

THYROIDECTOMY BLOCKS THE TRANSITION TO SEASONAL ANOESTRUS IN FEMALE RED DEER

Greg M Anderson and Graham K Barrell

Animal & Veterinary Sciences Group, P O Box 84, Lincoln University, New Zealand

There is evidence for a role of the thyroid glands in the control of seasonal breeding of mammals and birds. Two experiments were conducted to determine the role of thyroid hormones in regulation of the annual cessation of breeding activity and suppression of LH secretion in female red deer. In the first experiment red deer hinds were allocated to 3 groups, viz. euthyroid controls (n=5), thyroidectomized (THX, n=6), or THX treated with s.c. implants containing T_4 (100 mg, n=4) in May (early breeding season) and blood samples were collected twice weekly for the following 8 months. The second experiment used hinds which had been ovariectomized (OVX, n=5) or OVX plus THX (n=4) in May and treated with s.c. silicone rubber implants containing oestradiol-17 β (E_2 , 8 mg) from June until April the following year. On 3 separate occasions (Aug, Nov, Jan) these implants were removed for one month. Blood sampling was carried out weekly in conjunction with a monthly GnRH challenge (5 μ g, i.v.) and on two occasions, in the breeding season and non breeding season (Jul and Oct, respectively), blood samples were collected for 4 h at 10 minute intervals. Profiles of plasma progesterone concentration recorded in the first experiment were consistent with normal ovarian cyclicity until early September in all 3 groups of deer but thereafter the number of oestrous cycles declined ($P < 0.001$) in the control and T_4 -replaced THX hinds. In contrast, the breeding season pattern persisted in the THX animals. Basal and GnRH stimulated plasma LH concentrations in the second experiment underwent a seasonal decline whilst E_2 implants were present, which was not affected by thyroid status. However, when E_2 implants were removed mean basal LH (3.1 ± 0.8 vs 1.3 ± 0.5 ng/ml, $P < 0.05$) and GnRH stimulated LH (25.9 ± 3.6 vs 4.7 ± 0.4 ng/ml, $P < 0.001$) concentrations were higher in OVX plus THX hinds than OVX hinds, respectively.

These results show that T_4 is required for termination of the breeding season in red deer hinds and that its action in this species may be directed at the steroid-independent component of the mechanism which regulates seasonal breeding.