Effect of electroejaculation on behavioral and hormonal indicators of stress and nociception in beef bulls

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Electroejaculation has attracted attention as an animal well-being issue. Substance P is an eleven-peptide neurokinin involved in the integration of stress, pain, and anxiety. Plasma concentrations of substance P were elevated and associated with vocalization following castration compared to sham-castrated calves while cortisol concentrations were not different, suggesting substance P may be more specific for assessment of pain. We hypothesized that substance P would be a more specific indicator of nociceptive stress following electroejaculation as compared to cortisol, progesterone, and vocalization.

The objective of this study was to determine changes in hormonal and behavioral indicators of stress and nociception following electroejaculation in bulls. Nine Angus bulls (15 ± 0.76 months, 501.9 ± 14.3 kg) received each of three treatments in three 3x3 Latin squares. Treatments (applied at time 0) included no manipulation (control), rectal probe insertion without stimulation (probed), and electroejaculation (EEJ, Lane Pulsator IV™, one complete automated cycle); three bulls were treated contemporaneously (one in each group). Blood was collected via indwelling jugular catheter at -60, -30, 0, 2, 10, 20, 30, 45, 60, 75, 90, and 120 minutes relative to treatment. Vocalization (yes/no) was recorded. Concentration of plasma cortisol, progesterone, and substance P immunoreactivity were determined by competitive enzyme-linked chemiluminescence, radioimmunoassay, and ELISA, respectively. Concentrations of plasma hormones were analyzed by a mixed model analysis of variance for repeated measures; vocalization was analyzed by Fisher’s Exact Test. A greater number of bulls (P=0.029) vocalized during electroejaculation (5 of 9; 55.6%) compared to controls (0 of 9; 0%). There was an effect of treatment and an interaction of treatment and time on concentrations of plasma cortisol (treatment, P=0.0013; treatment*time, P<0.001) and progesterone (treatment, P=0.0012; treatment*time, P<0.001), with higher concentrations in EEJ compared to probed and control groups; elevations persisted through the 45 minute sample. Mean plasma concentration of substance P was not different (P=0.6264) between the three treatment groups. Increased vocalization and plasma concentrations of cortisol and progesterone indicate an acute stress response following electroejaculation; however, there is no difference in plasma concentration of substance P, suggesting the stress is not due to nociception.

Keywords: electroejaculation, bull, substance P, nociception, stress

Reference: