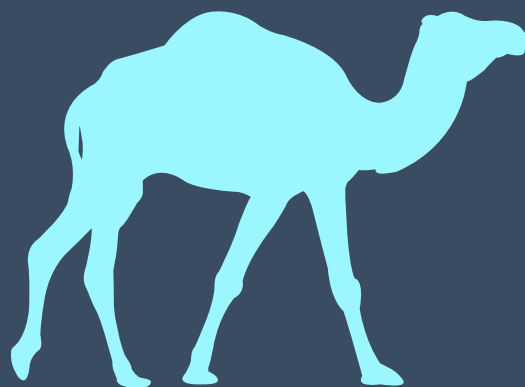




Department of
Primary Industries

NSW Code of Practice and Standard Operating
Procedures for the Effective and Humane
Management of Feral Camels



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© State of New South Wales through Regional NSW 2022. The information contained in this publication is based on knowledge and understanding at the time of writing (March 2022). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Regional NSW or the user's independent adviser.

Preface

This document (Code of Practice (COP) and relevant Standard Operating Procedures (SOPs)) provides current information and guidance to government agencies, land managers and pest animal controllers involved in the management of feral camels in NSW. The aim is for control programs to be conducted in a way that reduces the negative impacts of feral camels using the most humane, target-specific, economic and effective techniques available.

Previously published and endorsed COPs and SOPs¹ available via the PestSmart website (<https://www.pestsmart.org.au/>) can provide general guidance for national use, but some of the content may now be out-of-date. This revision of NSW-specific COPs and SOPs² has been developed to provide the most relevant and up-to-date information to support best practice pest animal management in NSW. Outdated information has been removed, while new information has been added to reflect the advancements and changes specific to feral camel management within NSW. For ease of use, the COP and SOPs for each species have been consolidated into one document; however, links are provided to allow printing of individual SOPs as required.

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Introduction

All pest animal management must aim to minimise individual animal suffering while at the same time optimising the population impact of a control program. This requires use of the most humane methods that will achieve the control program's aims. Consideration of animal suffering should occur regardless of the status given to a particular pest species or the extent of the damage or impact they create. While the ecological and economic rationales for the control of pests such as the feral camel are frequently documented, of equal importance is an ethical framework under which these pests are controlled.

A **Code of Practice** (COP) provides overarching context and brings together the SOP procedures in context, and now in one document that specifies humane control options and their implementation. In this way, COPs encompass all aspects of controlling a pest animal species as determined by best practice principles, relevant biological information, guidance on choosing the most humane and appropriate control technique and how to most effectively implement management programs.

This COP provides state-wide guidance and is based on current knowledge and experience in the area of feral camel control. It will be revised as required to take into account advances in knowledge and development of new control techniques and strategies.

Standard Operating Procedures (SOPs), ensure that an ethical approach (including the recognition of, and attention to, the welfare of all animals directly or indirectly affected by control programs) is uniformly applied to each pest animal control option. The SOPs are written in a way that describes the procedures involved and animal welfare issues applicable for each control technique, thus acting as a detailed guide to support best practice control programs.

Definitions and terms

Best practice management – a structured, consistent and adaptive approach to the humane management of pest animals aimed at achieving enduring and cost-effective outcomes. 'Best practice' is defined as the agreed principles and specific techniques at a particular time following consideration of scientific information and accumulated experience³.

Euthanasia – literally means a 'good death' and usually implies the ending of suffering for an individual; however, when used in regard to animals it usually refers to the means by which an animal is killed rather than the reason for killing it^{4,5}.

Humane – refers to an absence of (or minimal) pain, suffering and distress (e.g., a relatively more humane euthanasia method will cause less pain, suffering and distress than a relatively less humane euthanasia method).

Humaneness – level of welfare impact or welfare cost (e.g., assessing level of humaneness is equivalent to assessing welfare impact or cost).

Humane killing – the killing of animals using relatively humane methods in certain situations (e.g., animals used in research or pest management) for reasons other than to reduce their suffering.

Humane vertebrate pest control – the development and selection of feasible control programs and techniques that avoid or minimise pain, suffering and distress to target and non-target animals ⁶.

Pest animal – (also referred to as vertebrate pest) native or introduced, wild or feral, non-human species of animal that is currently troublesome locally, or over a wide area, to one or more persons, either by being a health hazard, a general nuisance, or by destroying food, fibre, or natural resources ⁷. Refer to Vertebrate Pesticide Manual ⁸ for relevant governance and legislation information as applied to the control of vertebrate pests.

Welfare – an animals' state as regards its attempts to cope with its environment ⁹. Welfare includes the extent of any difficulty in coping or any failure to cope; it is a characteristic of an individual at a particular time and can range from very good to very poor. Pain and suffering are important aspects of poor welfare, whereas good welfare is present when the nutritional, environmental, health, behavioural and mental needs of animals are met. When welfare is good, suffering is absent ¹⁰.

Best practice in pest animal management

From an animal welfare perspective, it is highly desirable that pest animal control programs are efficient, effective and sustained so that pest populations are reduced to low levels and not allowed to recover, thereby avoiding the need for repeated large-scale killing. Over the last decade, the approach to managing pest animals has changed ³. Rather than focussing on inputs, it is now realised that like most other aspects of agriculture or nature conservation, pest management needs to be carefully planned and coordinated with the aim of reducing to an acceptable level the damage due to pest animals i.e., the focus is on measurable economic and environmental outcomes. Pest animal control is just one aspect of an integrated approach to the management of production and natural resource systems and management of other factors may also be required to achieve the desired result. For example, for a lamb producer with limited resources, other factors influencing lamb production may include weed control, cover for lambs, ewe nutrition or rams that give a higher twinning rate. Unless pest animal control actions are well planned, collaborative and coordinated at the right temporal and spatial scales, individual control programs are unlikely to have long-term benefits. When planning pest animal management, there are some important steps that should be considered (Braysher and Saunders, 2015 ¹¹):

1. Identify the trigger to undertake pest animal management. Is there a community or political pressure for action on pests and an expectation that pest animals should be controlled? Pest control is unlikely to be effective unless there is strong local or political will to take action and commit the necessary resources.
2. Identify the key group to take responsibility for bringing together those individuals and groups that have a key interest in dealing with the pest issue.
3. Identify the problem. In the past the pest was usually seen as the only problem. We now know that the situation is more complex. First, determine what the problem is. For example, it may be effects on native fauna, reduced levels of agricultural production, and complaints from neighbours or emotional stress from worrying about pest impacts. Several factors impact on each of these problems and control of pests are often only part of the solution.

4. Identify and describe the area of concern. Sometimes it helps to remove agency and property boundaries (nil tenure) so that the problem can be viewed without the tendency to point blame at individuals, groups or agencies. Property and agency boundaries can be added later once agreement is reached on the best approach.
5. Try to break the area into smaller management units for planning. These smaller units may be determined by water bodies, mountain ranges, fences, vegetation that is unsuitable for a particular pest or other suitable boundaries that managers can work to. While it is best to work to boundaries that restrict the movement of pests, this may not be practicable and jurisdictional boundaries, for example, the border of a Landcare group, may have to be used in combination with physical boundaries. Once the management units are identified:
 - a. Identify as best you can, the pest animal distribution and abundance in each management unit.
 - b. Estimate as far as is practicable, the damage caused by the pest or pests to production and to conservation.
 - c. Gather and assess other relevant planning documents such as, recovery plans for threatened species and property management plans. Identify any key constraints that may prevent the plan being put into operation and identify all the key stakeholders.
 - d. Develop the most appropriate pest management plans for each of the management units.

Implementing effective and humane pest animal control programs requires a basic understanding of the ecology and biology of the targeted pest, other species that may be affected directly (non-targets) or indirectly (e.g., prey species) by a control program. Managers should take the time to make themselves aware of such information by reading the recommended texts included in this document.

The NSW Biosecurity Act 2015 and pest animal management

From 1 July 2018, the management of pest animals in NSW needs to account for the requirements and obligations under the NSW [Biosecurity Act 2015](#). Everyone in NSW who deals with pest animals, including land managers (public and private), recreational land users, other community members and even visitors to the state must manage those pest animals where they present a risk to biosecurity in NSW.

There are some specific requirements relating to some pest species outlined under the [Biosecurity Regulation 2017](#). For example, under the Biosecurity Regulation, it is illegal for a person to keep, move or release a feral pig, wild rabbit, feral deer or European red fox.

A number of documents are available to help land managers and other community members to understand which pest animals they must manage and how. Central to these are the [Regional Strategic Pest Animal Management Plans](#) that set out the requirements for managing the impacts of pest animals.

Specific members of the Local Land Services' team can investigate if they suspect a person or organisation is not managing pests properly and are able to provide educational material outlining the biosecurity risks presented by the pest animals, and management actions that must be taken to manage the risk posed. If appropriate management action is not taken to

manage the pest animals, trained and authorised staff from [Local Land Services](#) can undertake enforcement action.

Animal welfare and humaneness

Pest animals continue to cause significant damage and risks to the environment, agricultural production and to public health. Each year hundreds of thousands of pest animals are trapped, poisoned, shot or otherwise destroyed because of the harm they cause¹². For most people in today's society the management of pest animals is considered acceptable provided that such management is *humane* and *justified*¹³. However, some deficiencies need to be addressed, inhumane techniques replaced and new, more humane, alternatives developed. For further detail refer to [RSPCA Policy E02 Management of wild animals](#).

The humaneness of an individual pest control technique is highly dependent on the way the technique is applied and on the skill of the operator involved. Attention to details such as timing and coordination of control, bait delivery, lethal dose rates, type or calibre of firearm and ammunition have significant effects on animal welfare and target outcomes of control programs. By standardising the way control methods are applied, many of the negative welfare impacts can be reduced or even prevented. This document (COP and SOPs) has been specifically developed to address this issue.

It also contains a summary of the results of humaneness assessments for all individual techniques included as SOPs. The full assessments can be found on the PestSmart website (<https://www.pestsmart.org.au/>). These assessments were carried out using a model developed by Sharp and Saunders (2008, 2011)^{14, 15}. The model provides a practical, general means of assessment that can be applied to any control technique. The goal of humaneness assessment is to evaluate the impact of a control technique on individual animals and to use this assessment to determine which methods are more or less humane compared to others.

