

## ANIMAL WELFARE

**Title:** Validation of the effectiveness of alternative euthanasia techniques for mature swine using a penetrating captive bolt gun and electrocution-  
**NPB #20-097**

**Investigator :** Monique Pairis-Garcia

**Institution :** North Carolina State University

**Date Submitted:** 9/30/2020

**Scientific Abstract:** Euthanasia of mature swine is challenging given distinct age, sex and anatomical variations. Temporal and behind-the-ear locations are two sites that have been identified as alternatives to the more commonly used frontal placement. In stage-one, the effectiveness of two penetrating captive bolt gun (PCBG) styles (cylinder or pistol) was evaluated using frontal, temporal and behind-the-ear placement in anesthetized mature swine (n=36) (weight: 267 ± 41 kg) and calculated as the percentage of pigs that achieved cardiac and respiratory arrest within 10 min of treatment application. All animals were observed until a heartbeat was no longer detected by a pulse-oximeter, or until 10 min post treatment administration at which time animals with a detectable heartbeat were euthanized with a commercial grade electrocution stunner. Treatments that achieved >95% unconsciousness as well as both cardiac and respiratory arrest by 10 min in stage-one were included in stage-two using conscious live animals. Of the six initial treatments, use of the pistol style gun using either the frontal (33.3%, sows; 66.7%, boars) or temporal (33.3%, sows; 33.3%, boars) placement was unsuccessful as was the cylinder style gun at the temporal location for boars (33.3%) and therefore not included in stage-two. In stage-two, commercial, mixed breed, mature swine (n=42) (weight: 292 +/- 56 kg) were randomly assigned to one of four treatments based on inclusion criteria described in both stage-one and the animal use protocol. A 3-point traumatic brain injury (TBI) score (0=normal; 1=some abnormalities; 3=grossly abnormal, unrecognizable) was used to evaluate 6 neuroanatomical structures (cerebral cortex, cerebellum, hypothalamus, thalamus, pons and brain stem) and the presence of hemorrhage was also noted. All treatments were 100% effective in stage-two. A significant interaction between PCBG type and placement was determined on predicting total TBI as the cylinder style produced a higher total TBI score compared to the pistol type, of magnitude of +2.8 (P < 0.01). The cylinder style tended to produce a greater TBI score than the pistol in the temporal location (+1.2; P=0.08). No difference was noted for TBI score behind-the-ear (P>0.05). TBI tended to be less in boars compared to sows (-0.6; P=0.08). Hemorrhage was observed in frontal, parietal, occipital and temporal lobes. This study provides descriptive outcomes for successful alternative euthanasia options for mature sows and boars.

---

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](http://pork.org)

---