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EFFECTS OF CRANIAL CERVICAL GANGLIONECTOMY AND CASTRATION
ON ENDOCRINE AND MORPHOLOGICAL CHARACTERISTICS
OF MALE LAMBS

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ABSTRACT

EFFECTS OF CRANIAL CERVICAL GANGLIONECTOMY AND CASTRATION ON ENDOCRINE AND MORPHOLOGICAL CHARACTERISTICS OF MALE LAMBS

By Mark Warren Fisher

In a study of the effects of the pineal gland on reproductive development and hormone secretion, male lambs were incorporated into an overall 2 x 2 factorial design in which the experimental factors were:

- (1) cranial cervical ganglionectomized or non-ganglionectomized, and
- (2) castrated or entire.

The first experiment described was a longitudinal study of endocrine and morphological parameters recorded from these animals between 7 and 37 weeks of age. Plasma LH levels in entire lambs usually were very low throughout the experiment, although non-ganglionectomized entires did display a small elevation in levels between 8 and 13 weeks of age, which was not evident in ganglionectomized entires. At all ages plasma LH levels were elevated significantly in castrated animals. Neither ganglionectomy nor its interaction with castration had any significant effect on LH levels. In entire lambs plasma testosterone concentrations increased from 7 weeks to highest concentrations between 31 and 37 weeks of age. Overall, ganglionectomy reduced testosterone secretion,

but this probably was due to the lower body and testicular weights recorded from that group. The normal photoperiod-induced seasonal pattern of prolactin secretion in non-ganglionectomized lambs, with high levels during the summer months and low during winter, was markedly disrupted by ganglionectomy. Castration had no effect on prolactin levels and the interaction of castration and ganglionectomy also was non-significant.

Bodyweight was reduced significantly by ganglionectomy and this effect was accentuated in the ganglionectomized castrates. At autopsy, testicular weights and epididymal weights as well as epididymal sperm reserves were reduced, but not significantly, by ganglionectomy; these results probably reflected the bodyweight of those animals. Neither ganglionectomy nor castration had any significant effect on pineal weights, however the interaction of these two factors was significant due to the very large pineal of one of the non-ganglionectomized castrates.

A second experiment involved measurement of LH, prolactin and testosterone profiles in plasma obtained during hourly blood samplings which were conducted for 24 hours when lambs were both approximately 100 and 300 days of age. At both ages pulsatile secretion of LH and testosterone was confirmed, but no circadian rhythms of LH, testosterone or prolactin secretion were detected. Castration elevated LH levels significantly at both ages. Ganglionectomy and its interaction with castration had no effect on LH secretion at 100 days, but at 300 days these

factors were significant largely due to elevated levels being recorded from ganglionectomized castrates. Ganglionectomy did not affect testosterone levels in entire animals at either age while castrates had no detectable testosterone. Ganglionectomy reduced prolactin concentrations at 100 days of age (summer) and prevented the normal winter decline at 300 days of age. Castration and the interaction of castration with ganglionectomy had no significant influence on plasma prolactin levels at either age.

Pituitary LH and gonadal testosterone responses to 10 μ g synthetic GnRH were tested at 100 days and 300 days of age in a third experiment. In all animals, GnRH elevated LH levels and in entires this in turn resulted in increased testosterone levels. Castration significantly increased basal and peak LH levels together with total LH output. At both ages the LH and testosterone responses to GnRH were not influenced significantly by ganglionectomy, nor did the interaction of castration and ganglionectomy have any significant effect on LH secretory responses.

These studies confirm the concept that the pineal gland can influence the secretion of prolactin, and probably also LH and testosterone, and thus may be involved in the regulation of pubertal development in ram lambs.

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