Assessment of humaneness using the Sharp and Saunders model is based on the five domain approach to welfare assessment developed by Mellor and Reid (1994)¹⁶. According to this approach, potential or actual welfare compromise is identified in four physical or functional domains and one mental domain:

- 1: Nutrition – water or food deprivation, malnutrition.
- 2: Environmental – exposure to excessive heat or cold.
- 3: Health – disease or physical injury.
- 4: Behaviour – spatial or interactive restriction.
- 5: Mental or Affective State – includes impacts from the first four domains (e.g., thirst hunger, anxiety, fear, nausea, pain, boredom, depression, frustration, loneliness, distress) and any other cognitive awareness of external challenges leading to negative affective states.

When considering the humaneness or welfare impact of a control method, impacts are assessed in relation to nutrition, the animal's environment, its health or functional status, its behavioural needs and its overall mental status. As described by Sharp and Saunders (2008, 2011)^{14,15} and Beausoleil and Mellor (2015)¹⁷ when data is available, actual impacts in each of the four domains are evaluated using a range of quantitatively assessed changes in behaviour and physiology along with pathophysiological indicators of functional disruption.

Compromise in one or all of the physical domains is then used to infer potential negative affective impacts in the fifth domain. As welfare is generally considered to be a state within an animal that most directly relates to what the animal experiences, the overall impact of a control method on the animal's welfare generally reflects impacts in Domain 5. When the model is applied to a range of different methods, these can be compared, thus allowing an informed decision on control method choice based on relative humaneness.

Humaneness assessment using the Sharp and Saunders model follows a two-part process: Part A examines the impact of a control method on overall welfare and the duration of this impact; and Part B examines the effects of the killing method on welfare (so is only applied to lethal methods). For example, with live trapping followed by shooting, both Part A and Part B are applied, but with fertility control only Part A is applied.

In Part A, overall welfare impact is assessed by looking at the impacts in each of the five domains as described above. In Part B, the killing method is assessed by examining the level of suffering and the duration of suffering based on the time to insensibility criteria described by Broom (1999)⁹. Matrices are then used to determine the score for each part and then the two scores are combined to obtain the overall humaneness score.

Feral camel management

Background

Australia has a large feral population of dromedary camels (*Camelus dromedarius*). In 2008 there were approximately 1 million feral camels over 3.3 million km² in arid Australia¹⁸, revised down to 300,000 in 2013¹⁸. While they are uncommon in NSW, small numbers are occasionally sighted in western NSW. In response to increasing impacts of feral camels, a coordinated control program led by NSW Department of Primary Industries including Local Land Services and NSW National Parks and Wildlife Service was carried out in the Bourke area in 2015. Western Local Land Services and NSW DPI continue to carry out surveillance and encourage landholders to report feral camel observations.

Feral camels in NSW are generally found at low densities but can be locally abundant in some areas where landholders offer them a degree of protection for cultural or aesthetic reasons. A Pest Control Order for Feral Camels is in force in the NSW Western Division, enabling enforcement activities under the *Biosecurity Act 2015*. Landholders can keep domestic camels in the Western Division but require a license from NSW DPI. Due to decreased risk of camels forming feral populations in more closely settled and higher rainfall areas there are no restrictions on keeping camels in other parts of NSW.

Camels wander widely and eat mostly plant material, including fresh grasses and shrubs, preferring roughage to pasture that includes introduced grasses. In western NSW they have been observed to preferentially graze on softer and more palatable species such as Wild Orange (*Capparis mitchellii*) and Quandong (*Santalum acuminatum*). Browse heights, even where camels are at low densities have been observed over 4 m high.

Camels can go for long periods without needing to drink, but during the heat of summer they will drink every day if water is available.

Camels have a calving interval of just under two years and reproduce for around 25 years. Experienced feral camel control experts have estimated that camels could increase by 10% per annum in western NSW (O'Leary pers. comm.) due to the resources available in pastoral country relative to desert areas.

The harmful impacts of feral camels fall into three main categories: economic, environmental, and social/cultural. Negative economic impacts of feral camels nationally were estimated in 2008 at \$11.5 million¹⁸ and mainly include direct control and management costs, impacts on livestock production through competition for food and other resources, damage of infrastructure, and damage due to vehicle collisions.

Environmental impacts of feral camels include damage to vegetation; suppression of recruitment in some plant species; damage to wetlands; and competition with native animals for food and shelter. Feral camels also have significant negative impacts on the social/cultural values of Aboriginal people through damage to waterholes, bush tucker resources and infrastructure. Camels could also potentially spread exotic diseases.

Landholders can derive positive economic benefit from feral camels estimated at \$0.62 million/year¹⁸ through meat and live sales. Small numbers of feral camels are also used in the tourism industry.

For further information please see:

- National Feral Camel Action Plan: <https://www.environment.gov.au/biodiversity/invasive-species/publications/national-feral-camel-action-plan>
- PestSmart: <https://pestsmart.org.au/toolkits/feral-camels/>

Primary and supplementary control techniques

Pest control programs must be cost-effective. The techniques used within a control program need to be complimentary to each other and lead to a maximum impact reduction, which often requires reducing pest animal densities to low levels over a large scale and maintaining this level of population suppression indefinitely. This leads to a situation where the need for ongoing control is minimised and rates of re-invasion reduced. Follow-up control programs, where the initial reduction is maximised, are also much cheaper to implement as the target population is relatively small. Control techniques can be seen as primary or supplementary based on the following general principles.

Primary techniques are those that can achieve rapid pest population knockdown over large areas in a cost-effective way. Supplementary techniques are generally only effective in helping to maintain pest population suppression once densities have already been reduced to low levels. For example, in the management of camels, aerial shooting is the primary method of control and supplementary techniques are used as a follow-up, e.g., ground shooting. For effective control, regionally appropriate selection of at least one primary control technique and one supplementary control technique should be utilised to help satisfy general biosecurity duty requirements.

Spatial scale is also important. To achieve cost efficiencies and depending on the movement behaviour of the target pest, the area under control may need to be a collaboration of many adjoining land managers. This is particularly the case for highly mobile pest animals such as camels.

Poorly executed control programs can simply become sustained culling operations that do little to achieve long-term successful outcomes. This in turn can lead to sporadic implementation of crisis management programs where pest numbers have become unacceptable, but the outcome usually becomes sub-optimal. A rotation of primary and supplementary techniques can also be important. Pest animals can become familiar to a particular technique (e.g., ground shooting) that may require switching to another lethal method (e.g., aerial shooting). Another factor to consider is timing of control operations. Time of the year can mean targeting a biological weakness in the pest animal (e.g., a period of food and water stress). Alternatively, application of control can align with the need for the commodity to be protected when it is most vulnerable. In the case of camels, there is a particular opportunity for cost-effective management when they are congregated around resources during prolonged hot and dry periods.

Feral camel management methods

The control of feral camels is challenging because of their potentially wide-spread distribution, high mobility, low density and low requirement for water. At present, in NSW, management mostly involves aerial culling. Elsewhere in Australia live capture by mustering or trapping at water, ground-based shooting and exclusion fencing are also used. Exclusion fencing is useful for protecting key risk areas but does not reduce populations. It is expensive and limited in its application. Aerial shooting and trapping at water points is effective during drought when camels are congregating near water points but is less effective at other times.

Cost-effectiveness, humaneness and efficacy for each control technique need to be evaluated in every program. A brief evaluation of the humaneness of control techniques follows:

Humaneness of control techniques

Exclusion fencing

Exclusion fencing is generally regarded as a humane, non-lethal alternative to lethal control methods. However, fencing of large areas is expensive to construct and maintain and is difficult in rugged terrain. Therefore, it is only feasible and economical for protecting smaller areas of high conservation or cultural value. Exclusion fencing is mostly used to prevent access of camels to important cultural sites on Aboriginal land, primarily waterholes. However, it is rarely used as it is very difficult to exclude camels from a limited resource such as water and fences may affect native animals and cultural and aesthetic amenity.

Feral camels can be very destructive to conventional sheep and cattle fencing (and wild dog exclusion fencing) and this impact is a common trigger for control action. Dead feral camels have been found tangled in sheep and cattle fences in NSW.

Although exclusion fencing acts as a barrier to feral camels it can have negative effects on non-target species by altering dispersion and foraging patterns and causing entanglement. It can also create a significant hazard to wildlife in the event of a bushfire. Fences constructed to exclude feral camels from a water source should not preclude wildlife. Refer to the following RSPCA website for further perspectives on the humaneness of exclusion fencing:

<https://kb.rspca.org.au/knowledge-base/what-are-the-risks-to-wildlife-associated-with-barrier-and-cluster-fencing/>

Mustering for capture and removal

Mustering will expose feral camels to extended periods of stress and anxiety compared to aerial culling. To minimise this impact, it is preferable to use coacher camels that calm the mob and minimise potential for injury, exhaustion or separation of dependent calves from cows. Camels will be less stressed if they are mustered using horses or 4WD vehicles rather than motorbikes.

Feral camels should be handled quietly without force to avoid panic and trampling. The tail end of the mob must be allowed to set the pace rather than being forced to keep up with the leaders. Camels must not be driven to the point of collapse. Distances that the camels have to be mustered should be kept to a minimum e.g., by using portable yards.

It is preferable not to muster together separate feral camel social groups when bulls are in rut (April-September). However, if this cannot be avoided, all mature bulls must be drafted off from mixed social groups of cows, calves and young bulls as soon as possible after capture. Notwithstanding the above, some rutting bulls may have to be humanely culled to avoid injury to young calves and fighting between competing males.

Trapping for capture and removal

Trapping presents different risks than mustering, given that the camels are not driven into the trap but go in quietly of their own accord. However, herds of mixed ages and sexes are held together until separated so there is still the potential for welfare problems during the process of holding, handling and transferring the camels from the trap to a vehicle for transport.

