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**Rumen temperatures of dairy cows under heat stress**

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**Abstract:**

**Background/Objective:** In the course of the predicted climate change, the impairment of welfare and heat load of dairy cows has become increasingly important even under moderate climate conditions. In order to maintain the well-being of the cows and their performance, it is important to know when heat load influences physiological parameters such as body temperature. The objective of the present study was to analyze the rumen temperature of lactating dairy cows during the summer months in comparison to the ambient temperature (AT) and temperature-humidity index (THI) in the barn.

**Methods:** The study was conducted in a naturally ventilated dairy barn in Brandenburg, Germany, as part of the DigiMuh project (BMEL/BLE funded). Data from the summer of 2023 were analyzed for this study. The rumen temperatures of 40 dairy cows were measured individually every 10 minutes with a smaXtec bolus (smaXtec, Austria) placed in the reticulorumen. Statistical analysis was performed using JMP 16 (SAS Institute, USA). AT and relative humidity were recorded in the barn and the average THI was calculated every 10 min. The correlations (Pearson's correlation coefficient, r) between body temperature and barn climate were analyzed and a broken-stick model was performed for each individual cow, taking into account the animal individuality.

**Results:** The results showed only a slight positive correlation (P<0.001) between rumen temperatures and AT (r=0.11, mean summer temperature: 21.2°C) as well as THI (r=0.12, mean THI of that summer: 68.1). This indicates that even at high ATs, cows are still able to keep their core body temperature relatively constant.

**Conclusion:** A reaction in rumen temperature seems to be a late indicator of heat stress regarding the whole herd. Further analysis of data is necessary for an individual consideration of dairy cows’ heat load reactions.

**Keywords:** heat stress, animal welfare, dairy cow, climate change, environmental influence