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Richards, Iain  (2024) *Enhancing euthanasia protocols: a compassionate approach in equine and large animal practice*. In Practice, 46 (3). pp. 147-151. ISSN 0263-841X, **which has been published in final form at** <https://bvajournals.onlinelibrary.wiley.com/doi/10.1002/inpr.419> . ***This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Use of Self-Archived Versions. This article may not be enhanced, enriched or otherwise transformed into a derivative work, without express permission from Wiley or by statutory rights under applicable legislation. Copyright notices must not be removed, obscured or modified. The article must be linked to Wiley's version of record on Wiley Online Library and any embedding, framing or otherwise making available the article or pages thereof by third parties from platforms, services and websites other than Wiley Online Library must be prohibited.***

Euthanasia of farm animals

Euthanasia has essential principles of compassion towards owners and gentleness towards patients, ones that apply to all species, regardless of circumstances. That we can ensure a good a death, in sometimes trying circumstances, is something we, as a profession, excel at. However, Farm and Equine work, because of the size of animal and the relatively remote conditions of work do bring additional challenges. This article is based on a presentation given for many years at the SPVS final year seminar and is aimed especially at new or recent graduates. It is more an approach than an absolute instruction manual.

It must be realized that however necessary euthanasia is, we are still killing an animal. An animal that could be a much-loved family pet, one the owner had as a first pony and then saw their own children learn on. While equine work carries similarities with companion animal practice it must be remembered that the human-animal bond also exists in farming. The cow could be a uniquely treasured individual that the farmer remembers showing as a calf under the careful eyes of their grandparents. Aspects like this must not be underestimated and it is why, even on a strict commercial farm, all our skills of kindness and empathy are called for.

The author would suggest there are two key aspects in a successful euthanasia. Firstly, the human aspects of decision making regarding the animal, which for equine work are broadly similar to those in small animal practice. The client may not be expecting euthanasia as a potential outcome even in situations of an old horse, who then becomes recumbent, an owner may need some time or even plead for other options, even though the animal's future quality of life is low to nil. This is where what might be called a "dispassionately professional approach" is valuable. The ability to remain apart from the innate grief of the situation and to keep the conversation fixed on the future for that horse is critical in managing these cases. In farm practice, although the decision is often made on economic grounds and made by the farmer prior to the vet visit, these aspects still need to be considered. The increasing popularity of small-holders and of farm animals as pets creates situations where an animal is kept well beyond its production life, sometimes with a degree of misunderstanding of the animal's needs (see box 1)

Box 1

The Five Welfare Needs (as defined in the Animal Welfare Act 2006)

- *Need for a suitable environment*
- *Need for a suitable diet*
- *Need to be able to exhibit normal behaviour patterns*
- *Need to be housed with, or apart, from other animals*
- *Need to be protected from pain, suffering, injury and disease.*

Note - while this is the legal framework, it is now more usual to talk in terms of the five domains eg <https://www.bva.co.uk/take-action/our-policies/animal-welfare/>

The second aspect of successful farm/equine euthanasia surrounds the practical aspects of performing the euthanasia and of carcass disposal. A route of disposal that involves feeding the carcass to other animals (hounds, zoos) means that shooting is the only route available. However, with some horses and pet farm species, chemical euthanasia can be considered. The law regarding the burial of pets is complex and while a horse can be buried, there are very precise requirements to avoid water course contamination. These should be consulted and discussed with the owner, prior to the actual euthanasia, as should the cost of individual cremation.

Chemical Euthanasia

Most cases will utilise barbiturates, either pentobarbitone (usually 200mg/ml varied manufacturers) or a combination of quinalbarbitone and cinchocaine (Somulose, Dechra). The latter agent is included to cause cardiac arrest more rapidly than barbiturates alone. All the barbiturates are profound cardiac, respiratory and neurological depressants acting central by blocking GABA receptors.¹ The typical sequence of events is muscle relaxation, followed by cessation of breathing and cardiac activity (either by direct depression or anoxia). A consequence of the animal's size is that the relaxation of muscles is less "gentle" than in dogs or cats and can come as a real shock to owners. It is therefore vital to warn owners that the animals can literally crash to the ground. In the author's experience, using good sedation prior to barbiturate reduces this aspect. It is useful to explain to owners that once the agent is administered, the animal is unconscious and so unaware of what is happening – however alarming it may seem to the owner.

