



BEEF

Chapter 13

Methods of Euthanasia and Animal Disposal

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Euthanasia

Raising cattle comes with many rewards; however, on occasion it also involves being confronted with challenging decisions about deciding when to end the suffering of an animal. For responsible stockmen, remaining attentive to the well-being of the animals under their care helps ensure a good life for the animals and a safe, wholesome, and affordable food supply for our communities.

According to the “AVMA Guidelines for the Euthanasia of Animals” (2013), euthanasia is defined as, “a method of killing that minimizes pain, distress, and anxiety experienced by the animal prior to loss of consciousness, and causes rapid loss of consciousness followed by cardiac or respiratory arrest and death.”

Reasons to Consider Euthanasia

The following situations or conditions may lead to the decision to euthanize an animal:

- Unreparable fractures of the legs, hip or spine that result in immobility or inability to stand
- Emergency medical conditions causing severe pain that cannot be relieved by treatment (trauma from highway accidents or other severe incidents)
- Debilitation from disease or injury that renders an animal too weak to be transported or marketed
- Paralysis from traumatic injuries or diseases resulting in immobility
- Advanced cancerous conditions (e.g. lymphoma, cancer eye)
- Disease conditions for which cost of treatment is prohibitive
- Significant loss of production and quality of life (e.g. advanced age, severe mastitis)

Key Points

- Understand the various situations that should lead to euthanizing an animal.
- Go through the decision-making process of choosing the best method of euthanasia needs.
- Be aware of the acceptable and unacceptable methods of euthanasia.
- Know the proper placement on the bovine skull for gunshot and captive bolt methods.
- Confirm death following a euthanasia procedure.
- Understand the various carcass disposal methods available.

- Disease conditions with no known effective treatment (e.g. John's Disease), poor prognosis, or unusually prolonged recovery time
- Exposure to medications or chemical compounds that necessitate an extraordinarily long slaughter withdrawal period
- Diseases that pose a threat to human health (e.g. rabies)

Considerations in Choosing a Method of Euthanasia

Before carrying out a euthanasia procedure on-farm, some questions should be asked to determine the best method to use that ensures the safety of personnel, the animal, wildlife, and the environment.

1. Are the people involved in the euthanasia procedure safe? Choose a method with the lowest risk of human injury given the circumstances. While firearms are convenient, they carry greater risks than other euthanasia methods.
2. Is distress and suffering of the animal minimized up until loss of consciousness or death? Different situations may call for different methods of euthanasia, however, regardless of the method a quick, painless death is important for the well-being of the animal. Following human safety, animal well-being should be given the utmost attention.
3. How will the animal be restrained? The type of restraint should be suited to the method of euthanasia chosen. A captive bolt will require a high level of restraint to ensure proper placement and achieve unconsciousness in one shot. Evaluation of the quality and availability of restraint equipment (e.g. halters, chutes, gates) is important when choosing a euthanasia method. Animals less accustomed to human contact may become excessively stressed by restraint, therefore consideration for using firearms with minimal human contact may be more suitable.
4. Are skilled or trained individuals available to carry out the euthanasia? Some methods require specific skills to ensure the procedure is carried out safely and correctly. Accuracy and placement of gunshots and captive bolts are essential to a humane death and require training and practice to perfect.
5. Which method of euthanasia is the most aesthetically appropriate for the situation? Be considerate of any potential bystanders and the negative reactions displayed by the animal during the procedure. Some methods produce more involuntary movements than others and could lead to misunderstandings by individuals not familiar with the euthanasia process. Realize that death is a sensitive topic and the administration of barbiturates is perceived in a more positive light than other methods, especially in public settings.
6. Do certain tissues need to be sent in for diagnostic testing for disease purposes? In cases where rabies is suspected, a veterinarian should be called for guidance regarding euthanasia and sample collection. Methods that result in head trauma may cause excessive damage or loss of brain tissue needed for rabies testing and could result in exposure of people involved to the rabies virus.
7. What carcass disposal options are available? Check with all local, state, and federal regulations to determine which carcass disposal options are available in your area. Animals euthanized via barbiturate overdose may not be acceptable for rendering since drug residues may be present in the carcass that can end up in animal byproducts. Please refer to the section on carcass disposal for more information about each option.
8. How much does it cost? Costs vary depending on method. Higher initial costs exist for firearms and captive bolts. Methods that require a veterinarian may have additional fees. However, cost considerations should be secondary to those of human safety and animal well-being.

