

# Accepted Manuscript

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PII: S0093-691X(18)30001-3

DOI: [10.1016/j.theriogenology.2018.01.001](https://doi.org/10.1016/j.theriogenology.2018.01.001)

Reference: THE 14422

To appear in: *Theriogenology*

Received Date: 2 October 2017

Revised Date: 31 December 2017

Accepted Date: 1 January 2018

Please cite this article as: Randi F, McDonald M, Duffy P, Kelly AK, Lonergan P, The relationship between external auditory canal temperature and onset of estrus and ovulation in beef heifers, *Theriogenology* (2018), doi: 10.1016/j.theriogenology.2018.01.001.

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## The relationship between external auditory canal temperature and onset of estrus and ovulation in beef heifers

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### Abstract

The aim of this study was to evaluate the relationship of body temperature fluctuations, as measured by external auditory canal temperature, to the onset of estrus and ovulation. Beef heifers (n=44, mean age  $23.5 \pm 0.4$  months, mean weight  $603.3 \pm 5.7$  kg) were fitted with a Boviminder® ear tag 2 weeks before the start of the estrous synchronization protocol to allow acclimatization. The device recorded the temperature, accurate to  $0.01^\circ$  Fahrenheit, every 10 min and transmitted the data via a base station over the internet where it could be accessed remotely. The estrous cycles of all heifers were synchronized using an 8-day progesterone-based synchronisation program; on day 0 a PRID was inserted in conjunction with an injection of GnRH, and PGF $2\alpha$  was administered the day before PRID removal. Heifers were checked for signs of estrus at 4-h intervals (i.e., 6 times per day) commencing 24 h after PRID withdrawal. Beginning 12 h after the onset of estrus, the ovaries were ultrasound scanned at 4-h intervals to determine the time of ovulation. Body temperature was recorded every 10 min and averaged to hourly means for the following 4 periods relative to the detected oestrus onset (=Time 0): Period I: -48 h to -7 h, Period II: -6 h to +6 h, Period III +7 h to ovulation, and Period IV: ovulation to 48 h post ovulation. Data were analysed using a Mixed Model ANOVA in SAS in a completely randomized design to observe effects of induced estrus on external auditory canal temperature. The mean ( $\pm$  SD) interval from removal of the PRID to onset of estrus activity was  $46.6 \pm 14.7$  h. The mean duration of estrus was  $16.0 \pm 5.67$  h and the mean interval from estrus onset to ovulation was  $27.9 \pm 7.68$  h. Highest temperatures ( $100.95 \pm 0.03^\circ\text{F}$ ) were observed in Period II around estrus onset, whereas lowest temperatures were observed in the 48 h preceding estrus onset ( $100.28 \pm 0.03^\circ\text{F}$ ; Period I) and around ovulation ( $100.30 \pm 0.2^\circ\text{F}$ ; Period III)( $P < 0.001$ ). Indeed, around the time of estrus onset (Period II) mean temperature was  $0.66^\circ\text{F}$  ( $P < 0.001$ ) higher compared with Period I. Diurnal temperature rhythms were similar ( $P > 0.10$ ) before

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