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Comparison of penetrating and non-penetrating captive bolt in an alternative occipital approach in calves

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Abstract

The objective of this study was to describe the effect of penetrating or non-penetrating captive bolt using an occipital approach in 4–5 month old, Holstein steers weighing between 100–200 kg. Twelve calves were divided into two treatment groups; penetrating captive bolt (PCB; n = 6) and non-penetrating captive bolt (NPCB; n = 6). This sample size was chosen out of convenience and in conjunction with a separate study. Each calf was sedated with xylazine hydrochloride, then a captive-bolt device, outfitted with a standard penetrating bolt or a non-penetrating bolt, was placed flush on the dorsal midline of the cranium at the external occipital protuberance and aimed downward as though to intersect the intermandibular area. Following impact, indicators for loss of consciousness, such as respiration, righting response, corneal reflex, movement and vocalisation were recorded and characterised along with electrocardiogram and electroencephalogram recordings. After a 5-min observation period, all calves were administered potassium chloride. All calves experienced immediate and sustained loss of consciousness. The mean (± SEM) time to cessation of respiration was 60 (± 53.67) and 0 (± 0.0) s for PCB and NPCB, respectively. The mean time to cessation of convulsions was 310.4 (± 79.74) and 180.0 (± 60.24) s, respectively, and the mean number of convulsions was 2.75 (± 1.03) and 2.0 (± 0.837) for PCB and NPCB, respectively. Isoelectric EEG patterns were observed in 3/5 PCB and 3/4 NPCB with mean time to onset of isoelectric pattern in 69.0 (± 52.24) and 113.5 (± 56.87) s. Both treatments induced a successful stun, which suggests these techniques are appropriate for humane euthanasia in calves of this age.

Keywords: *animal welfare, cattle, euthanasia, non-penetrating captive bolt, occipital approach, penetrating captive bolt*