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Thermal status for different breeds of dairy cattle exposed to summer heat stress in a grazing environment

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A study was conducted to investigate thermal balance of lactating dairy cattle managed in an intensive managed rotational grazing system. The farm was located at the University of Missouri Southwest Research Center in Vernon County, MO. Thirty six lactating dairy cows were blocked by parity, days in milk, milk production and breed. Cows were grouped by breed with 100% Holstein (H, n=8), 75%H:25% Jersey (J) (75H, n=5), 50%H:50%J (50H, n=8), 25%H:75%J (75J, n=7), and 100% J (J, n=8), and maintained on the same pastures from June 15 through August 1, 2006. Cows were rotated to paddocks to maintain ad libitum access to pasture. Ambient variables, including air temperature (Ta) and relative humidity, were measured continuously. Ranges of Ta and calculated THI were 12 to 38C and 55 to 87, respectively. Thermal balance was evaluated prior to morning (0500) and afternoon (1600) milkings by measuring rectal temperature (Tre) and respiration rate (RR) on 16 days throughout the study during periods of maximum and minimum heat stress. Breed groups had different body weights ($p < 0.0001$) ranging from 530 kg (H) to 378 (J). However, body weight was similar for 75J and 75H (460 kg versus 501 kg, respectively). Although body weights were different across breed, combined change in rectal temperature with Ta ($r = 0.89$) and THI ($r = 0.92$) was predictable ($p < 0.0001$). Change in Tre with increasing Ta and THI was slowest for J and 75J, and highest for H and 75H. Change in Tre was influenced more by breed more than body weight. Respiration rate was correlated with Ta ($r = 0.88$) and THI ($r = 0.89$) ($p < 0.0001$), with 75J being more responsive than 75H. These results suggest that breed selection can be used to improve thermal balance of cows in intensively managed rotational grazing systems.