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

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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 foxes in NSW. The aim is for control programs to be conducted in a way that reduces the negative impacts of foxes using the most humane, target-specific, economic and effective techniques available.

Previously published and endorsed COPs and SOPs[1] 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(https://www.pestsmart.org.au/) can provide general guidance for national use, but some of the content may now be out-of-date.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 SOPs [2] has been developed to provide the most relevant and up-to-date information to support best practice pest animal management in NSW. Out-dated information has been removed, while new information has been added to reflect the advancements and changes specific to fox 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.

Contents

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 fox 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 fox 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 experience [3].

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 anima – (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 they can be managed. 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 cause [12]. 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 as 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, 16] 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 based on the 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.

Fox management

Background

The introduced European red fox (*Vulpes vulpes*) is widely distributed throughout an estimated three quarters of Australia and can survive in habitats ranging from arid to alpine through to urban environments. Although predominantly carnivorous, the fox is an opportunistic predator and scavenger with no specialised food requirements. Dietary studies conducted in agricultural landscapes of Australia show sheep, rabbits and house mice to be the most common food items. In more natural environments, native species predominate. Females reproduce only once a year with most cubs born during August and September. Mean litter size is four, ranging up to a maximum of about ten. Foxes can carry the zoonotic disease hydatidosis, and therefore physical contact with foxes or their faeces may pose a public health risk [18]. They can also transmit diseases to domestic animals and wildlife including sarcoptic mange, *Neospora caninum* and canine distemper.

Fox predation has long been recognised as a serious threat to Australian native fauna, contributing to significant declines in a range of species, and listed as a key threatening process under the *NSW Biodiversity Conservation Act* 2016. In 2009 foxes were estimated to cost the Australian agricultural industries more than $21 million annually [19]. This figure does not include costs of control or environmental impacts.

For further information please see:

- NSW Threat Abatement Plan for Predation by the Red Fox (*Vulpes vulpes*): http://www.environment.nsw.gov.au/resources/pestsweeds/110791FoxTAP2010.pdf
- PestSmart: https://pestsmart.org.au/toolkits/european-foxes/

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 foxes, ground baiting is a primary method of control and supplementary techniques are used as a follow-up e.g., trapping or Canine Pest Ejectors (CPEs). Regional variations can also occur in some species. For example, cage trapping is generally considered a supplementary technique but in problematic urban environments for troublesome individuals it may be the only option available. 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.

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., bait aversion) that may require switching to another lethal method (e.g., CPEs). 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 stress) when bait uptake might be maximised. Alternatively, application of control can align with the need for the commodity to be protected when it is most vulnerable e.g., when lambs are being born.

Fox management methods

The most commonly used fox control techniques are lethal baiting, shooting, trapping, den fumigation, and exclusion fencing [20]. Other measures such as guard animals and CPEs have also been used in recent years [21]. Fertility control through immunocontraception or by other chemical means is not currently a viable broad scale control option despite considerable research into its development [22].

The scale of problems involving fox predation, ranging in size from a small poultry shed to a large national park or agricultural region, can determine the most appropriate means of control or conversely the effectiveness of control in individual situations. For example, aerial

baiting would be the most cost-effective strategy over large areas whereas the use of guard dogs would only be suitable on a property basis. Similarly, the use of fertility control would be of little benefit in protecting small-scale enterprises. Cost-effectiveness, humaneness and efficacy need to be evaluated in every program. A brief evaluation of the humaneness of control techniques follows:

Humaneness of control techniques

Lethal baiting

Lethal baiting is considered to be the most effective method of fox control currently available; however not all poisons are equally humane. Depending on the poison used, target animals can experience pain and suffering, sometimes for an extended period, before death. Non-target animals including native species, such as quolls, working dogs and livestock can also be exposed to poisons either directly by eating baits intended for pest animals (primary poisoning) or through the scavenging of tissues from a poisoned animal (secondary poisoning). Sodium monofluoroacetate (1080) and para-aminopropiophenone (PAPP) are the only toxins registered for fox control in NSW.

1080

In carnivores, poisoning from 1080 is typified by severe central nervous system disturbance, convulsions, hyperexcitability, vocalising and ultimately respiratory failure. It is thought that during the initial onset of signs (e.g., manic running, yelping and shrieking, retching) the animal is likely to be conscious and capable of suffering. However, during the latter stages, when the animal shows signs of central nervous system disturbance including collapse, convulsions and tetanic spasms, suffering may not occur.

Para-aminopropiophenone (PAPP)

Mammalian carnivores and monitor lizards (*Varanus spp.*) are more susceptible to PAPP than other species. Once absorbed into the bloodstream PAPP induces the rapid oxidation of haemoglobin to methaemoglobin, which is not effective at transporting oxygen in the blood. This causes a deficit of oxygen to the heart and brain (hypoxia), resulting in lethargy and uncoordinated movement and ultimately loss of consciousness and death, which usually occurs within two hours after a lethal dose. PAPP has the advantage of an antidote (methylene blue) for use with non-target animals such as pet dogs and cats, but this needs to be administered by a veterinarian within 30 minutes of ingestion [23].

Canid Pest Ejectors

Canid pest ejectors (CPEs) in various forms have been used in the USA for coyote control since the 1930s. The original ejector used a .38 cartridge to propel cyanide into the mouth of a coyote after activation. A spring-loaded ejector replaced the .38 cartridge with further improvements developed over time. The device is now currently registered in NSW to contain 1080 (3mg and 6mg) and PAPP (400mg and 1000mg) in capsules for foxes and wild dogs respectively. CPEs incorporate a bait lure on the ejector head. The length of time a CPE can be deployed effectively in the field is limited by the detectability and longevity of the bait lure. A key advantage of the CPE is that unlike baits, the device cannot be moved or cached. They are also relatively target selective as both foxes and wild dogs possess

sufficient jaw strength to activate the device and receive a lethal dose [24]. For more information on CPEs see: https://animalcontrol.com.au/products/cpe

Shooting

Shooting can be a humane control method of killing foxes when it is carried out by competent, accurate and responsible shooters; the correct combination of firearm and ammunition and optimum shot placement are used; the target animal can be clearly seen and is within range; and all wounded animals are promptly located and euthanased humanely. Head shots are the preferred shot placement although chest shots are more likely when shot from a distance.

Dependent young will experience significant negative welfare impacts if they are not euthanased humanely after their mother is shot. If lactating vixens are shot, reasonable efforts should be made to find dependent cubs and kill them quickly and humanely by either shooting (with a single shot to the brain) or by fumigation of the den. Shooting can also have negative effects on surviving animals in social groups.

Shooting alone as a means of controlling fox populations is ineffective and must be used in combination with other management tools.

Trapping

All traps have the potential to cause injury and some degree of suffering and distress [25]. Traps that contain an animal (e.g., cage or box traps) cause fewer injuries than traps that restrain an animal (e.g., foot-hold traps[a]). Animals caught in a cage trap are not likely to experience significant injuries unless they make frantic attempts to escape. Importantly, non-target animals that are caught in cage traps can usually be released unharmed. Foot-hold traps on the other hand can cause serious injuries to both target and non-target animals such as swelling and lacerations to the foot from pressure of the trap jaws and dislocation of a limb if the animal struggles to escape. Foxes can also inflict injuries to their feet and legs by chewing on the captured limb, and to their teeth, lips and gums by chewing at the trap jaws. If foot-hold traps are used, they must have a rubber-like padding[b] on each jaw which cushions the initial impact and provides friction thus preventing the captured leg from sliding along or out of the jaws. Toothed[c], steel-jaw traps are prohibited for use on foxes in Australia as they cause significant injury, pain and distress.

[a] *Foot-hold* refers to a trap with two hinged jaws held open by a trigger mechanism that when activated, closes the jaws, by spring action, around the foot or leg, thus catching and restraining the animal.
[b] *Padding* is used to refer to traps that have a non-abrasive surface and durable cushioning material firmly fixed to the jaws i.e. commercially manufactured traps and after-market modifications.
[c] *Toothed* includes any jaws that are not smooth i.e. have metal teeth, serrations or spikes.

As well as injuries, trapped animals can suffer from exposure, thirst, starvation, shock, capture myopathy and predation; therefore, traps should be placed in a suitable area protected from extremes of weather and must be inspected at least once daily. Traps should not be set where there is a risk of entanglement with fences or thick vegetation as this can also cause injury to the fox.

Use of a lethal toxin with traps is to bring about a relatively quick death of trapped target animals. Cloths (containing PAPP) which are incorporated onto the jaws of the trap have been developed to improve the humaneness of foot-hold traps[26]. The fitting of PAPP cloths to the trap jaw will reduce the suffering of a trapped fox although some will not be euthanased if they don't ingest enough toxin due to differences in chewing behaviour, adverse environmental conditions (such as heavy rain), malfunctions of the device or failure through faulty application. Traps fitted with PAPP cloths must still be inspected daily to minimise harm to non-target animals caught in the trap. Where the daily inspection of traps is problematic, deployment of alternative control measures such as baits or CPEs should be considered. Trap alerts or remote notification of a trapped animal or activation of a trap may improve animal welfare outcomes: however, the technology is still under development. Lethal trap devices (LTDs) as an alternative carrier of toxins to cloths for fitting to foot-hold traps are also under development.

Treadle snares are a humane alternative to the toothed, steel-jawed trap but they can be difficult to set, are bulky to carry and may miss more target animals. The Collarum® trap is another alternative that throws a loop over the animal's head after it has pulled on a trigger. This spring-powered neck snare has been shown to be target specific and produce only low injury scores. Soft-net traps comprise a flexible metal frame and netting that collapses over the animal when it is triggered entangling the animal within the soft net. This trap also reportedly causes fewer injuries to the trapped animal compared to foot-hold devices.

Dealing with trapped animals

Trapped animals should be approached carefully and quietly to minimise panic, further stress and risk of injury. Trapped live foxes must be euthanased as quickly and humanely as possible.

For foxes in foot-hold traps this should be done with a single rifle shot to the brain. Captive bolt guns for stunning/euthanasia of conscious foxes could provide an alternative to shooting, however, research is required to determine efficacy, suitable methods of restraint, and positions for accurate bolt placement.

Foxes in cage traps should be euthanased with a shot to the brain, although an overdose of barbiturate (usually post-sedation) can be given by, or under the direction of, a veterinarian or other authorised person.

If lactating females are caught in a trap, reasonable efforts should be made to find dependent cubs and kill them quickly and humanely.

Non-target animals that are caught but not severely injured should be released at the trap site. If they are injured, but may respond to veterinary treatment, such treatment should be sought. Severely injured non-target animals must be euthanased quickly and humanely using an appropriate method (see *GEN001 Methods of Euthanasia*).

Fumigation of fox dens

Carbon monoxide (CO) is a colourless, odourless gas that causes oxygen depletion leading to unconsciousness and death without pain or discernible discomfort. Fumigation of fox natal dens appears to be a humane method of fox destruction provided that high enough concentrations of CO to bring about a rapid death can be introduced into the den; that cubs are sufficiently grown (> 4 weeks old) to be fully susceptible to the effects of CO; and, that animals are not directly exposed to high temperatures during combustion of the cartridges.