Equine

An intravenous cannula is recommended for virtually all equine euthanasia (exceptions being animals in difficult positions due to entrapment or recumbency when one gets intravenous access by whatever means necessary). This ensures accurate injection but also allows for potential top-up doses can be given. The administration time is typically over about 10-20 seconds, but this may vary depending on circumstances and the temperament of the animal. The time to recumbency and death also varies depending on any preexisting conditions or sedative mixtures used that reduce cardiac output.

The use of Somulose has, in some respects made chemical euthanasia easier owing to the smaller volume needed. It has very specific administration requirements (see www.noah.org) as the barbiturate must be given slowly enough to cross the blood brain barrier prior to cardiac arrest occurring.

Anecdotally, it has a reputation for variable effect, although author has found the product similar to pentobarbitone.

Box 2

Potential warning to owners of large animals undergoing euthanasia

Sudden collapse of animal

Violent involuntary movements

Defecation and urination

Reflux of fluid from nose or mouth

Profound bleeding from shot wounds in skull/down nose

Potentially longer to death than cat or dog

Farm Animals

Intravenous injection with a 14G 50mm needle is routine in adult cattle and is sometimes far easier to use than the placement of a cannula. In dairy cattle, the milk veins also provide a very accessible route, especially in recumbent animals. Sheep, goats and camelids have good venous access though the jugular vein. The viscosity of pentobarbitone solutions is quite high, so a 16G needle would be a recommended minimum. As there is some variation in concentration of products, referring to the data sheets is advised. For a reason he can't determine, the author finds sheep peculiarly resistant to pentobarbitone, taking more than one would imagine for their size. The doses for cattle can be 50-100ml, and it is hard to manipulate a 50ml syringe and maintain a steady injection. It is easier (especially if one has smaller hands) to have three or four 20ml syringes preloaded and to inject them in swift succession.

Magnesium sulphate can be used as an adjunct to pentobarbitone, but only in a fully unconscious animal. At times when pentobarbitone has been in short supply (either a manufacturing issue, or simply not enough in the boot) the author has anaesthetised cattle with 30ml barbiturate (200mg/ml) followed by a full bottle of magnesium sulphate intravenously to cause cardiac arrest.

Shooting

The size of many farm animals makes shooting a very common option and is still a viable alternative for horses. A simple piece of advice for new graduates is to get a licensed slaughterman/knackerman to do it. They are highly skilled, even with animals that are moving or difficult to handle. Watch and learn, for there will be situations that they are unavailable, or the euthanasia is needed immediately.

Slaughter v Euthanasia BOX 3

Strictly speaking, slaughter is the killing of a food producing animal through exsanguination – usually throat or thoracic inlet bleeding, following stunning. Animals that are eligible for on farm slaughter have to be those with an acute injury, having no chemical residue, and a carcass fit for consumption.

Captive Bolt

Captive bolts are stunning devices, so an additional means of killing (either pithing or bleeding) is required. A steel rod is fired by a variable explosive charge, which penetrates the skull at high energy, causing instant unconsciousness. It is spring loaded, so returns to within the instrument. The gun should be dismantled and cleaned of blood and tissue to ensure efficient operation. No firearms certificate is needed for purchase or use. If the carcass is intended for human consumption, the animal has to be bled as pithing (the destruction of the hind brain by a rod) is not permitted under legislation.

Firearms

A firearm can be used to both stun and kill owing to the destruction of the hind brain. In consequence, they cannot be used in animals intended for human consumption. Their use is therefore restricted to emergency situations. It is vital that anyone using a firearm has the weapon on their individual firearms certificate, and that the certificate is conditioned for humane dispatch. A firearm certificate must be applied for in using a weapon, even if that weapon is owned by the practice. An FAC is granted by your local police force and owing to long processing times, vets are advised to emphasise the need of the weapon for their work. Readers are also advised to consult the HSA website which is an excellent resource on firearms for on-farm killing www.hsa.org.uk

WARNINGS Box 4

Bystanders such as owners must be warned about the unpredictable nature of large animals during euthanasia.

