

Guidance for Euthanasia of Non-ambulatory Livestock at Meat Plants By Erika L. Voogd, Voogd Consulting, Inc.

Webster's II University Dictionary, 1996, defines euthanasia as "*The intentional causing of a painless and easy death to a patient suffering from an incurable or painful disease*".

In most meat plants, the majority of livestock arrive and are held in a condition which allows them to be harvested, without any challenges. On occasion, an animal may be received or develop a condition which prevents the animal from ambulating or moving, without human assistance. For livestock other than cattle, the animal can be reviewed by an FSIS inspector and may pass ante mortem inspection. However, in the case of all non-ambulatory cattle and other livestock that are condemned, it will be necessary to euthanize the animal and dispose of it properly. This resource document is designed to provide general recommendations for euthanizing of livestock that are non-ambulatory or condemned.

The most common methods of euthanizing livestock at the plant are:

1. Captive bolt gun
2. Gunshot
3. Electrocution (primarily with swine)

The main considerations for choosing a method and administering euthanasia in a meat plant are:

1. **Human safety:** Utilizing a method that can be administered with minimal risk to employees is the primary consideration. The use of a firearm carries some danger as does an electrical stun wand. Therefore, the safest method to stun is the captive bolt gun.
2. **Animal Welfare:** For any method utilized, death should be rapid and painless. All animals should be immediately rendered insensible to pain and fear, on the first stun or shot.
3. **Restraint:** The ability to restrain the animal during the stunning or shooting will greatly aid to assure an accurate and effective stun. Head restraint for large livestock is preferred and animal restraint is preferred for electrical stunning of pigs (plastic sort boards can be used as an electrical insulator and restraint).
4. **Skill:** Training is important for any method of euthanasia to insure proper equipment operation and to minimize the potential for injury. Training of the operator should be completed prior to practicing stunning and killing, with documentation of understanding. Skills should be reviewed and verified at least annually.

Procedures

Captive Bolt Gun: A captive bolt gun can be penetrating or non-penetrating (mushroom/concussion). The penetrating captive bolt would be preferred, as when administered correctly, the result is immediate and irreversible brain destruction. Both

types of guns, when used correctly, will cause a concussion, which stuns the animal to a state of unconsciousness, however, neither method causes complete death. Therefore, an additional procedure (such as exsanguination or bleeding) is absolutely necessary with a non-penetrating captive bolt stun and is recommended when using a captive bolt gun.

- Be sure that the captive bolt gun is properly maintained, following the manufacturers recommendations. The gun should be clean and dry with cartridges that are stored in a dry location.
- Follow manufacturer's recommendations for cartridge strength and size to assure that the gun will effectively stun the size and species of animal being euthanized.
- Place the captive bolt gun firmly against the skull such that the point of entry is in the location described for that species. (See Diagram 1 below)

