Evaluation of the CASH Dispatch Kit combined with alternative shot placement landmarks as a single-step euthanasia method for cattle of various ages

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Abstract

Humane euthanasia of cattle under field conditions presents special challenges for veterinarians and producers. The purpose of this study was to evaluate the effectiveness of the CASH Dispatch Kit captive-bolt system combined with improved shot placement landmarks as a single-step euthanasia method for cattle. Cattle destined for euthanasia for reasons unrelated to the study were utilised. Adult (> 2 years), young (6–24 months) and neonatal (< 1 month) cattle each received a single shot from the CASH penetrating captive-bolt pistol. An additional group of neonatal animals was shot with a non-penetrating muzzle attachment. The shot was placed on midline halfway between the top of the poll and an imaginary line connecting the lateral canthus of each eye. Following the shot, the animals were immediately assessed for loss of consciousness based upon: i) immediate collapse (if standing); ii) loss of eye reflexes with a centered, dilated pupil; iii) lack of co-ordinated respiration; iv) lack of vocalisation; and v) lack of a righting reflex. Lack of consciousness and heartbeat were assessed at 1-min intervals until cardiac arrest. All animals were adequately stunned by a single shot. Euthanasia via a single shot was successful in 28/31, 17/19, 8/10, and 9/10 adult, young, neonate (penetrating) and neonate (non-penetrating) animals, respectively. Reasons for failure included return of co-ordinated respiration and prolonged time until cardiac arrest. A single shot from the CASH Dispatch captive-bolt system will humanely euthanase most animals. However, the results of this study indicate that application of a follow-up step to ensure death is still needed in certain instances.

Keywords: animal welfare, brainstem, captive bolt, cattle, euthanasia, single step

Introduction

Humane euthanasia of cattle presents special challenges for veterinarians and livestock producers. Available approved methods are limited to barbiturate overdose and physical disruption of the brain via gunshot or captive-bolt device (American Veterinary Medical Association [AVMA] 2013). For on-farm use, gunshot or captive bolt are the most applicable methods. Barbiturate overdose is limited to use by a veterinarian and has the potential to result in dangerous chemical residues if carcasses are not disposed of properly. It also requires excellent restraint and close contact with the animal which make it difficult to safely apply in many situations. Gunshot can be effective and is generally readily available in most livestock-producing areas in the United States. However, gunshot requires skilled operators and carries significant safety concerns that must be addressed. Also, gunshot may not be available in some areas due to legal restrictions. Captive-bolt devices are readily available, have fewer legal restraints than firearms and can be effective in the hands of trained personnel. Safety concerns do exist, but they are generally less than those associated with a firearm and free bullet.

Numerous published studies have investigated the effectiveness of penetrating captive-bolt devices for stunning of animals prior to slaughter. In a slaughter setting, animals are typically exsanguinated within a few seconds of the captive-bolt shot. Very few studies have been published specifically investigating the use of a penetrating captive bolt for the purpose of euthanasia using live animals when a secondary step, such as exsanguination, is not performed immediately after rendering the animal unconscious with the captive bolt.

The initial goal in euthanasia is to rapidly induce unconsciousness so that an animal is insensible to noxious stimuli or stress (AVMA 2013) with death occurring rapidly after loss of consciousness. Consciousness is controlled by both the cerebral cortex and brainstem (Gregory & Shaw 2000).