

# Influence of elevated temperature and humidity index on body temperature and eating and lying behaviour of grazing dairy cows.

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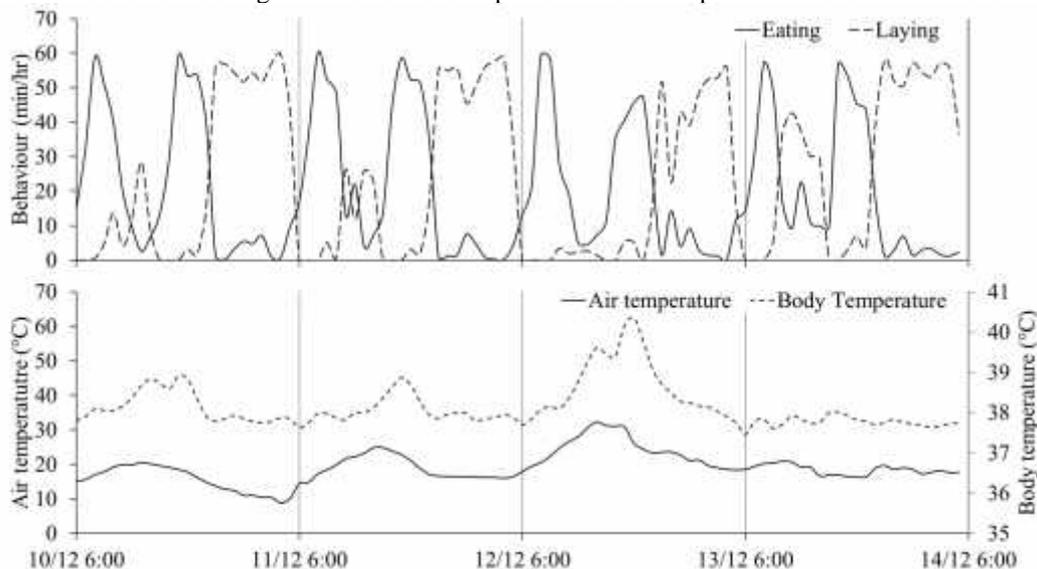
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Increasing frequency, duration and severity of heat events is a growing challenge for the Australian dairy industry. The resulting heat exposure leads to reduced feed intake, increased standing time and decreased activity and movement (Cook *et al.*, 2007). The objective was to examine the impact of high temperature humidity index (THI; Nguyen *et al.*, 2016) on the physiological response of grazing cows. It was hypothesised that when cows were exposed to THI above 68, body temperature would increase and eating and lying time would decrease.

This study was conducted in early summer (10 to 13 December, 2018) in Gippsland, Victoria using 24 Holstein-Friesian cows (mean  $\pm$  s.d. milk yield 31.0  $\pm$  4.00 L/day, bodyweight 577  $\pm$  46.7 kg, and days in milk 96  $\pm$  3.7). A fresh strip of pasture was offered after each milking with an allowance of 25 kg DM/cow/day measured to ground level. Each cow received a grain mix (average of 7 kg DM/day) during milking. Cows were fitted with intravaginal temperature loggers recording every 10 min and activity halters and behaviour meters measuring at 10 Hz to enable summaries of eating and lying duration (minutes per hour). Ambient conditions were recorded every 15 minutes by an on-site weather station. All data were analysed using a one-sample t-test to compare data from days with a mean daily THI of above 68 with data from days when THI was below 68.

Daily maximum air temperature ranged from 20.8 to 32.8°C. Daily minimum THI ranged from 52 to 63 and maximum THI from 68 to 81. On the single day that mean THI > 68, cows had greater body temperature (38.7 vs 38.0°C,  $P < 0.001$ ), spent less time lying (429 vs 630 min/day,  $P < 0.001$ ) and less time eating (466 vs 513 min/day,  $P < 0.001$ ) than on days when THI was below 68 (Figure 1). Duration of eating from 06:00 to 18:00 was lower ( $P < 0.001$ ) when mean THI > 68 (607 min) than days of THI < 68 (714 min) but there was no difference from 18:00 to 06:00 (319 min). Our results are consistent with previous reports of altered time budgets in cows during periods of high THI (Cook *et al.*, 2002; Allen *et al.*, 2015). In support of our hypothesis, ambient conditions characterised by high THI resulted in cow body temperature increasing and eating and resting behaviours being reduced. These changes to cow behaviour during hot weather have implications for milk production and cow welfare.



**Figure 1.** Mean time spent eating and lying by 24 Holstein-Friesian cows (upper panel) resulting from air and body temperatures (lower panel) on four consecutive days of early summer.

## References

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