

# Practice Tips

*Moderator - Arden Nelson*

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## Practical and Humane Bovine Euthanasia

**Don L. Gardner, DVM**

*Gardner Bovine Veterinary Service  
Huddleston, Virginia*

Most bovine veterinarians will encounter situations where an animal is unlikely to respond favorably to treatment. For both humane and economic reasons veterinarians should assume leadership and advise their clients with realistic predictions about expected outcomes for such animals. The likelihood of treatment success, the potential for animal suffering, the presence of drug residues, and the low probability of passing market inspection are considerations that can make humane euthanasia of a patient the best available option. Too often this decision is postponed, resulting in animal suffering as well as further economic loss for the owner.

Our oath as veterinarians compels us to relieve suffering, and the conduct of humane euthanasia is one of the means available to meet this commitment. There are several methods of euthanasia available, each with its advantages and disadvantages. It is important for the bovine veterinarian to be appraised of these methods in order to choose the best option for a given situation.

After accepting the responsibility of performing a safe, quick, and humane euthanasia, it is imperative that the attending veterinarian confirm death prior to leaving the scene. Absence of breathing, heartbeat and corneal reflex should be confirmatory if they persist for 4 to 5 minutes.

Euthanizing agents cause death by three basic mechanisms: (1) hypoxia, direct or indirect; (2) direct depression of neurons vital for life function; and (3) physical disruption of brain activity and destruction of neurons vital for life.

Agents that induce death by direct or indirect hypoxia can act at various sites and can cause unconsciousness at different rates. For death to be painless and distress-free, unconsciousness should precede loss of motor activity (muscle movement).

The second group of euthanizing agents depress nerve cells of the brain, inducing unconsciousness followed by death. Death is attributable to hypoxemia following direct depression of respiratory centers and/or cardiac arrest.

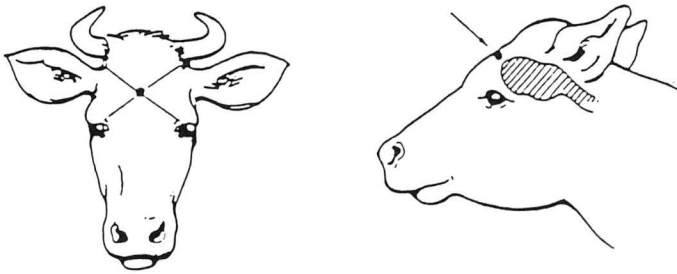
Physical disruption of brain activity, caused by concussion, direct destruction of the brain, or electrical depolarization of the neurons, induces rapid unconsciousness. Death occurs because of destruction of midbrain centers controlling cardiac and respiratory activity.

According to the guidelines established by the AVMA Panel on Euthanasia in their report in 1993, euthanasia techniques should result in rapid unconsciousness, followed by cardiac or respiratory arrest and ultimate loss of brain function. In addition, the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness. The following methods meet these criteria, and so are generally the preferred methods for euthanasia of cattle.

### *A. Gunshot to the Brain*

This method seems to be the method of choice for many bovine practitioners. It is cheap, instantaneous, does not require intimate contact with the animal and if done skillfully is as humane a method as is available.

The shot should be aimed towards the brain at a point determined by the intersection of two imaginary lines each drawn from the inside corner of the eye to a point a little above and behind the opposite ear (or to the base of the opposite horn) (*see diagram*). Practical experience has shown that a .22 - caliber firearm loaded with long rifle ammunition is sufficient for most cattle. A larger caliber should be used on large bulls. Bullet entry angle should be as close to perpendicular to the front of the skull as practical to prevent the possibility of ricochet and to effect the most destruction of CNS tissue.



Great care must be taken to ensure there is no danger to ourselves, to other people, or other animals.

Limitations are that some areas (IE: cities) may have prohibitions against the discharge of a firearm. Permits may be required for possession of handguns and maintaining security of the firearm is necessary. This is not the method one should use if brain tissue samples are desired for culture or histopathology.

#### B. Penetrating Captive Bolt Gun

As with gunshot the penetrating captive bolt kills by concussive force and brain/brainstem tissue destruction by penetration of the bolt. The same location on the front of the head is used as described for gunshot. The captive bolt gun must be placed firmly against the skull prior to actuation of the bolt by discharge of blank cartridge.

To have consistent performance with a captive bolt gun it is absolutely critical that the maintenance and cleaning instructions provided by the manufacturer be followed exactly to maintain hitting power of the gun. Poor gun maintenance is a major cause of poor stunning, in which more than one shot is required.