CO is the only fumigant registered for foxes. Other fumigants, e.g., chloropicrin and phosphine, are not registered for use against foxes and must not be used for fox den fumigation. These fumigants, particularly chloropicrin, are not considered humane as the animals are likely to suffer for extended periods before death.

Exclusion fencing

The use of exclusion fencing is generally regarded as a humane, non-lethal alternative to lethal control methods but only after lethal control measures have been employed to remove foxes from within the protected area. However, the high costs of establishing and maintaining fox-proof enclosures (including removal of foxes from within the enclosure), mostly limits their use to the management of threatened species. Although exclusion fencing acts as a barrier to foxes it can have negative effects on non-target species by altering dispersion and foraging patterns and causing entanglement and electrocution. It can also create a significant hazard to wildlife in the event of a bushfire [27]. There is also the caveat that exclusion fencing is only effective where the fencing itself is regularly inspected and repaired where required. Otherwise, they will be breached. 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/

For further information on pest exclusion fence design, please refer to sites such as:

https://www.wool.com/globalassets/wool/sheep/pest-animals/wild-dog-exclusion-fencing--australian-wool-innovation/kondinin-group-research-report---exclusion-fencing.pdf

https://www.wool.com/on-farm-research-and-development/sheep-health-welfare-and-productivity/pest-animals/wild-dog-exclusion-fencing/

Similar pest fence designs are also available from the web-sites of commercial fencing manufacturers.

Fertility control

Fertility control (in concept) is seen as a preferred method of broad scale fox control as it offers a potential humane and target specific alternative to lethal methods. However, no effective fertility control agents are currently available for broad-scale use against foxes in Australia, and research suggests that contraception delivered by bait is much less effective than lethal baiting for reducing fox density [22].

Guardian animals

The use of guardian animals to protect herd animals (e.g., sheep, goats, poultry) from external threats is seen as a humane alternative or adjunct to conventional lethal fox control. Dogs, alpacas, llamas and donkeys can be used to repel predators, alert owners to disturbances in the flock and reduce reliance on less humane forms of control.

Alpacas, llamas and donkeys have advantages over guard dogs as they require minimal supervision and can be managed in a similar manner to the livestock being protected. Dogs, on the other hand, require training and supervision to ensure that they do not injure or kill stock and wildlife or wander onto other properties. Owners must provide dogs with adequate feed and water, as well as regular maintenance and monitoring to protect them from adverse environmental conditions, disease, injury and distress [21]. Livestock guardian dogs are also susceptible to many lethal control techniques. Therefore, presence of guardian dogs can limit the number of options available for fox control.

Although there are anecdotal reports that guardian animals can be beneficial, there is also some conjecture around the effectiveness of using guardian animals to protect livestock and the negative impacts they might have (especially guardian dogs) on other species. This requires further investigation.

Risk assessment – bait application

An authorised control officer (ACO) must conduct a risk assessment to determine if it is appropriate to supply certain toxic baits (i.e., 1080 or PAPP baits) to any person. When issuing other vertebrate pesticides as baits, ACOs must consider if a risk assessment is relevant or required e.g., where there is zero risk which requires no further controls.

Refer to the relevant Pesticide Control Order (PCO) https://www.epa.nsw.gov.au/your-environment/pesticides/pesticides-nsw-overview/pesticide-control-orders and the NSW DPI Vertebrate Pesticide Manual https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/publications/nsw-vertebrate-pesticide-manual for further details on performing risk assessments.

Users of baits must always refer to any risk assessment and to a specific permit, approved label and Pesticide Control Order (PCO) for up-to-date information on conditions of use including distance restrictions, public notification and bait preparation, distribution, storage, transportation and disposal.

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

Control technique	Acceptability regarding humaneness* and Relative humaneness score (Part A [1-8], Part B [A-H]**)	Efficacy regarding population reduction	Cost-effectiveness	Target Specificity	Comments
Ground baiting with 1080 *Primary*	Acceptable Score: 1E – 1F	Effective	Cost-effective	Potential risk of poisoning non-target animals. Strategic ground baiting uses fewer baits than aerial baiting programs. Uneaten baits can be collected and destroyed.	Effective in accessible country. 1080 ingestion can also kill non-target animals including native species, cats, dogs and livestock. 1080 is toxic to humans; operators need to take precautions to safeguard against exposure.
PAPP baiting (FOXECUTE®) *Primary*	Acceptable Score: 1C-1D	Effective	Cost-effective	Potential risk of poisoning non-target animals	PAPP is highly toxic for domestic dogs and cats and may also pose a risk to native species, particularly varanids (goannas). PAPP has the advantage of an antidote (methylene blue) which can be used for companion animals, but it needs to be administered by a veterinarian within 30 minutes of ingestion.
Aerial baiting with 1080 *Primary*	Acceptable Score: 1E – 1F	Effective	Cost-effective	Potential risk of poisoning non-target animals as uneaten baits cannot be collected. Regionally specific techniques can be applied to minimise this risk.	Effective for broad scale control in remote areas. 1080 ingestion can also kill non-target animals including native species, cats, dogs and livestock. 1080 is toxic to humans; operators need to take precautions to safeguard against exposure.
Canid Pest Ejectors 1080 and PAPP *Supplementary*	Acceptable Scores: 1E – 1F (1080), 1C-1D (PAPP)	Limited	Cost-effective	Non-target risk reduced by the jaw pressure required to activate the ejector. However, some non-target species such as quolls are at risk.	Less suitable for broad-scale use compared to baits but can be used to target introduced predators in specific areas. Requires less maintenance (checking) than baits.

Control technique	Acceptability regarding humaneness* and Relative humaneness score (Part A [1-8], Part B [A-H]**)	Efficacy regarding population reduction	Cost-effectiveness	Target Specificity	Comments
Ground shooting *Supplementary*	Acceptable Score: 2A (head shot), 2D (chest shot)	Not effective	Not cost-effective	Target specific	Labour intensive, only suitable for smaller scale operations.
Guardian animals (e.g., dogs, alpacas, llamas, donkeys) *Supplementary*	Acceptable Score: N/A	Unknown	Unknown	Guard dogs may chase or attack non-target animals e.g., native wildlife, pet dogs, livestock	Likely to be only effective for small to medium enterprises. Currently, evidence on broad scale effectiveness remains anecdotal.
Exclusion fencing *Supplementary*	Acceptable Score: N/A	Limited	Expensive	Can be in certain situations	Useful for protection of threatened wildlife species and other valuable animals. Expensive, therefore impractical for broad scale application.
Den fumigation with carbon monoxide *Supplementary*	Acceptable Score: 3A – 3C	Not effective	Not cost-effective	Target specific if den is monitored for non-target use prior to fumigation	Useful for localised fox problems where baiting and shooting is not an option, not effective for broad scale control. Carbon monoxide is toxic to humans; operators need to take precautions to safeguard against exposure.
Padded-jaw traps *Supplementary*	Acceptable Scores: Foot-hold trap: 5B (head shot); N/A (PAPP)	Not effective	Not cost-effective	Risk of catching non-target animals but they can usually be released unharmed. Some species may experience severe injuries.	May be useful for problem animals but are inefficient for general control. Effectiveness depends on skill of operator

Control technique	Acceptability regarding humaneness* and Relative humaneness score (Part A [1-8], Part B [A-H]**)	Efficacy regarding population reduction	Cost-effectiveness	Target Specificity	Comments
Cage traps *Supplementary*	Acceptable Score: 4B	Not effective	Not cost-effective	May catch non-target animals but they can usually be released unharmed	Useful only in urban areas for problem animals.
Soft-net traps *Supplementary*	Acceptable Score: N/A	Not effective	Not cost-effective	May catch non-target animals but they can usually be released unharmed	May be useful in urban areas for problem animals, where baiting is inappropriate or where live-capture is required for research purposes.
Treadle snares *Supplementary*	Acceptable Score: N/A	Not effective	Not cost-effective	Risk of catching non-target animals but they can usually be released unharmed. Some species may experience severe injuries.	May be useful for problem animals but are inefficient for general control. Difficult to set.
Collarum® neck restraints *Supplementary*	Acceptable Score: N/A	Not effective	Not cost-effective	More selective than other devices. The baited top and capture mechanism is relatively species-specific, and the mechanics of the device make capture of other species unlikely.	May be useful in urban areas for problem animals. Can be difficult top set.
Fertility control *Not available*	Acceptable Score: N/A	Unknown	Unknown	Depends on agent used	No products currently registered.
Toothed, steel-jaw traps *Not available*	Not acceptable Score: N/A	Not effective	Not cost-effective	Risk of catching and causing severe injury and distress to non-target animals	Inhumane and must not be used. Alternatives are available.

Footnotes for Table 1

* 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 nature of the technique, may not be consistently humane. There may be a period of poor welfare before death.

Methods that are not acceptable and 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/fox-humaneness-matrix/.

N/A = Humaneness score not available.

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

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 baiting of foxes with 1080 (NSWFOX SOP1)
- Aerial baiting of foxes with 1080 (NSWFOX SOP2)
- Ground shooting of foxes (NSWFOX SOP3)
- Fumigation of fox dens using carbon monoxide (NSWFOX SOP4)
- Trapping of foxes using padded-jaw traps (NSWFOX SOP5)
- Trapping of foxes using cage traps (NSWFOX SOP6)
- Poisoning of foxes with FOXECUTE® para-aminopropiophenone (PAPP) baits (NSWFOX SOP7)
- Canid Pest Ejectors (CPEs) using 1080 and PAPP (NSWFOX SOP8)

NSWFOX SOP1 Ground baiting of foxes with sodium monoflouroacetate (1080)

Background

Lethal baiting with sodium monofluoroacetate (1080) is used to minimise the impact of the introduced European red fox (*Vulpes vulpes*) on native fauna and agricultural production. Lethal baiting is considered to be the most effective broad-scale method currently available. Foxes are amongst the most sensitive species to the effects of 1080. Good baiting technique helps to minimise the risk to non-target species and maximise the effect on targeted fox populations.

1080 is an odourless, tasteless, concentrated solution that has a coloured dye added for identification of the toxin. It is used for poisoning of foxes by incorporating it into fresh, dried or processed meat baits. Poisoned baits are distributed either on the ground by hand or from the air in a helicopter or fixed-wing aircraft. Aerial baiting procedures are described in NSWFOX SOP2 *Aerial Baiting of Foxes with 1080*.

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

- 1080 baiting is subject to an authorised control officer (ACO) risk assessment
- Baiting with 1080 should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- Ground baiting is used on rural properties or national parks and forestry estate that are accessible by road.
- Baiting with 1080 must not be used in areas where there is an unacceptably high risk to humans and companion animals, such as urban/residential landscapes.
- 1080 use is restricted in areas where there is a high risk of poisoning domestic stock and wildlife.

