

ANIMAL WELFARE

Title: Evaluation of a novel means to euthanize piglets – NPB #10-123

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Date Submitted: October 18, 2012

Scientific Abstract

This research was conducted to evaluate a novel means to euthanize piglets utilizing electromagnetic (EM) energy administered at 2,450 MHz power. Experiment 1 assessed whether or not EM energy could bring piglets to death and Experiment 2 evaluated the consciousness, unconsciousness, post-EM energy exposure (EMEE), and death of piglets. In Experiment 1, six anesthetized piglets were exposed to 40 s of EMEE. Prior to EMEE, heart rate, respiration rate, head surface temperature, and internal body temperature were recorded. Following EMEE, heart rate, respiration rate, head surface temperature, and intracranial temperature were recorded. Prior to EMEE, internal body temperature was 37.7°C and following EMEE intracranial temperature was 62.8°C. Head surface temperature was higher ($P < 0.01$) after EMEE (32.7 vs. 69.2°C, respectively). Moreover, respiration rate was reduced to zero in each piglet immediately following EMEE. Immediately after EMEE, heart rate slightly ($P = 0.86$) decreased (133 bpm prior vs. 129 bpm post EMEE). Unassisted death occurred after heart rate ceased within 4.8 min after EMEE application in five of the six piglets. Treatments in Experiment 2 included EMEE for 3, 6, or 9 s. In Experiment 2, electroencephalogram (EEG) and electrocardiogram were recorded during the states of consciousness mentioned above. Additionally, head surface and internal body temperatures were recorded before and after EMEE. State of consciousness and treatment interaction affected ($P < 0.01$) EEG amplitude and power. State of consciousness affected ($P < 0.01$) EEG frequency. Sex affected ($P < 0.01$) EEG amplitude. EMEE and treatment interaction also affected internal body and head surface temperatures ($P < 0.01$). Piglets exposed to 9 s EMEE had higher body temperature compared with piglets exposed to 3 and 6 s EMEE (40.6 vs. 39.1 and 39.6°C, respectively). In addition, piglets exposed to 9 s EMEE had higher post EMEE head surface temperature than piglets exposed to 3 s EMEE (39.7 vs. 34.9°C, respectively). Moreover, heart rate was reduced ($P < 0.01$) from conscious to unconscious to after EMEE applications; however, not immediately after euthanasia (172, 133, 88, and 129 bpm, respectively). In conclusion, three seconds is not enough time to denature brain tissue to a point that potentially eliminates the perception of pain. Thus, more than six seconds of EM energy is needed. After reaching insensibility, the EM energy exposure could be carried to the point of complete brain denaturation and physical death.

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.

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