



# Diagnostic validity of a telemetric and real time measurement system of reticular temperature for the prediction of parturition and estrus in dairy cows

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## Objectives:

It is proven that the reticular temperature (RT) in ruminants is representative for the animal's body temperature. In present study the suitability of the (RT) as an indicator for predicting parturition and estrus of dairy cows was investigated.

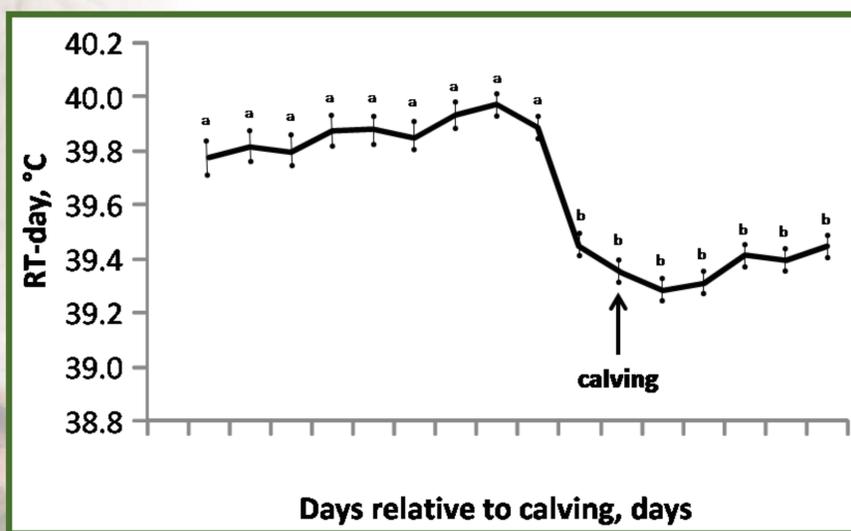


Figure 1: Decrease of RT around calving

## Material and Methods:

25 parturitions and 43 estruses of dairy cows were recorded. Estrus was confirmed by frequent measurement of milk-progesterone and, retrospectively, by a successful artificial insemination. RT was measured continuously every ten minutes with indwelling reticular sensors and data were read out by telemetry. In this study the averages of RT-day, 5 days before up to 2 days after estrus, and the RT-4 hour averages from 48 hours up to 20 hours after the temperature maximum at estrus and the RT-day averages 10 days before up to 10 days after calving, were analyzed. The time of day, feeding, breed and lactation number were also considered. The diagnostic accuracy of continuous measurement of RT was evaluated using ROC analysis

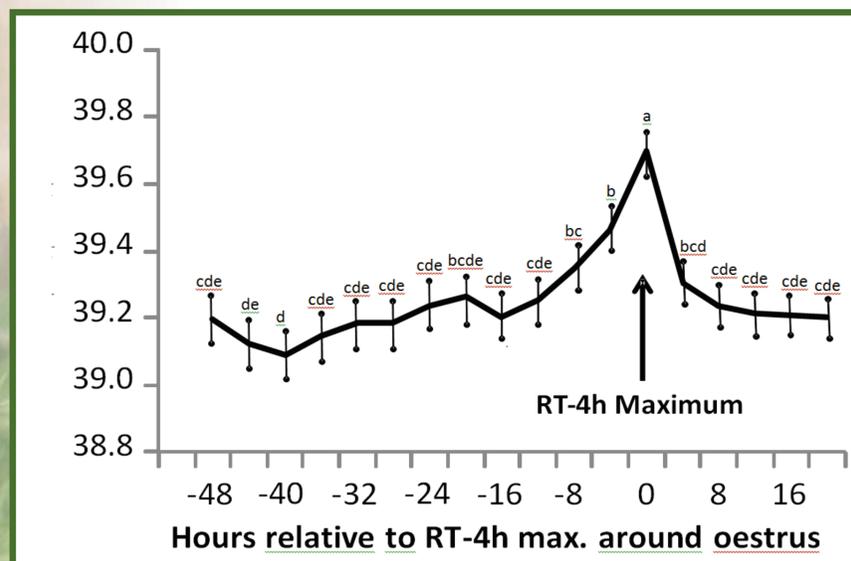


Figure 2: Increase of RT during estrus



## Results:

Average ambient temperature during the study period was 4.43° C ( $\pm$  7.86) and mean RT 39.23° C ( $\pm$  0.33). RT was significantly influenced by time of day and by the ambient temperature. RT was also significantly affected by the occurrence of estrus. The mean RT on the day of estrus was 0.15° C higher than the day before. The maximum RT-4-hour average on the day of estrus (39.71° C) was also increased significantly. The results for heat detection showed an area under curve (AUC) of 0.81. A significant effect of parturition on the RT was found. 48 hours prior to calving RT decreased significantly by 0.43° C. Up to a temperature threshold of  $\geq$ 0.40° C, 100% of the parturitions were detected by RT within 24 up to 48 hours, with a specificity of up to 93%. The prediction of parturition within 24 hours showed an AUC of 0.99.

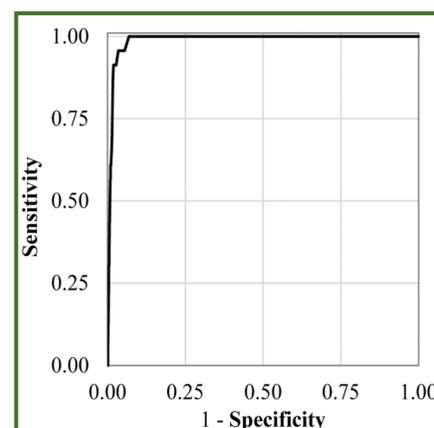


Figure 3: ROC analysis for the detection of calving by RT

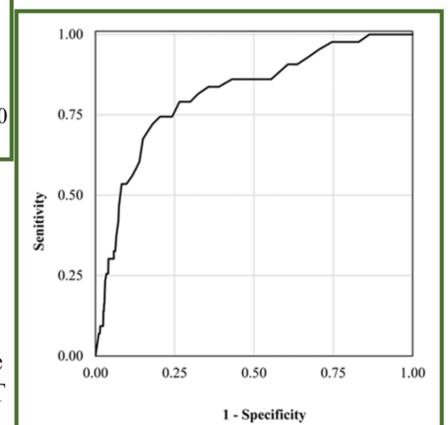


Figure 4: ROC analysis for the detection of oestrus by RT

## Conclusions:

We conclude that continuous RT measurement as used herein is highly suitable for detecting upcoming parturitions and, to a lesser extent, to identify cows in heat. Further results are promising for the early detection of health problems linked with an increase or decrease of body temperature.