- Timing of baiting programs on agricultural lands depends on farm management practices and will often occur at or before lambing/kidding. Baiting is also carried out at times when juvenile foxes are dispersing. In contrast, 1080 baiting may be continuous and ongoing in most programs targeting the conservation of native fauna.
- Baiting of foxes with 1080 can only be carried out under conditions set down in a specific permit issued by the Australian Pesticides & Veterinary Medicines Authority (APVMA) under Commonwealth legislation (*Agricultural and Veterinary Chemicals Code Act 1994*).
- In NSW, 1080 must also be used in accordance with the *Pesticides Act 1999* and the relevant Pesticide Control Orders (that include distance restrictions, signage and notification requirements).
- 1080 is a restricted chemical product (under Regulation 45 of the Agricultural and Veterinary Chemicals Code Regulations 1995) and is listed as a Schedule 7 – Dangerous Poison under the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). These listings require special precautions in the manufacture, handling, storage and use of 1080, along with specific regulations regarding labelling or availability.
- Handling of 1080 concentrated solution and preparation of baits must only be performed by an authorised person who has the appropriate training.
- Prepared and manufactured 1080 baits can only be obtained through an ACO employed by Local Land Services, National Parks and Wildlife Service, Border Fence Maintenance Board of NSW and other NSW public authorities.
- The 1080 user should refer to the NSW Vertebrate Pesticide Manual for all relevant legislation and its application.

Animal welfare implications

Target animals

- The toxicity of 1080 is due to the conversion of fluoroacetate to fluorocitrate, which inhibits the tricarboxylic acid cycle – a mechanism necessary for cellular energy production. In general, herbivores experience cardiac failure, whereas carnivores experience central nervous system (CNS) disturbances and convulsions and then die of respiratory failure. Some species, usually omnivores such as pigs, can be equally affected by both CNS and cardiac signs.
- After a fox has ingested 1080 there is a latent period of around 30 minutes to 3 hours before initial signs such as hyperexcitability, vocalisation, manic running and vomiting/retching are observed. Although the precise nature and extent of suffering after ingestion of 1080 is unknown, it is likely that the animal will experience distress and possibly pain during this initial stage. In the final stages of toxicosis, signs of central nervous system disturbance are marked and include collapse, convulsions and tetanic spasms. During periods of prolonged convulsions, it is possible that animals are lucid between seizures, however this is difficult to assess. If animals are conscious during the convulsive episodes or if they become conscious afterwards it is possible that they may experience pain and anxiety. There is also potential for injuries to occur after the appearance of clinical signs. Death occurs around two hours after the onset of clinical signs.

- To minimise the animal welfare implications of orphaning dependent cubs, where possible, it is preferable not to undertake baiting programs when vixens are lactating. This is also the time when vixens are moving around least within their territory thus reducing the likelihood of finding baits. To maximise the effect of fox control prior to spring lambing for example, baiting should be conducted during June and July when foxes are mating and more mobile.

Non-target animals

- 1080 is toxic to a wide range of species including birds, mammals and reptiles; however, there are marked differences in sensitivity. Dogs are extremely sensitive, and most other mammalian carnivores are highly sensitive to 1080 poisoning. Herbivores are less sensitive, and birds and reptiles increasingly more tolerant.
- Poisoning of non-target species can occur either directly by eating baits intended for foxes (primary poisoning) or through the scavenging of tissues or vomitus from a poisoned animal (secondary poisoning).
- At the conclusion of the baiting program collect and destroy any remaining baits by burial with a minimum of 500 mm of soil.
- Any fox (or dog) carcasses found after poisoning should be destroyed by burial with a minimum of 500 mm of soil
- The susceptibility of non-target species to 1080 poisoning is determined by many factors including sensitivity to the poison, body weight, concentration of 1080 in the bait, bait placement, bait type and palatability, timing of baiting and level of exposure to toxic baits.
- In agricultural areas where the risk to non-target species is unknown, especially where sensitive native carnivores are likely to be present, bait stations using buried, unpoisoned baits should be established and monitored. If baits are taken or disturbed by non-target animals, then poison baiting should not be commenced in the area. In conservation areas where native carnivores are known to be present, operators should consult relevant guidelines when planning a baiting program.
- Camera traps – devices that detect heat-in-motion – can be used to assess visitation. The camera is triggered to take photos as the subject moves within the detection zone i.e. vicinity of bait station.
- Tethering of baits can also be used where there is concern that removal or caching (storing) of baits may result in unacceptable non-target risks. To minimise caching by wild dogs and foxes, bait stations should only contain a single bait.
- To minimise the potential for toxic baits to be lethal to non-target animals, the following baiting strategies are recommended:
    - *Bait size and concentration of 1080* – baits should be large enough so that small native animals cannot eat enough of them to ingest a lethal dose. Each bait should contain a precise amount of 1080 (3 mg) that is sufficient to deliver a lethal dose to a fox. The rate is calculated to minimise sub-lethal doses and overdosing.
    - *Burial placement of baits* – baits should be buried in a shallow hole and covered with soil or organic material, so they are less likely to be removed by native species, particularly birds.

- *Distance between bait stations* – to minimise the risk of native animals finding multiple baits place 1080 baits no more than ten (10) per kilometre of trail or no more than twenty (20) 1080 fox baits per 100 hectares. Also, foxes may be less likely to cache baits when they are placed a distance apart.
- *Palatability and attractiveness of baits* – ensure that bait types used are highly attractive to foxes and less attractive to non-target species. Some native animals may not be attracted to meat or may be unable to eat some bait types. Domestic livestock are unlikely to eat meat baits. Presenting baits that are highly palatable to foxes reduces the likelihood of caching and thus potential for non-target consumption.
- *Marking of bait stations* – mark the location of buried baits so that any baits remaining at the end of the program can be collected and destroyed.
- *Timing of baiting* – this can be adjusted to reduce exposure to potentially susceptible species.

First aid for dogs

- Fox baits are highly attractive to other carnivores such as dogs. Care must be taken to ensure that working dogs and pets do not come into contact with fox baits. The prognosis for poisoned dogs is extremely poor unless vomiting can be induced shortly after ingestion of the bait and before clinical signs are evident.
- If a working dog or pet is known to have consumed a bait but is NOT yet showing signs of poisoning, induce vomiting by giving one of the following emetics by mouth:
  - washing soda crystals (sodium carbonate) – 3 to 5 crystals orally, DO NOT use laundry detergents or powders
  - table salt – 2 teaspoons of salt in 1 cup of water; more or less depending on the size of the dog
  - dilute hydrogen peroxide (3% solution) – 3 to 5ml
  - If the dog has vomited, clean it up immediately as the vomit is toxic.
- THEN SEEK VETERINARY ATTENTION IMMEDIATELY. The sooner action is taken following poisoning the better the prognosis.
- If these emetics are not immediately to hand or you are not having success in making the dog vomit it is better to seek veterinary attention immediately rather than waste time.
- If the dog has already begun to show signs of toxicosis (retching and vomiting, frenzied behaviour such as running and howling, convulsions, difficulty breathing etc.), DO NOT induce vomiting, but seek veterinary attention without delay.
- Veterinary intervention aims to decrease 1080 absorption and facilitate excretion; control seizures; and support respiration and cardiac function.
- See *First Aid – 1080 and your dog* for more information: https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/1st_aid_booklet-1.pdf

Workplace health and safety considerations

- If poisoning occurs, contact a doctor or the Poisons Information Centre (Ph 13 11 26) IMMEDIATELY. Urgent hospital treatment is likely to be needed. There is no effective antidote to 1080.
- For further information refer to the Material Safety Data Sheet (MSDS), available from the supplier, the Pesticide Control (1080 Bait Products) Order, and the NSW DPI Vertebrate Pesticide Manual.

Procedures

- An ACO must conduct a risk assessment to determine if it is appropriate to supply 1080 baits to any person. Risk assessments must consider threats to non-target species particularly domestic dogs, human health and the environment.
- ACOs must conduct a risk assessment of planned group baiting programs where baiting occurs less than the prescribed minimum distances provided in the current 1080 PCO.
- Users of 1080 must always refer to any risk assessment and to specific permit, approved label, Pesticide Control (1080 Bait Products) Order (PCO) and the NSW DPI Vertebrate Pesticide Manual for up-to-date information on conditions of use including distance restrictions, public notification and bait preparation, distribution, storage, transportation and disposal.

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NSWFOX SOP2 Aerial baiting of foxes with sodium monoflouroacetate (1080)

Background

Poisoning with sodium monofluoroacetate (1080) is used to minimise the impact of the introduced European red fox (*Vulpes vulpes*) on native fauna and agricultural livestock. Lethal baiting is considered to be the most effective method currently available. Foxes are amongst the most sensitive species to the effects of 1080. Good baiting technique helps to minimise the risk to non-target species and maximise the effect on targeted fox populations.

1080 is an odourless, tasteless concentrated solution that has a coloured dye added for identification of the toxin. It is used for poisoning of foxes by incorporating it into fresh, dried or processed meat baits. Poisoned baits are distributed either on the ground by hand or from the air in a helicopter or fixed-wing aircraft. Good baiting technique helps to minimise the risk to non-target species and maximise the effect on targeted fox populations. Ground baiting procedures are more common for fox control in NSW and are described in NSWFOX SOP1 *Ground Baiting of Foxes with 1080*.

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

- Aerial baiting programs must only occur when subjected to a risk assessment and approved by an Authorised Control Officer (ACO) and relevant authority.
- Baiting with 1080 should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- Baiting of foxes with 1080 can only be carried out under conditions set down in a specific permit issued by the Australian Pesticides & Veterinary Medicines Authority (APVMA) under Commonwealth legislation (*Agricultural and Veterinary Chemicals Code Act 1994*).
- In NSW 1080 must also be used in accordance with the *Pesticides Act 1999* and the relevant Pesticide Control Orders (that include distance restrictions, signage and notification requirements).

- In NSW aerial baiting for fox control should be restricted to areas where ground control is impractical or where it is necessary for the protection of threatened species. Approval for every aerial baiting program on land reserved under Part 4 of the *National Parks and Wildlife Act 1974* must be obtained from the relevant NPWS Branch Director. For all other land, approval for every aerial baiting program must be obtained from the LLS Chief Executive or their delegate. Aerial baiting must be organised through either LLS or NPWS or any other approved NSW public authority.
- Aerial baiting is recommended for large, sparsely populated areas that are remotely located and inaccessible by vehicles. Use of fixed wing aircraft is only permitted in the Western Division of NSW.
- Aerial baiting programs are limited to areas and situations that meet the restrictions stated in the LLS and NPWS approved task profiles and procedures for aerial baiting (available from ACOs).
- 1080 is a restricted chemical product (under Regulation 45 of the Agricultural and Veterinary Chemicals Code Regulations 1995) and is listed as a Schedule 7 – Dangerous Poison under the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). These listings require special precautions in the manufacture, handling, storage and use of 1080, along with specific regulations regarding labelling or availability.
- Handling of 1080 concentrated solution and preparation of baits must only be performed by an authorised person (ACO) who has the appropriate training.
- Prepared and manufactured 1080 baits can only be obtained through authorised government agencies.
- The 1080 user should refer to the NSW Vertebrate Pesticide Manual for all relevant legislation and its application.

