Control method: Ground shooting of feral donkeys

Assumptions:

- Best practice is followed in accordance with the standard operating procedure DON001.
- The shooter is competent and will make accurate decisions about whether the shot can be successfully placed.
- Small mobs are shot often from a vehicle. The impacts were considered on the group of donkeys being targeted – the first animal would be naïve but the impact would increase with each subsequent animal.
- The lead jack or jenny should be shot first and the rest of the mob will then mill around it.
- Since donkeys will remain in close proximity to the lead animal after it has been shot and as they have relatively flat foreheads, an accurate head shot is achievable.

PART A: assessment of overall welfare impact

DOMAIN 1 Water or food restriction, malnutrition				
No impact	Mild impact	Moderate impact	Severe impact	Extreme impact

DOMAIN 2 Environmental challenge				
No impact	**Mild impact**	Moderate impact	Severe impact	Extreme impact

DOMAIN 3 Disease, injury, functional impairment				
No impact	**Mild impact**	Moderate impact	Severe impact	Extreme impact

DOMAIN 4 Behavioural or interactive restriction				
No impact	**Mild impact**	Moderate impact	Severe impact	Extreme impact

DOMAIN 5 Anxiety, fear, pain, distress, thirst, hunger				
No impact	**Mild impact**	Moderate impact	Severe impact	Extreme impact

Overall impact
Mild

DURATION OF IMPACT				
Immediate to seconds	**Minutes**	Hours	Days	Weeks

SCORE FOR PART A:	**3**
Summary of evidence:	
Domain 1	No impact in this domain.
Domain 2	Mild impact arising from exercise during flight response (after at least one donkey in group has been shot).
Domain 3	Unlikely to be injured due to flight response. There is only a low risk of not being able to follow-up injured animals. Donkeys are not fast and most country is accessible.
Domain 4	The impact in this domain was graded in relation to the effect on donkeys after the first animal is shot (the first animal is naïve to behavioural impact). The disruption of the social group is likely to have an impact by affecting subsequent behaviour. Donkeys are very family-group orientated with strong maternal bonding. Lactating females stay with mob.
Domain 5	There will be some impact in this domain due to donkeys being frightened by the noise of the gunshot and also if other donkeys in the group start to panic after the first shot has been fired. However this response will be less than with horses as donkeys are less 'flighty'. If some animals in a group are not killed, the impact on the remaining animals in unknown but we assumed that removal of individuals in a group could potentially cause distress.

PART B: assessment of mode of death – head shot

Time to insensibility (minus any lag time)				
Immediate to seconds	Minutes	Hours	Days	Weeks
Level of suffering (after application of the method that causes death but before insensibility)				
No suffering	Mild suffering	Moderate suffering	Severe suffering	Extreme suffering

PART B: assessment of mode of death – chest shot

Time to insensibility (minus any lag time)				
Immediate to seconds	**Minutes**	Hours	Days	Weeks
Level of suffering (after application of the method that causes death but before insensibility)				
No suffering	Mild suffering	**Moderate suffering**	Severe suffering	Extreme suffering

SCORE FOR PART B:	**Head shot - A** **Chest shot - D**
Summary of evidence:	Note that frontal head shots are recommended and are more likely to be achievable than with other species.
Duration –	With head shots, a properly placed shot will result in immediate insensibility[1, 2, 3]. With chest shots, time to insensibility can range from seconds to a few minutes. The time to loss of consciousness and the time to death will depend on which tissues are damaged and, in particular, on the rate of blood loss and hence the rate of induction of cerebral hypoxaemia[4]. Loss of consciousness and death is likely to be quick when animals have been shot in the heart. 'Hydrostatic shock' (see below) may also contribute to rapid incapacitation and potentially rapid loss of consciousness with shots to the chest; however this effect seems to be variable and doesn't occur in all instances. There are anecdotal reports that donkeys are less susceptible to shock compared to other species such as deer or horses, therefore the time to death may be longer.
Suffering –	When animals are rendered insensible immediately with a well-placed head shot that causes adequate destruction of brain tissue there should be no suffering[1]. Animals that are chest shot and still conscious are likely to have a short period of suffering, though the extent of suffering will vary depending on which tissues are damaged and the rate of blood loss. During haemorrhage there is likely to be tachypnoea and hyperventilation, which, when severe, would indicate that there is a sense of breathlessness before the loss of consciousness[4]. Severe haemorrhage in humans is also associated with anxiety and confusion[5]. If chest shot animals are rendered insensible by the mechanism of 'hydrostatic shock' and they do not regain consciousness prior to death they are unlikely to suffer.

