Euthanasia

8

8.1 Introduction

What is euthanasia?

When suffering cannot be alleviated by any other means euthanasia is the only humane solution. Working equids may otherwise suffer a prolonged and painful death by abandonment, neglect or disease; an acute, painful death such as being eaten by wild animals (e.g. hyenas), or hit by a road vehicle. Euthanasia is therefore the humane method of ending an animal's life in the most pain-free and least stressful way possible.

> Euthanasia is the humane method of alleviating animal suffering in cases of chronic or incurable disease, pain or injury.

When making clinical decisions regarding euthanasia, consider the following:

- Owner involvement, discussion and consent
- Methods of humane destruction
- Disposal of animal carcasses
- Support for owners
- Staff support

In many cases the owner may refuse euthanasia for various reasons:

- Cultural
- Religious
- Economic
- Lack of recognition of the pain and suffering of the animal
- Peer pressure from family or neighbours
- Desperation at losing a work animal, a significant financial asset
- Belief that the animal will get better

It is the veterinarian's job to spend time with the owner explaining the animal's current welfare status and prognosis, and to educate the owner in understanding the reasons for proposing euthanasia.

The chosen method of euthanasia will depend on availability, country, the skill or preference of the veterinarian and options for carcass disposal.

Methods of euthanasia

8.2

Any method chosen must fulfil the following criteria (Jones 1992, Knottenbelt 1995):

1. Effect a quick reliable death without pain
2. Cause rapid loss of consciousness, with minimum stress
3. Be safe for human operators and the public
4. Be non-reversible
5. Be economic
6. Be easy to handle, store and administer

Physical methods

Free bullet

A properly placed gunshot can cause immediate insensibility and humane death. In some circumstances, a gunshot may be the only practical method of euthanasia.

> Shooting should only be performed by highly skilled personnel trained in the use of firearms and only in jurisdictions that allow for legal firearm use.

Personnel, public, and nearby animal safety should be considered. The procedure should be performed outdoors and away from public access.

When euthanasing an animal by a gunshot to the head, the firearm should be aimed so that the projectile enters the brain, causing instant loss of consciousness. The appropriate firearm should be selected for the situation, with the goal being penetration and destruction of brain tissue without emergence from the contra lateral side of the head. A .22-calibre long rifle, a 9 mm or .38-calibre handgun will be sufficient for most equids. The use of hollow-point or soft nose bullets will increase brain destruction and reduce the chance of ricochet.

Note the following advice:

- If the animal cannot be handled in a safe manner it should be sedated in advance of shooting.
- Have two spare bullets immediately available in case the first one does not kill the animal.
- Load one bullet at a time, do not preload all bullets into the gun in advance of shooting the animal because, if an animal is not killed with the first shot and in panic a second shot is fired inappropriately, this can be a major hazard to personnel.
- The person shooting the animal needs to be aware of his/her safety as he/she will need to be standing directly in front of the animal to ensure an accurate shot. The animal may fall forward when shot, so be ready to move quickly out of the way.
- The person firing the gun should also be in charge of holding the animal (e.g. via the lead-rope); there should be no other personnel or animals in the firing line.
- Imagine a line between the medial canthus of each eye and the base of each ear, forming a cross (Figure 8.2.1). The correct place to shoot a horse is around 2–3 cm above the point where the lines cross; 1–2 cm for a donkey.

- The firearm should be aimed directly down the neck, perpendicular to the front of the skull, and held just away from the point of impact (Figure 8.2.2). It is important that the gun is not held in contact with the animal's head as this will not allow for the escape of muzzle gases.

Penetrating captive bolt

A penetrating captive bolt fires a retractable bolt several inches into the skull of an animal. Although it is reported that, when used properly, a penetrating captive bolt gun produces immediate brain tissue destruction and death in the animal, in practice this is not consistent. In other species it is normally recommended that pithing (destroying the brainstem mechanically using a rod inserted through the hole made by the captive bolt) should follow the use of a penetrative captive bolt.

> It should be the standard requirement with this method of euthanasia in equids that pithing is always carried out following use of a penetrating captive bolt.

Non-penetrative captive bolts (which have a mushroom-shaped end and do not make a hole in the skull) are not suitable for euthanasia of equids.

Before using the penetrative captive bolt for euthanasia, staff must be trained both in using and maintaining it, and in the technique of pithing. Furthermore, all those present during this procedure should understand the procedure and that the animal may show violent reactions while being pithed (although this is purely due to brainstem destruction and no pain is experienced by the animal).

Figure 8.2.1 Imagine two lines drawn from the base of the ears to the medial canthi of the eyes. Aim to shoot a horse 2–3 cm above the place where the lines cross (white cross in photograph), and a donkey 1–2 cm above the cross.

Figure 8.2.2 Black arrow showing the direction of aim of a firearm or captive bolt.

Captive bolts are powered by gunpowder, thus the selection of the cartridge strength should be appropriate for the size of the animal (adult versus foal); this varies among manufacturers. The penetrating captive bolt gun should be placed firmly against the skull at the same location previously described for gunshot. If the captive bolt is not in firm contact an incomplete stun may occur. Equids must be adequately restrained and, ideally, sedated to ensure proper placement of the captive bolt.

