Control method: Shooting of pest birds (large)

Assumptions:	▪ Best practice is followed in accordance with BIR001 and the shooter is competent and will make accurate decisions about whether the shot can be successfully placed. ▪ Firearms, ammunition and effective shooting ranges (as outlined in the standard operating procedure) are followed. Not adhering to these guidelines will result in less humane outcomes. ▪ For large birds such as emus, the preferred method is a shot to the chest with a large calibre centrefire rifle. ▪ When firing, only single animals are targeted, not the group. ▪ Shooting is conducted in daylight hours. ▪ The impacts in Part A of the assessment were considered on the group of birds being targeted – the first bird would be naïve but the impact would increase with each subsequent bird.

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	There is a potential for heat stress. Emus will attempt to run from source of threat.
Domain 3	In groups of birds with several shot at one time, there is a potential for injury from tripping and running into fences. Emus are very flighty.
Domain 4	Shooting could potentially have an effect on the social group if some birds are not shot. There are close social bonds in male emus and chicks. Chicks of the same brood stay together with the male for around 4 – 6 months before they disperse[1].
Domain 5	There will be a fear response. Emus will try to escape by running, head forward and flat out[1].

PART B: assessment of mode of death – head shot

Time to insensibility (minus any lag time)				
Very rapid	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)				
Very rapid	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 - B**

Summary of evidence:

Duration –	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[2]. 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 does not occur in all instances. With head shots, a properly placed shot will result in immediate insensibility[3, 4, 5].
Suffering –	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[2]. Severe haemorrhage in humans is also associated with anxiety and confusion[6]. 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. When animals are rendered insensible immediately with a well-placed head shot that causes adequate destruction of brain tissue there should be no suffering[3].

Summary

CONTROL METHOD:	**Shooting of pest birds (large)**
OVERALL HUMANENESS SCORE:	**Head shot – 3A** **Chest shot – 3B**

Comments

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'[7,] 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[8, 9, 10]. 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[11]. 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[12].

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[13, 14]

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