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# Heat load affects measures of aversion in dairy cows

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*Abstract #23106*

## BACKGROUND

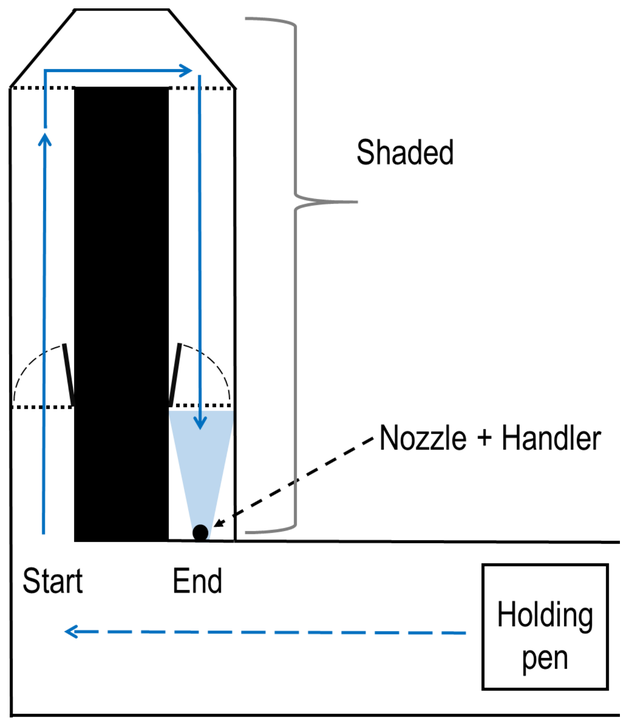
- In hot weather, dairy cows can experience problems (⇧ body temperature, mortality / ⇩ feed intake, milk yield, fertility)
- To cool cows, dairy producers commonly provide water spray at the feed bunk (*see photo*)
- In some studies, cows willingly use spray, but in others they show reluctance to wet the head or entire body
- Higher spray flow rates ⇨ greater spray impact ⇨ do cows find this aversive?
- In an aversion race, animals are predicted to show reluctance to approach aversive (vs. rewarding) stimuli:
  - (a) more slowly (greater transit time)
  - (b) with greater pressure needed from a handler

## OBJECTIVE

**Evaluate the degree of reluctance cows show to approach spray generating different levels of impact**

## MATERIALS & METHODS

- High-producing Holsteins (milk yield: 40 ± 5 kg/d)
- Covered raceway (*see diagram*); air temperature outside: 21 to 44°C
- Before each test: 20 min in holding pen, either with or without shade
- 7 treatments administered at end of race (for 1 min by a handler):
  - **Low sprinkler** (1.1 kPa spray impact, 0.4 L/min flow rate): n = 7 with pretest shade, n = 7 without
  - **High sprinkler** (8.9 kPa spray impact, 4.5 L/min flow rate): n = 9 with pretest shade, n = 8 without
  - **Unsprayed**: n = 8 with feed (rewarding control), n = 8 with shouting handler (aversive control), n = 8 with neither (neutral control)
- Each cow tested 10 times (2x/d, 5 consecutive days)
- Measures: transit time, handling pressure (0 to 6 scale), head posture (lowered vs. not) when entering treatment area

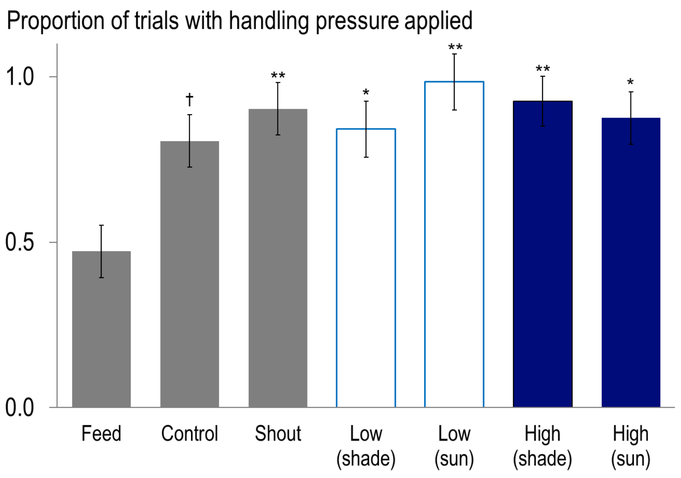



A handler moved behind the cow as she traveled through the race. At the end, another handler administered treatments for 1 min