To minimise the possibility of stress and injury, all traps when set must be inspected at least once daily. Bayonet gates must be removed from trap yards when yards cannot be inspected with appropriate frequency. Camels must have access to water and feed if they are to be held for more than 24 hours. Traps should be constructed to provide camels with shade and shelter and should be large enough to avoid overcrowding. In addition, yards should be well drained to allow camels to sit down in areas free of surface water after rainfall.

Capture and handling should be avoided when females are calving or have dependent young at foot. Dependent calves that do not accompany their mother into the trap may be separated and die of starvation or if trapped can get trampled underfoot.

Camel traps can have a negative impact on native non-target species (especially macropods) by inadvertently trapping them and also by excluding them from water sources. This impact can be minimised by using a suitable yard design that incorporates fencing material, spaced panels and gates that allow wildlife to escape if trapped. Also, the fencing used to protect alternative water sources from camels when trapping should allow access to wildlife species and minimize any risk of capture myopathy.

Management of captured or mustered camels

Mustering, capture and handling increase stress in feral camels as they are not used to confinement or close contact with humans. Consequently, these procedures have the potential to cause mismothering, feeding disruption, social disruption, and also abortion in heavily pregnant females. Metabolic, nutritional and parasitic diseases and also changes in environmental conditions may cause mortality and morbidity in confined feral camels, especially when confined for long periods.

The removal of trapped feral camels off-property for either sale to abattoirs, live export, or for domestication, involves additional stress to animals.

Shooting

Shooting is considered more humane than capture and removal as the animals are not subject to the stresses of mustering, yarding, and long-distance transportation.

Ground shooting

Shooting can be a humane method of destroying free-roaming feral camels when it is carried out by experienced, skilled and responsible shooters; the animal can be clearly seen and is within range; the correct firearm, ammunition and shot placement is used; and any wounded animals are promptly located and killed as quickly and humanely as possible. Head shots are the preferred shot placement when prevailing conditions are appropriate, e.g., stillness of target.

If lactating females are shot, dependent calves should also be shot quickly and humanely. Ground shooting is not suited to rough country as wounded animals cannot be effectively pursued and would suffer unnecessarily. There will be a negative impact on the animals in a social group that are not shot.

Shooting is also used to euthanase camels that have been captured by mustering or trapping when they are injured or diseased, there is no market for them or for other reasons as described in:

- Ground shooting of feral camels (NSWCAM SOP1)
- Mustering of feral camels (NSWCAM SOP 3)

Aerial shooting

All aerial shooting programs in NSW managed by Government agencies must adhere to the instructions and requirements of the NSW Feral Animal Aerial Shooting Team (FAAST) Manual ¹⁹. Private or commercial operators in NSW that are not conducting shooting as part of a FAAST program must still adhere to all relevant regulatory and legislative requirements.

Aerial shooting of camels from a helicopter can be a humane control method when it is carried out by highly skilled and experienced shooters and pilots; the correct firearm, ammunition and shot placement is used; and wounded animals are promptly located and euthanased.

With shooting, initial shots to the chest do not render the animal instantaneously insensible and time to death is slower whereas a well-placed initial shot to the head to destroy the brain will result in instantaneous insensibility and a quicker death. However, with aerial

shooting, chest shots are generally preferred for smaller species since the heart and lungs are the largest vital area and accurate shots to the head to destroy the brain can be difficult to achieve. This is particularly the case for species that move quickly and erratically. Head shots should only be attempted when conditions are ideal to avoid wounding. Shooting at other parts of the body (outside of head (brain) and chest (heart-lung) target zones) is unacceptable.

Compared with ground shooting, aerial shooting allows the delivery of multiple shots in quick succession to ensure a rapid death. There is also much better opportunity for rapid follow-up shots for any injured animals. There must be a minimum of two shots per animal – one of which must be a chest shot.

Table 1: Humaneness, Efficacy, Cost-effectiveness and Target Specificity of Feral Camel Control Methods

Control technique	Acceptability regarding humaneness* and Relative humaneness score (Part A [1-8], Part B [A-H]**)	Efficacy	Cost-effectiveness	Target Specificity	Comments
Aerial Shooting <i>Primary</i>	Acceptable if undertaken by approved and accredited operators Score: 3A (head shot), 3C-D (chest shot)	Effective	Relatively expensive. Can be cost-effective when camel density is high but cost prohibitive when camel densities are low	Target-specific	Suitable for extensive (large) areas and inaccessible country where landholder consent is obtained. In these circumstances it is a most effective way of achieving quick, large scale culling during congregation events or high density populations.
Mustering <i>Supplementary</i>	Acceptable Score: 5	Effective	Cost-effective. Requires sufficient returns to musterers to offset costs.	Target-specific	Efficient and cost-effective where camels are present in high densities, terrain is relatively flat and camel prices are sufficient. Increased welfare concerns associated with capture and transport of camels, particularly if over large distances. May be more costly than trapping depending on trap location and accessibility.

Control technique	Acceptability regarding humaneness* and Relative humaneness score (Part A [1-8], Part B [A-H]**)	Efficacy	Cost-effectiveness	Target Specificity	Comments
Trapping <i>Supplementary</i>	Acceptable Score: N/A	Effective	Cost-effective	Can have an impact on non-target species. Traps should be designed so that most wildlife can go through fences or under gates.	Can be used to trap animals to facilitate ground culling operations. Most effective when conditions are dry and there are few waterholes around where camels can drink. Cost-efficient method of capture, particularly when camels are trapped for sale and the trap facility is built in conjunction with trucking facility. If best practice is not adhered to there are significant animal welfare considerations with the implementation of this method.
Ground shooting <i>Supplementary</i>	Acceptable if undertaken by approved and accredited operators Score: 4A (head shot), 4D (chest shot)	Not effective at high population densities. Can be effective for low densities.	Not cost-effective for large scale removal operations.	Target-specific	Labour intensive, only suitable for smaller scale, opportunistic operations. Most useful during drought and where camels cannot be captured by trapping or mustering. Limited application in good seasons when there is lots of water around and camels are widely dispersed.

Control technique	Acceptability regarding humaneness* and Relative humaneness score (Part A [1-8], Part B [A-H]**)	Efficacy	Cost-effectiveness	Target Specificity	Comments
Exclusion fencing <i>Supplementary</i>	Acceptable Score: N/A	Limited	Expensive	Can be in certain situations	Expensive, therefore impractical for large scale application. Fencing can be effective for small, critical (economic or environmental) areas, though the maintenance costs are still high. Will have significant animal welfare impacts if camels are denied access to drinking water and there are no other sources of water nearby.

* Acceptable methods are those that are relatively humane when used correctly in accordance with the applicable Standard Operating Procedure. Conditionally acceptable methods are those that, by the nature of the technique, may not be consistently humane. There may be a period of poor welfare before death.

Methods that are not acceptable are considered to be inhumane – the welfare of the animal is very poor before death, often for a prolonged period.

** From assessments conducted using a model to assess the relative humaneness of pest animal control methods (Sharp and Saunders 2011)¹⁴. Humaneness score (AB) consists of Part A - welfare impact prior to death, scale of 1 – 8, less suffering to more suffering and Part B - mode of death, scale of A – H, less suffering to more suffering. For assessment worksheets and matrix of relative humaneness scores see: <https://pestsmart.org.au/toolkit-resource/feral-camel-control-methods-humaneness-matrix/>.

N/A = Humaneness score not available.

Control techniques are classified as primary (maximum effect), supplementary (follow-up) or 'not available'. In some situations, techniques can alternate between primary and supplementary.

Relevant legislation

All those involved in vertebrate pest control should familiarise themselves with relevant aspects of the appropriate federal and state legislation. The table below lists relevant legislation. This list is by no means exhaustive and was current at the time of writing.

Commonwealth	<i>Agricultural and Veterinary Chemicals Code Act 1994</i> <i>Environment Protection and Biodiversity Conservation Act 1999</i>
New South Wales	<i>Biodiversity Conservation Act 2016</i> <i>Biosecurity Act 2015</i> <i>Game and Feral Animal Control Act 2002</i> <i>Local Government Act 1993</i> <i>Local Land Services Act 2013</i> <i>National Parks and Wildlife Act 1974</i> <i>Pesticides Act 1999</i> <i>Prevention of Cruelty to Animals Act 1979</i>
Other relevant legislation	<i>Civil Aviation Act 1988</i> <i>Civil Aviation (Carriers' Liability) Act 1967</i> <i>Dangerous Goods (Road and Rail Transport) Act 2008</i> <i>Firearms Act 1996</i> <i>Work Health and Safety Act 2011</i>

Note: copies of the above legislation and relevant regulations may be obtained from federal and state publishing services.

Further information

Local Land Services	https://www.lls.nsw.gov.au/biosecurity/pestplan
NSW National Parks and Wildlife Service	https://www.environment.nsw.gov.au/topics/animals-and-plants/pest-animals-and-weeds/pest-animals
NSW Department of Primary Industries	https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests
NSW Environment Protection Authority	https://www.epa.nsw.gov.au/your-environment/pesticides/pesticides-nsw-overview/pesticide-control-orders
PestSmart Connect	https://www.pestsmart.org.au/

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Standard Operating Procedures

- Ground shooting of feral camels (NSWCAM SOP1)
- Aerial shooting of feral camels (NSWCAM SOP2)
- Mustering of feral camels (NSWCAM SOP3)

For guidance on regional application of control techniques, contact your nearest Local Land Services: <https://www.lls.nsw.gov.au/>



NSWCAM SOP1

Ground shooting of feral camels

Background

Ground shooting is usually conducted with the aid of all-terrain vehicles and is best suited to accessible and relatively flat areas where there are low numbers of problem camels. Ground shooting is also used for euthanasia of sick or injured camels. Shooting from a helicopter is considered a more humane control method as mobile wounded animals can be promptly located and killed. Shooting can be a humane method of killing feral camels when it is carried out by experienced, skilled shooters, the animal can be clearly seen and is within range, the correct firearm, ammunition and shot placement is used, and wounded animals are promptly located and killed.