Animal welfare implications

Target animals

- The toxicity of 1080 is due to the conversion of fluoroacetate to fluorocitrate, which inhibits the tricarboxylic acid cycle – a mechanism necessary for cellular energy production. In general, herbivores experience cardiac failure, whereas carnivores experience central nervous system (CNS) disturbances and convulsions and then die of respiratory failure. Some species, usually omnivores such as pigs, can be equally affected by both CNS and cardiac signs.
- After a fox has ingested 1080 there is a latent period of around 30 minutes to 3 hours before initial signs such as hyperexcitability, vocalisation, manic running and vomiting/retching are observed. Although the precise nature and extent of suffering after ingestion of 1080 is unknown, it is likely that the animal will experience distress and possibly pain during this initial stage. In the final stages of toxicosis, signs of central nervous system disturbance are marked and include collapse, convulsions and tetanic spasms. During periods of prolonged convulsions, it is possible that animals are lucid between seizures, however this is difficult to assess. If animals *are* conscious during the convulsive episodes or if they become conscious afterwards it is possible that they may experience pain and anxiety. There is also potential for injuries to occur after the

appearance of clinical signs. Death occurs around two hours after the onset of clinical signs.

- To minimise the animal welfare implications of orphaning dependent cubs, it is preferable not to undertake baiting programs when vixens are lactating. This is also the time when vixens are moving around least within their territory thus reducing the likelihood of finding baits. To maximise the effect of fox control prior to spring lambing for example, baiting should be conducted during June and July when foxes are mating and more mobile.

Non-target animals

- 1080 is toxic to a wide range of species including birds, mammals and reptiles; however, there are marked differences in sensitivity. Dogs are extremely sensitive, and most other mammalian carnivores are highly sensitive to 1080 poisoning. Herbivores are less sensitive, and birds and reptiles increasingly more tolerant.
- Poisoning of non-target species can occur either directly by eating baits intended for foxes (primary poisoning) or through the scavenging of tissues or vomitus from a poisoned animal (secondary poisoning).
- The susceptibility of non-target species to 1080 poisoning is determined by many factors including sensitivity to the poison, body weight, concentration of 1080 in the bait, bait placement, bait type and palatability, timing of baiting and level of exposure to toxic baits.
- There is a potentially greater risk to non-target species with aerial application of baits than occurs with ground baiting where baits are buried. Randomly dispersed baits on the surface of the ground can more easily be found by other animals. Foxes can take longer to encounter the baits, whilst baits made from dried meat can remain toxic for many months, especially in drier regions where degradation of 1080 is slow.
- The following baiting practices are recommended:
    - *Bait type* – dried meat baits are used to improve target specificity and to reduce insect activity. They are highly attractive to foxes but because of their dry, tough consistency will less likely be consumed by scavenging birds or native mammalian carnivores.
    - *Bait size* - each red meat and offal bait must weigh approximately 100 grams prior to any drying process.
    - *1080 concentration* - each bait contains a precise amount of 1080 (3.0 mg is recommended) that is sufficient to deliver a lethal dose to a fox. The rate is calculated to minimise sub lethal doses and overdosing.
    - *Distance between baits* – the minimum distances for the laying of 1080 fox baits have been set to minimise the risk to people and to non-target animals. Aerial baiting for foxes is permissible at a rate of up to 10 baits per km.
    - *Timing of baiting* – the risk of poisoning non-target species is increased when regular food sources are scarce, therefore timing should be adjusted to lessen exposure.

First aid for dogs

- Fox baits are highly attractive to other carnivores such as dogs. Care must be taken to ensure that working dogs and pets do not come into contact with fox baits. The prognosis for poisoned dogs is extremely poor unless vomiting can be induced shortly after ingestion of the bait and before clinical signs are evident.
- If a working dog or pet is known to have consumed a bait but is NOT yet showing signs of poisoning, induce vomiting by giving one of the following emetics by mouth:
  - washing soda crystals (sodium carbonate) – 3 to 5 crystals
  - table salt – 1 to 3 tablespoons
  - dilute hydrogen peroxide (3% solution) – 3 to 5ml
  - If the dog has vomited, clean it up immediately as the vomit is toxic.
- THEN SEEK VETERINARY ATTENTION IMMEDIATELY. The sooner action is taken following poisoning the better the prognosis.
- If these emetics are not immediately to hand or you are not having success in making the dog vomit it is better to seek veterinary attention immediately rather than waste time.
- If the dog has already begun to show signs of toxicosis (retching and vomiting, frenzied behaviour such as running and howling, convulsions, difficulty breathing etc.), DO NOT induce vomiting, but seek veterinary attention without delay.
- Veterinary intervention aims to decrease 1080 absorption and facilitate excretion; control seizures; and support respiration and cardiac function.
- See *Working dog safety & first aid* for more information

Workplace health and safety considerations

- If poisoning occurs, contact a doctor or the Poisons Information Centre (Ph 13 11 26) IMMEDIATELY. Urgent hospital treatment is likely to be needed. There is no effective antidote to 1080.
- For further information refer to the Material Safety Data Sheet (MSDS), available from the supplier, the Pesticide Control (1080 Bait Products) Order, and the NSW DPI Vertebrate Pesticide Manual.

Procedures

- An ACO must conduct a risk assessment to determine if it is appropriate to supply 1080 baits to any person. Risk assessments should consider threats to non-target species particularly domestic dogs, human health and the environment.
- ACOs must conduct a risk assessment of planned group baiting programs where baiting occurs less than the prescribed minimum distances provided in the current 1080 PCO.
- Users of 1080 must always refer to any risk assessment and specific permit, approved label and Pesticide Control (1080 Bait Products) Order for up-to-date information on conditions of use including distance restrictions, public notification and bait preparation, distribution, storage, transportation and disposal.

- Pesticide Control (1080 Bait Products) Order: https://www.epa.nsw.gov.au/your-environment/pesticides/pesticides-nsw-overview/pesticide-control-orders
- NSW DPI Vertebrate Pesticide Manual: https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/publications/nsw-vertebrate-pesticide-manual

Fixed wing aircraft or helicopters

- The aircraft must be suited to the purpose and must be registered to perform the task as per agency guidelines.
- The aircraft must be equipped with a Global Positioning System (GPS) that has a moving map display with topographic features and dull data logging capabilities.
- Crew must include a navigator (appropriately trained air observer)
- The location of all bait transects must be accurately recorded.
- A restrained leak–proof bait hopper and bait distribution mechanism (or equivalent) should be used for dispensing of baits.
- The pilot must be suitably experienced and licensed to perform the task
- Aircraft operators must ensure that their flying operations comply with requirements of the Civil Aviation Safety Authority.

Planning

- Aerial baiting should not be undertaken in excessively windy conditions where accuracy of bait dispersal and ability to maintain appropriate groundspeed may be adversely affected.
- Prior to the flight, map out transects (or flight lines) at 1km apart and calculate the baiting density in baits per square kilometre. The transect length is divided by the ground speed to give an even distribution of baits for the area.
- Enter the transect coordinates into the GPS to ensure accurate navigation and dispersal.

Dispersal of baits

- Aerial baiting of foxes is permitted by fixed wing aircraft and helicopters subject to certain conditions. Baits must be dispersed at differing minimum distances depending on use of helicopter or fixed wing aircraft. Refer to the relevant PCO for these conditions and distances.
- Provisions must be in place to ensure that baits are dropped only within the target area.
- Following the pre-determined transects, drop the baits at a linear rate to achieve the desired baiting density. Baits must not drop at more than 10 baits per kilometre of transect. The aircraft should travel at a suitable ground speed and height that enables the baits to be safely dropped with accuracy and precision.
- Bait dispersal locations should be recorded by GPS coupled to software capable of storing these positions.

A timing system should be employed to indicate when to drop each bait to achieve the pre-determined spacing.

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NSWFOX SOP3
Ground shooting of foxes

Background

The introduced European red fox (*Vulpes vulpes*) has a significant impact on native fauna and agricultural production. Shooting of foxes is undertaken by government vertebrate pest control officers, landholders and professional or experienced amateur shooters. Although shooting may reduce the local number of foxes or problem animals, it is labour intensive and is not effective as a general fox control method. Aerial shooting is not effective due to their cryptic, nocturnal behaviour. Ground shooting is usually done at night from a vehicle with the aid of a spotlight (or thermal detection device) but can also be conducted during the day. Fox drives ('battues') using a line of beaters to flush foxes into a line of guns are occasionally used in rural areas. Shooting is a humane method of killing foxes when it is carried out by experienced, skilled and responsible shooters; the animal can be clearly seen and is within range; and the correct firearm, ammunition and shot placement is used.

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

- Shooting should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- Shooting is often used prior to lambing season and as an adjunct to other control methods. It is time-consuming and labour intensive and therefore an inefficient method for large-scale fox control in Australia.
- Although shooting can result in a localised reduction in fox numbers, it is ineffective in significantly reducing fox populations, particularly over the longer-term. Young, inexperienced foxes, which are easily lured into the shooters range, are more likely to be killed by shooting. To compensate for this bias, the breeding and survival of remaining animals is enhanced. Also, dispersal of foxes from the area decreases whilst the rate of fox immigration from other areas increases.

- Shooting is not suitable where dense cover is available for foxes or in the vicinity of human habitation.
- Shooting of foxes should only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licences 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 destroying foxes. On the other hand, if inexpertly carried out, shooting can result in wounding that may cause considerable pain and suffering.
- 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 is dead before another is targeted.
- Wounded foxes 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 vixens are shot, reasonable efforts should be made to find dependent cubs and kill them quickly and humanely by either shooting (with a single shot to the brain) or by fumigation of the den with carbon monoxide (refer to NSWFOX SOP4 *Fumigation of fox dens with carbon monoxide*).

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 at movement, colour, shape, sound or, when spotlighting, eye reflection ('eye shine').
- Only shoot at the target animal once it has been positively identified and never shoot over the top of hills or ridges as other animals or people may be out of sight beyond the hill in line with the fall of shot.
- Shooting should be used with caution around lambing paddocks as it may disturb the lambing flock and cause mismothering. Also avoid paddocks containing sensitive livestock e.g., horses, farmed deer. They are easily frightened by spotlights and gunshots and may injure themselves by running into fences and other obstacles.

Workplace health and safety considerations

- Firearms are hazardous. All people 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.
- Warm, comfortable clothing and stout footwear is recommended, especially when shooting at night.
- Care must be taken when handling fox carcasses as they may carry diseases such as hydatidosis and sarcoptic mange that can affect humans and other animals. A fox with obvious mange should only be handled while wearing gloves. Routinely wash hands after handling all fox carcasses.