Summary

CONTROL METHOD:	**Ground shooting of feral donkeys**
OVERALL HUMANENESS SCORE:	**Head shot – 3A** **Chest shot – 3D**

Comments

Wounding rates with ground shooting

When animals are shot at, some will be killed outright, others will be missed and some will be wounded but not killed. Of the ones that are wounded, some will be killed by subsequent shots but some will escape to either die later or recover. Therefore to determine welfare impact we are interested in the extent of injury or wounding associated with ground shooting and the likelihood of it happening. There do not appear to be any reported wounding rates from ground shooting of feral donkeys but there have been a few studies in other species. For example:

Impala

A study of the night shooting of wild impala found that 93% of animals were killed instantaneously by the first shot[6]. The point of aim was the head. Of the 6.3% of animals that were wounded and timing of shots was recorded (n=31), the mean time between wounding and death was 30 seconds (maximum time 1 min 57s; minimum time 4.8s). Of a total of 990 shots fired, 74 (7.5%) missed animals completely and 57 (5.8%) resulted in animals being wounded (3 animals were wounded before dispatch). No animals escaped after wounding.

Deer

Estimates of wounding rates by deer stalkers have shown that 2% of deer escape wounded, 11% of deer required two or more shots to kill and 7% took 2-15 minutes to die.[7]

In a study to examine the effects of wound site and blood collection method on biochemical measures obtained from red deer, 84% of 69 deer were killed with a single shot and no deer escaped wounded[8]. Eleven of the deer were shot twice (and one deer was shot 3 times), the first shot usually being in the chest. Of the deer killed with one shot, 38% of stags and 80% of hinds were shot in the head or neck. When deer had been shot in the chest, they often ran a short distance. An estimate was made of the time between the first shot and the deer falling to the ground. The median time was 60 secs for the multiple shot animals and 0 secs for the single-shot.

What would be considered to be an acceptable wounding rate for ground shooting?

As a guide, for captive bolt stunning in abattoirs, the level of acceptability is that 95% of animals must be rendered insensible with one shot. An excellent score is 99%.[9]

It has been suggested that a review of deer culling by shooting is warranted when, in a cull of average size (between 80 and 120 deer), 14 to 16% of the carcasses contain more than one permanent wound tract (i.e. required more than one shot).[10]

For comparison with a method that is considered to be less humane than shooting – bow hunting of deer-between 12% and 48% of shot deer may escape whilst injured.[4]

Hydrostatic shock

With shooting, in addition to the damage caused by the penetrating projectile, there is scientific evidence that organs can also be damaged by the pressure wave that occurs when a projectile enters a viscous medium, a phenomenon known as 'hydrostatic shock'[11,] Experimental studies on pigs and dogs demonstrate that a significant ballistic pressure wave reaches the brain of animals shot in an extremity such as the thigh[12, 13, 14]. It is hypothesised that damage to the brain occurs when the pressure wave reaches the brain from the thoracic cavity via major blood vessels but could also occur via acceleration of the head or by passage of the wave via a cranial mechanism[15]. It is also thought that hydrostatic shock may produce incapacitation more quickly than blood loss effects, however not all bullet impacts will produce a pressure wave strong enough to cause this rapid incapacitation[16].

