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LH SECRETION IN THYROIDECTOMIZED, OVARIECTOMIZED RED DEER HINDS GIVEN OESTRADIOL, GNRH AND THYROID HORMONES

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In the ewe[1] and red deer stag[2], thyroid hormones are required for the normal transition from the breeding to the non-breeding state. Two experiments were conducted to determine if thyroid hormones play a similar role in the red deer hind, and to characterise the timing and dose of exogenous thyroid hormone required for normal seasonal transitions to occur in August/September. In Experiment 1 (1993), 15 mixed age hinds were thyroidectomized and ovariectomized at the beginning of the breeding season (April) and implanted with s.c. constant release oestradiol implants. Hinds also received s.c. thyroxine implants either throughout the study (April - December, n=5), from April to 27 July (n=5), or from 15 October to the end of the study. Unfortunately, the thyroxine implants proved to be unreliable and produced low and variable plasma T3 concentrations. In Experiment 2 (1994) therefore, 20 thyroidectomized, ovariectomized oestradiol-implanted hinds received three injections of 0, 0.025, 1.0 or 40 mg of T3 s.c. (n=5) in mid-July and late October.

There was no effect of treatment group in either year on mean seasonal LH profiles. Mean LH concentrations during July and August were 1.93 ± 0.11 ng/ml and declined slightly in late September to 1.17 ± 0.03 ng/ml. In Experiment 2, the pituitary LH response to 10 µg i.v. GnRH (10 minutes post injection) in all treatment groups declined from 41.44 ± 3.59 to 8.17 ± 1.70 ng/ml between 11 July and 16 Aug, and remained low (<8 ng/ml) throughout October and November.

In 1994 hinds were sampled intensively for 4 hours in July (breeding season) and December (non-breeding season), and again in December in the absence of oestradiol implants, to characterise pulsatile secretion of LH. There were no significant group effects on any of the pulse parameters measured or of sampling date on LH pulse frequency (P>0.05), but pulse amplitude, basal and mean LH concentrations were generally lower in December than July in the presence of oestradiol and intermediate or high in the absence of oestradiol (Table 1).

Table 1 LH pulsatility (mean ± sem) from Experiment 2. Means assigned different letters within parameters are significantly different (P<0.05).

	July	December (+E_2)	December (-E_2)
Pulses/4h	3.55 ± 0.26^{a}	3.37 ± 0.32^{a}	3.22 ± 0.30^{a}
Amplitude (ng/ml)	2.21 ± 0.53^{ab}	1.23 ± 0.27^{a}	3.29 ± 0.79^{b}
Basal LH (ng/ml)	2.02 ± 0.20^{a}	0.77 ± 0.06^{b}	1.17 ± 0.19^{c}
Mean LH (ng/ml)	3.28 ± 0.31^{a}	1.27 ± 0.08^{b}	2.51 ± 0.44^{a}

These data show that, unlike ewes, thyroidectomized hinds experience a decline in reproductive activity in spring, but but we are unable to say whether or not these changes represent a complete transition to the non-breeding state.

1. Webster, JR; Moenter, SM; Woodfill, CJI and Karsch, FJ (1991). *Endocrinology* **129:** 176-183.
2. Shi, ZD and Barrell, GK (1994). *Reproduction, Fertility and Development* **6:** 187-192.