Equipment required

Firearms and ammunition

- Centrefire rifles are preferred since they provide the advantage of a flatter trajectory and higher projectile energy, however the .17HMR rimfire is also suitable as it delivers enough energy at the target, is flat shooting and accurate out to around 80 metres.

- The minimum firearm and ammunition requirements for the ground shooting of foxes are:
  - calibre: .172 inches
  - bullet weight: 17 grain
  - muzzle energy: 245 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)
.17HMR	17	2550	245	80
.22 Hornet	45	2665	710	100
.222 Rem	50	3345	1242	200
.223	55	3240	1282	200
.22/250	55	3680	1654	200

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

- Rifle bullets must be of an expanding type designed to deform in a predictable manner e.g., hollow-point, soft-point, polymer tip.
- 12-gauge shotguns with heavy shot sizes of No. 2, SSG, BB or AAA can be used at closer ranges, up to 20 metres from the target animal.
- The accuracy and precision of firearms and shooters should be tested against inanimate targets prior to the commencement of any shooting operation.

Other equipment

- If shooting at night, a handheld spotlight, or a helmet or headband mounted spotlight.
- Thermal scope or thermal detection device with 640 x 480 resolution and 50mm lens, where possible.
- Fox whistle (for making artificial rabbit distress calls), if desired.
- First aid kit.
- Lockable firearm box.
- Lockable ammunition box.
- Personal protective equipment (hearing and eye protection).
- Communication devices (2 way/mobile etc.) are recommended for safety reasons.

Procedures

Shooting at night

- Most shooting of foxes is done at night from a vehicle with the aid of a spotlight or thermal device. This method relies on the ability of the shooter to approach the animal until it is within shooting range. Some shooters try and lure animals into range by using whistles that produce artificial rabbit distress calls.
- Foxes must 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.
- Spotlights and thermal devices should be used to identify hazards.
- It is recommended that during daylight hours shooters familiarise themselves with the terrain they are to cover. Take note of potential hazards and also any landmarks that may help with navigation.
- Shooting over the top of hills or ridges produces unacceptable risk. Be aware that the spotlight only illuminates a small portion of the danger zone and only a fraction of the projectile's range.
- When illuminated by the spotlight, foxes have an extremely bright eye reflection or shine ranging from pale yellow in juveniles to a golden yellow in mature foxes.
- If you are using a spotlight and have identified a fox, do not fire unless you are sure it will be killed. Foxes learn very quickly and if previously frightened may not face a light again. Also, when using fox whistles be sure to get a successful shot so that the fox will not learn to associate whistles with danger.

Shooting in the day

- Foxes are mostly active at night and at dawn and dusk, so shooting during the day is less effective than shooting at night with a spotlight or thermal device.
- Daylight drives or 'battues' are sometimes effective and are common in some rural areas. These involve the use of unarmed beaters, often with dogs, to drive foxes into a line of people waiting with firearms. Many foxes, including wary adults, can be taken by this method but it requires the use of many people and only small areas can be covered.
- If dogs are used during battues to flush foxes out from vegetation or dens, they must be adequately controlled to prevent them from attacking foxes. Dogs should only be trained to drive foxes from cover, not to capture or attack them. For further information on the use of dogs refer to GEN002 *Safety and welfare of working dogs used in pest animal control.*
- Fox drives or battues are not selective, so there is a risk of encountering other animals, including pet cats, which can be mistaken for a fox and shot. Also, if dogs are used, they may pursue and sometimes catch non-target animals. Capture of foxes or non-target species by dogs is unacceptable on animal welfare grounds.

Target animal 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 fox should only be shot at when:
  - it can be clearly seen and recognised
  - it is within the effective range of the firearm and ammunition being used
  - a humane kill is probable. If in doubt, do NOT shoot.
- The vital areas targeted for clean killing of foxes 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 great blood vessels. This can be achieved by one of the following methods (see also Figure 1*)*.

Head Shot (this is the preferred shot placement)

Frontal position (front view)

- The firearm is aimed at a point midway between the level of the eyes and the base of the ears, but slightly off to one side so as to miss the bony ridge that runs down the middle of the skull. The aim should be slightly across the centreline of the skull and towards the spine.

Temporal position (side view)

- The firearm is aimed horizontally at the side of the head at a point midway between the eye and the base of the ear.

Chest Shot

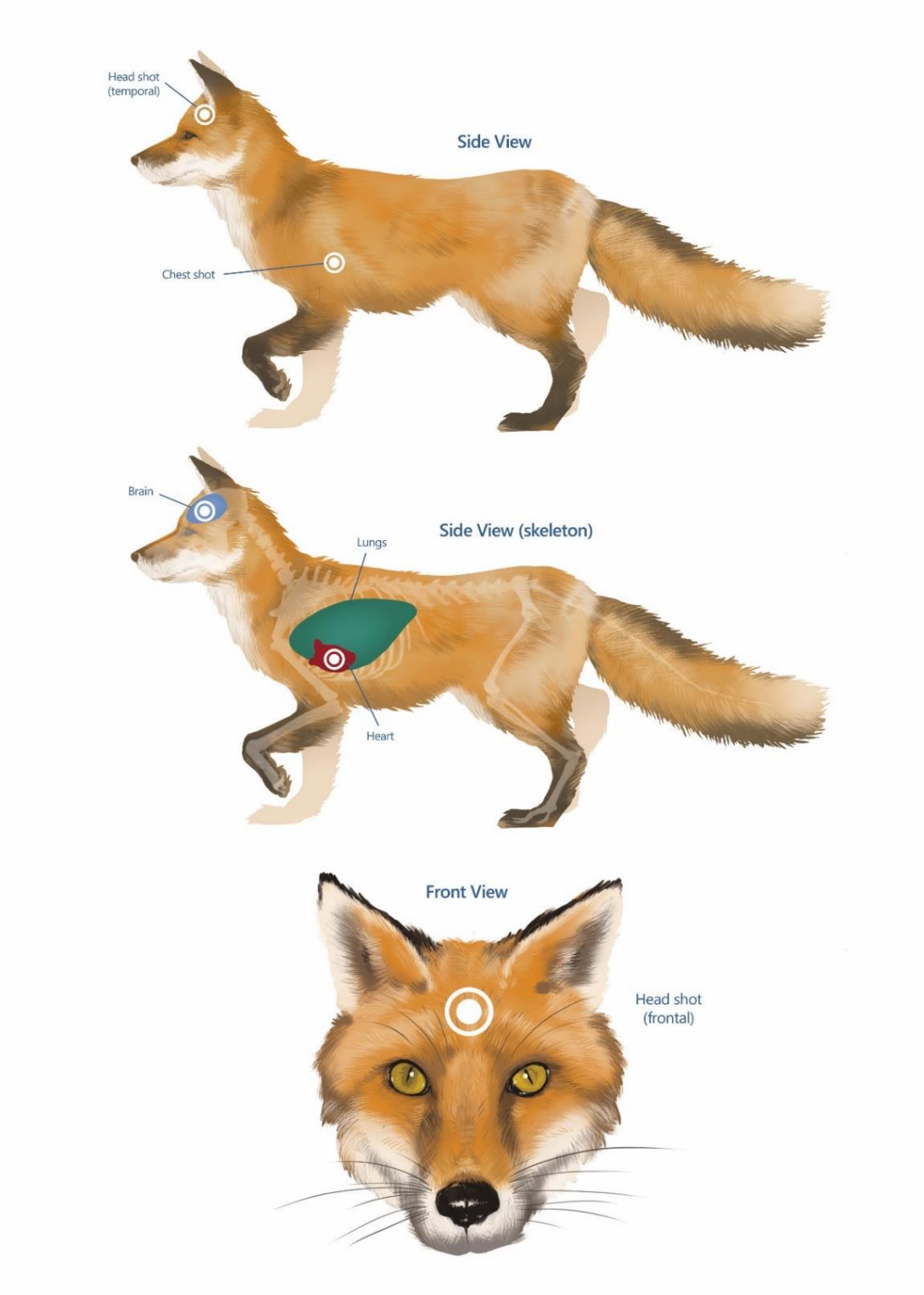
Side view

- The animal is shot from the side so that the bullet enters the chest at a point behind the foreleg slightly above and immediately behind the elbow joint.
- When using a rifle, the target animal must be stationary and within a range that permits accurate placement of the shot. Shots to the head are preferred over chest shots.
- When using a shotgun, the target animal may be stationary or mobile, but must be no more than 20 metres from the shooter. The pattern of shot should be centred on the head or chest. It is essential that the distance to the target animal is accurately judged. To achieve adequate penetration of shot, the animal must be in range. It is recommended that shooters practice estimating distances before a shooting operation.
- The target animal should be physically checked to ensure it is dead before moving on to the next animal.

- Death of shot animals should always be confirmed by observing a combination of the following:
  - no heartbeat
  - no breathing
  - no corneal reflex (no blinking when eyeball is touched)
  - no response to a toe pinch (a firm squeeze of the pad or large toe).

If death cannot be verified, a second shot to the head should be taken immediately.

Figure 1: Shot placement for foxes



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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NSWFOX SOP4
Fumigation of fox dens using carbon monoxide

Background

The introduced European red fox (*Vulpes vulpes*) has a significant impact on native fauna and agricultural production. Fumigation of breeding, or natal dens with carbon monoxide (CO) gas is sometimes used to kill young cubs. Although den fumigation may locally reduce the number of foxes or problem animals, it is not effective as a general fox control method. Carbon monoxide is a toxic, colourless, odourless gas that causes oxygen depletion leading to unconsciousness and rapid death without pain or discernible discomfort. The gas is generated by the incomplete combustion of carbon using sodium nitrate within a fumigant cartridge.

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

- Den fumigation should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- Den fumigation is best suited to localised fox problems such as active dens within lambing paddocks or near poultry. It is time-consuming and labour intensive and therefore an inefficient method for large-scale fox control in Australia.
- Fumigation should be carried out only when active dens containing young cubs older than 4 weeks of age can be located. This will usually be around August to October.
- Carbon monoxide fumigation appears to be a humane method of fox destruction provided that high enough concentrations of CO to bring about a rapid death can be introduced into the den; that cubs are sufficiently grown to be fully susceptible to the effects of CO; and, that animals are not exposed to high temperatures during combustion of the cartridges.
- Carbon monoxide is the only fumigant registered for foxes. Other fumigants, for example, chloropicrin (trichloronitromethane) and phosphine (aluminium phosphide) are

not registered for use against foxes in NSW. Chloropicrin is considered to be highly inhumane and phosphine also causes significant suffering therefore they must not be used for fox den fumigation.

- DEN-CO-FUME® carbon monoxide cartridges are the only prescribed means for the generation of CO as a fumigant. Exhaust from idling internal combustion engines does not produce adequate CO concentrations and older engines produce sulphur and nitrogen oxides that cause severe irritation before death. Also, the exhaust gases produced may be unacceptably hot.
- Fumigation can take place in adverse weather conditions as generation of CO by combustion of the cartridges is not affected by wet and windy weather conditions. However, fumigation should be avoided in dry, hot, windy weather when there is a high fire risk.
- Fumigants must be used according to instructions on approved labels, guidelines issued by NSW EPA, and the NSW DPI Vertebrate Pesticide Manual.