This standard operating procedure (SOP) is a guide only - it does not replace or override the relevant NSW or federal legislation. The SOP should only be used subject to the applicable legal requirements (including WHS) operating in the relevant jurisdiction.

Individual SOPs should be read in conjunction with the overarching Code of Practice for that species to help ensure that the most appropriate control techniques are selected and that they are deployed in a strategic way, usually in combination with other control techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

Application

- Ground shooting should only be used in a strategic manner as part of a coordinated program designed to achieve sustained effective control.
- The remoteness and low density mean that searching and ground shooting is time consuming and labour intensive. It is therefore not considered an effective method for large-scale control.
- Ground shooting as a means of population control is not suitable in inaccessible or rough terrain where sighting of target animals and accurate shooting is difficult or when wounded animals cannot easily be followed up and killed, in these circumstances aerial shooting may be the preferred technique.
- The optimal period for ground shooting is during dry seasons or droughts when groups of camels are forced to congregate around remaining areas of water or succulent feed. Shooting during drought may reduce the number of camels that may otherwise die slowly of hunger or thirst.
- Frequent shooting from the ground may teach camels to avoid certain areas, making overall control difficult.

- Shooting of feral camels should only be performed by skilled operators who have the necessary ability and experience with firearms and who hold the appropriate licenses and accreditation.
- Storage and transportation of firearms and ammunition must comply with relevant legislative requirements. (See *Firearms Act 1996*, *Firearms Regulation 2017*).

Animal welfare implications

Target animals

- The humaneness of shooting as a control technique depends almost entirely on the skill and judgement of the shooter. If properly carried out, it is one of the most humane methods of killing camels.
- Shooting must be conducted with the appropriate firearms and ammunition and in a manner that aims to cause immediate insensibility and painless death.
- When shooting an animal, it must be clearly visible, and able to be killed with a single shot due to the difficulty of follow-up shots from the ground, particularly in difficult terrain. A solid rest or support should be utilised to ensure accurate shot placement.
- Only head (brain) or chest (heart-lung) shots must be used. A well-placed shot to the head to destroy the brain will result in instantaneous insensibility and a quicker death compared to a well-placed shot to the chest. Chest shots to destroy the heart can present challenges for accurate placement and may not always result in rapid death. For this reason, under ideal conditions, head shots are preferred over chest shots, however in some situations (e.g., where close approach is not possible; the head is obstructed or cannot be targeted; the animal is already wounded; or a second 'follow-up' shot can be quickly taken), because the chest is a larger target, a chest shot may be the most suitable option. Shooting at other parts of the body is unacceptable.
- Correctly placed head shots cause brain function to cease, and insensibility will be immediate. Death from a shot to the chest is due to massive tissue damage and haemorrhage from major blood vessels. Insensibility will occur sometime after, from a few seconds to a minute or more. If a shot stops the heart functioning, the animal will lose consciousness very rapidly.
- The shooter must be certain that each animal or defined group of animals is dead by physical inspection before another is targeted.
- Wounded camels must be located and dispatched as quickly and humanely as possible with a second shot preferably directed to the head. If left, wounded animals can escape and suffer from pain and the disabling effects of the injury.
- If lactating cows are shot, reasonable efforts should be made to find dependent calves and kill them quickly and humanely with a shot to the brain.

Non-target animals

- Shooting is relatively target specific and does not usually impact other species. However, there is always a risk of injuring or killing non-target animals, including livestock, if shots are taken at movement, colour, shape or sound. Only shoot at the target animal once it

has been positively identified. Never shoot over the top of hills or ridges as other animals or people may be out of sight and be in the danger zone of a stray bullet.

- Non-target camels can also be injured if a bullet passes through the target animal and hits another animal.

Workplace health and safety considerations

- Firearms are hazardous. Everyone should stand well behind the shooter when an animal is being shot. The line of fire must be chosen to prevent accidents or injury from stray bullets or ricochets.
- Shooting from a vehicle is potentially dangerous. An agreed safety procedure between the shooter and others in the vehicle must be in place to ensure that people do not enter the field of fire or disturb the taking of a shot.
- Firearm users must strictly observe all relevant safety guidelines relating to firearm ownership, possession and use.
- Firearms must be securely stored in a compartment that meets state legal requirements. Ammunition must be stored in a locked container separate from firearms.
- The shooter and others in the immediate vicinity should wear adequate hearing protection to prevent irreversible hearing damage, and safety glasses to protect eyes from gases, metal fragments and other particles.
- Care must be taken when handling feral camel carcasses as they may carry diseases such as ringworm, mange, and melioidosis that can affect humans and other animals. Routinely wash hands and other skin surfaces after handling carcasses.

Equipment required

Firearms and ammunition

- Large calibre, high powered centrefire rifles fitted with a telescopic sight must be used.
- The minimum firearm and ammunition requirements for the ground shooting of feral camels are:
 - calibre: .308 inches
 - bullet weight: 150 grain
 - muzzle energy: 2649 ft-lbs
- Examples of acceptable firearm and ammunition combinations with maximum shooting distances are included in the table below:

Cartridge	Bullet weight (gr)	Muzzle velocity (ft/sec)	Muzzle energy (ft-lbs)	Maximum distance (metres)
.308 Winchester	150	2820	2649	200
.300 Win Mag	150	3275	3572	200

Source: <https://press.hornady.com/assets/pctthumbs/tmp/1410995911-2019-Standard-Ballistics-Chart.pdf>

- Ammunition must expand and should be heavily constructed, controlled expansion or bonded core projectiles.
- Shotguns are NOT recommended for use on feral camels. If they must be used in an emergency situation, rifled slugs are to be used as ammunition.
- The accuracy and precision of firearms should be tested against inanimate targets prior to the commencement of any shooting operation.

Other equipment

- Lockable firearm box.
- Lockable ammunition box.
- Personal protective equipment (hearing and eye protection).
- First Aid kit.
- Appropriate maps identifying access trails and land tenure.
- Communication devices (e.g., 2-way radios / mobile or satellite phones) are recommended for safety reasons.

Procedures

- Camels should NOT be shot from a moving vehicle as this can significantly detract from the shooters' accuracy.
- Ensure you are in a firm, safe and stable position before taking a shot.

Target and shot placement

- The objective is to fire at the closest range practicable in order to reduce the risk of non-lethal wounding. Accuracy with a single shot is important to achieve an immediate and, therefore, humane death.
- A camel should only be shot at when:
 - it is stationary and can be clearly seen and recognised;
 - it is within the effective range of the firearm and ammunition being used; and
 - a humane kill is probable. If in doubt, do NOT shoot.
- Ensure there are no other camels behind the target animal that may be wounded by the shot passing through the target.
- Although camels are large animals, the vital areas targeted for clean killing are small. Shooters should be highly skilled and experienced at shooting and be able to accurately judge distance, wind direction and speed and have a thorough knowledge of the firearm and ammunition being used.

- The shooter must aim either at the head, to destroy the major centres at the back of the brain near the spinal cord or, at the chest, to destroy the heart, lungs and greater blood vessels. This can be achieved by one of the following methods (also see Figure 1).

Head Shots (This is the preferred shot placement)

Placement for head and chest shots are detailed below and in Figure 1.

Poll position (rear view)

- The firearm should be aimed at the back of the head at the intersection of the skull and the neck and directed towards the mouth i.e., perpendicular to the neckline.

Temporal position (side view)

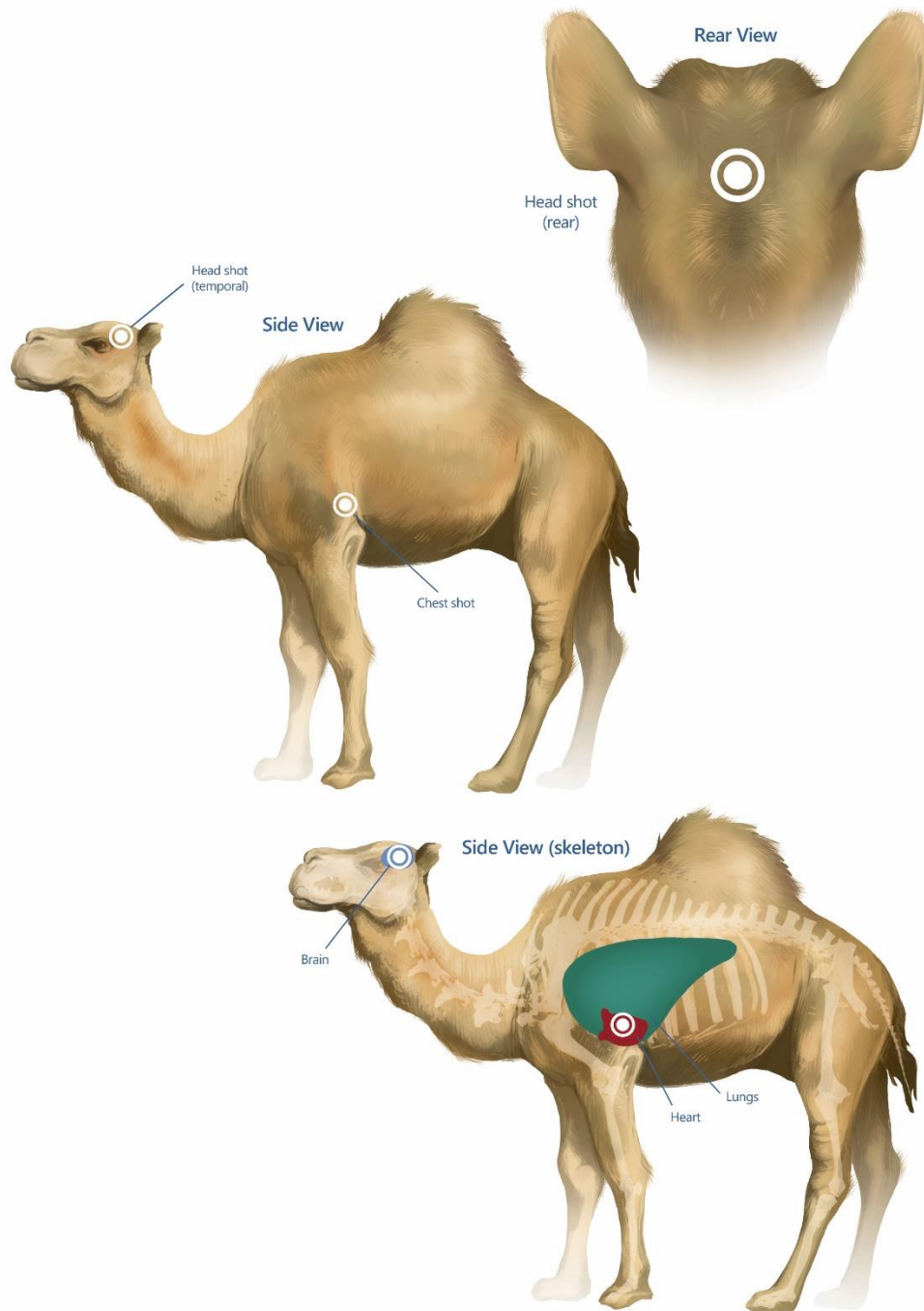
- The camel is shot from the side so that the bullet enters the skull midway between the eye and the base of the ear. The bullet should be directed horizontally.
- Note that frontal brain shots are not recommended during ground shooting of camels since the shape of the skull can cause bullet deflection.

