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Determination of a stray voltage threshold in Holstein heifers, influence of predictability and past experience on behavioural and physiological responses

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Abstract

Stray voltage (< 10 V) may impair animal welfare. Our objectives were to: i) determine the threshold at which heifers react to voltage and ii) investigate effects of past experience and random applications of voltage. Firstly, forty heifers were trained to eat from two metallic feeders at the end of a test corridor. For 20 heifers, voltage was applied for 2 min (every day in steps of 0.33 V, 0 to 5 V) to the feeder (F1) in which the heifer started to eat (VOLT). Heifers could change to the non-electrified feeder (F2) if they wished. Twenty heifers (CONT) followed the same procedure without voltage exposure. For voltages ≥ 2.3 V, percentage of feed eaten from F1 (%FeedF1) was lower, time spent eating in F1 and latency to change to F2 were shorter compared to 0 V. At 2 V and above, more VOLT than CONT heifers performed muzzle-licking and abrupt head movements. Secondly, after four weeks, the same heifers were exposed to 3.3 V for either 11 consecutive days (DAILY, n = 20) or randomly on 4/11 days (RAND, n = 20). CONT heifers had higher cortisol concentrations than VOLT heifers on the first day of test. %FeedF1 was higher for RAND than DAILY heifers. The threshold at which avoidance behaviour started appeared to be 2.3 V in our experimental conditions. Adaptation was more difficult with unpredictable rather than predictable voltage and past experience seemed to reduce the effects of subsequent exposure.

Keywords: *animal welfare, cattle, past experience, stray voltage, stress, unpredictability*