Acceptable Methods of Euthanasia

The “AVMA Guidelines for the Euthanasia of Animals” (2013) recognizes three methods of euthanasia for cattle:

1. Administration of a lethal dose of barbiturates or barbituric acid derivatives by an approved person;
2. Gunshot, using the appropriate caliber and type of ammunition for the situation, that inflicts physical disruption of brain activity via destruction of brain tissue;
3. Penetrating captive bolt that induces unconsciousness followed by either technique:
 - a. Exsanguination,
 - b. Administration of potassium chloride, or
 - c. Pithing to warrant death.

Administration of lethal dose of barbiturates

Intravenous injection of a lethal dose of barbiturates is an effective and humane method of euthanasia. These compounds are controlled substances and can only be procured and used by a licensed veterinarian. Care must be taken by the administrator to ensure that the full dose of barbiturate is administered in the vein. In some cases, this may necessitate the placement of an intravenous catheter prior to administering the medication.

Carcasses of animals that have been euthanized with barbiturates may be prohibited from being picked up by rendering companies due to the persistence of these compounds following the rendering process. If rendering is the desired method of disposal, one should check with the rendering company prior to having an animal euthanized with barbiturates.

Anatomical Markers for Captive Bolt or Gunshot

Ensuring proper position when using a firearm or penetrating captive bolt aids in a successful euthanasia. The proper point of entry is the intersection of the two imaginary lines each drawn from the rear, outside corner of the eye to the base of the opposite horn, or the polled area where a horn would be present. This intersection is above the eyes, not between the eyes (Figure 1). For a firearm,

a distance of 2 to 12 inches should be maintained between the barrel and the skull. For captive bolts, place the gun against the skull.

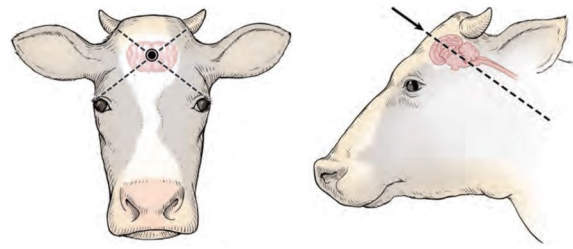


Figure 1: Anatomical landmarks for use of gunshot or captive bolt in cattle euthanasia. Photo courtesy of American Veterinary Medical Association.

Exsanguination

Use of a penetrating captive bolt in most animals will not result in sufficient damage to the brainstem to elicit a timely death. As such, the death of the animal must be accomplished by additional procedures. One of these procedures is that of exsanguination, or “bleeding out” of the carcass. Exsanguination should never be used as the sole method of euthanasia.

Following the animal’s loss of consciousness, a sharp knife should be used to sever the carotid arteries in the neck. Those performing this procedure should anticipate a large amount of blood to be produced where this is performed. After the flow of blood from the arteries has ceased, the animal may be checked for confirmation of death (see below).

Pithing

Pithing is a means of ensuring death in an animal that has been rendered unconscious by a captive bolt. It involves introducing a rigid rod into the entry site of the captive bolt and manipulating it such that brain tissue in the area of the brainstem is sufficiently destroyed. This procedure often results in significant muscle movements in the affected animal, and is not always aesthetically acceptable to bystanders.

Intravenous injection of potassium chloride (KCl)

Saturated solutions of potassium chloride (KCl) can be administered to an animal to cause death once the animal has been rendered unconscious. Potassium chloride is toxic to the heart and will cause cardiac

arrest. This substance must be administered intravenously. Volumes of 125 to 250 ml of KCl are usually sufficient to cause death, but additional volumes should be given if death does not occur.

The administrator should have sufficient syringes loaded with KCl before the animal is rendered unconscious, and take care to position themselves such that they are not injured by involuntary movements of the animal's limbs.

Special Considerations for Euthanizing Bulls or Calves

Bulls are physically large, have thick skulls, and can be temperamental during handling. Proper euthanasia equipment choices for these animals include: a heavy duty penetrating captive bolt gun, a higher caliber firearm (≥ 0.30 caliber), or a heavier gauge shotgun (should achieve a 1000 ft. / lb. muzzle energy). When using injectable agents, it is imperative that the appropriate dose be calculated for the size of the animal. Proper restraint is essential to perform a euthanasia technique accurately and safely. It is best to minimize the amount of stress experienced by the animal by preparing the tools, the people, and the facilities before the animal is brought in for the procedure.

Calves are much smaller than mature cows or bulls. Despite their small size and the ease with which they can be handled, the ethical expectations are the same for all euthanasia procedures. Calves have the same three accepted methods of euthanasia as mature bovines. Blunt force trauma to the head is not an acceptable method for cattle, and a calf's skull is still too hard to accurately and consistently cause sufficient brain tissue damage to induce death by this method. A 0.22 rifle may be sufficient for young calves as long as proper restraint is used to maintain accurate position of the shot. Be aware that bullet ricochet off the skull is still possible with a smaller caliber. The same considerations of safety for the people and animal, proper restraint to minimize stress, and choosing an appropriate technique must be followed.