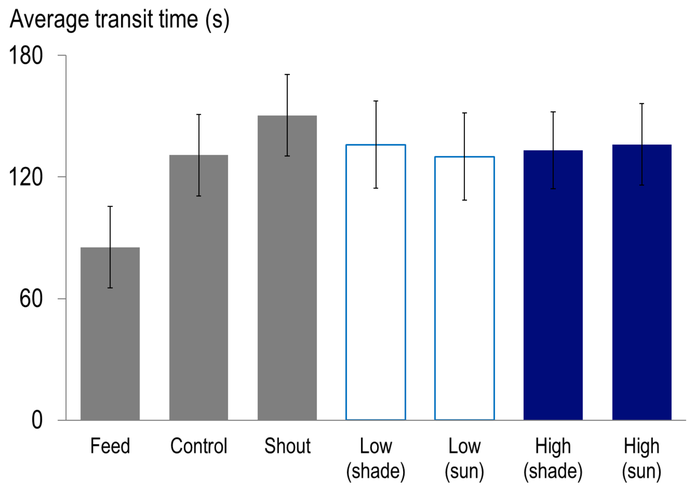
## RESULTS

All analyses: MIXED (SAS 9.4)

**❶ Feed was rewarding: handlers applied pressure half as often when feed was offered** (binary measure: score 0 vs. ≥1; overall $P = 0.001$). Pairwise differences between the feed treatment vs. others: $^{**}P < 0.01$; $^{*}P < 0.05$; $^{\dagger}P < 0.07$. There were no other treatment differences ($P \geq 0.725$). Based on this, the feed treatment was excluded from analyses ❸❹❺.




**❷ Transit time did not reflect differences in reward or aversion** (overall $P = 0.424$)

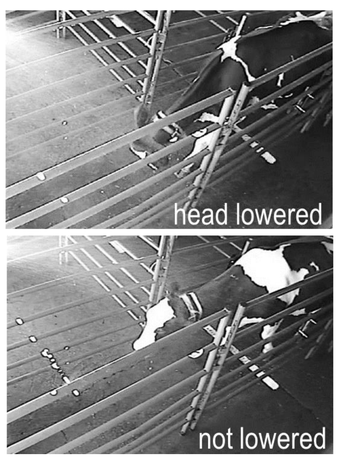


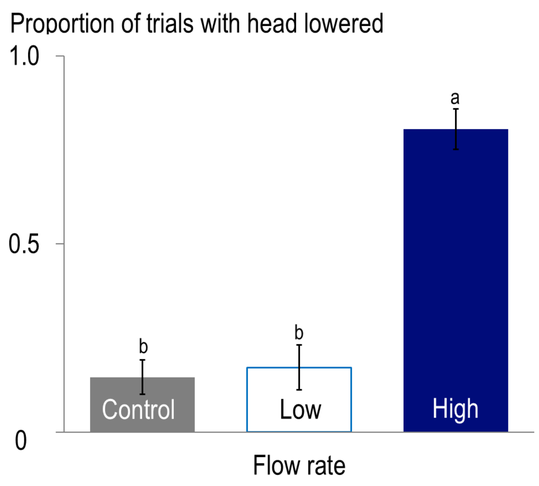

**❸ Transit time reflected heat load:**

- **In warmer weather, transit time increased overall** (by 13 s per 10°C increase in air temperature; $P = 0.043$)
- **As respiration rate ⇧, unsprayed cows moved more slowly** (by 7 s per 10 breaths/min increase; $P = 0.017$), **but sprinklers mitigated this response** ($P \geq 0.283$)

**❹ Handling pressure did not change with heat load** ($P \geq 0.129$)

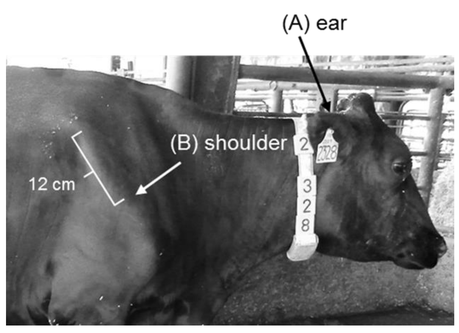
**❺ Cows lowered their heads nearly 5 times as often when approaching High vs. Low or no spray** ($P < 0.001$), **perhaps to reduce exposure of sensitive body parts to higher-impact spray**

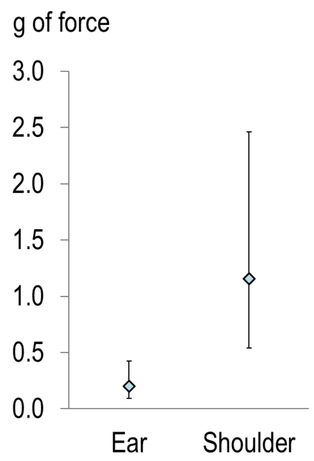



**❻ Indeed, cows responded to lower levels of force when von Frey monofilaments were applied to their (A) ear vs. their (B) shoulder** ($P < 0.001$), **indicating the former had greater sensitivity**

Back-transformed means (natural log) and 95% confidence intervals are shown


## CONCLUSIONS

- **Cows lowered their heads to protect sensitive areas from higher-impact spray, but they did not find this spray aversive overall**
- **Handling pressure reflected willingness, but transit time increased in response to heat load rather than aversion**

Chen et al. 2016. Appl. Anim. Behav. Sci. 179:23-31.
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