FVE/ FEEVA Best Practice Protocol for Euthanasia of horses 2021

FVE/2021/PP/003
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1. Introduction

This is a technical document for vets on best practice techniques for horse[1] euthanasia, it is an addendum to the broader paper, FVE/FEEVA End of Life for horses, which covers more ethical aspects of horse euthanasia.

When horses need to be euthanised, there are several matters to consider. A method of euthanasia is only acceptable when its effect is guaranteed. It must cause loss of consciousness before cardiac or respiratory arrest. Loss of consciousness can be achieved through medical suppression or mechanical disruption (captive bolt, free bullet/gunshot).

Secondly, human safety during euthanasia should be addressed because of the potential hazards and unpredictability of the procedure.

Finally, proper disposal of the carcass after euthanasia should be arranged and considered prior to selecting the method of euthanasia.

In general, veterinarians performing euthanasia must assess and attempt to minimise the potential for animal distress due to physical discomfort or surroundings. A horse should be properly identified, and owner consent verified before euthanizing a horse, except in the cases where the welfare of the animal is severely compromised and the owner cannot be contacted. Euthanasia should always be according to applicable law.

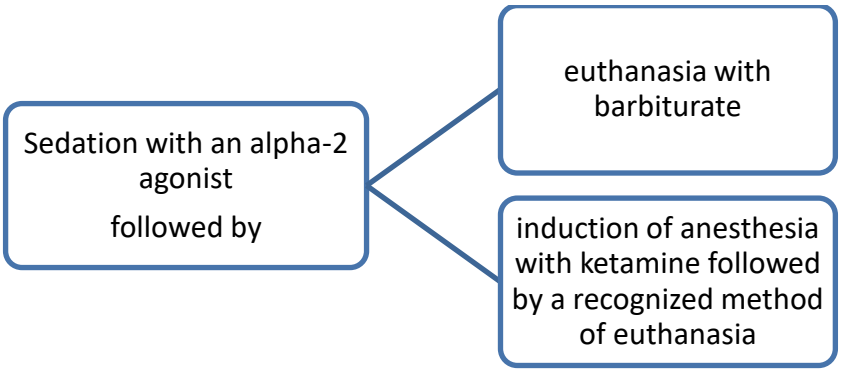
Bystanders and horse handlers should always be instructed on safety measures and the course of events before the horse is euthanised.

2. Recommended options for euthanasia of horses

A. Sedation with an alpha-2 agonist followed by euthanasia with barbiturate solutions (or combinations)

B. Sedation with an alpha-2 agonist followed by induction of anesthesia with ketamine followed by a recognized method of euthanasia

[1] This protocol is specifically for horses and ponies. It does not cover other equids.



2.1 Recommended medications for medical euthanasia of horses

- Sedation

  An alpha-2 agonist is essential, one of the following options could be used:
  - Detomidine 0.01-0.02 mg/kg
  - Romifidine 0.04 0.08 mg/kg IV
  - Xylazine 0.5-1.0 mg/kg IV

  Acepromazine can be considered
  - Acepromazine 0.05-0.1 mg/kg

- Induction of general anaesthesia
  - Ketamine 2.0-2.2 mg/kg IV.
    (Ketamine can be combined with benzodiazepines such as Midazolam or Diazepam 0.05-0.1 mg/kg IV)

- Euthanasia solutions (overdose of barbiturates or authorised barbiturate combinations)
  - Pentobarbital 44-140 mg/kg IV administered as a bolus (quickly)*
  - Somulose: combination of barbiturate and cinchocaine hydrochloride administered slowly over 15 seconds**

Placement of a catheter to secure intravenous access throughout the procedure is strongly recommended.
The effect of sedation and induction agents should be monitored until the desired effect of deep sedation is achieved, before injection of any euthanasia solution.
The dosage used will vary depending on the circumstances under which euthanasia is being performed, e.g. the dosage required in an emergency euthanasia on a racetrack is higher than required in elective euthanasia in a horse's own familiar surroundings.
Sedation and/or anesthesia assist in achieving the best conditions for euthanasia. It must be recognized that sedatives or anesthetics given at this stage can lower the blood pressure and may delay the onset of the euthanasia agent.

*Recommended dosage varies between national authorisations (SPC) across Europe. According to research, 67 mg/kg is an adequate dose to obtain cardiac arrest.

**Recommended dosage according to the individual mixture. Cinchocaine hydrochloride is similar to lidocaine hydrochloride.

2.2 Use of barbiturates and barbiturate combinations

An intravenous overdose of barbiturates is the method of choice, it reliably causes a quick loss of consciousness and death with the minimum amount of pain and distress for the animal.

