The effect of active immunisation against testosterone or oestradiol on antler growth in yearling red deer (*Cervus elaphus*) stags

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Steroids are known to regulate pedicle growth and aspects of the timing of antler growth. As part of a series of studies designed to investigate the precise role of steroids, the effect of active immunisation on pedicle and antler growth was measured. The aim was to determine whether modification of androgen levels using this technique could influence pedicle antler growth. Twenty-five red deer (*Cervus elaphus*) stag calves were allocated to one of five treatments:

a) Before pedicle initiation immunised against testosterone (T). Commenced April.
b) Control for (a).
c) After pedicle initiation immunised against testosterone. Commenced August.
d) After pedicle initiation immunised against oestradiol (E_2). Commenced August.
e) Control for c) and d).

The antigens were testosterone or oestradiol conjugated to human serum albumin. Antigens (5 mg protein equivalent) were injected firstly in Freunds Complete Adjuvant and subsequently at six weekly intervals in Freunds Incomplete Adjuvant. Antlers, testes and live weight were measured every two weeks and a blood sample was taken. This was analysed for Luteinising Hormone (LH) and testosterone. All data were analysed by ANOVA. Overall antler length was increased by immunisation: 39.2, 49.6 and 50.4 cms (sed 2.9) for the combined control, T and E immunised treatments respectively. There was a significant interaction between the T-immunised treatment and treatment onset, with the early treatment T-immunised group having a greater effect on antler length than the later treatment. Immunisation, particularly against T, increased testis diameter and lowered live weight by 5-10 kg. Immunisation had no effect on plasma LH or T levels, but there was a strong trend for elevated T levels. The data can be interpreted in several ways. The growth reduction of about 10% is a castrate-like condition indicating that the effect of testosterone has been blocked. In contrast the increased testis size and trend toward higher plasma T concentration could indicate a supra-normal effect of testosterone. Additionally no alteration on the T feedback on LH was measured indicating an apparently normal neuro-endocrine control mechanism. The fact that pedicles grew normally in the early onset part of the study would tend to indicate that the trophic component of T action was unaffected. In contrast it appears that the negative action of T on antler growth was reduced thus permitting larger antlers to grow. It was concluded that active immunisation against T and E_2 reduced the effectiveness of these steroids as regulators of antler size.