RESEARCH ABSTRACT

ANIMAL WELFARE

Title: Field evaluation of humane pig euthanasia using a dump trailer as a CO2 chamber- **NPB #20-119**

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Date Submitted: 2/15/2021

Scientific Abstract:
For the veterinary community, the American Veterinary Medical Association (AVMA) maintains ownership of the Guidelines for Depopulation of Animals (AVMA). Methods of euthanasia for swine include gunshot, captive bolt, CO2, anesthetic overdose and blunt force trauma (age-dependent) (AVMA). Due to the threat of foreign animal disease, the swine industry has renewed interest in methods of mass depopulation. One of these methods is the use of carbon dioxide as an inhalant anesthetic. Research has supported the use of carbon dioxide as a means of euthanasia if the gas is delivered at a rate of 20-30% per minute over the course of five minutes. While carbon dioxide has long been used on a small scale within swine farms, the use of this gas for euthanasia of large groups of animals and the welfare implications has not been explored. In this study, the objective is to evaluate the effectiveness and animal welfare implications of administering the inhalant anesthetic, CO2, in a 12-foot dump trailer as a method of humane euthanasia for sows, grower and market weight pigs. A 12-foot dump trailer was converted into a swine euthanasia chamber. Carbon dioxide was introduced into the trailer via a vaporizer connected to a carbon dioxide tank. Four trials were performed with sows, grower and market weight animals. Trial 1 was split into two groups of 3 sows weighing approximately 450 lbs each. Trial 2 was split into one group of fifteen 80 lb pigs and one group of twenty 80 lb pigs. Two groups of 5 sows at approximately 450 lb were euthanized in Trial 3. Seven market weight pigs (~250 lb) were euthanized in Trial 4 which consisted of one group. In each group, with the exception of trial 4, 3 animals were fitted with single use ECG devices and accelerometers as described previously. Six animals were fitted with these devices in Trial 4. Each device was activated just prior to loading into the chamber. Mean time to cessation of movement (COM) across all three size categories (grower, finisher, sows) was 282 seconds (95% CI 245 – 320). No significant differences in time to COM were detected between size categories (p=0.9742, Kruskal-Wallis rank test) (non-normal distribution per Shapiro-Wilk test: p=0.03076). ECG tracing data were available for 12 individual pigs across the 4 trials. Asystole was noted in all the tracings. Persistent electrical activity (PEA) was noted following presence of arrhythmias in 10 of the 11 complete tracings. PEA slowly decreased in intensity until it was no longer detectable by the end of the 15-minute post-CO2 shutoff period for 7 of 8 tracings. CO2 levels of 80% or greater were reached within 5 minutes of introduction into the chamber for all groups in Trials 1-4. The data found in this study support the use of carbon dioxide for a method of mass depopulation of swine herds.