Animal welfare implications

Target animals

- When inhaled, CO binds to haemoglobin in the red blood cells with an affinity 250 times that of oxygen. This results in reduced oxygen-carrying capacity and altered delivery of oxygen to cells. Hypoxia - the reduction of oxygen supply to the tissues - eventually leads to unconsciousness and death.
- Death occurs rapidly at CO concentrations of 4 to 6%. Carbon monoxide concentrations greater than 2% are sufficient to cause loss of consciousness within minutes. Failure of the respiratory centre then occurs followed by death from cardiac arrest.
- Hypoxia induced by CO is insidious. Animals do not appear to experience distress as unconsciousness is induced without pain or discomfort.
- With den fumigation, the time to unconsciousness and death depends on factors such as CO concentration (influenced by size of den, porosity of the soil in the den, full or incomplete combustion of the cartridge) and animal age.
- Neonatal animals are relatively resistant to hypoxia. Physiological mechanisms exist to protect the animal from cerebral damage when oxygen is limited in the uterus and during birth. Because inhalation of CO causes hypoxia, neonatal animals may therefore take longer to become unconscious and die than adult animals.
- Because the recommended time for den fumigation is when the cubs are > 4 weeks of age, it is less likely that the vixen will also be killed. She will usually only be in the den for prolonged periods of time during the first 3 weeks after the birth of the cubs.
- To ensure that death is rapid, fumigation should only be performed when cubs are relatively well grown i.e. greater than 4 weeks of age. At this stage cubs will be starting to eat solid food, evidenced by the presence of animal materials at the entrance to the den e.g., small carcasses, feathers, bones. If the cubs are less than 4 weeks of age, there will usually be no evidence of fresh and partially eaten animal material. Fresh earth at the den entrance indicates it has recently been cleaned out by the vixen and may contain

newborn cubs. Fumigation of dens containing neonatal cubs is less effective and is considered to be inhumane.

- There is a risk of foxes experiencing burns to skin and fur if they come into contact with cartridges whilst they are still hot. Use of the DEN-CO-FUME® portable fumigator will help to overcome this risk and is therefore recommended.

Non-target animals

- Provided presence of foxes is confirmed, fumigation of dens is one of the most target-specific means of fox destruction and will have no significant impact on non-target species if used correctly.
- There appears to be no significant risk of secondary poisoning if carcasses of gassed animals are consumed by non-target predatory or scavenger species.
- The cartridges must only be used in dens where there is evidence of occupation by foxes e.g., presence of fox tracks, prey remains and distinctive odour. If a den appears to be empty or possibly occupied by a non-target species, fumigation must not be performed.

Workplace health and safety considerations

- Operators must strictly follow the directions on the approved label when using CO cartridges and are recommended to work in pairs. The cartridges must not be used for any other purpose than the destruction of foxes in natal dens.
- The cartridges must not be used in situations where the operator is in a confined space. Never enter a confined den that has been recently fumigated.
- CO may be explosive at concentrations exceeding 10%.
- Carbon monoxide is extremely hazardous to humans as it is highly toxic and difficult to detect. Exposure from inhalation of combustion products can cause fatal poisoning. Non-fatal poisoning may result in permanent nervous system damage.
- If combustion products are inhaled remove patient from contaminated area. Lay patient down and keep warm and rested. Early signs of toxicosis are headache, dizziness and weakness. If patient is not breathing, apply artificial respiration and perform cardiopulmonary resuscitation (CPR) if necessary. Transport patient to a hospital or doctor without delay.
- Do not touch burning cartridges; they are capable of causing severe burns.
- Once ignited the cartridge will burn vigorously for several minutes, creating a risk of fire in surrounding vegetation. This can be minimised by ensuring that the cartridges are inserted and lighted in-situ. Alternatively, and preferably, the Den-Co-Fume® Fumigator can be used.
- The ingredients in the cartridge are harmless until ignited. Precautions must be taken to prevent unintentional ignition during storage, transport and use.
- For further information refer to the Material Safety Data Sheet (MSDS), available from the supplier.

Equipment required

DEN-CO-FUME® carbon monoxide fumigant cartridges

- The cartridges consist of a cardboard tube containing carbon in the form of charcoal (35%) and sodium nitrate (65%). Once ignited by a fuse, the active components burn for 2 to 4 minutes to produce CO. One cartridge will produce up to 3% carbon monoxide in a den volume of 1000 litres ($1m^3$). The concentration will be higher in smaller dens.
- For a typical fox den with only one entrance, one cartridge will be sufficient. If dens are quite old and large with multiple entrances or, they are located in enlarged rabbit warrens, two or more cartridges placed at opposite ends may be necessary.
- Cartridges must be stored in a cool, dry, well-ventilated area away from any source of ignition (e.g., sparks, naked flames etc.).

DEN-CO-FUME® fumigator

- Cartridges may be placed directly inside the den or they may be burnt inside a DEN-CO-FUME® fumigator. This is a portable steel combustion chamber with a flexible steel pipe that can be used for fumigation when access to the den is restricted or where there is an unacceptably high risk of fire.
- Use of the fumigator chamber is recommended for the following reasons:
  - Prevents exposure of foxes to unacceptably high temperatures, especially in smaller dens where the distance from the end of the cartridge to the animal is less.
  - Reduces the risk of fire in surrounding vegetation.
  - Allows monitoring of cartridge combustion. If the cartridge fails to burn completely, another cartridge can be used to ensure that the desired concentration of CO is reached.
  - Allows fumigation of den when access is restricted.
- Refer to the 'instructions for use' for more details.

Other equipment

- Shovel or mattock.
- Small amount of sand for preparing sand pads.
- First aid kit.

Procedures

Assessment of den suitability

- Fumigation must only be used in natal dens which have evidence of current fox activity. This can be determined by:
  - The presence of small fox (cub) footprints in the immediate vicinity of the den and also inside the den

- The presence of partially consumed, fresh animal carcasses for example, rabbits and birds at the den entrance
- A distinctive odour, sometimes with large numbers of flies present
- Trails and flattened vegetation characteristic of cub 'play areas'.

Establish sand pads or cameras

- To confirm the existence of cubs in the den, a camera or sand pad (1m^2 area of raked earth or sand) can be established outside of the den. Although, in doing this, there is a risk of disturbing the den and the vixen removing the cubs.

Fumigation of dens

Do NOT inhale smoke coming from the cartridge or fumigator

- Dens are treated only when the existence of cubs (>4 weeks old) is confirmed.
- Make sure all den entrances are located and if only one cartridge is to be used, block off all but one of these entrances.
- If using the cartridges on their own:
  - Use a shovel handle or flexible hose to probe the den to establish that no animals are within 2 metres of the entrance. Flames from the ignited cartridge will extend for up to 30cm and heat will be intense for around 1 metre in a direct radiant path from the combustion point.
  - Place the cartridge well into the entrance of the den, light the fuse, confirm the cartridge has ignited, and then seal the entrance to the den with earth. If smoke emerges from any other entrances attempt to seal these with earth also. Do not disturb the den after fumigation.
- If using the cartridges with the fumigator:
  - Ensure there are no animals near to the entrance of the den.
  - Place the end of the pipe into the den and seal the den opening with earth.
  - Place the cartridge in the fumigator, light the fuse and close the door. If smoke emerges from any other entrances, attempt to seal these with earth also. After the cartridge has completely burned (wait for around 10 minutes), remove the pipe outlet from the den and quickly re-seal the entrance. Leave the den sealed.
- Refer to the specific instructions for use with each product for more details.

Procedural notes

Supplier of the DEN-CO-FUME® carbon monoxide fumigant cartridges and DEN-CO-FUME® fumigator is Animal Control Technologies of Australia, Somerton Victoria. http://www.animalcontrol.com.au/

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NSWFOX SOP5 Trapping of foxes using padded foot hold traps

Background

The introduced European red fox (*Vulpes vulpes*) has a significant impact on native fauna and agricultural production. Trapping of foxes is undertaken in areas where poison baiting is unacceptable and other methods cannot be used e.g., semi-rural and urban/residential areas. Trapping may be useful for the control of nuisance animals but is not effective as a general fox control method. In urban/residential areas, cage traps are preferred over foot-hold traps as fewer injuries are sustained (target and non-target), non-target animals can be released unharmed and trapped foxes can be transported away from the area for euthanasia. Refer to *NSWFOX SOP6 Trapping of foxes using cage traps*. Foot-hold, padded-jaw traps should only be used at sites where the animal can be killed by shooting whilst still held in the trap.

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

- Trapping is time-consuming and labour intensive and is therefore an inefficient method for large-scale fox control.
- Traps have the potential to cause significant suffering and distress so should only be used when there is no suitable alternative.
- Humane and successful trapping requires extensive training and experience. Trapping by inexperienced operators can result in 'trap-shy' foxes that are difficult to catch because they have previously escaped from a carelessly prepared and presented trap. Similarly, poor technique can result in greater rates of injuries and non-target captures.
- Selection of appropriate traps and trap sites will minimise the damage, pain and distress caused to target and non-target animals.
- Every effort must be made to avoid animal deaths from factors such as exposure, shock, capture myopathy and predation.

- Once trapped, foxes are euthanased by shooting at the site of capture (observing relevant firearms restrictions).
- Traps must be used in accordance with relevant state legislation (*see Prevention of Cruelty to Animals Act 1979 NSW)*. Use of steel-jaw traps is prohibited in NSW. Trapping with padded-jaw traps, cage traps and treadle snares is permitted.
- Shooting of foxes in traps should only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licences and accreditation. Storage and transportation of firearms and ammunition must comply with relevant legislation requirements.
- In NSW, PAPP cloths, when incorporated with traps, must be used in accordance with the *Pesticides Act 1999* and the relevant Pesticide Control Order (that include distance restrictions, signage and notification requirements).

Animal welfare implications

Target animals

- Foot-hold traps cause pain and distress in two ways, pressure of the trap jaws on the captured limb and restraint of the animal. Injuries will inevitably occur to some animals, especially when they struggle to escape the trap. These range from swelling of the foot and lacerations to dislocations and fractures. Foxes may also inflict injuries to their feet and legs by chewing on the captured limb, and to their teeth, lips and gums by chewing at the trap jaws. To reduce capture distress, trapped foxes must be destroyed as quickly and humanely as possible.
- Traps must be inspected daily to prevent prolonged suffering from exposure, thirst, starvation and/or shock to foxes (and non-targets). Cloths (containing PAPP) which are incorporated onto the jaws of the trap have been developed to improve the humaneness of foot-hold traps. Traps fitted with PAPP cloths must still be inspected daily to minimise harm to non-target animals caught in the trap. Where the daily inspection of traps is problematic, deployment of alternative control measures such as baits or CPEs should be considered.
- It is preferable to set traps (with suitable chain length) at sites where vegetation can provide shade and shelter. However, sites should be avoided where there is a risk of the trapped animal becoming entangled in understorey vegetation or fences, which could result in dislocation of the limb.
- Where possible, trapping should be avoided when adverse weather conditions threaten the welfare of trapped animals.
- Captured animals must be approached carefully and quietly to reduce panic, further stress and risk of injury.
- To minimise the animal welfare implications of orphaning dependant cubs, it is preferable not to undertake trapping when vixens are lactating.
- If lactating vixens are caught in a trap, reasonable efforts should be made to find dependent cubs and kill them quickly and humanely by either shooting (with a single

shot to the brain) or by fumigation of the den with carbon monoxide (refer to NSWFOX SOP4 *Fumigation of fox dens with carbon monoxide*).

