SEASONAL VITAMIN D DEFICIENCY IN SHEEP IN SOUTH-EASTERN AUSTRALIA

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Franklin (1953) concluded from supplementation trials that vitamin D deficiency could limit lamb growth and wool production in south-eastern Australia during winter and spring. Since little vitamin D supplementation is used in the industry, the present study was initiated to obtain analytical data on vitamin D nutrition of grazing sheep.

Plasma samples were obtained monthly from ewes and lambs in five flocks to examine the seasonal variation in vitamin D status, and the response to vitamin D_3 supplementation (11,000 u/kg, i.m.). On one property, 40 of 80 ewes in two flocks in mean condition score *2* and *3,* respectively (1 - *5* range), were supplemented before lambing in July, and their lambs were supplemented at marking. Lamb survival to marking and weaning, and growth rates to weaning were recorded. Plasma calcium and phosphorus concentrations in treated and control ewes were compared prelambing, at lambing, and at weaning. In two flocks lambing in May, weaned lambs were treated in September.

Plasma 25-hydroxyvitamin D_3 (25-(OH)D_3) and vitamin D_3 concentrations were measured by competitive protein binding and non-equilibrium ligand binding assays, respectively, after extraction and high performance liquid chromatography. Plasma 25-(OH)D was lower in lambs than in ewes (e.g. newborn lambs 3.9 $\pm$ 1.4; ewes 15.7 $\pm$ 5.9 ug31, mean $\pm$ sem, n=8). A seasonal pattern was evident with some ewes and lambs in each flock having undetectable plasma 25-(OH)D_3 (<2 ug/l) in winter and spring, and up to 65 ug/l in the autumn. Detectable levels were not recorded in lambs in some flocks until December. Vitamin D supplementation of ewes and lambs increased plasma 25-(OH)D_3 to 172 ug/l within 1a days after injection; the levels then decreased with a half-time of about 30 days. Vitamin D concentrations in treated ewes (1.96 $\pm$ 0.40 ug/l) were significantly higher than in control ewes *(0.25 $\pm$ 0.08* ug/l, $P<0.001$), which were low when compared with published values.

Supplementation of ewes had no effect on plasma Ca and P concentrations in ewes and lambs to weaning. Plasma Ca in ewes was significantly lower between lambing and weaning than prelambing in treated and control groups ($P<0.05$). Vitamin D treatment of ewes had no effect on survival of lambs to marking, but significantly more lambs receiving supplementation at marking survived to weaning (91% vs 73%, $P<0.05$). Treatment had no effect on lamb growth rate.

Supplementation of lambs in September after weaning, resulted in increases in live weight (1 kg / 6 weeks) compared with untreated lambs in one flock ($P<0.05$). In another flock of lambs with hypocalcaemia and bone fragility after grazing an oat crop, vitamin D treatment had no effect on liveweight gain, but increased plasma calcium concentrations in severely-affected lambs.

The study confirms that vitamin D nutrition of lambs grazing winter and spring pastures can be inadequate, Its role in survival of lambs after weaning warrants further investigation. Liveweight responses in lambs may not always be obtained after supplementation since vitamin D may not be the only factor limiting calcium homeostasis, growth, and bone development. Vitamin D deficiency would not seem to be responsible for the seasonal decline in plasma calcium concentrations observed in lactating ewes grazing pastures in winter and spring.

FRANKLIN, M.C.(1953). Aust. vet. J. *29* :302

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