Impact of Evaporative Pads and Cross Ventilation on Core Body Temperature and Resting Time of Lactating Cows

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Summary

A trial was conducted to determine the impact of evaporative cooling pads on core body temperature **(CBT)**, time spent lying, and number of lying bouts of Holstein cows housed in cross-ventilated freestall facilities. Despite cool ambient conditions during the trial, cows without evaporative pads tended to have elevated CBT above 102°F for 2.3 more hours per day and elevated CBT above 102.5°F for 0.95 more hours per day than cows with evaporative pads. These trends were evident even though the stocking density of the freestalls was greater in the facility with evaporative pads than in the facility without pads (123 vs. 113%). Lying times and lying bouts did not differ between treatments. Results of this study indicate that CBT tended to be reduced when evaporative pads were used, even under relatively mild ambient conditions.

Introduction

With the adoption of low-profile, cross-ventilated freestall facilities, dairy producers are asking questions concerning the impact of evaporative pads on dairy cattle performance. Cooling systems that reduce core body temperature **(CBT)** improve milk production and reproductive performance of dairy cattle. Increasing resting time also has a positive impact on milk production. During the summer of 2009, a trial was conducted at Morris, MN, to evaluate the impact of evaporative pads on CBT, time spent lying, and number of lying bouts of Holstein cows housed in cross-ventilated freestall facilities.

Experimental Procedures

Two cross-ventilated facilities — 1 with and 1 without evaporative pads — were used in this study. Each facility had 4 pens of cows and a nominal width of 400 ft. Both facilities had 1 baffle per pen of cows. One hundred forty-three cows were fit with activity data loggers (HOBOS) to determine time spent lying and number of lying bouts per day, and 87 cows were fit with blank intravaginal HOBOS to determine CBT every 5 minutes. Environmental data were collected with activity loggers every 15 minutes at both sites to determine temperature, relative humidity, and temperature-humidity index. Individual cow CBT and activity data (9 days per cow) were analyzed to determine the amount of time when CBT exceeded 102°F or 102.5°F, time spent lying, and number of lying bouts per day. These variables were analyzed statistically using pen as the experimental unit and including cow and day as additional random effects. Parity, reproductive status, and days in milk were tested as covariates in each model but were removed if they did not contribute significantly to the prediction equation.

Results and Discussion

Environmental data for the 2 locations are presented in Figures 1, 2, and 3. Environmental data are illustrated for ambient conditions and at the baffle closest to the intake and exhaust for each

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freestall facility. Average ambient conditions were mild during the trial, with afternoon highs of 77°F. Lying times and lying bouts did differ between treatments. Cows housed in the facility with evaporative pads had lying times of 660 minutes/day and 12 lying bouts per day, whereas cows without evaporative pads had lying times of 654 minutes/day and 12.9 lying bouts per day. Time that CBT exceeded 102°F or 102.5°F tended ($P = 0.06$) to be greater for cows without evaporative pads. Core body temperature was above 102°F for 566 and 704 minutes/day and above 102.5°F for 321 and 378 minutes/day for cows with and without evaporative pads, respectively. Despite the cool ambient conditions, cows without evaporative pads tended to have elevated CBT above 102°F for 2.3 more hours per day and elevated CBT above 102.5°F for 0.95 more hours per day than cows with evaporative pads. These trends were evident even though the stocking density of the freestalls was greater in the facility with evaporative pads than in the facility without pads (123.4 vs. 113.1%). Results of this study indicate that CBT tended to be reduced when a cross-ventilated barn was equipped with cooling evaporative pads, even under relatively mild ambient conditions.

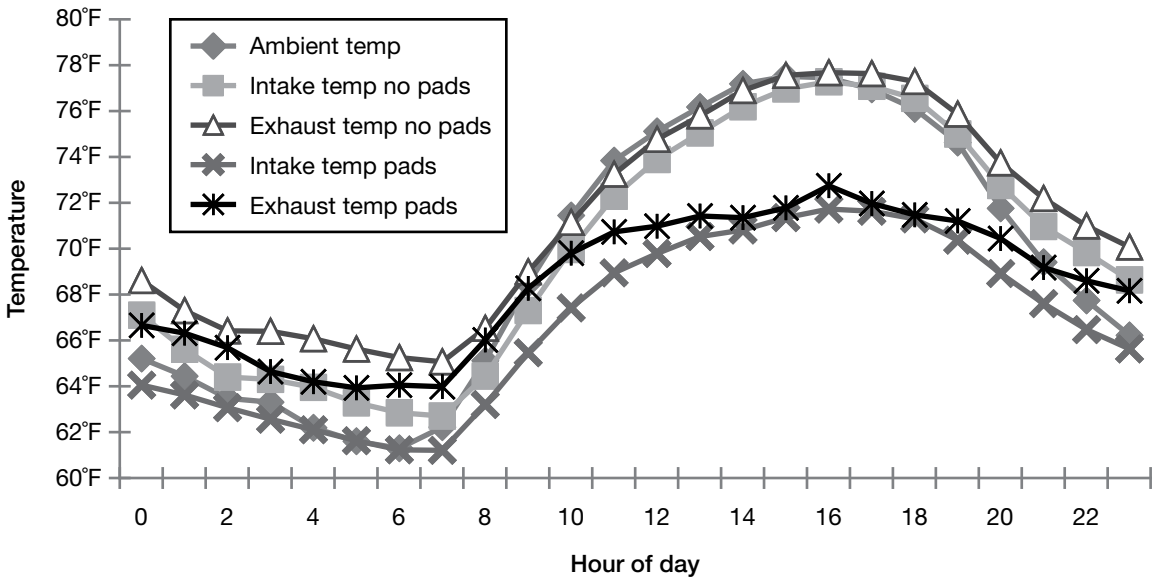

Figure 1. Ambient temperature during 9 days of the research trial.