Non-target animals

- Traps are not target specific, so a wide range of non-target species may be caught. These can include birds (e.g., ravens, magpies, and pied currawongs), kangaroos, wallabies, rabbits, hares, echidnas, goannas, wombats, possums, bandicoots, quolls and sheep. If there is a high risk of trapping non-target animals, traps should not be set.
- Different groups of non-target animals suffer different levels of injury and distress. For example:
  - Wallabies often experience serious injuries e.g., dislocations, due to the morphology of their limbs and because they become very agitated when restrained.
  - Goannas (e.g., lace monitors) also suffer from dislocations and can die from hyperthermia.
  - Birds, rabbits and hares can be preyed upon by foxes, cats and wild dogs whilst caught in traps.
- Traps must not be set near areas such as waterholes or gully crossings that are regularly frequented by non-target species. Animal tracks and pads or holes in fences utilised predominately by non-target animals should also be avoided.
- Live non-target animals caught in traps must be examined for injuries and signs of illness or distress and dealt with as follows:
  - Animals that are unharmed or have only received minimal injuries such as minor cuts or abrasions should be immediately released at the site of capture.
  - Animals that have more severe injuries or are suffering from thermal stress should receive appropriate attention. An animal suffering from thermal stress can initially be placed in a suitable quiet holding area which provides warmth or shade to allow recovery before release. Animals with treatable injuries that cannot be immediately released or those failing to recover from thermal stress should be presented to a veterinarian or a registered wildlife carer for treatment.
  - Animals with injuries that are untreatable or that would compromise their survival in the wild should be euthanased using a technique that is suitable for the species. For more information on euthanasia techniques refer to *GEN001 Methods of Euthanasia*.
- If wild dogs or feral cats are caught in the trap they must be euthanased quickly and humanely by a shot to the brain using an appropriate firearm (refer to NSWCAT SOP2 Trapping of feral cats using cage traps and NSWDOG SOP1 Trapping of wild dogs using padded foot-hold traps).
- If a domestic pet is caught, it should be taken to the nearest animal shelter, council pound or veterinarian where it can be scanned for a microchip and the owner contacted or assessed as to suitability for re-homing.
- Traps fitted with PAPP cloths may kill domestic and working dogs. Neighbours must be notified at least 72 hours in advance to allow them to take appropriate action e.g., restraint and/or muzzling. Signage and distance restrictions are also compulsory (refer to PCO).

Workplace health and safety considerations

- Firearms are hazardous. All people should stand well behind the shooter when a fox is being shot. 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.
- Care must be taken when handling fox carcasses as they may carry diseases such as hydatidosis and sarcoptic mange that can affect humans and other animals. A fox with obvious mange should only be handled while wearing gloves. Routinely wash hands after handling all fox carcasses.
- Operators should be wary of the risks of injury when placing and setting traps. Protective clothing, boots and leather gloves may help prevent injuries from shovels, hammers and trap jaws as well as disease risk.
- Do not re-handle PAPP treated traps unless wearing cotton overalls buttoned to the neck and wrists and disposable gloves. Clothing must be laundered after each day's use.

Equipment required

Traps

- Approved foot-hold traps suitable for catching foxes must be used for example, Victor Soft-Catch trap. It is illegal to use serrated, steel-jawed traps in NSW.
- Traps must have the following characteristics:
  - The jaws have no teeth
  - The steel jaws are offset to increase the space between them when closed. (i.e. a gap (minimum 6mm) remains when the jaws are closed)
  - Each jaw has a rubber-like pad to cushion the impact of the jaws on the limb and to prevent the limb sliding out. The padding fills the offset gap when the jaws are closed.
- All traps should be checked for damage, sharp surfaces and malfunctions e.g., loose rubber pads, before they are taken into the field.
- Traps should be handled in a way that eliminates contamination with human related scents. Gloves should also be used when handling and setting traps.
- Traps should also have:
  - A spring placed in the anchor chain to act as a shock absorber, reducing the chance of dislocation of the captured limb. Swivels should be located on both ends of the anchor chain to allow the trap to twist as the animal struggles to escape

- Pan tension adjusted to suit the target species so that an appropriate force is required to depress the pan and trigger the trap. This minimises the chance of non-target animals setting off the trap.

PAPP cloths

- The use of PAPP cloths is not compulsory but is encouraged to reduce animal suffering.
- Use 2.5 g of PAPP paste per trap (placed at a maximum of four treated traps per km^2).
- Cut cloth/gauze to size (approximately 60 mm wide and sufficiently long to wrap 3-4 times around the trap jaw - approx. 150- 200mm). Wrap the cloth around the lazy trap jaw two times.
- Dispense the entire contents of a single tube of PAPP paste along the wrapping on the upper face of the jaw (when viewed closed) leaving space at both ends for tying off.
- Continue one more complete wrap of cloth around the trap jaw to cover the paste with a single layer of cloth. Do not apply more than one layer of cloth over the paste.
- Secure cloth/gauze to trap jaw using fine tie wire at both ends.

Lures

- Olfactory stimuli such as fox faeces and/or urine or a commercially prepared lure e.g., synthetic fermented egg may be used to lure foxes into the trap set.
- The attractiveness of lures will vary with season and location.

Meat baits

- A handful of meat bait is placed near the trap. Beef heart, liver rabbit, lamb, chicken, and kangaroo have all been used as bait. The bait can be covered with a light dusting of soil to reduce foraging by corvids and to mimic food cached by a fox. Use of meat baits will however likely increase non-target interaction with traps.
- Attractiveness and palatability of the bait will vary with season and location. Choose lures that do not attract localised non-targets e.g., avoid meat based lures where quolls or goannas are present.

Firearms and ammunition

- Smaller calibre rifles such as a .22 rimfire with hollow or soft-point ammunition are suitable for euthanasia at short range (within 5 metres).
- 12-gauge shotguns with shot sizes of BB or AAA may also be used.
- The accuracy and precision of firearms should be tested against inanimate targets prior to the commencement of any shooting operation.

Procedures

Selection of trap sites

- Traps should be set along tracks and trails or other areas frequented by foxes for example, scent pads, scratch points and around carcasses. Do not set traps near fences and other objects such as trees, bushes etc. in which the trapped fox (or a non-target) may become entangled.
- The location (GPS coordinates) of all trap sites must be accurately recorded and marked. This information should be readily available to others in case the trapper is unable to return to check traps.
- The recording of target and non-target captures as well as injuries can also be valuable in the constant improvement of trapping technique.
- On-line apps such as FeralScan may assist in these processes: https://www.feralscan.org.au/.
- Signage should be deployed on public lands to advise that traps are being used in the area.

Placing and setting the trap

- Traps should be set at the end of each day and checked early each morning. If traps are left set during the day, they should be checked again in late afternoon.
- Before setting each trap ensure that it is functioning properly.
- Traps should only be anchored to stakes or fixed objects if there is a shock absorbing device such as a spring fitted to the anchor chain and a swivel attaching the chain to the trap. It is recommended to use a short length of chain (approx. 30-50 cm). Alternatively, the trap can be tied to 'drags', objects such as solid pieces of steel or timber that will move when the fox pulls against the trap. The drag may need to be sufficient to restrain larger predators such as dogs. Use of drags should be minimised as they can potentially have greater welfare concerns than anchor points.
- Set the trap and place into position in the hole in the ground. Ensure that surrounding shrubs or debris will not interfere with the spring mechanism.
- Carefully camouflage the area around the trap with leaves, grass debris etc. but leave a slightly cleared area (10-15cm) over the area of the plate.
- Place the meat bait and/or lure a suitable distance away so that the fox is likely to step on the trap to smell it for example, on a slightly elevated clump of grass, stick or rock behind the trap.

Shooting of foxes

- Trapped live foxes should be euthanased by shooting whilst still held by the trap.
- Unnecessary people should keep away from the area to allow the fox to become less agitated. The shooter should approach the animal in a calm and quiet manner.

- To maximise the impact of the shot and to minimise the risk of misdirection the range should be as short as possible that is, 5-20 cm from the head if using a rifle, 1–2 metres if using a shotgun.
- Never fire when the fox is moving its head, be patient and wait until the fox 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 2).

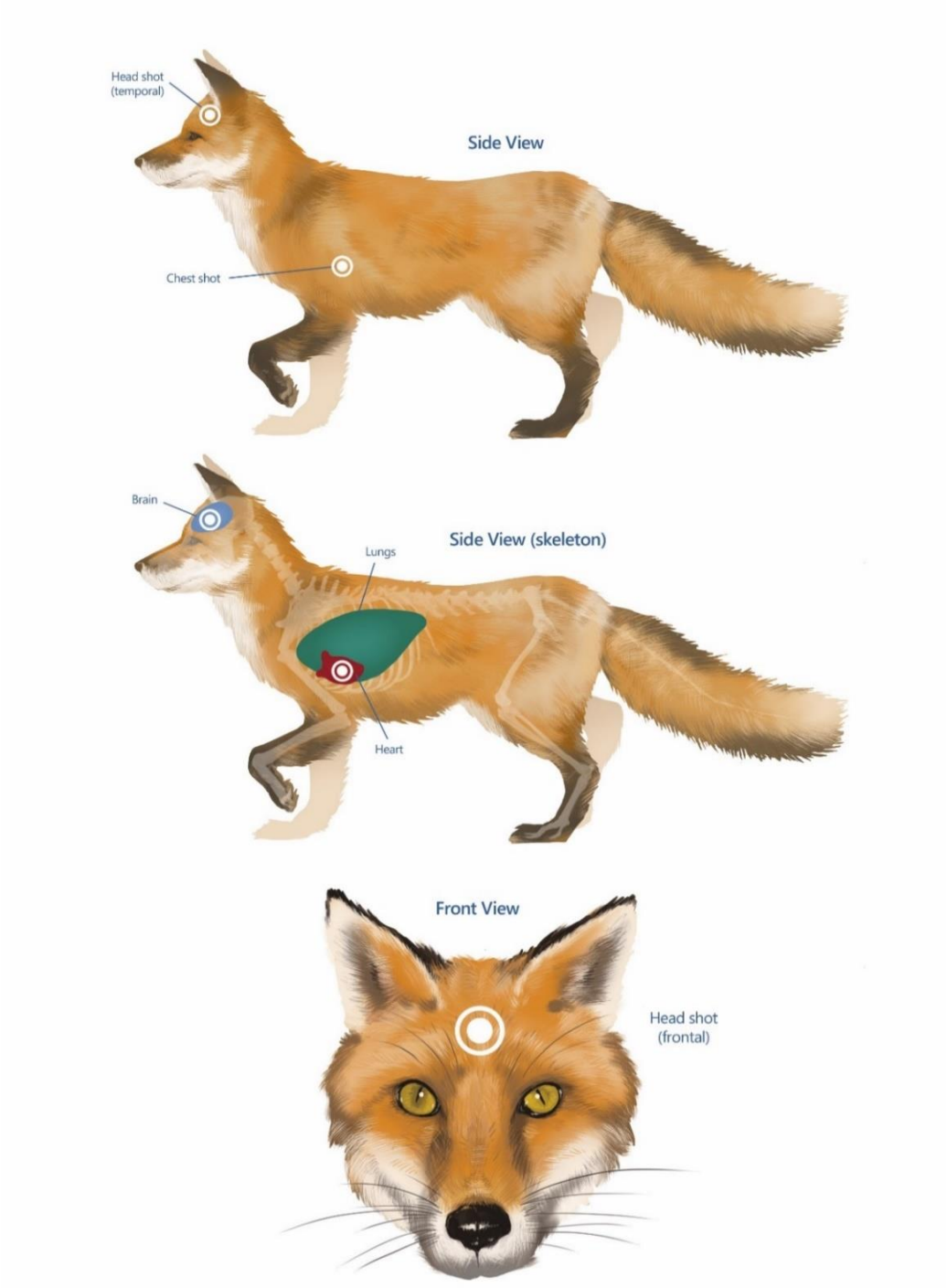
Frontal position (front view)

