

## **THERMAL PROTECTION OF THE FETAL SHEEP IS ROBUST UNDER FIELD CONDITIONS**

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When body temperatures of maternal and fetal sheep are recorded in the laboratory over the last 2 months of pregnancy, fetal body temperature closely follows that of the mother, resulting in a very stable feto-maternal gradient within each pair (Laburn *et al.*, 1992). Furthermore, the nycthemeral rhythm of temperature shows an amplitude of approximately 1°C. Recent advances in the use of miniature data loggers to make continuous recordings of body temperatures have enabled us to extend our measurements of fetal temperature to natural field conditions. At approximately 110 days of gestation (term approximately 150 days), and under halothane general anaesthesia and sterile surgical conditions, data loggers (StowAway and TidBit, Onset, Massachusetts, USA) were implanted into the abdominal cavities of 4 pregnant sheep, and one fetus in each sheep. Body temperatures then were recorded every 5 minutes. After surgery, maternal and fetal body temperatures were recorded for 1-2 weeks in the laboratory, after which the pregnant ewes were sent out into the field where recordings continued throughout birth and for 4 weeks post partum. Air temperature in the laboratory was  $\pm 23^{\circ}\text{C}$ , and there was no wind, while air temperature in the field ranged between 10 and 23°C. Body temperature recordings in the laboratory concurred with previous findings, in that the feto-maternal gradient stayed constant for each mother-fetus pair at between 0.3 and 0.7°C, and daily indoor body temperatures of both mother and fetus fluctuated very little (amplitude of less than 1°C). Under natural field conditions maternal body temperatures showed daily rhythms with a nycthemeral amplitude of up to 3°C, but fetal temperatures fluctuated much less (up to 1°C). The fetus was protected against precipitous falls in maternal body temperatures at night. Consequently, the feto-maternal gradient varied significantly more than in laboratory conditions. After birth, lamb temperatures stayed 0.5 - 1.0°C higher than that of their mothers for the first month. Thus field experiments demonstrate thermal protection of the fetus to be more robust than would be expected from laboratory studies.

Laburn, H.P. Mitchell, D. and Goelst, K., 1992. Fetal and maternal body temperatures measured by radiotelemetry in near-term sheep during thermal stress. *J. Appl. Physiol.* 72, 894-900.

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