Confirmation of Death

Following all methods of euthanasia, death must be confirmed using a combination of the following criteria:

- Lack of heartbeat
 - When evaluating the presence of a heartbeat, it is suggested to use a stethoscope placed on the thoracic cavity under the left elbow of the animal.
- Lack of respiration
 - Use caution when observing for movement of the chest as an indicator of respiration. An animal that is simply unconscious may have an erratic — or even absent — respiration rate.
 - Observing a lack of respiration and a lack of a heartbeat for more than five minutes is a reliable means of confirming death.
- Lack of a corneal reflex
 - Conscious animals blink when the eyeball is touched.
- Presence of rigor mortis.
 - Rigor mortis alone, or the stiffening of the muscles and body, is the only criteria that confirms death by itself, but will not occur until several hours following death.

It is good practice to continue monitoring the animal for an extended period of time (20-30 minutes) before disposing of the animal. Remember, the most reliable way to confirm death is to use a combination of criteria mentioned above.

Unacceptable Methods of Euthanasia

State laws may outline methods of euthanasia that are unacceptable. Regardless of the presence or absence of regulations, certain methods of euthanasia are unacceptable on the basis of animal suffering and should not be used (partial list):

- Manually applied blunt trauma to the head
- Injection of unapproved chemical substances (such as disinfectants) that are not labeled as euthanasia agents
- Injection of air into a vein

- Drowning
- Electrocution with a 120-volt electrical cord
- Injection of a chemical substance labeled for euthanasia (such as potassium chloride) to a conscious animal that specifically required an animal to be unconscious prior to its use.

Carcass Disposal

State and local regulations govern proper means of carcass disposal – whether animals have been euthanized or died from natural causes. For example, in South Dakota, the South Dakota Animal Industry Board (SD AIB) regulates the guidelines for on-farm disposal of animal carcasses. Several options exist for on-farm carcass disposal:

- Bury
- Burn
- Render
- Compost (with approval).

Producers should become familiar with state and local carcass disposal regulations that apply to their situation. In South Dakota, a carcass should be removed within 36 hours after an animal dies (SD AIB, 2011).

When choosing to bury carcasses, it is first necessary to determine that there are no buried lines, pipes, or cables in the area to be excavated. Free services exist to aid in detection of these buried structures; for example, in South Dakota, SD One Call at 1-800-781-7474 or Dial 811 can be called to schedule a survey of the location. Burial sites should be located somewhere that is accessible during various climate conditions, aesthetically acceptable, and not in close proximity to common public areas. Burial sites should typically be 1000 feet from water sources (natural or manmade) or occupied dwellings. Other limitations exist concerning roadways, property boundaries, aquifers, and the type of subsurface soil/gravel when determining an acceptable burial site. To achieve compaction of the soil, at least four feet of soil should cover the burial site. Some maintenance will need to be done to prevent water from collecting over the burial site, and additional soil will need to

be added as the ground sinks from carcass decay and compaction.

Burning, or incineration, should follow local ordinances and local fire departments should be notified before beginning. State and local regulations also govern choices for fuels for fires. For example, in South Dakota, tires, railroad ties, or treated wood are unacceptable fuels for open fires. A burn site should be located at least 1000 feet from flammable substance containers and occupied dwellings. The fire's smoke plume should be monitored to minimize the impact on neighbors or highways and aircraft traffic. Weather conditions may prevent or postpone carcass disposal since wind and dry conditions are not suitable for burning.

Calling a licensed rendering plant service may be an option in some areas. Carcass removal should be scheduled within 36 hours of animal death. A complete list of rendering companies can be attained from the governing agency that manages carcass disposal for the area. Remote, rural areas such as the western half of South Dakota have comparatively limited access to rendering services.

Composting carcasses on-farm is another disposal option that may be considered. Composting is only effective when the right types and amounts of substrates are used in the right conditions and when compost piles are correctly managed. In South Dakota, operations may be permitted to compost animal carcasses only when approved by the SD AIB.

In summary, when dealing with losses of livestock and their proper disposal, it is important to be familiar with all current local and state regulations. Producers should be considerate of the general public within viewing distance of disposal sites. These citizens may be concerned about the cause of the animal's death and the effects on human health or the environment and natural resources. Polite, honest communication, even about difficult topics such as the death of an animal, is an opportunity to build trust with the general public, particularly those not directly involved in raising animals for the food supply.

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