Anecdotal reports by hunters maintain that some species are more susceptible to this shock effect than others; however no studies were found that confirmed this. However there is some speculation that, if one of the mechanisms that contribute to the effect of hydrostatic shock and subsequent damage to the brain is caused by acceleration of the head, it is possible that some animals may be more resistant to the incapacitating effects of shooting. It is recognised that animals such as head-butting ruminants appear to be more resistant to concussion than humans and are thought to have a higher acceleration threshold which could make them more resistant to traumatic brain injury not only from externally imposed forces, accelerations and blunt force trauma but also from an internal ballistic pressure wave generated by a projectile[17, 18].

Bibliography

1. American Veterinary Medical Association (2001). 2000 Report of the AVMA Panel on Euthanasia. *Journal of the American Veterinary Medical Association* **218**, 669-696
2. Gregory, N. (2004). *Physiology and behaviour of animal suffering*. (Blackwell: Oxford, UK).
3. Longair, J. et al. (1991). Guidelines for euthanasia of domestic animals by firearms. *Canadian Veterinary Journal* **32**, 724-726
4. Gregory, N.G. (2005). Bowhunting deer. *Animal Welfare* **14**, 111-116
5. Zajtchuk, R. (1995). Anesthesia and Perioperative Care of the Combat Casualty. Chapter 4 - Hemorrhage, Shock and Fluid Resuscitation. (Office of The Surgeon General at TMM Publications, Borden Institute, Walter Reed Army Medical Center: Washington, DC).at <http://www.bordeninstitute.army.mil/published_volumes/anesthesia/ANfm.pdf>

6. Lewis, A.R., Pinchin, A.M. & Kestin, S.C. (1997). Welfare implications of the night shooting of wild impala (Aepyceros Melampus). *Animal Welfare* **6**, 123-131
7. Bradshaw, E.L. & Bateson, P. (2000). Welfare Implications of culling Red Deer (*Cervus elaphus*). *Animal Welfare* **9**, 3-24
8. Bateson, P. & Bradshaw, E.L. (2000). The effects of wound site and blood collection method on biochemical measures obtained from wild, free-ranging red deer *Cervus elaphus* shot by rifle. *Journal of Zoology* **252**, 285-292
9. Grandin, T. (2007). Implementing effective animal welfare auditing programmes. *Animal Welfare & Meat Production* 227-242 (CABI: Cambridge).
10. Urquhart, K.A. & McKendrick, I.J. (2003). Survey of permanent wound tracts in the carcases of culled wild red deer in Scotland. *Veterinary Record* **152**, 497-501
11. Courtney, M. & Courtney, A. (2008). Scientific Evidence for Hydrostatic Shock. *0803.3051* at <http://arxiv.org/abs/0803.3051>
12. Suneson, A., Hansson, H. & Seeman, T. (1990). Pressure Wave Injuries to the Nervous System Caused by High-energy Missile Extremity Impact: Part I. Local and Distant Effects on the Peripheral Nervous System-A Light and Electron Microscopic Study on Pigs. *The Journal of Trauma* **30**,
13. Suneson, A., Hansson, H. & Seeman, T. (1990). Pressure Wave Injuries to the Nervous System Caused by High-energy Missile Extremity Impact: Part II. Distant Effects on the Central Nervous System-A Light and Electron Microscopic Study on Pigs. *The Journal of Trauma* **30**,
14. Wang, Q., Wang, Z., Zhu, P. & Jiang, J. (2004). Alterations of Myelin Basic Protein and Ultrastructure in the Limbic System at the Early Stage of Trauma-Related Stress Disorder in Dogs. *The Journal of Trauma* **56**,
15. Courtney, A. & Courtney, M. (2009). A thoracic mechanism of mild traumatic brain injury due to blast pressure waves. *Medical Hypotheses* **72**, 76-83
16. Courtney, A. & Courtney, M. (2007). Links between traumatic brain injury and ballistic pressure waves originating in the thoracic cavity and extremities. *Brain Injury* **21**, 657-662
17. Courtney, M. & Courtney, A. (2007). Sheep Collisions: the Good, the Bad, and the TBI. *0711.3804* at <http://arxiv.org/abs/0711.3804>
18. Shaw, N.A. (2002). The neurophysiology of concussion. *Progress in Neurobiology* **67**, 281-344