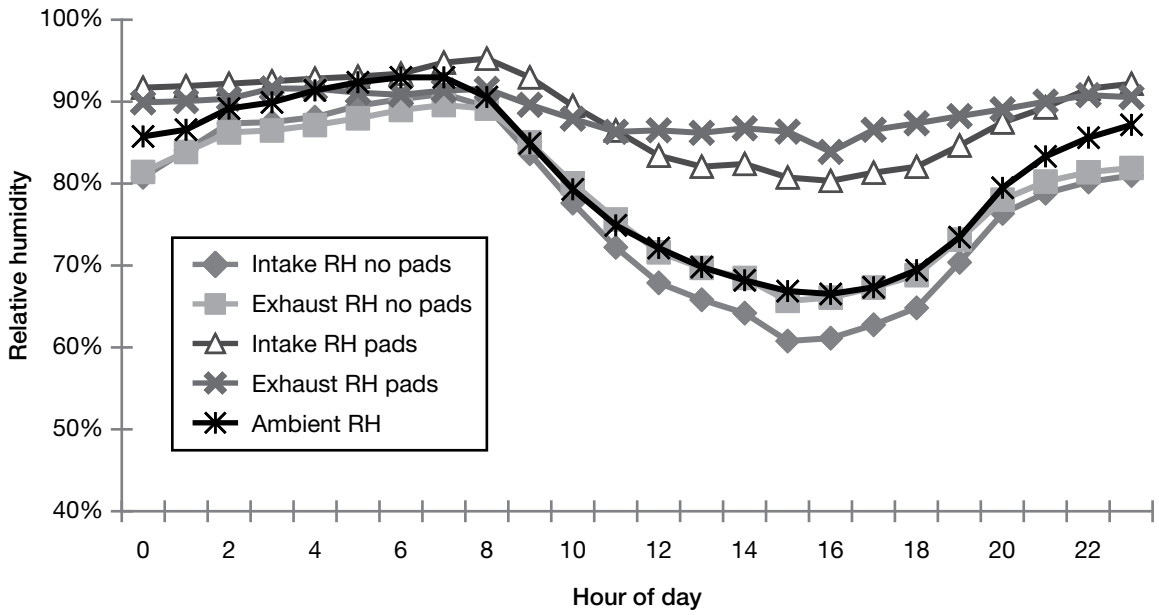

Figure 2. Ambient relative humidity during 9 days of the research trial.

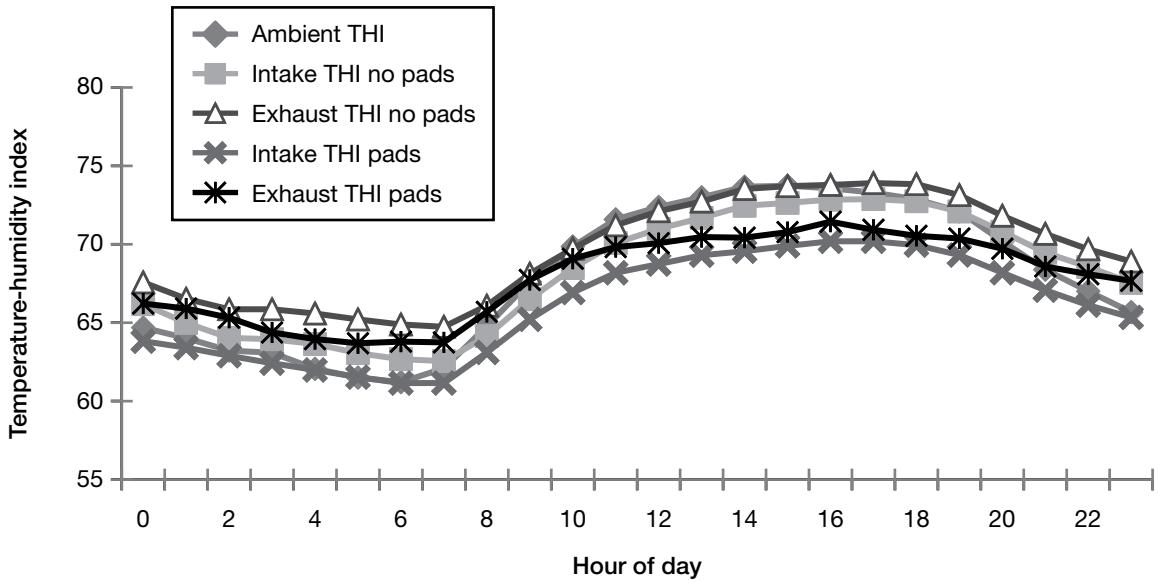

Figure 3. Ambient temperature-humidity index during 9 days of the research trial.