Validation of vaginal temperature measurement in bitches

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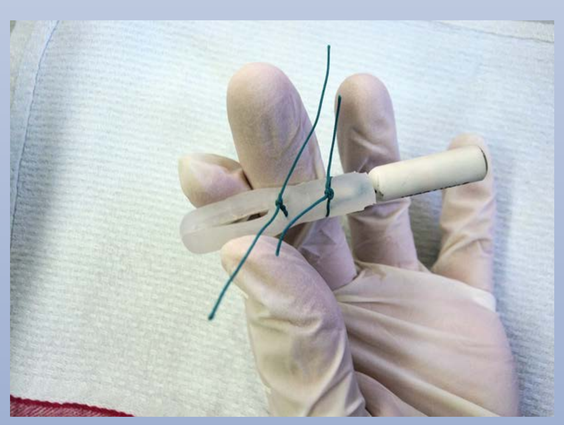
Introduction

Measuring body temperature (BT) is considered a fundamental element within physical examination in veterinary medicine. The most common method for obtaining BT in animals is rectal thermometry (1). For research purposes, continuous measurements are advantageous (2, 3). One method of continuous temperature measurement in cows utilizes temperature loggers inserted into the vagina (4-6). The the objective of this study was to validate the application of temperature loggers to continuously measure vaginal temperature in bitches and to compare values obtained via rectal thermometry.

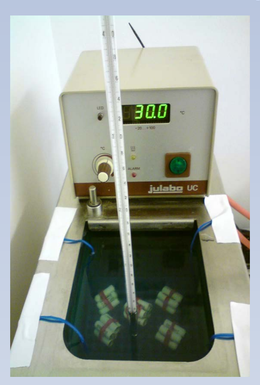
Tradtional site of body temperature measurement, rectal thermometry.



Temperature loggers were attached to a progesterone free modified Controlled Internal Drug Release device (CIDR-blank) for ewes.

Material and Methods

The first experiment was performed in vitro, using a water bath, to compare temperature values measured by the loggers (DST micro-T, Star Oddi) with a calibrated liquid-in-glass thermometer as a gold standard. Twenty - six temperature loggers and the calibrated liquid - in - glass thermometer were placed into the same water bath. Every 10 min the temperature of the water bath was increased by 1.0 °C covering a range from 30.0 °C to 45.0 °C. From each of the temperature loggers 144 paired observations were generated and used for analysis. The second experiment included 5 privately owned non-spayed bitches which were gynecologically healthy. The temperature logger was pushed through the speculum using a sterile swab and placed approximately 18 cm deep in vaginal cavity. The loggers were programmed to measure temperatures in 10 min intervals over a 3 day period. Rectal temperatures were measured with a digital thermometer (VT 1831, Microlife) and compared to the vaginal temperature measurements obtained by the logger at the same minute. To retrieve the temperature logger a vaginal endoscopy was performed using carbon dioxide insufflation to distend the vaginal cavity and a rigid endoscope consisting of a telescope and a sheath.



