

Operant Conditioning of Urination by Calves

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Accumulation of feces and urine in dairy barns is a cause of cattle and human health concerns and environmental problems. It is usually assumed that cattle are not capable of controlling their defecation and urination. We tested whether calves could be taught to urinate in a location using classical or operant conditioning. Twenty-four female Holstein calves were alternately assigned as treatment or control (exp 1: n = 12, median age, range = 39, 31-50 d; exp 2: n = 12, median age, range = 50, 29-64 d). Experiment 1 used classical conditioning, involving repeated pairing of entry into a stall and urination (induced by diuretic). During the training period (d 1-5), treatment calves were placed in the stall and injected IV with diuretic (Salix, Intervet Inc. at 0.5 mL/kg BW) to induce urination. During the test period (d 6-15), calves were held in the stall for 10 min without diuretic injection, and urinations, defecations and vocalisations were recorded. The procedure was identical for control calves except saline was used in place of a diuretic. In the test period, classically conditioned calves did not urinate more than controls ($P=0.41$, t -test; means \pm SE: 4.30 ± 1.28 vs. 6.00 ± 1.41 for treatment and control calves, respectively). In experiment 2, calves were trained using operant conditioning. On training days, operant calves were placed in the stall, received IV of diuretic and, upon urination, were released from stall to receive approx. 250 mL milk reward. On test days, calves were placed in the stall but did not receive a diuretic; calves that urinated received the milk reward but calves failing to urinate within 15 min were given a 5 min "time out" and received diuretic the following day. Yoked controls were never given diuretic but held in the stall for the same amount of time and received the same "reward" or "punishment" as their matched operant calf the previous day. Urinations, defecations and vocalisations occurring in the stall on test days were compared between operant calves and controls. Calves trained using operant conditioning had a higher frequency of urinations in the stall than their controls ($P=0.03$, paired t -test; means \pm SE = 5.25 ± 0.95 vs. 2.32 ± 0.52 for treatment and control calves, respectively).

Implications: The results of our experiment show it may be feasible to train cattle to urinate in specific areas using operant conditioning. Training cattle to urinate and defecate in strategic places within the barn could allow for improved cleanliness, more efficient manure management and a reduction in volatile emissions.