Continuous vaginal temperature measurement in bitches before parturition

B. Geiser, S. Arlt, O. Burfeind and W. Heuwieser

Clinic for Animal Reproduction, Faculty of Veterinary Medicine, FU Berlin, Germany
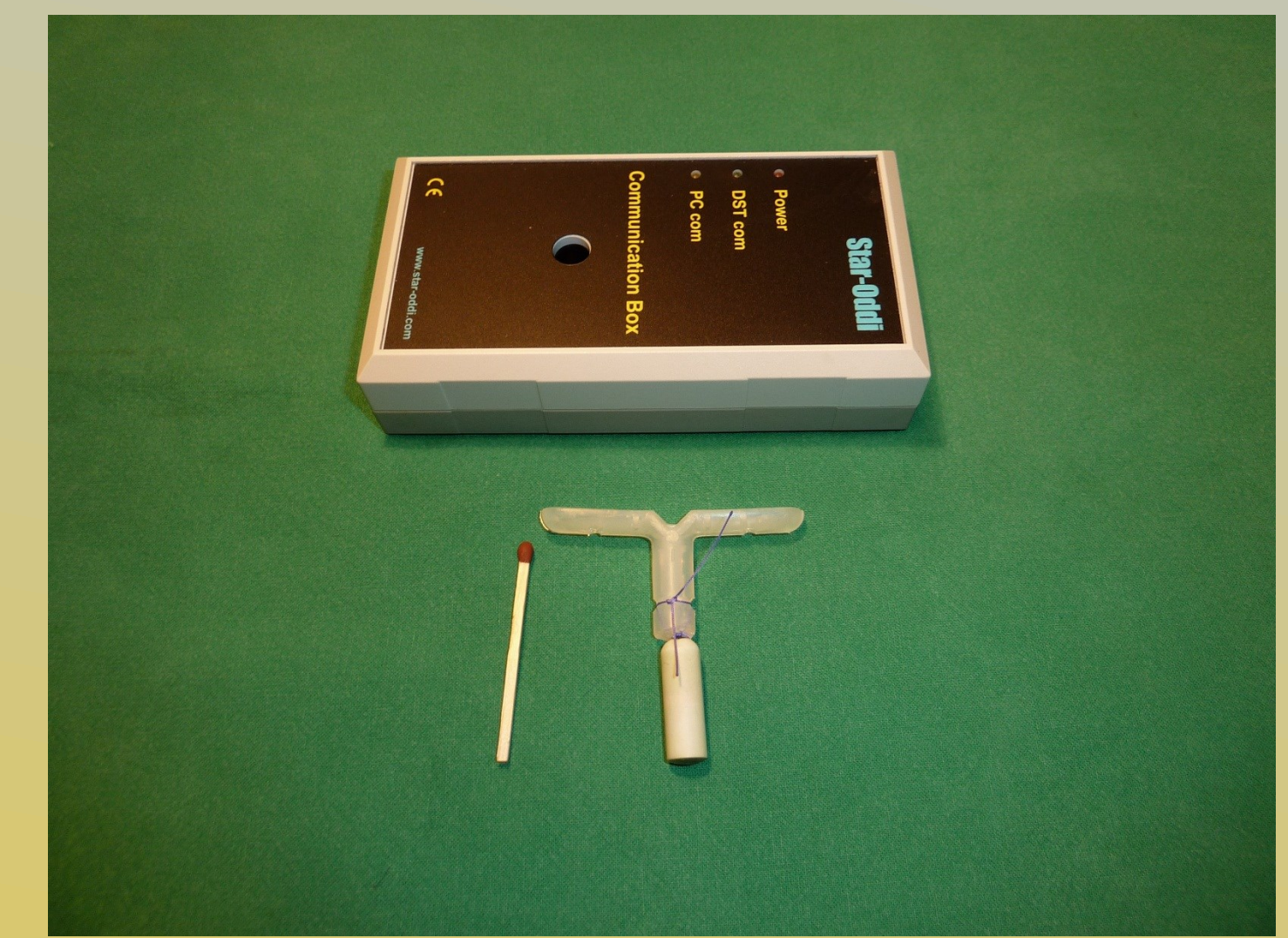www.tiergyn.de

Fig.1

Introduction

One of several parameters addressing signs of parturition in dogs is a marked drop in body temperature approximately 24 hours before whelping (1, 2). The predictive value of a temperature drop in bitches, however, still remains controversial (3,4). The objective of this study was to determine sensitivity and specificity of a temperature decline measured continuously by a logger placed into the vaginal cavity to predict parturition in bitches. This measuring method has been demonstrated to have close correlation with rectal measurements (5).