Chest Shots

Side view

- The firearm is aimed horizontally at the centre of a line encircling the minimum girth of the animal's chest, immediately behind the forelegs. The shot should be taken slightly behind and below the shoulder at the point immediately behind the elbow. This shot needs to be angled forward at 40-45° to the camel's body to hit the heart.
- Shooting of individuals should stop when the flight response of the herd limits further accurate shooting.
- Where possible calves and juveniles should be shot before shooting mature camels.
- The target animal or animals in a defined group should be physically checked to ensure they are dead before moving on to the next animal or group. *Always approach the animal from the dorsal (or spinal) side to prevent injury from kicking legs.* Death of shot animals can be confirmed by observing a combination of the following:
 - no heartbeat
 - no breathing
 - no corneal reflex (no blinking when the eyeball is touched)
 - no response to a painful stimulus (e.g., a pinch of the ear tip).
- If death cannot be verified, a second shot to the head should be taken immediately.

Figure 1: Shot placement for ground shooting of camels



Note that shooting an animal from above or below the horizontal level as depicted here will influence the direction of the bullet through the body. Adjustment to the point of aim on the external surface of the body may need to be made to ensure that the angled bullet path causes extensive (and therefore fatal) damage to the main organs in the target areas.

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NSWCAM SOP2

Aerial shooting of feral camels

Background

Aerial shooting of camels from a helicopter is used in large or otherwise inaccessible areas. It is an effective and relatively cost-effective method of quickly reducing camel populations. Teams involved in shooting from a helicopter require (at minimum) a shooter (seated immediately behind the pilot), an observer and the pilot. The observer or navigator primarily looks for and reports hazards plus keeps the helicopter within the approved shooting area, identifies target animals for the pilot, and records locations, species and animals killed. The pilot aligns the helicopter for the optimum shot, advises the shooter when to shoot and can also confirm kills and advise on requirements of additional shots for humaneness purposes.

Aerial shooting is a humane method of killing camels when it is carried out by experienced and skilled shooters and pilots, the animal can be clearly seen and is within range, the correct firearm, ammunition and shot placement is used, and wounded animals are promptly located and killed.

This standard operating procedure (SOP) is a guide only; it does not replace or override the relevant NSW or federal legislation. The SOP should only be used subject to the applicable legal requirements (including WHS) operating in the relevant jurisdiction.

Individual SOPs should be read in conjunction with the overarching Code of Practice for that species to help ensure that the most appropriate control techniques are selected and that they are deployed in a strategic way, usually in combination with other control techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

Application

- All aerial shooting programs conducted by Government Agencies - National Parks and Wildlife Service (NPWS) or Local Lands Services (LLS) - in NSW must be planned and implemented under the NSW Feral Animal Aerial Shooting Team (FAAST) framework and in accordance with the procedures of the NSW FAAST Manual.
- Private or commercial operators in NSW that are not conducting shooting as part of a FAAST program must still adhere to all relevant regulatory and legislative requirements.
- Shooting of camels should only be performed by competent, trained personnel who have been tested and accredited for suitability to the task and marksmanship and who hold the appropriate licences and accreditation (e.g., accredited through the FAAST training course or for non-FAAST programs other approved competency, e.g., AHCPMG311 – Use of firearms for pest control activities from aircraft, AHCPMG304 – Use firearms to humanely destroy animals).

- Aerial shooting should only be used in a strategic manner as part of a coordinated program designed to achieve sustained effective control. A shooting operations plan must be prepared and approved by the relevant agency for each FFAST aerial shooting program.
- Aerial shooting is a cost-effective method where camel density is high. Costs per animal increases greatly as camel numbers decrease or become widely dispersed.
- Aerial shooting is effectively used to control camels in inaccessible or rough terrain where camels cannot be caught, or humanely ground shot, or when there is no viable market for them. In areas of heavy cover (e.g., vegetated creek lines, woodlands and forest), effectiveness is limited since camels might be concealed and difficult to locate from the air.
- The optimal period for aerial shooting is during dry seasons or droughts when camels are forced to congregate around remaining areas of water and feed.
- For safety reasons, shooting from a helicopter must not be undertaken in adverse weather conditions (e.g., strong wind, rain, low cloud, hot days that cause unpredictable thermals).
- Operators (including helicopters, pilots, shooters and navigators) must hold the appropriate licences and permits and be skilled and experienced in aerial shooting operations. Where managed by Government Agencies they must also be approved by FFAST.
- Helicopter operators must have approval from the Civil Aviation Safety Authority to undertake aerial shooting operations (carriage and discharge of firearms in an aircraft).
- Aerial shooting should comply with all relevant federal and state legislation, policy and guidelines.
- Storage, use and transportation of firearms and ammunition must comply with relevant legislative requirements.

Animal welfare implications

Target animals

- The humaneness of aerial shooting as a control technique depends on the skill and judgement of both the shooter and the pilot. If properly done, it can be a humane method of killing feral camels.
- Only chest (heart-lung) or head (brain) shots must be used. The initial chest (heart-lung) shot or head (brain) shot (taken only when conditions are favourable for accurate shot placement) must be followed up with a further accurate heart-lung shot once the animal has collapsed. This deliberate 'overkill' policy is aimed at ensuring a quick death given the difficulty in confirming death from the air.
- Death from shots to the chest is due to massive tissue damage and haemorrhage from major blood vessels. Insensibility will occur sometime after the shot, ranging from a few seconds to a minute or more. If a shot stops the heart functioning, the animal will lose consciousness very rapidly. Correctly placed initial head shots cause brain function to cease and insensibility will be immediate.

- In some situations e.g., when conditions are ideal, an initial head shot will achieve a quick humane death. In other situations an initial chest shot will be more appropriate.
- Shooting must be conducted in a manner that maximises its effect thus causing rapid death. This requires the use of appropriate firearms and ammunition.
- A target animal can only be shot when:
 - it is clearly visible and recognised
 - it is within effective range of shooter and the firearm and ammunition being used; and
 - a humane kill is probable. If in doubt do NOT shoot.
- The pilot must offer the shooter the best opportunities for a humane kill. This includes maintaining a stable shooting platform and to ensure that the helicopter is always aligned so that the shooter can maintain accuracy and to avoid shots to unacceptable parts of the body e.g., spine or neck shots. Aerial shooting should not be carried out if the nature of the terrain reduces accuracy resulting in too many wounding shots and prevents the humane and prompt despatch of wounded animals.
- To minimise the animal welfare implications of leaving dependent calves to die, where possible they should be targeted first.
- If lactating females are shot, reasonable efforts should be made to find dependent calves and kill them quickly and humanely.
- Aerial shooting programs by their nature must be highly accountable. Apart from maintaining absolute animal welfare standards, records should be kept of number and location of animals killed, hours flown, ammunition used and fly-back procedures.

Non-target animals

- Shooting is relatively target specific and does not usually impact on other species. However, there is always a risk of injuring or killing non-target animals, including livestock, if shots are taken before an animal has been positively identified.
- Sensitive livestock such as horses are easily frightened by gunshots, helicopter rotor noise, wind etc. and may injure themselves by running into fences and other obstacles. Avoid shooting in areas where these livestock occur or organise the removal of them from the area prior to the shooting program.

Workplace health and safety considerations

- The potentially hazardous nature of aerial shooting requires that safety protocols be strictly followed. Each team member must be aware of and trained in all aspects of helicopter and firearm safety.
- The helicopter pilot must perform a thorough pre-flight briefing with all personnel to establish communication protocols between the shooter and the pilot including pre-shot manoeuvre, commands for firing and emergency procedures.
- Shooting from a helicopter can be hazardous, particularly in areas of rugged topography. The combination of low-level flight, close proximity to obstacles (trees, rocks and wires) and the use of firearms makes this task extremely hazardous.

- It is essential that ejected ammunition cases do not interfere with the safe operations of the helicopter. It might be necessary to fit a deflector plate (mandatory for FFAST operations) to the firearm to ensure shells are ejected safely.
- Firearm users must strictly observe all relevant safety guidelines relating to firearm ownership, possession and use.
- When not in use, firearms must be securely stored in a compartment that meets state legal requirements. Ammunition must be stored in a locked container separate from firearms.
- Adequate hearing protection should be worn by the shooter and others in the immediate vicinity of the shooter. Repeated exposure to firearm noise can cause irreversible hearing damage.
- Safety glasses are recommended to protect the eyes from gases, metal fragments and other particles.
- Refer to the current version of the FFAST Management and Training System for further details on workplace health and safety requirements.

