

## Euthanasia and Worker Safety

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Euthanasia is the humane process whereby the pig is rendered insensible, with minimal pain and distress, until death. Euthanizing agents cause death by three basic mechanisms: (1) hypoxia (lack of oxygen), direct or indirect; (2) direct depression of nerve cells in the brain necessary for life function; and (3) physical disruption of brain activity and destruction of nerve cells necessary for life.

Acceptable methods of euthanasia may vary by species and circumstance. Methods of euthanasia appropriate for pigs have been outline by the American Association of Swine Veterinarians (AASV) and the Pork Checkoff (Table 1).

Table 1. Methods of euthanasia appropriate for pigs of different sizes

	Suckling pig (up to 12 lbs)	Nursery pig (up to 70 lbs)	Grower-Finisher (up to market wt)	Mature pig (sow or boar)
Carbon dioxide (CO <sub>2</sub> )	Yes	Yes	Yes, but not practical*	Yes, but not practical*
Gunshot	No	Yes	Yes	Yes
Penetrating captive bolt	No	Yes	Yes	Yes
Non-penetrating captive bolt	Yes	Yes, with secondary step	No	No
Electrocution, head to heart	Only for pigs over 10 lbs	Yes	Yes	Yes
Electrocution, head only	Only for pigs over 10 lbs	Yes, with secondary step	Yes, with secondary step	Yes, with secondary step
Veterinarian administered anesthetic overdose	Yes	Yes	Yes	Yes
Blunt trauma	Yes	No	No	No

\*This method is an acceptable form of euthanasia for this size of pig but may not be practical for individual pig euthanasia on-farm due to lack of equipments suitable for this size.

Each of these methods poses a hazard to workers (Table 2). Worker safety may be affected by the size and body weight of the animal to be euthanized, the temperament of the animal, and methods and/or equipment available for animal restraint.

*Table 2. Safety of euthanasia methods*

Risk to human safety	Method of euthanasia
High	Gunshot
Moderate	Carbon dioxide (CO <sub>2</sub> ) Penetrating captive bolt
Low	Non-penetrating captive bolt Veterinarian administered anesthetic overdose Blunt trauma Electrocution (head to heart, and head only – low risk only if proper lockout/tagout procedures followed)

## Carbon dioxide (CO<sub>2</sub>)

CO<sub>2</sub> is a colorless odorless gas that creates hypoxia, or a lack of oxygen. This causes direct depression of the brain and heart. The use of CO<sub>2</sub> is inexpensive and relatively safe for workers. However, it is only practical for small pigs. Chambers can be purchased or homemade (Figure 1).



Worker injury scenarios vary, but may include accidental inhalation of gas or physical injury as a result of incorrect bending and lifting technique handling the animal, improper gas levels, poor chamber maintenance, or improper venting of the chamber. The following measures are recommended to make CO<sub>2</sub> chamber use safer:

- Train employees on the proper use of CO<sub>2</sub> chambers
- Use chambers that are appropriately sized for the pig
- Complete regular inspection of canisters and regulators
- Properly vent the CO<sub>2</sub> chamber and carry out the procedure in a well-ventilated area
- Regularly assess euthanasia process in barns

## Firearms

Firearms are an acceptable means of euthanasia for swine other than suckling pigs. When used properly, gunshot can cause immediate insensibility and death. In some cases, firearms may be the only practical method of euthanasia.

Worker injuries may include: shooting oneself, shooting another person, ricochet injury, injury due to a thrashing animal,

or other animal handling-associated injuries. These injuries may occur due to poor aim, shooting without a clear background, or movement of the animal. The following measures are recommended to make firearm use safer:

- Train employees on the proper use of firearms
- Match the size of the gun and ammunition to the pig
- Make sure company euthanasia policy requires that safety equipment be worn during the procedure - safety goggles, ear plugs, etc.
- Put in place strict storage and safety guidelines for firearms use
- Perform the procedure outdoors if possible
- Make sure that onlookers stand behind the person delivering the shot
- Make sure that firearms are regularly inspected and maintained
- Regularly assess euthanasia process in barns

## Captive bolt

Captive bolt guns are powered by gunpowder or air compression. They cause concussion and trauma to the brain and brain stem. Two types of guns exist: penetrating and non-penetrating. Penetrating guns are most common in pork production. Captive bolt guns are made in one of two forms: pistol grip or in-line/cylindrical (Figure 2). Pistol grip guns are safest because workers can easily tell which end is out. Some guns may only stun pigs rather than killing them instantly; in this case, pigs that return to consciousness require a secondary step (e.g. exsanguination or pithing) to ensure humane death.