Fig. 3

Fig. 2

Material and Methods

In this study 16 pregnant bitches of differents breeds (bodyweight 3 to 63 kg) were enrolled. A temperature logger (DST micro-T, Star Oddi, Fig.1) was applied into the vagina between day 56 and 61 after estimated ovulation (n = 9) or first mating date (n = 7). The logger was programmed to measure temperature in 10 min intervals. It was attached to a progesterone free modified Controlled Internal Drug Release device (CIDR-blank) and inserted into the vagina through a sterile round speculum (Fig.2). A transponder (Back Home Transponder, Virbac) was placed under the silicon lining of the CIDR-blank. Utilizing an identification microchip scanner, the transponder could be identified from the outside ensuring the presence and position of the temperature logger (Fig.3).

It was expelled spontaneously from the vagina before delivery of the first puppy. The difference between vaginal temperature at a particular time of day and vaginal temperature measured 24 h, 36 h and 48 h before was calculated for each of the hourly averages during the last 120 h before delivery. The diagnostic performance of a decrease in vaginal temperature to predict parturition within the next 24 h, 36 h and 48 h was tested using receiver-operating characteristics (ROC) analysis.

Results

The mean whelping of the bitches occurred 62.1 ± 1.8 days after estimated ovulation date (n = 9) and 60.6 ± 1.9 days after first mating (n = 7).
In the last 24 hours before parturition, mean temperature was lower (37.3 ± 0.3 °C) than 24 to 48 hours (37.6 ± 0.2 °C), 49 to 72 hours (37.7 ± 0.1 °C), 73 to 96 hours (37.7 ± 0.1 °C) and 97 to 120 hours (37.8 ± 0.1 °C, p < 0.05) earlier.

Mean vaginal temperature of 16 bitches in the last 120 hours before parturition.

Test performance in % (95% CI) of incremental decrease in vaginal temperature measured over a 24 h period as a predictor of parturition within 24 h, 36 h and 48 h (n = 16).

	VT[a] ≥ 0.3°C	VT ≥ 0.3°C	VT ≥ 0.4°C
Parturition within	24 h	36 h	48h
Sensitivity[b]	58 (52-63)	53 (49-58)	69 (63-74)
Specificity[c]	84 (81-86)	90 (87-92)	88 (84-91)
+ Predictive value[d]	63 (57-68)	81 (76-85)	76 (70-81)
- Predictive value[e]	80 (77-83)	70 (66-74)	83 (79-86)
AUC[f]	0.72* (0.69-0.75)	0.74* (0.72-0.77)	0.80* (0.77-0.83)

VT[a] = vaginal temperature; Sensitivity[b] = sensitivity: proportion of bitches that whelped within 24h, 36h and 48 h and showed a decrease in VT; Specificity[c]: proportion of bitches that did not whelp within 24h, 36h or 48h and did not show a decrease of VT; + Predictive value[d] = positive predictive value: proportion of bitches that showed a decrease in VT and whelped within 24h, 36h and 48h; - Predictive value[e] = negative predictive value: proportion of bitches that did not show a VT decrease and did not whelp within 24h, 36h and 48h; AUC[f] = Area under the curve;* P < 0.01

Conclusion

This is the first report of continuous temperature measurement in the prepartum period of the bitch calculating sensitivity and specificity for prediction of parturition. Although bitches may exhibit a decrease in body temperature around the time of parturition, detecting this decrease does not determine the onset of parturition precisely as demonstrated by the low values for sensitivity.

(1) England England GCW, 2010: Genital surgery in the bitch and queen. In: Noakes DE, Parkinson TJ and England GCW, (eds), Veterinary reproduction and obstetrics, 9 edn. Saunders Elsevier, London, pp. 376-390.
(2) Verstegen-Onclin K and Verstegen J, 2008: Endocrinology of pregnancy in the dog: a review. Theriogenology 70, 291-9.
(3) Luvoni GC and Beccaglia M, 2006: The prediction of parturition date in canine pregnancy. Reprod Domest Anim 41, 27-32.
(4) Veronesi MC et al. F, 2002: Correlations among body temperature, plasma progesterone, cortisol and prostaglandin F2alpha of the periparturient bitch. J Vet Med A Physiol Pathol Clin Med 49, 264-268.
(5) Maeder B, Arlt S, Burfeind O and Heuwieser W, 2012: Application of vaginal temperature measurement in bitches. Reprod Domest Anim 47, 1-3.
(6) Burfeind O, Suthar VS, Voigtsberger R, Bonk S, Heuwieser W. Validity of prepartum changes in vaginal and rectal temperature to predict calving in dairy cows. J Dairy Sci 2011; 94(10):5053-61.