The basal semi-purified diet contained 3 mg Zn/kg and $ZnSO_4$ was added to produce treatment concentrations of Zn of 7, 14 and 28 mg/kg. A pair-fed group of 28 mg Zn/kg was included to control for effects of reduced feed intake. Sheep were held in individual pens and fed the diets until day 28 of lactation. Deionised water was offered ad libitum and the cages were free of any galvanised metal. Cell mediated immunity was measured using lymphocyte proliferation and $\gamma$-interferon production in response to con-A and KLH.

The plasma zinc concentration fell during pregnancy in all ewes but declined most in the 3 mg/kg group ($P < 0.05$) to 0.33 mg/L at parturition. Plasma zinc concentration in lambs at birth was independent of zinc treatment but during lactation the lambs from the 3 mg/kg treatment had the lowest plasma zinc concentration (0.67 mg/L).

There were no significant effects of dietary zinc treatment on feed intake or weight of ewes, nor on birth weights or survival of lambs. Growth rates of postpartum lambs from the group fed 3 mg Zn/kg were slower than other groups, but the differences were not significant ($P>0.05$). There were no clinical signs of zinc deficiency in ewes. Only lambs from the group fed 3 mg Zn/kg developed clinical signs and these consisted of sores on the lips after about 20 days of lactation. Cell mediated immunity was not significantly affected by zinc treatment.

The results suggest that ewes mobilise zinc from body tissues to maintain normal gestation and parturition when zinc intakes are low. However, at a dietary zinc concentration of 3 mg/kg, ewes were unable to supply sufficient zinc during lactation to prevent the onset of clinical signs of deficiency in their lambs. The absence of any apparent defect in cellular immunity in lambs suggests that immune function is not more sensitive to reduced zinc supply than other metabolic systems, and may only be affected when signs of zinc deficiency are severe.

WHITE, C.L., MARTIN, G.B., HYND, P.I. and CHAPMAN, R.E. (1994). Br. J. Nutr. 71: 425.

MARTIN, G.B. and WHITE, C.L. (1992). J. Reprod. Fert. 96: 497.

---

CSIRO Division of Animal Production, Private Bag, P.O. Wembley, Western Australia 6014
*Murdoch University, Murdoch, Western Australia 6150