Equipment required

Firearms and ammunition

- Firearms should be:
 - Reliable, well maintained and capable of good accuracy
 - Fitted with a red dot scope with zero magnification
 - Rifles should be semi-automatic .308 calibre
- Ammunition:
 - Protected point strongly constructed (e.g., bonded core); 150-180gn.
 - Firearm and ammunition combinations for rifles with maximum shooting distances are included in the table below:

Cartridge	Bullet weight (gr)	Muzzle velocity (ft/sec)	Muzzle energy (ft-lbs)	Maximum distance (metres)
.308 Winchester	150	2820	2648	70
.300 Win Mag	150	3275	3573	70

Source: <https://press.hornady.com/assets/pctumbs/tmp/1410995911-2019-Standard-Ballistics-Chart.pdf>

- Specifying ammunition based on species alone rather than individual body mass is problematic. Shooters should select ammunition (from those specified) that best suits their situation, and which is justifiable on animal welfare grounds. This may particularly apply to situations where multiple species are being controlled in the one operation.

- To provide a backup in case of firearm/ammunition malfunction, at least two functioning firearms must be carried by shooters at all times.
- The accuracy and precision of firearms should be tested against inanimate targets before any shooting operation.

Aircraft

- Aircraft used for aerial shooting should be manoeuvrable, fast and responsive to allow quick follow-up of any wounded animals.
- The FFAST governance structure has compiled a list of helicopter operators, aircraft and pilots who are approved for FFAST operations. Only helicopter operators and aircraft deemed appropriate to the particular task will be selected for FFAST operations. Approved operators can be sourced through the State Air Desk (LLS) or the through the Flight Operations Unit (NPWS).
- GPS (global positioning systems) and computer mapping equipment with appropriate software must be used to assist in the accurate recording of information (e.g., where animals are shot) and to eliminate the risk of shooting in off-target areas.

Other equipment

- Flight helmet (with intercom).
- Fire-resistant flight suit.
- Safety harness.
- Other personal protective equipment including lace-up boots, gloves and appropriate eye and hearing protection.
- Survival kit (including a first aid kit).
- Emergency locating beacon.
- Lockable firearm box.
- Lockable ammunition box.
- Refer to the current FFAST Manual for further information.

Procedures

- Shooters must not shoot at an animal unless they are confident of cleanly killing it without unnecessary pain, distress or suffering. Only chest (heart-lung) or head/brain shots must be used. Shooting at other parts of the body is unacceptable.
- Wounded animals can suffer from pain and the disabling effects of the injury (including sickness due to infection). The cost of ammunition and extra flying time must not deter operators from applying fly-back procedures.
- Where target animals are encountered in a group they should typically be shot from the back of the group first (the last one shot is furthest away from the helicopter). This may not always be possible e.g., when an animal breaks away from a group. In this case the shooter and pilot need to communicate so they focus on the same animal.

- In NSW, camel groups will generally be small. However, in the event that a large group is encountered, it may be necessary to break the group up to shoot them as sub-groups, including the flyback procedure.
- Each animal must be shot at least twice with at least one bullet placed in the heart/lung and before shooting further animals. The only exemption to two shots is when the heart/lung is completely destroyed after the first shot as may be the case with smaller animals.
- The shooter must shoot an animal more than twice in the following circumstances:
 - where directed by the pilot or if the shooter considers it necessary
 - until a bullet is placed in the heart/lung of the animal
 - if the animal doesn't appear dead (signs of life could include attempting to lift its head, any coordinated body movement, eye blinking or breathing).
- Each animal shot must be considered dead by the shooter and pilot, and verbally announced as a 'kill' by the pilot before shooting further animals. This procedure allows for both the shooter and pilot to make a judgement of each animal shot being dead, by the animal exhibiting no sign of life and/or by observing the placement of a bullet into the heart/lung.
- A flyback procedure is required after shooting a group of animals and must be applied at all times. The procedure is as follows:
 - fly back over each animal of the group shot
 - hover over each animal long enough to assess that the animal doesn't exhibit any sign of life
 - where there is any doubt by the shooter or pilot that the animal is dead or that there is a bullet in the heart/lung, the shooter is to shoot further bullet/s into the heart/lung of the animal.
- Larger groups of camels should be deliberately split up to focus on smaller groups. When large groups of animals are encountered or when groups are encountered in heavy vegetation, the shooter and pilot must consider the ability to conduct an effective flyback procedure. If an effective flyback is likely to be hampered by continuing to shoot further animals in a group or when animals already shot are unlikely to be found, shooting should temporarily cease, and a flyback conducted over animals already shot.
- Target camels should be mustered away from watercourses and areas of dense vegetation before being shot, as wounded animals will be difficult to locate if they go down in these locations.
- Once a target is sighted and has been positively identified, the pilot should position the helicopter as close as is safe to the target animal to permit the shooter the best opportunity for a humane kill.
- The pilot should aim to provide a shooting platform that is as stable as possible.

Target animal and shot placement

Placement for head and chest shots are detailed below and in Figure 2.

Chest Shot

Side view

- The firearm is aimed at the centre of a line encircling the minimum girth of the animal's chest, immediately behind the forelegs. The shot should be taken slightly to the rear of the shoulder blade (scapula). This angle is taken because the scapula and humerus provide partial protection of the heart from a direct side-on shot.

Head Shots

Poll position (rear view)

- When aerial shooting, most head shots will be taken at this position as animals are running away from the helicopter. The firearm should be aimed at the back of the head at a point between the base of the ears and directed towards the mouth.

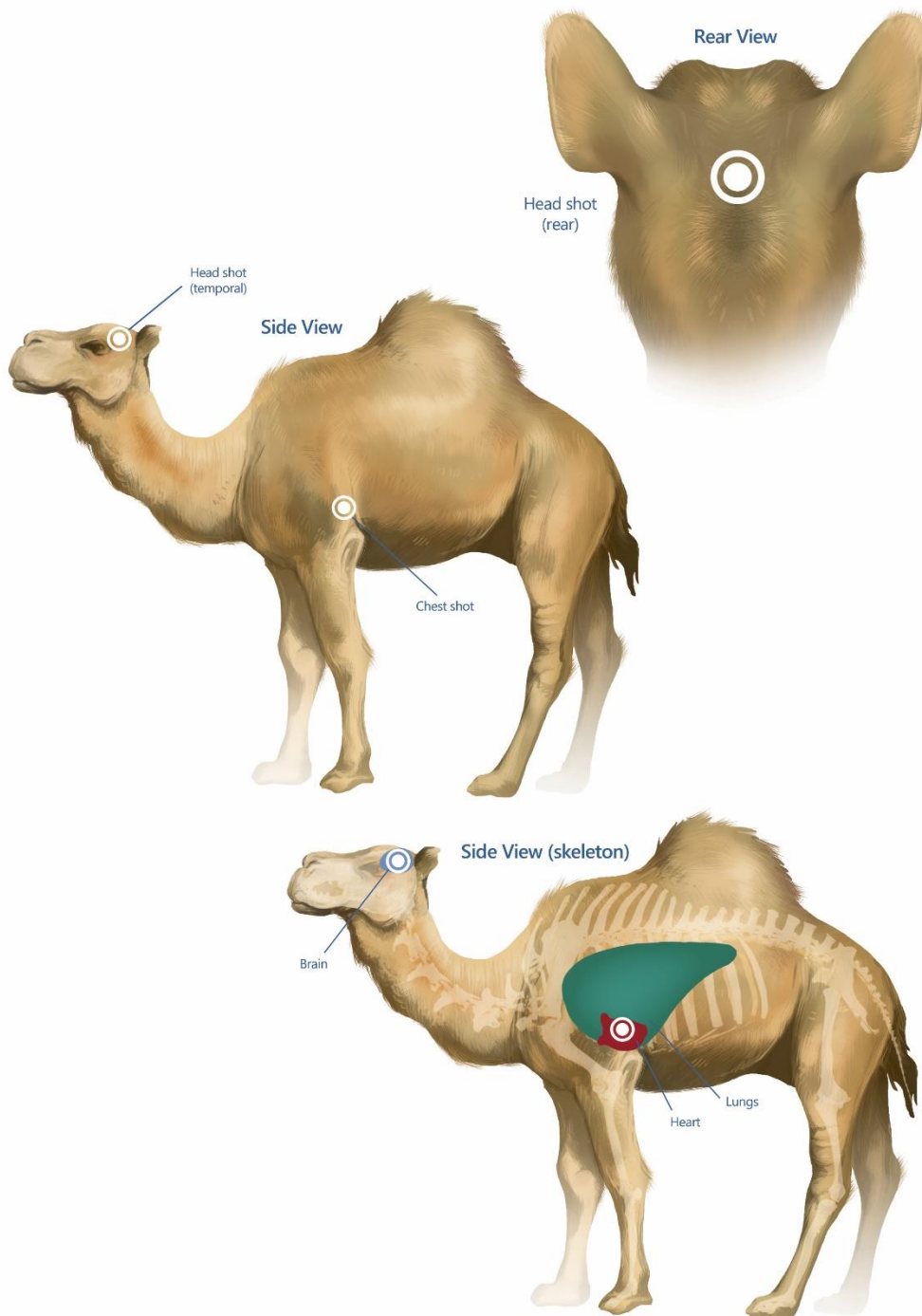
Temporal position (side view)

- This shot is occasionally used where a second shot needs to be delivered to an injured animal that is lying on its side. The camel is shot from the side so that the bullet enters the skull at a point midway between the eye and the base of the ear.

Frontal position (front view)

- This position is occasionally used when an animal faces the shooter. Frontal brain shots for camels should be avoided as bullets could be deflected due to the shape of the skull.

Figure 2: Shot placement for aerial shooting of feral camels



Note that shooting an animal from above or below the horizontal level as depicted here will influence the direction of the bullet through the body. Adjustment to the point of aim on the external surface of the body may need to be made to ensure that the angled bullet path causes extensive (and therefore fatal) damage to the main organs in the target areas.

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NSWCAM SOP3

Mustering of feral camels

Background

Feral camels are mustered by helicopter, motorbike (or other vehicle) or on horseback, often with the assistance of coacher camels. Once mustered into yards, the camels are usually sold to abattoirs for slaughter. This can offset the costs of capture and handling. Small numbers are also sold for live export. Where there is no market for them or where removal may be too costly or impractical e.g., in remote areas without access to transportation, camels are sometimes destroyed by shooting in the yards.