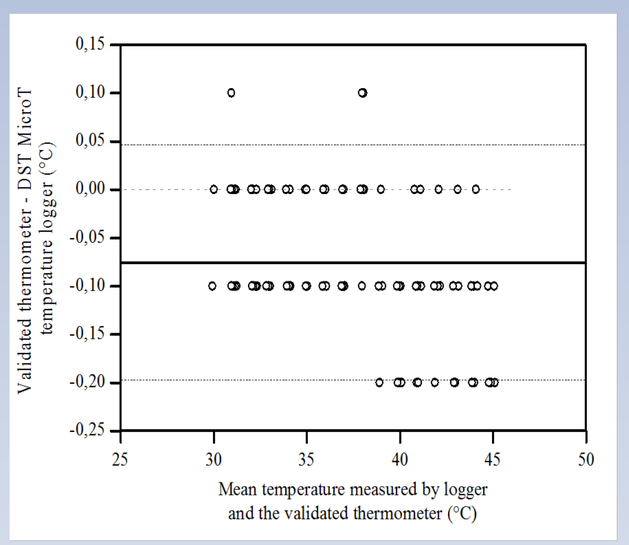
(1) Goodwin S. Comparison of Body Temperatures of Goats, Horses, and Sheep Measured With a Tympanic Infrared Thermometer, an Implantable Microchip Transponder, and a Rectal Thermometer. Contemp Top Lab Anim Sci 1998; 37(3):51-55.
(2) Greer RJ, Cohn LA, Dodam JR, Wagner-Mann CC, Mann FA. Comparison of three methods of temperature measurement in hypothermic, euthermic, and hyperthermic dogs. J Am Vet Med Assoc 2007; 230(12):1841-8.
(3) Quimby J, Olea-Popelka F, Lappin M. Comparison of digital rectal and microchip transponder thermometry in cats. J Am Assoc Lab Anim Sci 2009; 48(4):402-4.
(4) Burdick NC, Carroll JA, Dailey JW, Randel RD, Falkenberg SM, Schmidt TB. Development of a self-contained, indwelling vaginal temperature probe for use in cattle research. J. Thermal Biol. (2011), doi:10.1016/j.jtherbio.2011.10.007
(5) 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.
(6) Vickers LA, Burfeind O, von Keyserlingk MA, Veira DM, Weary DM, Heuwieser W. Technical note: Comparison of rectal and vaginal temperatures in lactating dairy cows. J Dairy Sci 2010; 93(11):5246-51.

A sterile round speculum was inserted into the vagina.

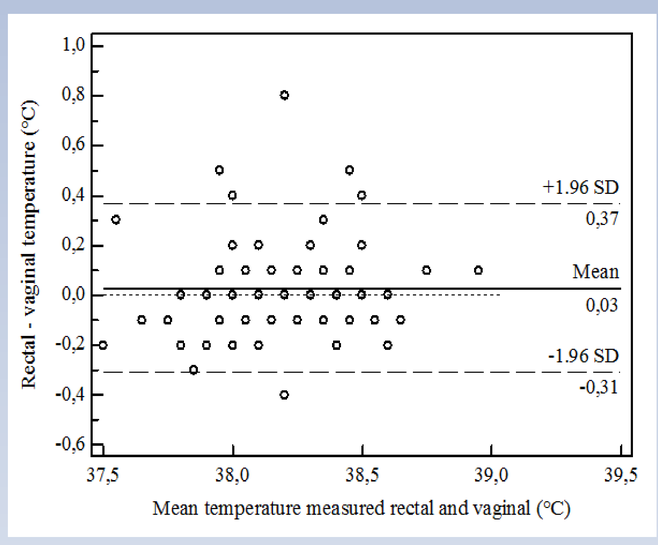
Utilizing a reading device the transponder could be indentified

Results

The mean difference between the temperature loggers and the gold standard was low (Mean ± SD = 0.1 ± 0.1 °C). A high association was found between the measurements of the temperature loggers and the calibrated liquid-in-glass thermometer (r = 1.0; P = 0.000). During the in vivo experiment, a total of 118 paired observations could be used to compare vaginal with rectal temperature. The vaginal and rectal temperatures were correlated (r = 0.79, P < 0.05). The mean difference between rectal and vaginal temperatures was low (0.0 ± 0.2 °C, rectal temperature: 38.1 ± 0.2 °C, vaginal temperature: 38.1 ± 0.3 °C, P = 0.07). The visual inspection of the vagina via endoscope after removal of the temperature logger did not show any macroscopic signs of inflammation of the mucosa. The mucosa was clear of any focal or disseminated redness, lesions or abnormal discharge. Exfoliative cytology, however, indicated an increase of neutrophil granulocytes.



Differences between temperature value measured by the temperature loggers and the validated thermometer versus the mean values of both methods (°C).



Differences between temperature values measured by the temperature loggers and digital rectal temperatures (VT 1831, Microlife) versus the mean values (°C) of both estimates.

Conclusions

The utilized temperature loggers provide accurate and reliable data compared to the gold standard. When positioned in the vagina for a period of three days, it causes no visual macroscopic side effects on the mucosa in bitches. This method offers an easy and comfortable way of sampling continuous BT in bitches with minimal human interference.

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45th Annual Conference of Physiology and Pathology of Reproduction 2012, Abstr. No.82