

ANIMAL WELFARE

Title: Application of Electrocutation in Suckling Pigs for Mass Depopulation,
- NPB #20-117

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Industry Summary: Project Objective #1 evaluated the effectiveness of the Best & Donovan Hog Stunner ESS for depopulation of weaned pigs from a commercial breed to wean facility. Within this evaluation a feed cart was utilized as a temporary holding area taking advantage of this commonly found piece of equipment's plastic walls and floor along with rubber tires to minimize the risk of human safety. We found the "V-shaped" position of the probe works excellently for positioning the probe directly behind to the pig's ears and found this placement to be 100% effective at immediately rendering the pig insensible and ~99% effective at simultaneous euthanasia. While attempts were made to place the stunner probe simultaneously to the head and chest area, we found this positioning to be difficult at best and impossible for most medium to large sized weaned pigs given the fixed position of the probes. Electricity was delivered to piglets at the lowest possible voltage of 360 volts for a period of 3-8 seconds per attempt with no noticeable difference in effective euthanasia rates at any different periods of application. Pigs which were well wetted down prior to electrocution had minimal electrical arcing and its associated burning of skin and hair, but failure to adequately wet down the pigs will result in the smell of burnt hair due to electrical arcing. Using this procedure, we were able to successfully euthanize ~5 piglets/minute or ~300 piglets/hour using a team of 3 individuals. There is no blood associated with the procedure and it is much more worker friendly than alternative piglet depopulation methods with which our team has personal experience.

Project Objective #2 is to develop a list of Best Practices to share with the industry, please find this document listed as Appendix 1 with this Final report.

For additional information regarding this project, please contact Dr. Clayton Johnson at johnson@hogvet.com.

Key Findings:

- Electrocutation is an effective, safe and welfare friendly means of mass euthanasia of due to wean piglets at a Breed to Wean farm.
- The Hog Stunner ESS machine is easy to use, portable and quick to set up at any pig farm using an existing 110 volt outlet.
- Piglet restraint can be easily accomplished using commonly found equipment and supplies including a feed or piglet cart.
- Electrocutation using commercial stunning machines is an effective and safe means of mass piglet euthanasia with easy set up using commonly found barn supplies and equipment.

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:

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Keywords: Piglet, Euthanasia, Depopulation, Electrocution, Hog Stunner ESS

Scientific Abstract: Commercial electrocution equipment is commonly utilized to render market pigs insensible at packing facilities. This same equipment is available for purchase by pig producers and can be used on farm in depopulation situations. The Hog Stunner ESS from Best and Donovan was acquired and utilized to depopulate due to wean piglets from a commercial Breed to Wean farm. Our observations were that electrocution using the Hog Stunner ESS was a safe and rapid way to conduct mass euthanasia, requiring minimal training and only supplies and equipment already commonly found on most U.S. pig farms.

Introduction: The pork supply chain relies on moving pigs from one phase of production to the next. Regular movement of pigs is critically important for Breed to Wean farms which have limited space to house their piglets. As growing pig farms have been forced to hold pigs due to COVID-19 induced marketing disruptions, some Breed to Wean farms have been forced to mass depopulate due to wean pigs to create farrowing space for incoming pregnant sows. While there are several approved methods of mass depopulation of due to wean piglets, very few are practical for on-farm application. Electrocution is an approved method and while commercial electrocution equipment is not available on most Breed to Wean farms, it can be easily purchased and rapidly set up for use in farm.

Objectives: While commercial equipment is available, best practices for use in mass piglet euthanasia are lacking. Our proposal has 2 primary objectives:

1. Evaluate the effectiveness of a commercially available electrical stunner (Best and Donovan Hog Stunner ES) for euthanizing due to wean piglets in a commercial breed to wean facility. Euthanasia effectiveness along with throughput metrics will be evaluated and recorded.
2. Develop a set of recommended Best Practices for dissemination to the commercial industry that can serve a guide for implementing electrical stunning as a mass euthanasia method for due to wean piglets.

Materials & Methods: A field trial was performed at a 6400 head commercial Breed to Wean facility using the Hog Stunner ESS to electrocute ~4000 due to wean piglets. Within this facility a temporary holding alley was utilized using a feed cart with plastic walls and floors. Piglets were euthanized by a licensed veterinarian using attempts with both the one step method of passing electricity through the brain and heart simultaneously as well as the two-step method of passing electricity through the brain initially and heart secondarily as needed based on the need for a secondary step to complete euthanasia. For the 1 step method the probe of this stunner was applied simultaneously to the head area and approximately 6" behind the head, near the level of the thoracic/lumbar spine for no less than three seconds and within 15 seconds of stunning per AVMA Guidelines for Depopulation of Animals. A minimum of 0.5 amps and 110 volts at a 60 hertz current frequency was utilized, consistent with AASV recommendations for On Farm Euthanasia of Swine. Assessment of efficacy in stunning and euthanasia was made by the absence or presence of tonic and clonic movements. If the one-step method was not effective, then alterations were made to employ a two-step method of stunning via electricity through the brain then euthanasia via electricity through the heart for piglets not euthanized passing electricity through the brain alone. Additionally, all piglets will be wetted down with a fan tip and low-pressure hose prior to euthanasia. Time metrics were tracked regarding the number of piglets that can be euthanized per minute utilizing this method and number of personnel required. Pictures and video were recorded to support further education regarding these procedures.