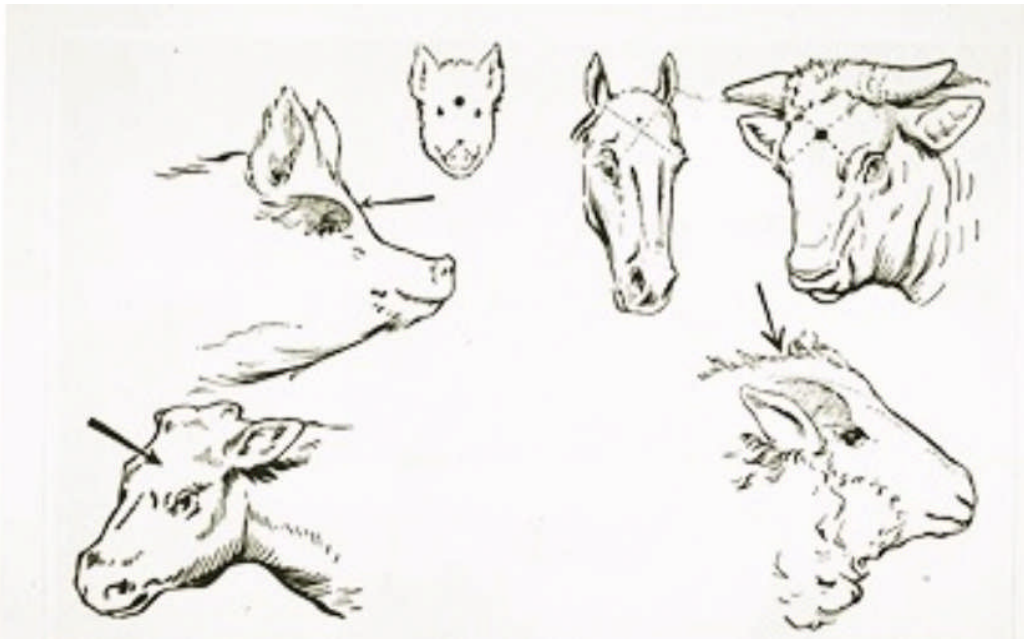


Diagram 1: Proper location of captive bolt stun gun for each species.

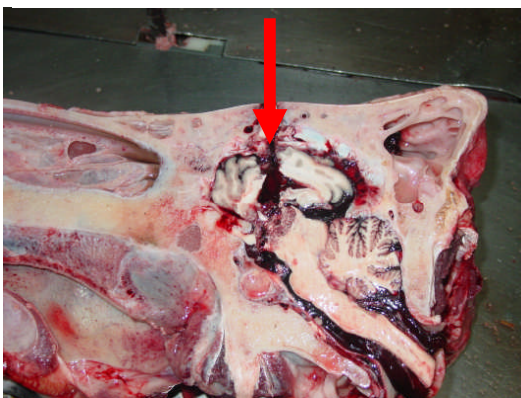


Diagram 2: Proper stun angle of penetration, Hold or aim perpendicular to the head. Brain stem is damaged.

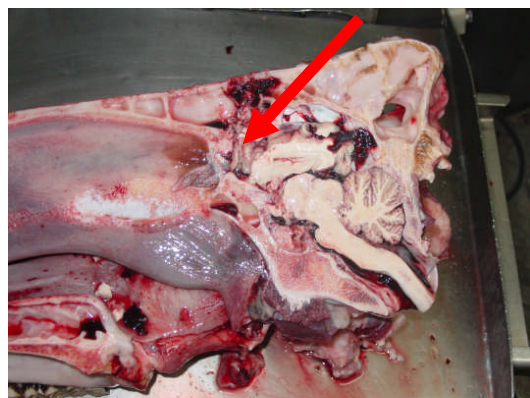


Diagram 3: Improper angle of penetration. Brain and brain stem intact.

- For cattle, the correct location of the stun is “the point of entry of the projectile at the intersection of two imaginary lines, each drawn from the inside corner of the eye to the base of the opposite horn (or to a point slightly above the opposite ear in a cow without horns)” (Shearer),
- There are stronger, more powerful captive bolt guns, with a longer penetrating bolt that have been specially manufactured for large cattle and bulls. These are designed to penetrate through the brain and to destroy the brain stem (Diagram 2).
- Employees must use caution when stunning animals, especially larger animals such as cattle, boars, etc. A halter or restraint can be utilized to minimize head movement during stunning.
- For large animals such as boars and all cattle, it is strongly recommended that a second shot be administered to the head, (within 30 seconds of the first shot) to further destroy brain function. FSIS Humane Slaughter regulations require that the first shot **MUST** render the animal insensible; however, a second shot can greatly reduce reflex reaction such as kicking and thrashing (which occurs in most animals after stunning).
 - For maximum effectiveness, the second shot should be administered quickly after the first shot (within 30 seconds). For penetrating captive bolt guns, do **NOT** attempt to shoot into the same hole, as this may damage the gun. Shoot the animal in a different location, near the initial stun hole.
 - Be sure to outline the plant standard procedure for double stunning of large and heavy headed animals in the plant Humane Handling Program to ensure Regulatory and Auditor recognition of this practice.

