

AASV Foundation Research

Final Report

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Efficacy testing for a novel method for euthanasia of suckling piglets

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Statement of the problem:

Methods for euthanizing piglets less than twelve pounds have become more publicly scrutinized. Many parties within the U.S. swine industry desire to have more alternative euthanasia methods that are safe, quick, effective and as aesthetic as euthanasia can be.

Objectives of the first part of the research are:

- To rapidly anesthetize via dispersal of isoflurane then painlessly achieve hypoxic euthanasia via the subsequent dispersal of carbon monoxide by a patented single-use aerosol canister.
- To prove efficacy of the S₂ system and determine the optimal duration in the S₂ chamber to achieve successful euthanasia.

Brief materials and methods (including statistical analysis)

Suckling piglets were euthanized with the S₂ system to determine the efficacy by evaluating the following variables:

- Number of animals in the chamber
- Duration of time in the chamber (5, 10, 15, 20, 25, 30 minutes)
- Weight of the animals
- Post-application parameters
- Carboxyhemoglobin levels in the blood post-application

Significant results

- Based on observations, minimal to no stress response (vocalization, escape attempts, etc.) is apparent during the application period of the S₂ system. The times that piglets were observed vocalizing were isolated to when they stood under the nozzle where the gas sprayed into the chamber.
- Per our objective of determining the optimal duration in the S₂ chamber to achieve successful euthanasia, the five and ten minute duration was not adequate time to consistently euthanize piglets regardless of age, weight, etc. This is depicted in Graph 1.
 - The number of rounds completed was not equal at each time period. More rounds were conducted at 15, 20, 25 and 30 minute duration. This was due to the high incidence of unsuccessful euthanasia at 5 and 10 minute duration in the S₂ chamber.
- The findings suggest that younger piglets may need to remain in the chamber for a longer period of time than older piglets to ensure adequate exposure to carbon monoxide levels.
 - Of the piglets that were not successfully euthanized (10 animals out of 159):
 - Eight were left in the S₂ chamber for 5 or 10 minutes
 - The remaining two were 1 day old and weighed 1.5 and 3.0lbs (25 min and 15 min in S₂ chamber respectively).

- Respiratory disease has the potential to limit gas exchange / respirations therefore impacting the success of euthanasia by gas inhalation.
 - To evaluate this aspect, all euthanasia was conducted at farms that were PRRSv positive.
 - Only 14 of the 159 animals were specifically euthanized due to severe respiratory challenge (dyspnea, coughing, nasal discharge). Of these 14, one of the euthanasia attempts was unsuccessful. Note this was at 5 minutes for duration in the S₂ Chamber.

Graph 1: Outcome of Euthanasia (# of Animals) by Duration of Time in S₂ Chamber

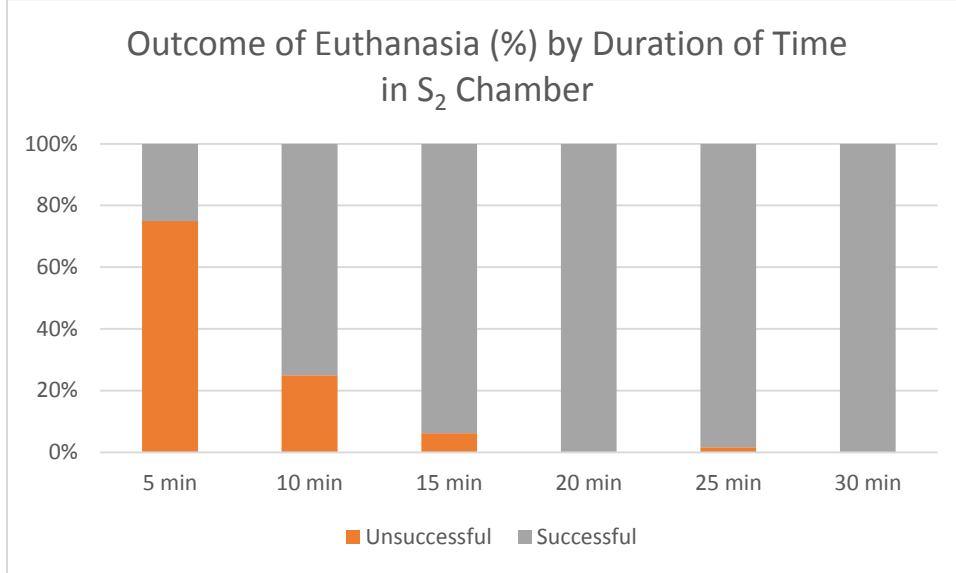


Table 1: Count of animals that were not successfully euthanized based on age range and duration of time in S₂ Chamber.

Unsuccess by Age & Time	5 min	10 min	15 min	20 min	25 min	30 min
NB to 4 days	2	2	1	0	1	0
5 to 9 days	2	0	0	0	0	0
10 to 14 days	1	0	0	0	0	0
15 days to wean	1	0	0	0	0	0
TOTAL # ANIMALS TESTED	8	8	16	29	61	37

Discussion of how results can be applied by practitioners

- The protocol that was tested allowed for successful rapid anesthesia and painless euthanasia:
 - 30 minutes in the S₂ chamber for piglets ≤ 4 days of age
 - 20 minutes in the S₂ chamber for piglets ≥ 5 days of age
- Carboxyhemoglobin levels did not have a direct correlation with success or failure of the euthanasia.
- Limitations of this project:
 - Due to the binomial outcome of the statistical question (successful or unsuccessful), the number of animals needed to find statistical significance was difficult to achieve in a field setting within a single production system.