

ANIMAL WELFARE

TITLE: On-farm validation of captive bolt technology as a single stage euthanasia method – NPB #09-196 revised

INVESTIGATOR: Dr. Suzanne Millman

INSTITUTION: Iowa State University

CO-INVESTGATORS: Jennifer Woods, Jeffrey Hill, Kent Schwartz, Temple Grandin, Raymond Brooks, Jr., Annette O'Connor, Anna Johnson

DATE SUBMITTED: August 19, 2012

SCIENTIFIC ABSTRACT

There has been limited published research on the use of penetrative or non-penetrating captive bolt for euthanasia of swine. The CASH Dispatch Kit is a heavy duty cartridge propelled captive bolt device with interchangeable muzzle assemblies. The unit provides a non-penetrating captive bolt muzzle for piglets, and a variety of penetrating bolt assemblies for pigs ranging from large nursery-age pigs to mature breeding stock. The overall objective of this project was to determine effectiveness of a single application of the captive bolt device for euthanasia of pigs at different ages.

The first experiment explored effectiveness of the Cash Dispatch captive bolt device when applied to anesthetized pigs, and also to evaluate the association between traumatic brain injury to anatomical regions of the brain and effectiveness of captive bolt technology for euthanasia of pigs at different ages. Forty two pigs, six from each of 7 weight classes (2-3kg, 7.5-10 kg, 15-20 kg, 30-40 kg, 100-120 kg, 200-250 kg, >300 kg) were enrolled. Each pig was anesthetized, and then euthanized with the “Cash” Dispatch Kit. Death was determined according to cessation of cardiac and respiratory function. Postmortem dissection was used to determine the presence of hemorrhaging and the extent of traumatic brain injury. All 30 pigs in the 5 lightest weight classes were effectively euthanized. Four of the 12 pigs in the heaviest weight classes required a secondary method. All pigs that were successfully euthanized with a single application of the CASH Dispatch captive bolt device displayed haemorrhage in all 5 neuroanatomical regions assessed (cerebral cortex, cerebellum, thalamus, pons and medulla). However, 2 of the 4 pigs requiring a secondary euthanasia step lacked haemorrhage in the medulla and pons. Interestingly, although all pigs successfully euthanized with a single shot of the penetrating captive bolt displayed traumatic brain injury in the cerebral cortex, only 1 pig (weight class 4) showed traumatic brain injury in any of the other 4 regions of the brain.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • pork.org

In the second experiment, the effectiveness was assessed when the Cash Dispatch captive bolt device was used by stockpeople on commercial farms. Two hundred and ten pigs in the same 7 weight classes were enrolled in the trial. Fifteen stockpersons were enlisted from a single production company to perform euthanasia. There were 202 pigs (97%) that were effectively euthanized with a single application of the "Cash" Dispatch Kit. Seven pigs (2 sows and 5 boars) in weight classes 6 and 7 required a second shot. Weight class was significantly associated with the need for a second shot ($P=0.006$). Stockperson was also associated with the need for a second shot ($p=0.0048$), but there were no differences between sows and boars. Two-thirds of the pigs that required a second shot vocalized ($p=0.0038$). Similarly, two-thirds of pigs that required a second shot displayed respiration after the initial shot ($p=0.00002$). However, vocalization and respiration were also observed in pigs that were successfully euthanized, indicating that neither is a reliable predictor of euthanasia success.

We conclude that the Cash Dispatch captive bolt device is effective as a single step euthanasia method for pigs <200kg. For mature animals, further refinements in terms of equipment design and/or application by stockpeople are needed to ensure reliable performance with mature animals. Stockpeople should be prepared to administer a second shot swiftly when euthanizing mature pigs with a captive bolt device.