Results: While the consistent application of the one step method passing electricity through the brain and heart simultaneously was deemed to be impractical if not impossible early in the field trial, the two step method was extremely effective with ~1% of piglets needing a secondary electrocution attempt of the thoracic region to complete euthanasia. The process was perceived to be extremely humane by all involved and an improvement relative to our collective experiences using alternative techniques for mass depopulation of due to wean piglets. The Hog Stunner ESS was able to be used leveraging only the instructions and training materials supplied by the manufacturer, and worked consistently throughout each depopulation event. A team of three was able to effectively euthanize piglets at a rate

of 5 piglets/minute or 300 piglets/hour. A set of recommended best practices was developed and is presented in Appendix 1 of this document for industry utilization.

Discussion: Electrocutation is a humane and approved method of both euthanasia and mass depopulation of swine. Commercial euthanasia equipment is readily available for purchase and can be utilized with minimal training and without need for additional outside supplies or equipment. Assuming biosecurity is acceptable, the commercial euthanasia equipment is portable and could be leveraged across multiple farms if needed. Electrocutation using the Hog Stunner ESS is a viable, practical and safe form of mass depopulation for due to wean piglets.

Appendix 1: Best Practices

Supplies & Equipment Required:

- Commercial Stunning Transformer & Wand
 - Hog Stunner ES & ESS is a viable option, Manufactured by Best & Donovan, 5570 Creek Road, Cincinnati, OH 45242, 1-800-553-2378
- Heavy Duty Electrical Drop Cord (if no outlet within 10 feet of Depopulation Location)
- Heavy Duty Hose & Wand with “Shower” Setting
- 4 x Feed/Pig Moving Carts

Personnel Required:

- 3 People Total Working in an Assembly Line Flow
 - 1 People gathering and delivering pigs to Depopulation location
 - 1 Person operating equipment and performing the Euthanasia
 - 1 Person confirming insensibility and death, removing dead pigs from carts

Depopulation Area Setup:

- Clean the area to allow easy movement of Feed/Pig Moving Carts into within and out of the area
- Connect the hose to the nearest available water outlet and attach the wand
 - Set wand to “Shower” setting
- Plug in the Commercial Stunning Transformer & Wand into a regular 110 outlet
 - Turn Voltage setting to lowest setting
 - Ensure timer is set for a minimum of 3 seconds

Procedure:

- Gather piglets into Feed/Pig Moving Cart not to exceed 0.67 sq ft/pig stocking rate (no piling of pigs, maximum 1 layer deep)
- Move piglets in Feed/Pig Moving Cart to Depopulation area
- Wet pigs down using “Shower” setting immediately prior to euthanasia
- Identify the pig who’s head and neck are located furthest from other pigs in the cart, place the “V-shaped” end of the prod directly behind the pig’s ears, sliding the prod down until it is fully in contact with the pig’s head and neck
- Press the button on the wand to allow electricity to flow uninterrupted for a minimum of 3 seconds, repeat this process for all pigs in the cart
- Pass the cart to the person in charge of confirming insensibility and death, if any pigs are deemed to need a second attempt, remove them from this cart return the cart to the person actively performing electrocution for a second attempt
- When all euthanasia is complete, completely unplug the wand and transformer, storing them in separate locations until the next depopulation event

ESS Electrical Stunner: A Tool for Wean Pig Depopulation

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- Manufactured by Best & Donovan
- 40lbs total, 3lb wand
- Designed for market hogs as well as sheep/other animals
- Requires standard residential 110V grounded outlet



Current SOP

Staffing

- 1 people inside farm, one outside person running tractor
- 1 people filling carts with wean pigs from holding room, farrowing room
- 1 person running machine-veterinarian or senior production staff
- 1 person confirming insensibility and death, removing dead pigs from carts to tractor



Current SOP

Process

- Assembly line approach
- Feed carts loaded with one layer of pigs (~6-7 depending on size)
- Pigs sprayed with water prior to euthanasia using garden hose
- Prod placed behind ears to ensure electricity flows through the brain rapidly inducing insensibility
- Pigs electrocuted for 3-5 seconds individually avoiding contact with remaining sensible pigs



Current SOP

Process

- Piglets left in cart for ~5 minutes post euthanasia until agonal breathing has ceased
- Post euthanasia monitoring performed by trained, dedicated worker to ensure insensibility
- Pigs with signs of sensibility are returned to previous step for additional application
- Pigs handled twice: placed in cart on front end, removed as last step



Current SOP



1. Pre Loading Carts (2 people)



2. Application of Electrocution (one person)



4. Removal (one person)



3. Post Application Monitoring (one person)



Process Timeline

- Preload carts- 5 minutes
- Application of electrical stunning- 3-5 seconds
- Post application monitoring- 5 minutes
- Time to stop vocalization- immediately post application
- Time to stop movement- 1-5 minutes, coordinated movements stop immediately when applied correctly
- Removal of cart- 20-30 seconds
- Total time: ~10 seconds per pig
- 300 pigs/hour peak efficiency



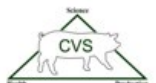
Efficiency

- Can euthanize up to 2000 pigs per day, two shifts recommended
- Percent survivability- about 1% require additional application of electricity, not necessarily sensible
- Utilizes hose, feed carts already found on farm, only additional equipment is device itself



Lessons learned

- Best time to do is evening/late afternoon after regular farm staff have completed sow movements/weaning
- Rate limiting steps are application of electricity and filling carts



Cost Per Pig

- ~\$3100 for Device
- Electricity usage is negligible
- Main cost is labor to administer device



Human Safety Concerns

- Device designed to kill
- No touching of applicator end of wand at any time while plugged in
- Completely unplugged when not in use, wand stored separately
- All-in all-out of feed cards during process



Human Welfare/Mental Health

- Subjectively better than blunt force trauma
- Minimal blood (also good for FAD applications)
- Smoking an issue if pigs are not properly wetted down prior to application
- Additional fans for ventilation
- Music for participants?