This standard operating procedure (SOP) is a guide only; it does not replace or override the relevant legislation that applies in NSW. The SOP should only be used subject to the applicable legal requirements (including WHS) operating in the relevant jurisdiction.

Individual SOPs should be read in conjunction with the overarching Code of Practice for that species to help ensure that the most appropriate control techniques are selected and that they are deployed in a strategic way, usually in combination with other control techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

Application

- Mustering should only be used in a strategic manner as part of a coordinated program designed to achieve sustained effective control.
- Mustering may only be efficient and economic when camel densities are high.
- In relatively flat and accessible country, mustering is usually performed on horses or on motorbikes (or other vehicles). In rough, hilly country and more extensive areas, helicopters or light aircraft are used to drive the camels towards a set of yards where a ground team completes the muster.
- Because mobs of camels are scattered and the mob size can often be small, musters are often done over large areas. It is often more effective to accumulate two or more mobs and then herd them to yards for capture. Those that escape capture may be more difficult to catch in subsequent musters.
- Mustering can be a relatively labour intensive exercise compared to other removal techniques and can be more stressful to the camels.
- To ensure that mustering, capture and handling is performed with the least stress to the camels, operators should have a good knowledge of camel behaviour and must have good stock handling skills. They should also be familiar with the terrain they are to cover so that dangerous areas can be avoided.

- Aircraft operators must ensure that their flying operations comply with requirements of the Civil Aviation Safety Authority.
- Shooting of feral camels should only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licenses and accreditation.
- Storage and transportation of firearms and ammunition must comply with relevant legislative requirements.

Animal welfare implications

Target animals

- Mustering, capture and handling increase stress in feral camels, as they are not used to confinement or close contact with humans. As a result, these procedures can lead to capture myopathy, heat stress and dehydration, acute lameness or injuries, fight injuries, stress-induced infections (e.g., salmonellosis), feeding disruption resulting in ill-thrift or colic, and abortion in heavily pregnant females.
- Mustering must not be conducted if camels are in poor body condition, e.g., at the end of prolonged droughts.
- To avoid heat stress, mustering should be carried out in the cooler months.
- The tail end of the mob must set the pace rather than being forced to keep up with the leaders.
- Distances that the camels have to be mustered should be kept to a minimum, e.g., by using portable yards.
- Feral camels should be handled quietly without force to avoid panic and trampling.
- Camels that are severely injured during mustering or yarding must be killed quickly and humanely.
- Whenever possible, avoid mustering when females are calving or have young at foot that are entirely dependent on their mother. This is to prevent dependent calves being left to die of starvation if their mothers are mustered and the young are left behind. Although births can occur throughout the entire year, calving usually occurs in the six months of June to November. Avoid mustering during the peak calving time of late August – early September. Apart from the welfare implications, control at times of calving will reduce effectiveness as females leave the group for periods up to three weeks to give birth in isolated locations. This is thought to be a strategy to prevent infanticide by bulls.
- If trained dogs are to be used with feral camels they should be used with caution. Dogs may be useful for mustering but may agitate yarded or confined camels. Feral camels may kick out at dogs if they feel threatened or cornered. Trained herding or sheep dogs may be more suitable than traditional cattle dogs as they are less likely to bite.
- Camels must not be hit with objects such as plastic PVC pipe. However, objects such as PVC pipes are useful. They safely extend a stock handlers reach to gently goad camels and provide visual obstruction to help direct camels as required. Electric prodders should only ever be used as a last resort when reasonable actions to get a camel to move have failed.

- All mature males should be separated from cows, calves and young males, especially if they are in rut.
- Only fit and healthy animals should be selected for transport. Heavily pregnant, very young or weak/sick/injured animals must either be euthanased, given proper veterinary assistance or transported at a later date when they are more suitable for transportation.
- The loading, transport, unloading, holding and slaughter of feral camels must be undertaken with the minimum amount of stress, pain or suffering. Guidelines on these procedures can be found in relevant state or federal government guidelines. For example:
 - [Australian Standards for the Export of Livestock](#)
 - [Australian Animal Welfare Standards and Guidelines— Land Transport of Livestock](#)
 - [Livestock at Slaughtering Establishments, SCARM Report 79](#)
 - [Operational guidelines for the welfare of animals at abattoirs and slaughterhouses.](#)

Non-target animals

- Mustering is target specific and does not usually impact other species.
- Dogs used for mustering must receive adequate care at all times. This includes food, water, shelter, safe and comfortable transportation, current vaccinations, worming, flea, tick and heartworm prevention, where appropriate. For more details refer to [GEN002 The care and management of dogs used for pest animal control.](#)

Workplace health and safety considerations

- During construction of yards, operators should be wary of the risks of injury from lifting heavy items. Leather gloves and eye protection will help prevent injuries from wire, steel posts and hammers.
- The mustering, confinement and handling of feral camels is not without risk to the operators involved. A first-aid kit should be carried at all times and motor bike/ATV riders should wear helmets.
- Firearms are hazardous. During culling operations, all people should stand well behind the shooter when shots are being fired. The line of fire must be chosen to prevent accidents or injury from stray bullets or ricochets.
- Firearm users must strictly observe all relevant safety guidelines relating to firearm ownership, possession and use.
- Firearms must be securely stored in a compartment that meets state legal requirements. Ammunition must be stored in a locked container separate from firearms.
- The shooter and others in the immediate vicinity should wear adequate hearing protection to prevent irreversible hearing damage, and safety glasses to protect eyes from gases, metal fragments and other particles.
- Although normally relatively placid, bull camels during rut should be approached with caution as they can have no fear making them quite dangerous.

- Care must be taken when handling feral camel carcasses as they may carry diseases such as ringworm, mange and melioidosis that can affect humans and other animals. Routinely wash hands and other skin surfaces after handling carcasses.

Equipment

Yards

- Either portable or fixed holding yards can be used.
- Fixed yards that were originally designed for cattle rather than camels will need to have the following alterations:
 - increase height of race walls to 1.8 metres
 - increase height of bows over race and the gate slides to 2.4 metres
 - metal loading ramps should be covered with dirt/sand to reduce the hollow sound.
- The entrance should have winged fences to effectively direct camels into the yard. Hessian should be run out from the yard for around 100 metres to form part of the wing fences. This will help prevent camels running into the fences. If possible, the wings should be further extended until they reach natural barriers such as the side of a range or a hill. Ribbon wings made out of flagging tape attached to twine are effective. To deflect approaching camels, one wing fence needs to be longer than the other, commonly 500 metres to 1 km long.
- Entrance gates must be wide enough (about 6 metres) to allow the easy flow of animals. Yards should be large enough for the camels to enter at a reasonable pace and pull up and settle before encountering fences and panels, and to allow all camels to sit on their sternums at the same time.
- The yard fencing should form both a physical and visible barrier to minimise the potential for injuries. Steel or timber post-and-rail fencing is recommended.
- Barbed wire and narrow gauge high tensile steel must not be used for containment of camels in high pressure areas (e.g., yards, wings, corridors, and confined spaces) as it can cause severe injury to animals.
- Yards must be maintained and constructed of materials that minimise the risks of injury or escape of camels once inside the enclosure. Projections such as loose wire or sharp edges that are likely to cause injury should be eliminated and fences should be secure and high enough to prevent camels escaping. Hessian draped over vulnerable portions of the yard (e.g., gates and damaged sections) can be used to deter camels from placing unwanted and additional pressure on these sections. Removing corner strainers from the fences around holding yards may help prevent damage by camels. Also, removing overhead rails from gateways may help to reduce baulking as camels enter the yards.
- Yards should be located and designed to minimise both dust and boggy conditions.

- Further details of yard design and construction can be obtained from relevant guidelines, for example:
 - [Agfact 4-28: Circular cattle yard – 250 head capacity.](#)
 - [Agfact A2.7.11: Beef cattle yards for less than 100 head.](#)
 - [Cattle yards: design, materials and construction \(3rd edition\)](#)

Choosing a yard site

- Yards should be located close to suitable water.
- A suitable yard site needs to be sufficiently flat to enable the erection of portable yards. If designed to be serviced by trucks, the yard should be set up in close proximity to suitable haulage roads and adjacent to sufficient space for trucks to turn.
- Yards should be set up in a location that prevents the camels from seeing them until it is too late for evasion, for example on the other side of scrub that the camels are being pushed.
- Where possible, yards should be positioned in a shady area with as much natural vegetation as possible. However, avoid having trees near the entrance of the yards if using a helicopter.
- Yards must be well drained to allow camels to sit down in areas free of surface water after rainfall.

Firearms and ammunition

- For shooting animals in yards, a .308 Win with 130 to 150 grain soft point projectiles is suitable.
- Smaller calibre rifles such as .22 magnum rimfire with hollow - or soft-point ammunition are suitable for euthanasia of camels at short range (from 5-25cm away).

Fixed wing aircraft or helicopter

- The aircraft must be suited to the purpose and must fulfil Civil Aviation Safety Authority (CASA) requirements for the task of mustering.
- The pilot must be suitably experienced and licensed and hold the appropriate endorsements for aerial mustering of stock.
- Aircraft operators must ensure that their flying operations comply with requirements of CASA.

Procedures

Mustering

- 'Coacher' camels - domesticated camels that are released amongst feral camels to quieten them - should be used where possible during mustering.

- Motorbikes and ATVs are useful for pushing camels through scrub, but vehicles and horses are better for containing and quietening camels. Skilled riders on horseback are also used to pursue and direct feral camels into winged yards.
- Camels should not be excessively chased but moved steadily at a continual pace that will prevent them from turning back or baulking at the entrance to the yards. Camels must never be driven to the point of collapse.
- Only muster the number of camels that can be comfortably handled. The fewer camels that are included in any one operation and the shorter the distance travelled the less stress will be placed upon the animals.
- If camels need to be contained (blocked up) outside of yards it is best to do so in a large open area that allows sufficient room to remove and apply pressure as needs to comfortably contain the camels with minimum stress.
- Camels should be allowed to drop out of groups that are being mustered if required to protect the safety and welfare of the animals or operators. This may include heavily pregnant females, females with dependent calves and other camels, especially those in poor condition, or behaving dangerously. Also, if a female camel continually breaks away and will not move along with the group, it is possible that she may be heavily pregnant or have a dependent calf hidden somewhere. It is best to leave her go and move on with the rest of the group. Animals such as these that are not easily mustered should be culled humanely in accordance with agreed best practice and ensuring that no dependent young are left behind.
- Note that mobs of young bulls can be difficult to muster. Also, some bull camels in rut may fight when unfamiliar groups are mustered together and can disturb muster operations making it advisable to leave or drop them out. Bulls come into rut primarily from April to September. Animals such as these that are not easily mustered should be culled humanely in accordance with agreed best practice.

