

ENDOCRINE RESPONSES OF EWE LAMBS EXPOSED TO A 500 KV A-C TRANSMISSION LINE

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An experiment is being conducted to examine the biological responses of ewe lambs chronically exposed to electric and magnetic fields (E/MF) produced by a commercial 500 kV a-c transmission line. Twenty Suffolk ewe lambs 7 weeks of age (\bar{x} body weight = 27 kg) were assigned randomly in equal numbers to a control and treatment (line) group. The line group of lambs, maintained on a metal slotted-floor pen, were exposed to the E/MF beginning on April 6. Control lambs, housed in a similar pen, are located 229 meters from the transmission line. Electric and magnetic field strengths to which line and control lambs are exposed are 4.1 to 7.5 kV/m and 15 to 50 vs .1 to .4 mG, respectively. The following end points are being monitored: Body weight, wool growth, behavior and changes in serum concentrations of melatonin, cortisol and progesterone. Blood samples are collected via indwelling jugular vein catheters at .5 to 3 h over eight 48 h sampling periods and analyzed for melatonin and cortisol. Serum progesterone is monitored twice weekly from 23 wk of age to determine onset of puberty.

Growth of control and line lambs as determined by weekly weighings has not differed during the course of the study. Mean body weights of control and line lambs at 1 yr of age were 92.9 and 91.1 kg respectively. Similarly growth of wool measured on the side and britch areas of control and line lambs has not differed. Behavior of control and line lambs has not differed in percentage of time devoted to such activities as feeding, drinking, standing and resting. Lambs in both groups spend over 50% of their time resting.

Serum concentrations of melatonin have been determined for two of the 48 hr sampling periods (18 and 32 wk of age). Serum concentrations of melatonin are maximal during hours of darkness and minimal during hours of daylight. Mean nighttime melatonin concentrations during the 48 hr sampling period at 18 wk of age were 14.7 (night 1) and 27.6% (night 2) less for the line group but the differences were not significant. Mean nighttime melatonin concentrations at 32 wk of age were similar for the line and control group ($P > .05$). Age at puberty did not differ ($P > .05$) between groups (controls, 241.2 ± 2.2 days; line 236.2 ± 3.3 days). Average body weight at puberty for the control and line group was 72.5 and 72.9 kg, respectively. Serum concentrations of cortisol varied markedly within and between animals and were not affected by treatment ($P > .05$).

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Further studies are needed to determine the extent of the effects of the fields on the fetus. An experimental design was used to determine the effects of the fields on the fetus. The fetus was chronically exposed to electric and magnetic fields (EMF) produced by a commercial 500 kV 50-Hz transmission line. Twenty Suffolk ewe lambs 7 weeks of age (X body weight = 32 kg) were assigned randomly in equal numbers to a control and treatment (line) group. The line group of lambs, maintained on a metal slatted-floor pen, were exposed to the EMF beginning on April 8. Control lambs, housed in a similar pen, are located 226 meters from the transmission line. Electric and magnetic field strengths to which line and control lambs are exposed are 4.1 to 7.5 kV/m and 18 to 30 v to 4 mG, respectively. The following end points are being monitored: Body weight, wool growth, behavior and changes in serum concentrations of melatonin, cortisol and progesterone. Blood samples are collected via indwelling jugular vein catheters at 5 to 8 h over eight 48 h sampling periods and analyzed for melatonin and cortisol. Serum progesterone is monitored twice weekly from 28 wk of age to determine onset of puberty.

Growth of control and line lambs as determined by weekly weightings has not differed during the course of the study. Mean body weights of control and line lambs at 1 yr of age were 82.5 and 81.1 kg, respectively. Similarly, growth of wool measured on the side and back areas of control and line lambs has not differed. Behavior of control and line lambs has not differed in percentage of time devoted to such activities as feeding, drinking, standing and resting. Lambs in both groups spend over 50% of their time resting.

Serum concentrations of melatonin have been determined for two of the 48 hr sampling periods (18 and 32 wk of age). Serum concentrations of melatonin are maximal during hours of darkness and minimal during hours of daylight. Mean nighttime melatonin concentrations during the 48 hr sampling period at 18 wk of age were 14.7 (night) and 27.8% (night) less for the line group but the differences were not significant. Mean nighttime melatonin concentrations at 32 wk of age were similar for the line and control group ($P > 0.05$). Age at puberty did not differ ($P > 0.05$) between groups (control, 241.2 \pm 2.2 days; line, 230.2 \pm 2.9 days). Average body weight at puberty for the control and line groups was 72.5 and 72.9 kg, respectively. Serum concentrations of cortisol varied markedly within and between animals and were not affected by treatment ($P > 0.05$).

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