Pithing should be carried out immediately after firing the captive bolt. Animals will show spasms immediately following use of the captive bolt; however this must not delay the operator in pithing as quickly as possible. Ideally a specially designed pithing rod should be used. If this is not available a straightened metal coat hanger, a knitting needle, or other similar stiff rod of sufficiently small diameter to pass into the brain cavity through the captive bolt entry hole may be used. The pithing tool is introduced into the brain cavity and down into the spinal canal. Thrusting movements are used to ensure rapid and complete destruction of the brainstem. The animal may thrash violently while this is carried out: this is a result of the stimulation/ destruction of nervous tissue rather than a sign of pain.

Severance of the aorta

This technique is not advocated as it can be highly dangerous for the operator as death may be violent. It involves cutting the aorta per-rectum and should only be attempted as a last choice if the animal is already anaesthetised (Knottenbelt 2006).

Pharmacological (chemical) euthanasia

In general this will consist of 2 steps:

1. Sedation or general anaesthesia of the animal
2. Administering an agent to kill the animal

Several different agents can be administered to kill the animal, and the depth of anaesthesia necessary for each agent varies.

It is essential that, before administering any agent that brings about death by cardiac arrest (e.g. saturated potassium salt solutions), the animal should be fully anaesthetised.

Cardiac arrest is extremely painful and sedation alone is not sufficient.

When using pharmacological agents for euthanasia, it is important to consider the impact on carcass disposal as agents may present a risk to the environment and may also make the carcass toxic to any animal that might feed on it.

In all cases, it is important to ensure that all drugs are drawn up and ready before starting the euthanasia procedure. Pre-placement of a jugular catheter (preferably 14G) is also necessary due to the large volumes of drugs that need to be injected.

Barbiturates

- Pentobarbitone sodium
- Thiopentone (see below in conjunction with KCl)

When properly administered by the intravenous route, barbiturate overdose depresses the central nervous system, causing deep anaesthesia progressing to respiratory and cardiac arrest. However, barbiturates can cause sudden or violent falls if administered too slowly or in insufficient quantities (see Table 8.2.1 for reported doses). Thus, the use of sedatives is advised (e.g. xylazine or detomidine) prior to the barbiturate overdose to minimise violent thrashing and provide more controlled progression to recumbency. Barbiturate overdose is less disturbing to observers (more aesthetically acceptable). It is relatively inexpensive.

> Ensure a catheter is placed as large volumes are needed.

In many countries, barbiturates may not be available or may be subject to specific legislation. Furthermore, carcass disposal after using them can be especially difficult as the drug persists in the carcass and may cause sedation or even death of animals that consume the body.

Drug	Dose	Reference
alpha2-agonist (e.g. xylazine)	See Table 7.1.2	See Table 7.1.2
pentobarbitone sodium	Range from 20–30 mg/kg to 40 mg/kg	Jones 1992, Knottenbelt 2006

Table 8.2.1 Reported dose rate of pentobarbitone sodium for euthanasia.

Potassium chloride

> Use of potassium chloride for euthanasia is unacceptable unless the animal is fully anaesthetised (Jones 1992).

The use of a supersaturated solution of potassium chloride injected intravenously (or, as a last course of action, intracardiac) in an animal under general anaesthesia is an acceptable method to produce cardiac arrest and death. For reported doses see table 8.2.2.

The high concentration of potassium ions is cardiotoxic, and rapid intravenous (or intracardiac) administration of 1–2 mmol/kg of body weight will cause cardiac arrest. This is the preferred injectable technique in situations where there is any risk that carcasses of euthanased animals may be consumed.

Potassium chloride is not a controlled substance. It is easily acquired, transported and prepared for use in the field. However, it is of the utmost importance that personnel performing this technique are trained and knowledgeable in anaesthetic techniques, and are competent in assessing the anaesthetic depth appropriate for administration of potassium chloride intravenously.

> Administration of potassium chloride intravenously requires animals to be in a surgical plane of anaesthesia characterised by loss of consciousness, loss of reflex muscle response, and loss of response to noxious stimuli.

Saturated potassium chloride solutions are effective in causing cardiac arrest following rapid intracardiac or intravenous injection. The residual tissue concentrations of general anaesthetics after anaesthetic induction have not been documented. No toxicoses have been reported in wildlife scavengers that might access and consume carcasses euthanased with potassium chloride in combination with a general anaesthetic. However, proper carcass disposal should always be attempted to prevent possible toxicosis by consumption of a carcass contaminated with general anaesthetics.

Drug	Dose	Reference
Thiopentone	5–11 g/kg	Abass et al. 1994, Muir and Scicluna 1998
Potassium chloride	1–2 mmol/kg	AVMA 2007

Table 8.2.2 Reported euthanasia protocol using thiopentone and potassium chloride.