Gunshot: A .22 caliber bullet, administered with a rifle or hand gun, is sufficient to effectively stun most animals. A .22 magnum or 9 mm or .357 Magnum should be used on bulls and boars as well as heavy headed and thick haired animals such as large Herefords and Scottish Highlander cattle, because these animals have a thicker hide and skull and/or more hair present on the forehead. The use of a hollow point or soft nosed bullet increases brain tissue destruction.

- The firearm should be held 2-10 inches away from the intended point of contact and the bullet should be directed perpendicular to the front of the skull to prevent ricochet (See diagram 2). Note: do **NOT** place the gun in direct contact with the head, as this can cause the gun to explode.
- Only skilled and trained employees should administer gunshot stuns. Care should be taken to minimize the potential for stray bullets that can injure employees or bystanders.
- Local laws should be followed when deciding to use a firearm for euthanasia.

Facilitating Death: After the animal is stunned, it is necessary to ensure death, especially before moving this animal to a disposal area (for aesthetic and humane reasons). There are two methods that are most commonly utilized to ensure death:

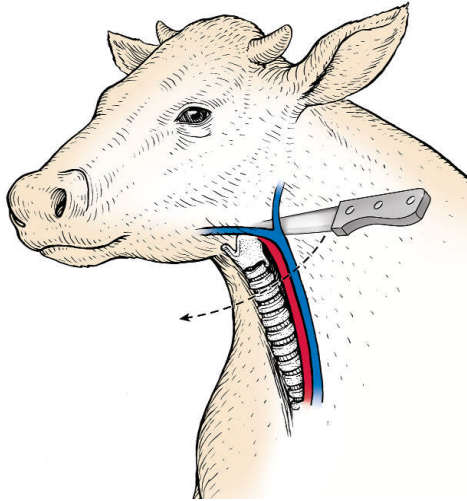


Diagram 4:
Exsanguination by severance of major blood vessels in the neck: 1) Jugular Vein, (indicated in blue color), 2) Carotid Artery, (indicated in red color), and 3) Trachea or Windpipe (white tube). (Shearer)

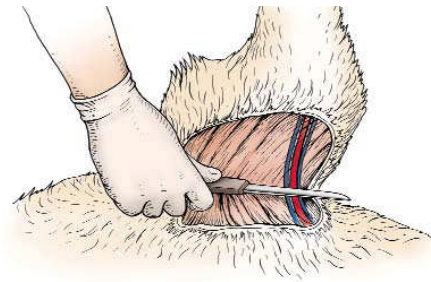


Diagram 5:
Exsanguination by severance of the brachial vasculature at the point of the elbow. (Shearer)

Exsanguination:

- The most common method for exsanguinating an animal (bleeding) is to sever one of both carotid arteries, in the neck area. For cattle, a clean, sharp knife that is at least 6 inches in length can be inserted behind the point of the jaw, just below the neck bones and directed downwards until the blood flows freely. (Diagram 4).
- For pigs, the knife should be at least 5 inches (120 mm) in length. Insert the knife in the midline of the neck at the depression of the front of the breast bone. Raise the skin with the knife point using light pressure and a lifting motion. Once penetration has been made, the knife handle should be lowered so that the blade is in a near vertical position, then push it upward and sever all major blood vessels arising from the heart. (Grandin, 2009)
- An alternative method of exsanguination is to “lift one front leg and insert a knife deeply at the point of the elbow and cutting the skin, blood vessels and brachial vasculature until the limb can be laid back against the thorax” (AVMA/AABP Practical Euthanasia of Cattle). (See Diagram 5)
- Be aware that, although unconscious, the animal is still alive, and it is possible that the involuntary muscle contractions can be present and could injure the operator or others involved in the exsanguination process. Approach the animal from the back to avoid injury from thrashing legs or head.