Holding camels in yards

- To minimise stress and injury in the yards, mature bulls must be drafted off from mixed social groups of cows, calves and young male herds as soon as possible after capture.
- If mature bulls prove to be troublesome they should be humanely euthanased to protect the welfare of other camels and operators.
- The stress of mustering can cause sweating and water loss therefore camels must be given access to water as soon as possible after capture, either through yard watering or through succulent feed while being moved or held in open areas. Camels will rehydrate in a few hours following even severe dehydration. Average size camels require up to 30-40 litres of water per day in summer.
- Leaving the camels for a period of time (e.g., overnight) to explore and move through the yards and races with no pressure allows them to habituate to the new environment and can make them easier to handle.
- When moving animals in the yard, smaller groups of less than 15 animals will be easier to handle.
- If camels are held in yards for more than 24 hours they must have access to feed as well as water. Low quality hay (oats, wheat or pasture) is preferred. Note that lucerne hay can

cause bloating in camels that are not adapted to this type of feed. Yarded camels will require approximately a third of a small square bale of hay per day.

- Camels captured by mustering should be allowed a minimum of 24 hours rest with access to feed and water before they are transported on journeys longer than 8 hours. In the 24 hours prior to transport they must be assessed for signs of injury, disease, inappetence, illness, late pregnancy or distress. Account must be taken of their possible unwillingness to eat unfamiliar feed.
- Camels should not be held in the holding yards for extended periods. If camels are being held for any length of time they should be drafted into a large holding paddock that contains adequate shade, food and water.

Loading camels

- Short, straight races and ramps with a minimal incline should be used. Metal loading ramps should be covered with dirt/sand to reduce the hollow sound that can cause camels to balk during loading.
- During loading it is essential that the operators are patient and remain calm. This reduces stress on the animals and makes them easier to handle.
- Occasionally, some camels, usually older cows will sit down in the race and refuse to get up. Strategies to prevent camels sitting down include:
 - moving camels steadily along the race and not allowing them to step backwards
 - limiting the number of camels to no more than three in the race
 - ensuring that the hump cannot come into contact with overhead rails etc.
 - having a camel in a pen off to the side at the end of the race so that it is visible to the animals in the race.
- Running the camels through the race prior to loading to allow them to get used to the experience.
- If a camel has sat down in a race and refuses to get up, walk away and leave it for a short period – it may stand up when the pressure to do so has been removed.
- It is recommended that the rails on the race are secured with bolts that can be removed when required to shift a sitting camel.
- Electric prodders should only be used sparingly and as a last resort (if their use is allowed within state legislation). Apply prods only to the skin under the forelegs or on the back of the rear legs. Repeated use of electric prodders not only causes suffering but is likely to have the undesired effect of the animal refusing to move at all.

Transporting camels

- Specific requirements for the land transport of camels can be found in:
 - Animal Health Australia (AHA) (2012). [Australian Animal Welfare Standards and Guidelines— Land Transport of Livestock](#). Version 1.1., AHA, Canberra.

Shooting of camels

- It may be necessary to euthanase camels by shooting in the following situations:
 - when there is no market for the captured camels
 - if camels have sustained serious injury during mustering or in the holding yards
 - where dependent young have become separated from their mother
 - where camels have a disease or condition that would prevent the animal from being transported, slaughtered or domesticated.
- If camels are free-roaming and not contained in yards then refer to NSWCAM SOP1 ground shooting of feral camels. If the animals have been captured and are contained within a yard, then follow the procedures described below.
- Shooting must be conducted to cause sudden and painless death with minimum distress to the animal. Only head shots are acceptable.
- The shooter should approach the animals in a calm and quiet manner. To prevent unnecessary agitation of the confined camels, other people should keep away from the area until shooting is completed.
- To maximise the impact of the shot and to minimise the risk of misdirection the range should be as short as possible.
- Never fire when the camel is moving its head. Be patient and wait until the camel is motionless before shooting. Accuracy is important to achieve a humane death. One shot should ensure instantaneous loss of consciousness and rapid death without resumption of consciousness.
- Shots must be aimed to destroy the major centres at the back of the brain near the spinal cord. This can be achieved by one of the following methods (see also Figure 3).

Head Shots

Placement for head and chest shots are detailed below and in Figure 3.

Poll position (rear view)

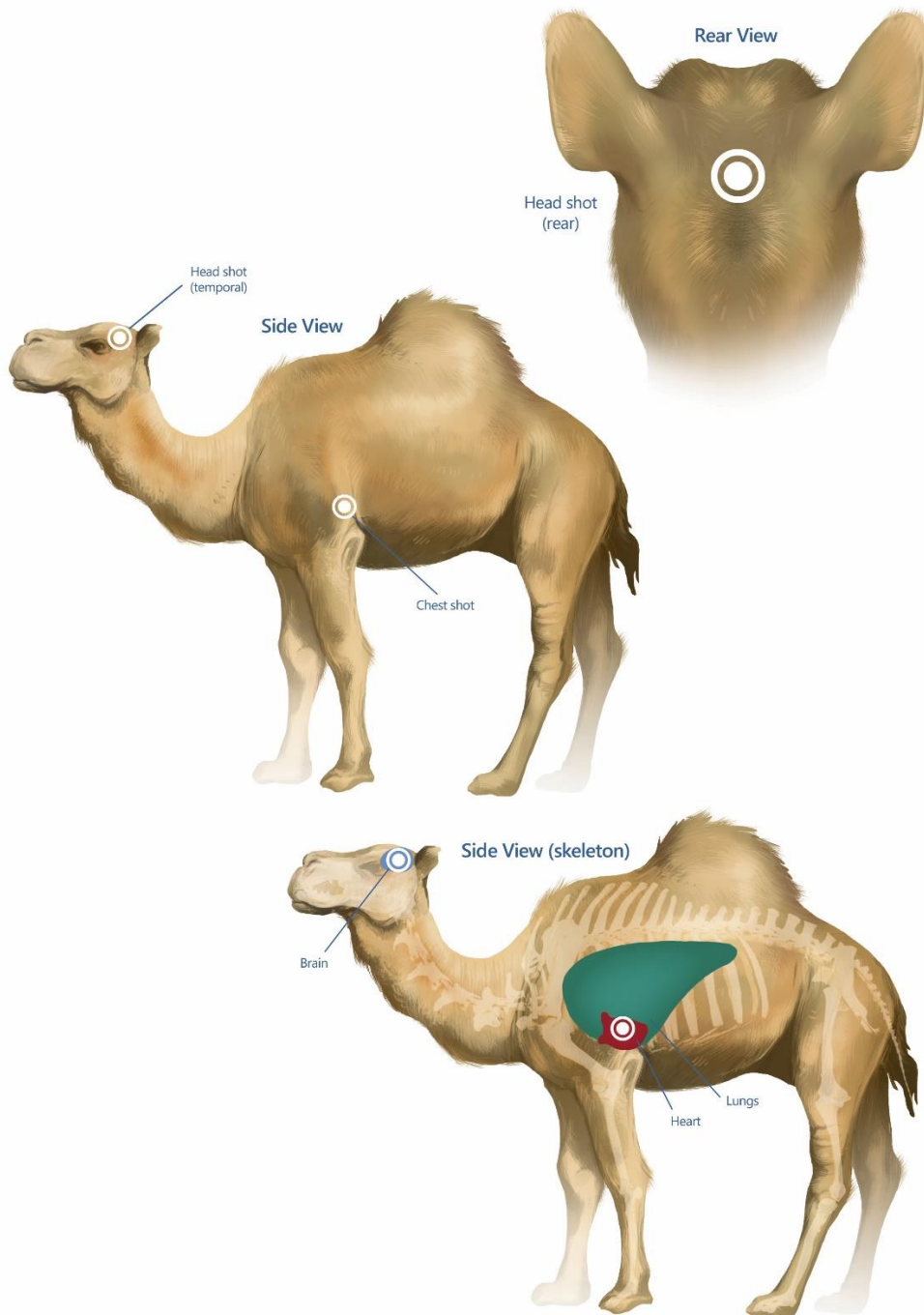
- The firearm should be aimed at the back of the head at the intersection of the skull and the neck and directed towards the mouth. i.e., perpendicular to the neck line.

Temporal position (side view)

- The camel is shot from the side so that the bullet enters the skull midway between the eye and the base of the ear. The bullet should be directed horizontally.
- Note that frontal brain shots are not recommended during ground shooting of camels since the shape of the skull can cause bullet deflection.
- The target animal should be checked to ensure it is dead before moving on to the next animal. Always approach the animal from the dorsal (or spinal) side to prevent injury from kicking legs. Death of shot animals can be confirmed by observing a combination of the following:
 - no heartbeat
 - no breathing

- o no corneal reflex (no blinking when the eyeball is touched)
- o no response to a painful stimulus (e.g., a pinch of the ear tip).
- If death cannot be verified, a second shot to the head should be taken immediately.
- When large numbers of animals are to be killed in the holding yard, provisions should be made to dispose of carcasses in an appropriate manner (i.e., by burying and/or burning). Numerous guidelines are available that describe disposal methods.

Figure 3: Shot placement for feral camels



Note that shooting an animal from above or below the horizontal level as depicted here will influence the direction of the bullet through the body. Adjustment to the point of aim on the external surface of the body may need to be made to ensure that the angled bullet path causes extensive (and therefore fatal) damage to the main organs in the target areas.

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