Barbiturates depress the central nervous system (CNS) in descending order beginning with the cerebral cortex and resulting in inducing a loss of consciousness, progressing to general anaesthesia. With an overdose, apnoea due to depression of the respiratory centre is followed by cardiac arrest.

Considering the safety of people involved, sedation of the standing horse or induction of general anaesthesia should be instituted before injection of barbiturates. Direct intravenous administration without prior premedication or induction of general anaesthesia does lead to loss of consciousness before induction of cardiopulmonary arrest, however it can cause induction of excitation and the horse to fall backwards abruptly.

Due to the injection volume of barbiturates and because it should be given strictly intravenously, secure intravenous access should be obtained, for example, by using an intravenous catheter.

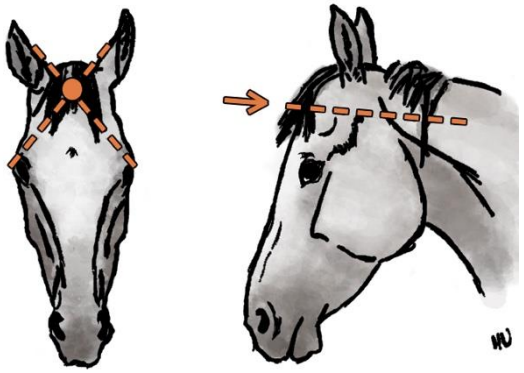
The commercial barbiturate combination products are usually interchangeable with pure barbiturates.

However, the combination of *pentobarbital with a neuromuscular blocking agent (NMBA)* **is NOT ACCEPTABLE** because of the potential for the NMBA to induce paralysis prior to the onset of unconsciousness.

2.3 Other humane methods for euthanasia of horses

- Penetrating Captive Bolt followed by bleeding or pithing

The physical damage to the brain is followed by an instant loss of consciousness, while the subsequent bleeding, pithing or injection of euthanasia solution will cause death. Motor activity may continue and can be dangerous.



The technique requires skill, adequate restraint and proper placement of the captive bolt, and should only be performed by well-trained personnel.

Appropriate licences can be mandatory.

2.4 Methods of euthanasia of horses that are considered conditionally[2] acceptable

- Potassium Chloride or Magnesium Sulphate *ONLY under general anaesthesia*

A saturated solution of potassium chloride (dosage 75-150 mg/kg IV) or magnesium sulphate (2 ml/kg IV) will induce cardiac arrest.
A saturated solution of potassium chloride can be made with 355g KCl in 1l of water. Clonic spasms and muscle fasciculations may occur if given to conscious animals.
A saturated solution of magnesium sulphate (Epsom salt) can be made with 360g $MgSO_4$ in 1l of water at 20 ^oC.

!! Potassium chloride and magnesium sulphate are not controlled substances and are not approved for euthanasia of animals in many countries !!

- T61 *ONLY under general anaesthesia*

T61 is a commercially available combination of embutramide, mebezoniumiodide, tertracainehydrochloride. Embutramide causes unconsciousness and respiratory depression and mebozoniumiodide causes muscular paralysis. Only to be used under general anaesthesia to avoid the effects of mebezoniumiodide prior to loss of consciousness.
Excitation and distressed vocalisation are described when given to conscious animals because it is painful when injected.

- Intrathecal lidocaine *ONLY under general anaesthesia*

Administration of 2% lidocaine hydrochloride at a dosage of 4 mg/kg administered within 30 seconds. The method is only to be used by veterinarians experienced with intrathecal injections.

- Gunshot to the head (free bullet)

A gunshot to the head is considered acceptable if performed by a skilled and licensed person.

According to EU regulation 1099/2009 regarding methods of stunning for slaughter of animals, it is permissible to use a firearm with free projectile to cause severe and irreversible damage to the brain in the case of slaughter.

3. Confirmation of death

Regardless of the method of euthanasia used, death must be confirmed before disposal of the animal. The following should be used to evaluate consciousness or confirm death:

1. Lack of a heartbeat (auscultation of the heart)
2. Lack of respiration (movement of thorax and airflow in nostrils)
3. Lack of corneal reflex (touching the surface of the eyeball for corneal reflex)

[2] Please always follow national legislation. Some countries do not allow certain of these conditional methods.

4. Disposal of the carcass

After euthanasia, disposal of the carcass remains must be carried out through appropriate measures ideally at a destruction plant or cremation, and always according to applicable law.
If carcasses are allowed according to national legislation to be left in the field, a penetrating captive bolt, a gunshot to the head (with a bullet that does not contain lead), or a nontoxic injectable agent (potassium chloride after induction of anaesthesia with a non-toxic general anaesthetics) should be used.

There are potential environmental hazards associated with carcasses left in the field containing harmful residues from other chemical euthanasia methods (e.g. barbiturate overdose) such as being consumed by scavengers or predators.

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