Figure 2. Captive bolt gun configurations



“Cash Special” Captive Bolt Stunner Gun  
-.25 Caliber (Standard)  
[www.qcsupply.com](http://www.qcsupply.com)



Schermer KR Stunner Standard Bolt  
[www.qcsupply.com](http://www.qcsupply.com)



Blitz-Kerner Captive Bolt Stunner  
[www.qcsupply.com](http://www.qcsupply.com)

Worker injury scenarios vary but include shooting oneself with the gun, shooting another person, gunpowder explosion, and animal handling-associated injuries. These injuries may be due to many factors including: holding the gun improperly, bad shot positioning, injury due to a thrashing animal and improper animal restraint. The following measures are recommended to make captive bolt gun use safer:

- Train employees on the proper use of captive bolt guns
- Make sure company euthanasia policy requires that safety equipment be worn during the procedure - safety goggles, ear plugs, etc.
- Select bolt length and cartridge combination appropriate to the age and size of pig
- Make sure than guns are regularly cleaned and serviced

- Be aware of the firing end of the gun at all times
- Regularly assess euthanasia process in barns

## Electrocution

Electrocution induces death by cardiac fibrillation, which causes lack of oxygen to the brain. Generally, electrocution is not a commonly used method of euthanasia in swine. Electrocution is best when using the head-to-heart configuration, which passes electrical current simultaneously through the brain and heart. Head only electrocution can be used but does not cause cardiac fibrillation; a secondary step (such as exsanguination) is required within 15 seconds of initial stunning.

Worker injury scenarios may include worker electrocution or injury by the animal. These injuries may be caused by poorly maintained equipment, inadequate animal restraint, and improper application or technique. The following measures are recommended to make electrocution safer.

- Provide extensive training for workers performing electrocution
- Selectively assign employees to this task based on their skill and comfort level
- Make sure proper lockout/tagout procedures are in place
- Regularly assess employees for proficiency and technique
- Perform regular maintenance on equipment
- Electrocution apparatuses should include an isolation transformer to improve electrical safety and provide sufficient amperage to instantly induce unconsciousness
- Follow proper animal restraint techniques
- Make sure the electrodes and the animal are not near conductive materials such as metal gates, metal floors or metal snares.

## Veterinarian administered anesthetic overdose

An anesthetic overdose, which typically involves barbiturates, causes depression of the respiratory center and cardiac arrest. This method of euthanasia, which is very common in companion animals, is used less frequently in swine due to high cost, difficulty of administration, and legal restrictions involving the drug.

Workers may become injured by accidental injection, possible overdose, or by the animal. Injuries may be caused by carelessness or improper restraint. The following measures are recommended to make anesthetic overdose administration safer:

- Allow only veterinarians to administer the overdose
- Limit amount of drugs in barn (there are legal limits); keep drugs under lock and key
- Train employees in proper animal handling and restraint
- Document and account for all inventory

## Blunt trauma

Blunt trauma is approved only for neonatal pigs (up to 12 pounds). A single, sharp blow is delivered to the central skull bones with sufficient force to produce immediate depression of the central nervous system and destruction of brain tis-

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sue. Employees must be well trained in this method and constantly monitored for proficiency.

Worker injuries may include muscle strain or hitting oneself. These injuries may be caused by poor aim or inadequate training. To perform blunt force trauma properly, a quick firm blow to the top of the head over the brain must be delivered with accuracy and resolve to ensure euthanasia and not just stunning. Some workers who are uncomfortable with the procedure may hesitate or close their eyes during administration which increases the risk of worker injury and the likelihood of prolonging piglet death. The following measures are recommended to make blunt trauma safer:

- Provide extensive training
- Selectively assign employees to this task based on their skill and comfort level
- Regularly assess employees for proficiency and technique

## Summary

There are six euthanasia methods that are appropriate for swine. Many of these can be performed safely by workers. Training, monitoring for proficiency, and proper equipment maintenance are very important to ensure both worker safety and quick, humane death for pigs.

## References

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