Cinchocaine and quinalbarbitine

Available as a single preparation for use with or without prior sedation. Do not use with xylazine as violent reactions can occur which then negatively affect the procedure (Knottenbelt 1995). It is not available in all countries; however, when used correctly, injected over a period of 12–15 seconds, collapse occurs within 40 seconds and death within 2–3 minutes (Knottenbelt 1995).

Other injectable agents

- Magnesium sulphate Saturated solution administered after sedation (xylazine) and anaesthesia (thiopentone) has been induced – although condemned for use in equids by the AVMA (2007).
- Chloral hydrate Do not use as sole agent – large volumes are needed, at least three times the anaesthetic dose (Jones 1992).
- Muscle relaxants e.g. suxamethonium (succinylcholine at 0.1 mg/kg) – Never use in isolation, but it can be combined with or given shortly after barbiturates (thiopentone 10 mg/kg), or ketamine, to produce death (Jones 1992, Jones and Knottenbelt 2001, Knottenbelt 2006).

In some countries, none of the above agents is available and other agents will need to be sourced. In these cases, the considerations discussed above still apply. The methods should be discussed within the veterinary team with advice sought externally if required. Always consider the effectiveness of the agent, training of staff, the welfare and experience of the animal, and carcass disposal.

Confirmation of death

Confirmation of death is essential.

Immediately following delivery of the euthanasia method a standing animal should collapse. It may experience a period of muscle contraction (usually no longer than 20 seconds). This may be followed by a period of relaxation and some poorly coordinated kicking or paddling

movements. The pupils of the eyes will be fully dilated. The animal must be checked within 5 minutes to confirm death (Figure 8.2.3).

> Death may be confirmed by the absence of breathing, absence of a heartbeat (pulse), and absence of a corneal reflex (blinking).

To check the corneal reflex, touch the animal's cornea (surface of the eye). There should be no response if the animal is dead. The presence of any eye movement or blinking at this time is evidence of sustained or recovering brain activity; repeat the same or an alternative euthanasia procedure.

Figure 8.2.3 Check and confirm death of the animal.

Agents that should not be used for euthanasia in equids

- Strychnine
- Hydrogen cyanide
- Nicotine

All of these hypoxic agents are very dangerous to the humans administering them (Jones 1992). Strychnine and hydrogen cyanide both produce violent convulsions before death, and nicotine also produces undesirable stimulation of the central nervous system.

Case study – Euthanasia

8.3

Location Gujranwala, Pakistan

Attending veterinarian Dr Javed Iqbal Gondal

History

Type of work animal was doing: Transportation of goods by carriage or cart in the city area

Number hours per day/days per week the animal worked: 12 hours per day, 6 days per week

Name and age of animal: Rambo, a 22-year-old donkey

It was an extremely hot humid day. The veterinarian encountered Nisar Ahmad and Rambo at the road side. The cart was loaded with heavy goods and the animal was in a terrible condition. Nisar Ahmad was going to the bazaar to unload the goods in a shop; he also had other goods for transportation for the rest of the day. But Rambo was suffering considerably.

Clinical examination findings

Rambo was lame, unable to walk properly and over-loaded; Rambo was not able to work properly (Figure 8.3.1). His owner forced Rambo to work which was very difficult for the animal.

Problems seen:

- Eye problems/poor eye sight
- Very bad lip lesions at both commissures
- Incisor over-bite
- Irregular molars
- Deformed limbs and bowed tendons
- Arthritis of all four fetlock joints
- Thrush in both hind feet
- Severe lameness
- Bronchitis
- Fistulous withers

Figure 8.3.1 Initial examination at the roadside.

Diagnosis

Rambo was in considerable suffering and pain, with multiple chronic conditions and an inability to continue working.

Initial treatment

Analgesia was given to Rambo and the owner was asked to meet the veterinarian the next day for further discussion.

Follow-up

The next morning, the veterinarian visited Nisar Ahmad's home and saw Rambo. There was no proper shade or shelter and water for Rambo. Examination showed all of Rambo's welfare needs were compromised including the above list plus multiple galls and severe dehydration.

After a long discussion, the owner was persuaded that Rambo was unfit for work and in severe pain. He agreed to euthanasia (Figure 8.3.2).

Procedure for euthanasia
The animal was euthanased by chemical injection using the following procedure:

- Firstly, permission taken from owner and consent form signed
- Animal sedated with xylazine 1.1mg/kg IV
- Administered thiopentone sodium 10mg/kg, slow IV
- Followed by saturated solution of magnesium sulphate
- Confirmed death: absence of breathing, heart beat and corneal reflex

Figure 8.3.2 Consultation with the owner on the decision to euthanase, with written consent obtained.

Disposal of carcass
A contract exists with the local municipal committee who collects the carcass and then disposes by proper burial.

Discussion
It can be very difficult to persuade poor equine owners to euthanase their animals. Discussion highlighting the income loss, feeding costs and poor welfare of the animal can help to persuade owners. The owner's wife also played a vital role. The couple have since purchased a new animal.

References

8.4

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Further reading

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