Penetrating captive bolt guns can be obtained from Koch Supplies, Kansas City, 800-456-5624. The Koch Magnum is a good one. Another source is Hantover, Kansas City, 800-821-2227. The Schermer model ME is good. Packers Engineering Equipment Co. Omaha, 800-279-7326 also sells captive bolt guns.

Limitations are that the operator must be very close to the animal and physically hold the gun against the skull. If the animal is aggressive or wild this may

require physical restraint or sedation with xylazine or acepromazine. This also would not be a good choice if brain tissue is desired for culture or histopathology. However, the captive bolt can be safer than a gunshot and the cost of use is very low.

#### C. Barbiturate Overdose

Intravenous administration of an overdose of barbiturates has been held as the gold standard of euthanasia methods. It possesses many of the required characteristics of a desired agent. It has rapid onset of action and unconsciousness progresses to anesthesia. With an overdose, deep anesthesia progresses to apnea, owing to depression of the respiratory center, which is followed by cardiac arrest.

Limitations with this method mainly revolve around the bureaucratic nightmare of record keeping and security control that controlled substances require. Most of the strictly bovine practitioners with whom I am acquainted do not want to contend with these problems. The cost of an adult bovine dose of barbiturates is an added deterrent to their use. Carcasses of animals euthanized by barbituric acid derivatives or other chemical agents may contain potentially harmful residues. These carcasses should be disposed of in a manner that will prevent them from being consumed by human beings or animals.

**There is a real need for an acceptable, low volume, reasonably priced IV euthanizing agent that is not a controlled substance. The AABP animal welfare committee would like to encourage research, development and marketing of such an agent.**

#### D. Exsanguination

Exsanguination can be used to ensure death subsequent to stunning, sedation or anesthesia. Because anxiety is associated with extreme hypovolemia, exsanguination must not be used as a sole means of euthanasia. Since a pool of blood on the ground is not esthetically pleasing or desirable, transrectal severance of the caudal aorta with the blood pooling in the abdominal cavity can be a client friendly method to use. This method following heavy sedation with xylazine requires the least amount of financial investment and may be the one of choice where brain cultures or histopathology is required following euthanasia. Also, when discharge of a gun is prohibited or undesirable this route can be very applicable.

#### E. Other Methods

Electric stunning is not recommended for use in research facilities or on farms. Stunning and euthanasia by electrocution is acceptable only conditionally, because special skills and equipment are required. Restraint equipment is required to hold the

animal so the electrodes can be placed in the correct position. Use of an electric cord plugged into 115 V house current is not acceptable and the risk to human safety is high.

Agents that induce muscle paralysis without unconsciousness are condemned as sole agents for euthanasia (e.g. Succinylcholine, strychnine, nicotine, magnesium or potassium salts).

Other substances that can kill when administered intravenously (Nolvasan, formalin, etc.) cannot be recommended until research shows they fulfill the

requirement of unconsciousness prior to cessation of respiration or cardiac arrest. However any method is acceptable if preceded by unconsciousness.

### References

1. Andrews, E J, Bennett, Clark, J D, *et al.* "Report of the AVMA panel on euthanasia", *Journal of American Veterinary Medical Association*, 1993; 202: pg 229-249.
2. Grandin, T, "Euthanasia and slaughter of livestock", *Journal of American Veterinary Medical Association*, 1994; 204: pg 1354-1360.
3. *Code of Recommendations and Minimum Standards for the Emergency Slaughter of Farm Livestock*, State of California, Animal Welfare Advisory Committee, December, 1996, pg 16.

## FOR YOUR LIBRARY

Fertility and Obstetrics in Cattle (Second Edition)  
**D.E. Noakes**

*Fertility and Obstetrics in Cattle* is intended as an immediate source of reference and information for veterinary students, veterinary surgeons and anyone working with cattle. The information is presented concisely and clearly, making the book an ideal reference. Extensive lists of further reading are also provided.

This Second Edition has been updated throughout with new material including the use of transrectal diagnostic ultrasonography. As veterinary practitioners play a major role in dealing with

subfertility in cattle, a greater emphasis is placed on solving such problems in dairy herds, and reference is made to the latest data on infectious agents and their effects on reproductive performance.

**ABOUT THE AUTHOR: D.E. Noakes, BVetMed, PhD, FRCVS, is professor of veterinary obstetrics and diseases of reproduction, Royal Veterinary College, University of London.**

Iowa State Press, Ames, Iowa 50014-8300;  
Tel. 1-800-862-6657 ext. 624; Fax 1-515-292-3348