Some plants may prefer a more hygienic procedure that does not involve bleeding to ensure death. An alternative method may be chosen because of bio-security, hygiene, aesthetics or waste disposal concerns.

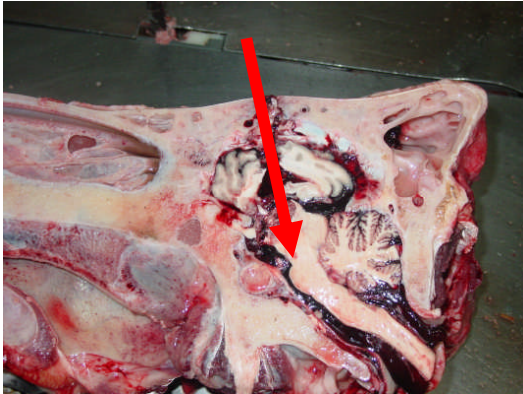


Diagram 6: Proper angle of penetration for pithing rod.

Pithing: “Pithing is a procedure that is used to ensure death by physically disrupting the brain and rostral (anterior) part of the spinal chord” (Grandin, 2009). The pithing procedure is utilized after a gunshot or penetrating captive bolt.

- The pithing rod chosen should be rigid, yet somewhat flexible (a welding rod can be used). Insert a metal rod into the hole created by the bullet or penetrating bolt.
- The pithing rod must be long enough to be inserted through the brain until it reaches the spinal cord. Move the rod back and forth around inside the head, to essentially “scramble the brain”.
- For pithing to work properly, the bullet or captive bolt must have first effectively penetrated the brain.
- Care should be taken with older cattle, with consideration for control of SRM material (Specified Risk Material) that may be present on the pithing rod, after insertion into the head.

Confirming Death:

- After the initiation of stunning and pithing or bleeding, it is best to allow 3 minutes for the animal to die, prior to checking for vital signs.
- Involuntary movements can occur for several minutes after stunning, therefore, for safety reasons, it is best to approach the animals from the back, avoiding the legs and head.
- The best method to verify that the animal has died is to use a stethoscope to check for heartbeat (under the left elbow). The absence of a heart beat will confirm that the animal is dead. If a stethoscope is not available, check for a pulse.
- In a meat plant, the most common methods to verify that the animal has died are to check for the absence of respiration and the lack of a corneal reflex.
- A lack of heartbeat *and* the absence of respiration for more than 5 minutes should be used to confirm death.
- At least three of these signs death must be present to verify death:
 - Absence of rhythmic breathing
 - Cessation of heartbeat
 - Absence of pulse

- Absence of palpebral reflex (run finger along eyelashes with no response)
 - Absence of corneal reflex
 - Dilation of pupils
 - Loss of color in mucous membranes
- The animal is NOT dead if any of the following occur:
 - The animal lifts its head or righting reflex is present
 - It vocalizes
 - The eye is moving (tracking) or blinking
 - A pulse is present
 - There is an extended period of movement (initial involuntary movements should last no more than 20-30 seconds)
 - Pupils are constricted
 - The animal responds to painful stimuli such as a pinching of the nose

Disposal:

- For aesthetic and humane reasons, it is preferable for reflex functions to have fully ceased prior to transporting or disposing of euthanized animals.
- It is best to wait at least 20 minute after death, before disposing of a euthanized animal.

References:

Grandin, T. "Improving Animal Welfare, a Practical Approach", Cabi Publishing, 2009.

Shearer, J.K. and Nicoletti, P. "Procedures for Humane Euthanasia", Brochure Prepared by University of Florida College of Veterinary Medicine.

Practical Euthanasia of Cattle: Considerations for the Producer, Livestock Market Operator, Livestock Transporter, and Veterinarian. Brochure prepared by the Animal Welfare Committee of the American Association of Bovine Practitioners, 1999.