Wisconsin Veterinary Diagnostic Laboratory
UNIVERSITY OF WISCONSIN–MADISON

Large Animal Humane Euthanasia Guidelines

(Provided by UW School of Veterinary Medicine)

Alternative Chemical Euthanasia Protocols: Equine and Bovine Patients

Note #1: These are suggested doses and agents – every patient is unique and doses of each agent may need to be adjusted according to clinical indication and the safety of personnel involved in the procedure. For example, very-compromised animals may need lower doses; on the other hand, extremely excited or stressed animals may need higher doses.

Note #2: The use of potassium chloride is UNACCEPTABLE in conscious animals. Refer to the AVMA Guidelines for the Euthanasia of Animals: 2020 Edition for further information (https://www.avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf).

SEDATION

Equine: Xylazine (1.0-1.5 mg/kg IV)

Bovine: Xylazine (0.1-0.5 mg/kg IV)

Ensure adequate sedation (ear/head drooping, reduced muscle tone [tongue/tail/neck relaxation], reduced activity to stimuli). Then follow with:

ANESTHETIC INDUCTION

Equine and Bovine: Ketamine (2.2-5.0 mg/kg IV) and Midazolam (0.1-0.2 mg/kg IV)

Ensure a surgical plane of anesthesia (loss of consciousness, reflexive muscle responses [lateral recumbency], and response to noxious stimuli). Then follow with:

EUTHANASIA

Potassium chloride (75-150 mg/kg IV quickly)

Potassium Chloride (KCL) can be purchased for injection or made from salts widely available at pharmacies, grocery stores or feed mills. Check the label for ingredients as you MUST use chemical or food grade 100% KCL. Because it is used to euthanize an animal, it does not need to be filtered or sterilized. The dosage needed for KCL euthanasia (under anesthesia) is 75-100 mg/kg, which will require substantial volumes of KCL. KCL as a saturated solution can be made with 35.5g of KCL in 100 mls of water. Super-saturated solutions can be made but are difficult to maintain in solution. Precipitated salts will clog catheters and needles (especially in cooler weather) so we do not recommend using more than a saturated solution of KCL. Always have more KCL solution than needed to ensure proper and humane euthanasia under AVMA guidelines.

ALWAYS have extra potassium chloride syringes readily available if the above is inadequate.

ALWAYS be aware of the effects associated with injected potassium solutions such as muscle twitching, tremors, and gasping.

NEVER administer potassium chloride to an animal that is not in a surgical plane of anesthesia.

If adequate sedation or anesthesia is NOT achieved with the above doses, additional sedation with xylazine (equine: 1.0 mg/kg IV; bovine: 0.1 mg/kg IV) or anesthesia with ketamine (2 mg/kg IV) and midazolam (0.1 mg/kg IV) may be given. ALWAYS be prepared to administer higher initial doses if there is any question.

Use Of Captive Bolt for Humane Euthanasia of Large Animal Species

Following sedation, as previously described, bovine patients may be euthanized by penetrating captive bolt. Personnel performing captive bolt euthanasia should be familiar with the technique as described in the AVMA guidelines for the euthanasia of animals (https://www.avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf).

Excerpts from AVMA Guidelines for the Euthanasia of Animals (2020):

POTASSIUM CHLORIDE AND MAGNESIUM SALTS, p. 36: 'Personnel performing this technique must be trained and knowledgeable in anesthetic techniques, and be competent in assessing the level of unconsciousness that is required for administration of potassium chloride and magnesium salt solutions IV. Administration of potassium chloride or magnesium salt solutions IV requires animals to be in a surgical plane of anesthesia characterized by loss of consciousness, loss of reflex muscle response, and loss of response to noxious stimuli.'

RUMINANTS, p. 67-68: 'While not acceptable as a sole method of euthanasia, rapid IV injection of potassium chloride may assist in ensuring death after cattle have been rendered unconscious by penetrating captive bolt, gunshot, or administration of general anesthetics (a-2 adrenergic agents such as xylazine alone are insufficient; see comments under Unacceptable methods).'

EQUINE, p. 78: 'Recently, rendering plants and landfills have refused equine carcasses euthanized with pentobarbital. For this reason, adjunctive methods should be considered. Anesthetizing the equid with xylazine – ketamine should be followed by one of the following: (1) saturated solution of potassium chloride injected IV or intracardially; (2) saturated solution of magnesium sulfate injected IV; or (3) 60 mL of 2% lidocaine injected intrathecally. Each of these performed in an equid in a deep surgical plane of anesthesia is an acceptable method to invoke cardiac arrest and death.'