The use of firearms is inherently dangerous, especially free-bullet weapons. Even a .22 rimfire can travel a mile and ricochet, including within a body, is unpredictable. There are four rules of working with firearms

- 1. Treat every firearm as if it is loaded*
- 2. Never point a firearm at anything unless you wish to destroy it*
- 3. Be aware of your target and what lies behind it*
- 4. Keep your finger off the trigger until you are ready to fire it*

There are, broadly four types of firearm that can be used

Humane Killer

These are either of the Greener Bell type (now discontinued) or a modified pistol, usually in .32 calibre. The Greener was highly effective, but had a disadvantage in that two hands were needed to operate the weapon. The standard single-shot pistol can be operated with one hand, allowing the other hand to hold eg head collar. Both are designed to be used in contact with the skull and some humane killers have to be in contact for the firing mechanism to work.

Adapted Handgun

These are modified to hold one, or at the most two rounds and, as they have not had modifications made to the barrel, should not be used in contact with the skull but from a short distance (5 - 25cm).

To be effective a firearm must generate sufficient kinetic energy for the projectile to enter the skull and penetrate to the hindbrain. A figure of 200J is the minimum recommended for an effective kill. Some of the standard commercial ammunition for hand guns barely reaches this minimum requirement and the author has had poor experiences with a commercial .32 weapon and ammunition combination. His opinion is that a larger calibre of .38 is a more reliable choice for effective humane killing.

Shotgun

All shotguns can be highly effective at humane dispatch. They deliver a relatively heavy projectile with considerable energy and, contrary to perception, produce a neat hole, with the shot dissipating in the skull causing instant death. They can be used at slightly greater distances but the author would recommend this is only for those familiar with the use of such weapons. Most standard shot cartridges are effective in all livestock.

Rifle

Unless one is accustomed to using rifles, these should be the weapon of last resort, with a shotgun preferred in most situations. While highly effective, delivering a bullet at energy levels vastly beyond the minimum, they are weapons of precision and power and the risks of ricochet are high.

Positioning

The target for firearms is the hind brain, a target about the size of an orange. Its position in the skull is lower than most people think. A correctly aimed projectile will penetrate the skull and travel into the spine, a trajectory that also reduces the risk of over penetration and ricochet. Details of the aim points can be found here <https://www.hsa.org.uk/humane-killing-of-livestock-using-firearmsintroduction/introduction-2>

Emergency Euthanasia

As in small animal practice, good preparation and planning will go a long way to ensuring a successful outcome. Having the right equipment in the car and having a good familiarity with it is as vital for euthanasia as the most technically adept anaesthesia. If there is the possibility of using firearms, then the importance of gaining familiarity with the safety features and the handling characteristics cannot be over estimated.

Personal Safety

All animals are unpredictable, those in distress the more so and large farm animals in distress offer considerable challenges. Heavy sedation, even cocktails of alpha-2 and ketamine should be considered prior to the actual act of killing. Recumbent animals should only be approached from the animal's backbone (if in sternal recumbency) to avoid kicks. If using firearms, some form of hearing protection is advised, even twists of cotton wool are better than nothing and running the risk of permanent hearing damage.

While the use of firearms for humane killing carries a sense of the dramatic and potentially "overkill" they are highly effective means of achieving a good death.

Unconsciousness and death are rapid, potentially quicker than with chemical euthanasia. Regardless of the method used, vets must be advocates for the animal first. However, owners' wishes and concerns must be respected. As with small animal euthanasia good planning and effective communication will ensure successful outcomes and create a better scenario should the unexpected occur.



Pictures below in order 1) Cash captive bolt 2) charges for captive bolt 3) Cash .32 with cartridge



References

1. *3+"Enctmg"MY."Vtko "EO0"Xgvgtkpct{"Cpcguvj gukc"G/Dqqm<"Xgvgtkpct{"Cpcguvj gukc"G/Dqqm0"
Rj kncf gnr j kc."WPKVGF"MKPI FQO<"Gnugxkgt"J gcnvj "Uekgpegu="42350