

Cattle Producer's Handbook

Animal Health Section

692

Understanding Euthanasia on the Farm

G. W. Brumbaugh, DVM; J. J. England, DVM; and C. A. Hinds, DVM
Caine Veterinary Teaching Center, University of Idaho, Caldwell

“Euthanasia” is derived from the Greek terms “eu,” meaning “good,” and “thanatos,” meaning “death.” A “good death” is essential to the humane termination of an animal’s life and should be considered seriously. Veterinarians may perform the euthanasia, supervise personnel who are trained to perform euthanasia, or train designated individuals to perform euthanasia. Training of personnel to properly perform euthanasia should include safety for personnel, proper techniques, minimization of distress to the animal being euthanatized, regulatory requirements, verification that the animal is deceased, proper disposal of the animal’s body, and biosecurity for the farm.

Adherence to protocols for euthanasia is as important as adherence to protocols for other animal care activities. The duty of the veterinarian or trained personnel performing euthanasia includes that person’s disposition to induce death in a manner that considers the animal’s interest and/or well-being and the use of techniques that induce death rapidly, painlessly, and as distress-free as possible.

Decisions Regarding Euthanasia

Humane behavior reflects the desire to do what is best for the animal and serves to bring about the best possible outcome for the animal. Euthanasia meets the description of humane behavior when death is a welcome event and when the owner and the veterinarian determine that continued existence is not an attractive option for the animal. Euthanasia may be the compassionate choice of treatment when death would not be worse than living. When the animal no longer functions well, displays behaviors that are innate to the species, or is suffering, euthanasia may be the humane decision.

When the decision has been made to perform euthanasia, the goal is to minimize pain, distress, and adverse effects to the animal. Ethically, when the animal’s life is

to be taken, it should be done with respect for the interests of the animal and performed as humanely as possible. Complete absence of pain and distress cannot always be achieved. Attempts should be made to minimize pain and distress within the reality of the diverse environments in which euthanasia is performed.

The finality of death is, in part, what makes it an ethically important issue. Death eliminates future opportunities for improvement and eliminates suffering that may be associated with progressively deteriorating conditions.

Acceptable Methods of Euthanasia for Cattle

Acceptable methods of euthanasia consistently produce a humane death when used alone. *Methods acceptable with conditions* are techniques that require certain conditions to be met in order to consistently produce humane death. Personnel who perform euthanasia must be proficient in the safe use of the chosen technique. Understanding of the normal behavior of the animal species to be euthanatized and experience with proper restraint of the animal species is also expected. Euthanasia should only be performed when the necessary supplies are available and in accordance with applicable federal, state, and local laws.

An acceptable method of euthanasia should induce unconsciousness, should minimize pain and distress, and should result in loss of life-supporting function of the brain, heart, and lungs. Unconsciousness is defined as the loss of individual awareness and occurs when the brain does not integrate information. It is observed in animals as the loss of the righting-reflex or inability to maintain an upright (sternal) position while lying. Uncoordinated movement of limbs may occur when the animal is unconscious.

Pain is a subjective, conscious experience and, by definition, an unconscious animal cannot perceive pain. For that reason, it is important that the method of euthanasia rapidly induce unconsciousness. Vocalization, salivation, urination, defecation, pupillary dilation, rapid heart rate, sweating, and reflex muscular contractions (shivering, tremors, or other spasms) should be interpreted with caution because they can occur in animals that are conscious or unconscious.

Stress can be divided into three phases or types: (1) “eustress” results when harmless stimuli create adaptive responses that are beneficial to the animal; (2) “neutral stress” results when the animal’s response is neither harmful nor beneficial, and (3) “distress” results when the animal’s response impairs its well-being and comfort.

To avoid distress for the animal, euthanasia should be performed within the animal’s physical and behavioral comfort zone. An approach to euthanasia that can be applied in surroundings that are familiar to the animal may help reduce distress. Positioning the animal on a non-slip surface, reducing noise, or placing a blindfold on the animal are examples of simple modifications of the animal’s surroundings that could be beneficial. Sedation and/or anesthesia help achieve the best conditions for euthanasia.

The human-animal relationship should be respected when discussing euthanasia. Owners, caretakers, veterinarians, and other personnel quickly become attached to the patient. Regardless of the method of euthanasia that is chosen, it is important to consider the level of understanding and perceptions of people who are in attendance when they witness or participate in euthanasia of an animal.

When death of the animal has been achieved and verified, the owner and caretaker should be notified verbally. Veterinarians and managers of personnel who participate in euthanasia should observe those individuals for adverse effects of such activity on the performance of their duties. Appropriate responses should be made to assist those individuals to make emotional adjustments.

Mechanisms of Euthanasia

Ideally, any method of euthanasia should result in rapid loss of consciousness, followed by cardiac and respiratory arrest, and subsequent loss of function of the brain.

Unacceptable methods for euthanasia of cattle include the following: manually applied blunt trauma to the head, injection of chemicals (KCl, MgSO₄, disinfectants, or non-anesthetic agents) into conscious animals, sedation followed by injection of KCl or MgSO₄, drowning, and injection of air into general circulation.

The following are *not acceptable as the sole method* of euthanasia but *are acceptable as adjunctive methods* to ensure death of the animal after it has been rendered unconscious by captive bolt, gunshot, or general an-

esthesia: saturated solution of potassium chloride, or magnesium sulfate IV; second or third shot to brain; exsanguination; or pithing.

Intravenous (IV) administration of an overdose of barbiturates is an acceptable method of euthanasia for cattle. Skillful IV administration of an overdose of barbiturates usually produces smooth transition through all phases of euthanasia. Regulatory requirements for use of controlled substances and limitations for disposal of the animal carcass may be unacceptable for some situations.

Methods most commonly used for on-farm euthanasia of cattle are gunshot or penetrating captive bolt, which are methods acceptable with conditions. With either of those methods, death is induced by destruction of brain tissue. Factors to be considered when choosing the most appropriate firearm include: caliber of firearm, type of projectile, distance from the animal when discharging the firearm, age and sex of the animal, and accuracy of placement of the projectile.

Distance from the animal when discharging the firearm should be between 1 to 3 feet. Handguns, rifles, or shotguns are acceptable firearms. Choice of which to use will be influenced by the distance from the animal at which the firearm is to be discharged. Calibers suggested for handguns or rifles to use for euthanasia of cattle range from .22 to .45. For calves, standard- or high-velocity .22 long rifle shells will be the minimally adequate caliber. However, adult animals (bulls or cows) often have dense bone that usually necessitates use of larger calibers (.22 magnum or larger) than would be used for young animals or calves. Solid-point projectiles are preferred to hollow-point.

Preferred gauges of shotguns for euthanasia of cattle are 20, 16, or 12 using slugs or birdshot, No. 6 or larger. The use of a .410 gauge with No. 4 or No. 6 discharged at a distance of 1 meter is effective. The 12-gauge with No. 7½ birdshot discharged at a distance of 2 meters is also effective but considered to be more powerful than necessary. Discharged with appropriate energy, birdshot is an effective projectile that can penetrate the skull, provide adequate destruction of brain tissue, and unlikely to unsafely exit the skull. When a gunshot or penetrating captive bolt is used for euthanasia, the veterinarian should be prepared to perform a second or third discharge, if necessary.

Penetrating captive bolt systems are available in a variety of configurations or styles. In order to provide adequate safety for personnel and humane euthanasia, the animal must be properly restrained when using penetrating captive bolt systems and adjunct methods of euthanasia. Direct contact between the captive bolt gun and the animal’s head is required. Training in the proper use and maintenance are important for proper function, regardless of the style of captive bolt selected. Penetrating captive bolt guns induce immediate loss of

consciousness and usually are followed by an adjunctive method of euthanasia such as exsanguination, pithing, or IV injection (120 to 250 mL) of a saturated solution of potassium chloride.

Exsanguination is accomplished with an incision at the ventral aspect of the throat, where the lower jaw and neck meet, transecting skin, muscles, trachea, esophagus, carotid arteries, jugular veins, other vessels, and nerves.

Pithing is a physical technique designed to cause death by destruction of tissue of the brain and spinal cord. A pithing rod is inserted in the entry site of the projectile or captive bolt and manipulated manually to destroy brain, brainstem, and spinal cord. Involuntary muscular activity of the animal during pithing can be quite violent.

The anatomic point of entry of the projectile (from firearm or captive bolt) should be at the intersection of two imaginary lines, each drawn from the outside corner of the eye to the center of the base of the opposite horn, or equivalent position for polled animals (Fig. 1, www.vetmed.iastate.edu/vdpam/extension/dairy/programs/humane-euthanasia/). The direction of flight of the projectile, or the captive bolt, should be perpendicular to the skull at the specified point of entry.

Visual indicators that the animal has been rendered unconscious by use of firearm or penetrating captive bolt are immediate collapse, brief tetanic spasms followed by

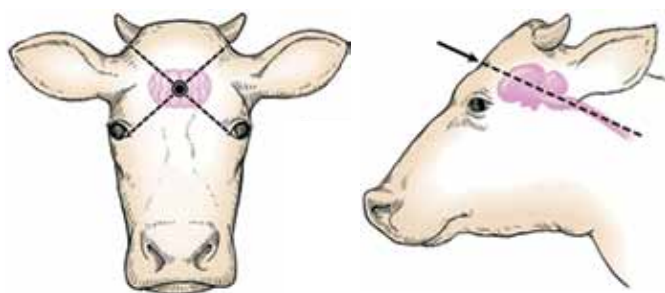


Fig. 1. Anatomic point of entry of a projectile from a firearm or a captive bolt when euthanizing a bovid. www.vetmed.iastate.edu/vdpam/extension/dairy/programs/humane-euthanasia/ (used by permission).

uncoordinated movements of the hind limbs, immediate and sustained cessation of rhythmic breathing, lack of coordinated attempts to rise, absence of vocalization, glazed or glassy appearance to the eyes, and absence of reflexes of the eyes. The presence of or a corneal reflex is highly suggestive that the animal is conscious.

Several criteria should be used to confirm death before disposal of the animal. Those include lack of pulse, cessation of breathing, loss of corneal reflex, no detectable sounds using a stethoscope from heart or lungs, grey discoloration of mucous membranes, and rigor mortis.

Disposal of Animal Remains

After properly performing euthanasia, the animal's remains must be properly disposed. Personnel involved with disposal should have been instructed to safely handle biohazardous materials and should have protective clothing and equipment. If samples of tissues are needed for diagnostic purposes, those should be appropriately obtained.

Selection of a method for disposal of the euthanized animal should be considered and planned before the euthanasia procedure. Laws and regulations apply to processes for safe disposal of remains of dead animals in order to manage residues of drugs and chemicals, to protect scavengers, and to protect adulteration of rendered products.

Methods for disposal include incineration or cremation, burial, securely covered if the ground is frozen and prevents burial, composting, delivery to landfill that is approved to receive animal remains, or rendering to become part of animal feeds. Special disposal methods may be required if the animal was treated with a dewormer, a fly repellent, an antimicrobial agent, or was euthanized using an overdose of barbiturate. Products rendered from ruminants are prohibited by law for use in feed for ruminants.

Additional Resource

AVMA Guidelines for Euthanasia 2013: www.vetmed.iastate.edu/vdpam/extension/dairy/programs/humane-euthanasia/