- The firearm is aimed at a point midway between the level of the eyes and the base of the ears, but slightly off to one side so as to miss the bony ridge that runs down the middle of the skull. The aim should be slightly across the centreline of the skull and towards the spine.

Temporal position (side view)

- The firearm is aimed horizontally at the side of the head at a point midway between the eye and the base of the ear.
- Death of shot animals should always be confirmed by observing the following:
  - no heartbeat
  - no breathing
  - no corneal reflex (no blinking when eyeball is touched)
  - no response to a toe pinch (a firm squeeze of the pad or large toe).
- If death cannot be verified, a second shot to the head should be taken immediately.

Figure 2: Shot placement for foxes.



Head shots (temporal or frontal) should be used for shooting foxes caught in traps. See text for details.

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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NSWFOX SOP6 Trapping of foxes using cage traps

Background

The introduced European red fox (*Vulpes vulpes*) has a significant impact on native fauna and agricultural production. Trapping may be useful for the control of nuisance animals but is not effective as a general fox control method. Cage traps are used to capture problem foxes in urban/residential areas and other areas where it is unacceptable or undesirable to use 1080 or foot-hold traps. Animals trapped in a cage can be transported away from the area for euthanasia. Padded-jaw, foot-hold traps can only be used at sites where the animal can be killed by shooting while still held in the trap. Refer to *NSWFOX SOP5 Trapping of foxes using padded-jaw traps*. From an animal welfare perspective, cage traps are preferred over foot-hold traps as fewer injuries are sustained and non-target animals can be released unharmed.

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

- Trapping is time-consuming and labour intensive and is therefore an inefficient method for large-scale fox control.
- Cage traps are generally not effective in rural environments where foxes are more suspicious of man-made structures.
- Traps have the potential to cause significant suffering and distress so should only be used when there is no suitable alternative.
- Humane and successful trapping requires extensive training and experience.
- Selection of appropriate traps and trap sites will maximise chance of capture and minimise the distress caused to target and non-target animals.
- Every effort must be made to avoid target and non-target deaths from factors such as exposure, shock, capture myopathy and predation.

- Once trapped, foxes are either euthanased by shooting at the site of capture or taken to an appropriate site away from residential areas to be shot whilst still in the cage or killed with a lethal injection by an authorised person.
- Traps must be used in accordance with relevant legislation (*see Prevention of Cruelty to Animals Act 1979*). Use of steel-jaw traps is prohibited in NSW, but trapping with padded-jaw traps, cage traps and treadle snares is permitted.
- Shooting of foxes should only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licences and accreditation. Storage and transportation of firearms and ammunition must comply with relevant legislation requirements.

Animal welfare implications

Target animals

- Foxes are likely to suffer distress from being confined in a cage trap and they can sometimes be injured while trying to escape, although the potential for injury is less than that for foot-hold traps.
- Cage traps can cause extensive injuries to the teeth and mouth of trapped foxes; this is minimised by using a small mesh size (50mm is recommended).
- Traps must be inspected daily to prevent suffering and possible death from exposure, thirst, starvation and/or shock.
- It is preferable to set up traps at sites where vegetation can provide shade and shelter.
- Shade cloth or hessian can be for used for protection during extremes of weather. In hot weather, water should be provided and in cold weather bedding should be available inside the cage. Where possible, trapping should be avoided when adverse weather conditions threaten the welfare of trapped animals.
- Captured animals must be approached carefully and quietly to reduce panic, further stress and risk of injury.
- Trapped foxes must be euthanased as quickly and humanely as possible.
- If transporting a trapped fox away from the capture site to be euthanased, the cage should be covered with hessian or a blanket to provide shelter from direct sunlight, wind and rain and to minimise stress from visual threats.
- To minimise the animal welfare implications of orphaning dependant cubs, it is preferable not to undertake trapping when vixens are lactating.
- If lactating vixens are trapped and shot, reasonable efforts should be made to find dependent cubs and kill them quickly and humanely by either shooting (with a single shot to the brain) or by fumigation of the den with carbon monoxide (refer to NSWFOX SOP4 *Fumigation of fox dens with carbon monoxide*).

Non-target animals

- Traps must not be set near areas that are regularly frequented by non-target species.

- Traps are not target specific; therefore, other species such as birds and reptiles may be caught.
- Non-target animals caught in traps must be examined for injuries and signs of illness or distress and dealt with as follows:
  - Animals that are unharmed or have only received minimal injuries such as minor cuts or abrasions should be immediately released at the site of capture
  - Animals that have more severe injuries or are suffering from thermal stress should receive appropriate attention. An animal suffering from thermal stress can initially be placed in a suitable quiet holding area that provides warmth or shade to allow recovery before release. Animals with treatable injuries that cannot be immediately released or those failing to recover from thermal stress should be presented to a veterinarian or a registered wildlife carer for treatment
  - Animals that have injuries that are untreatable, or which would compromise their survival in the wild should be euthanased using a technique that is suitable for the species. For more information on euthanasia techniques refer to *GEN001 Methods of Euthanasia*.
- If wild dogs or feral cats are caught in the trap they must be euthanased quickly and humanely by a shot to the brain using an appropriate firearm (refer to *NSWCAT SOP2* Trapping of feral cats using cage traps and *NSWDOG SOP2* Trapping of wild dogs using cage traps.
- If a domestic pet is caught, it should be taken to the nearest animal shelter, council pound or veterinarian where it can be scanned for a microchip and the owner contacted or assessed as to suitability for re-homing.

Workplace health and safety considerations

- Trapped foxes are dangerous to handle and can inflict serious bites. If these foxes are killed while still in the cage, there should be no need to handle them directly. However, if handling is necessary, leather gloves and a catching pole should be used. Operators must be protected by tetanus immunisation in case of bite infection.
- Firearms are hazardous. All people should stand well behind the shooter when a fox is being shot. The line of fire must be chosen to prevent accidents or injury from stray bullets or ricochets. 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 fox carcasses as they may carry parasites which cause diseases such as toxoplasmosis, hydatidosis and sarcoptic mange that can affect humans and other animals. A fox with obvious mange should only be handled while wearing gloves. Routinely wash hands after handling all fox carcasses.

Equipment required

Traps

- Wire mesh cage traps are used. These can be obtained from commercial suppliers and are available in a variety of sizes (e.g., a fox size cage is 90cm x 45cm x 45cm and made of 2.5 mm welded wire with a mesh size of 50mm). The traps have a spring door that is activated either by a treadle plate or a hook mechanism.

Lures

- Olfactory stimuli such as fox faeces or urine (or a mixture of both) or a commercially prepared lure (e.g., synthetic fermented egg) may be used to lure foxes into the trap.
- The attractiveness of lures will vary with season and location.

Meat baits

- A handful of meat bait is placed inside the cage trap. Rabbit, lamb, chicken, and kangaroo have all been used as bait.
- Attractiveness and palatability of the bait will vary with season and location.

Firearms and ammunition

- Smaller calibre rifles such as a .22 rimfire with hollow or soft-point ammunition, are suitable for euthanasia at short range (from 5-25cm away).
- The accuracy and precision of firearms should be tested against inanimate targets prior to the commencement of any shooting operation.

Procedures

Selection of trap sites

- Traps should be set along fences, tracks and trails or areas frequented by foxes for example, scent pads, scratch points, holes in fences, around carcases.
- The location of all trap sites must be accurately recorded. This information should be readily available to others in case the trapper is unable to return to check traps.
- Do not place in areas where the traps may be interfered with/damaged by large stock or humans.

Placing and setting the trap

- It is preferable to set traps at the end of each day and check early each morning. If traps are left set during the day, they should be checked again in late afternoon.
- Before setting each trap ensure that it is functioning properly.

- Where possible place the traps parallel to objects such as fences, logs or sheds with the rear of the cage against an obstruction to prevent foxes taking the main bait without going into the trap.
- Cage traps should be set squarely on the ground and the doors of the trap bent upward to increase the openness of the trap space.
- Place the meat bait at the rear of the trap, attached to the hook mechanism if present. A second piece of meat is placed at the mouth of the trap.
- Cover the floor of the trap with 3-5cm of soil.
- If using lures place them in suitable positions inside and outside the trap.
- The trap should be pegged to the ground to prevent the animal from tipping it over and injuring itself and/or releasing the trap door.

Euthanasia of foxes

Trapped foxes can be killed humanely using one of the following methods.

Shooting of foxes

- Trapped live foxes should be destroyed by shooting whilst still inside the cage trap.
- Unnecessary people should keep away from the area to allow the fox to become less agitated. The shooter should approach the animal in a calm and quiet manner.
- To maximise the impact of the shot and to minimise the risk of misdirection the range should be as short as possible, that is, 5-20 cm from the head. When shooting, the barrel should be just inside the cage.
- Never fire when the fox is moving its head, be patient and wait until the fox is motionless before shooting. Accuracy is important to achieve a humane death. One shot to the head 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).

Frontal position (front view)

- The firearm is aimed at a point midway between the level of the eyes and the base of the ears, but slightly off to one side so as to miss the bony ridge that runs down the middle of the skull. The aim should be slightly across the centreline of the skull and towards the spine.

Temporal position (side view)

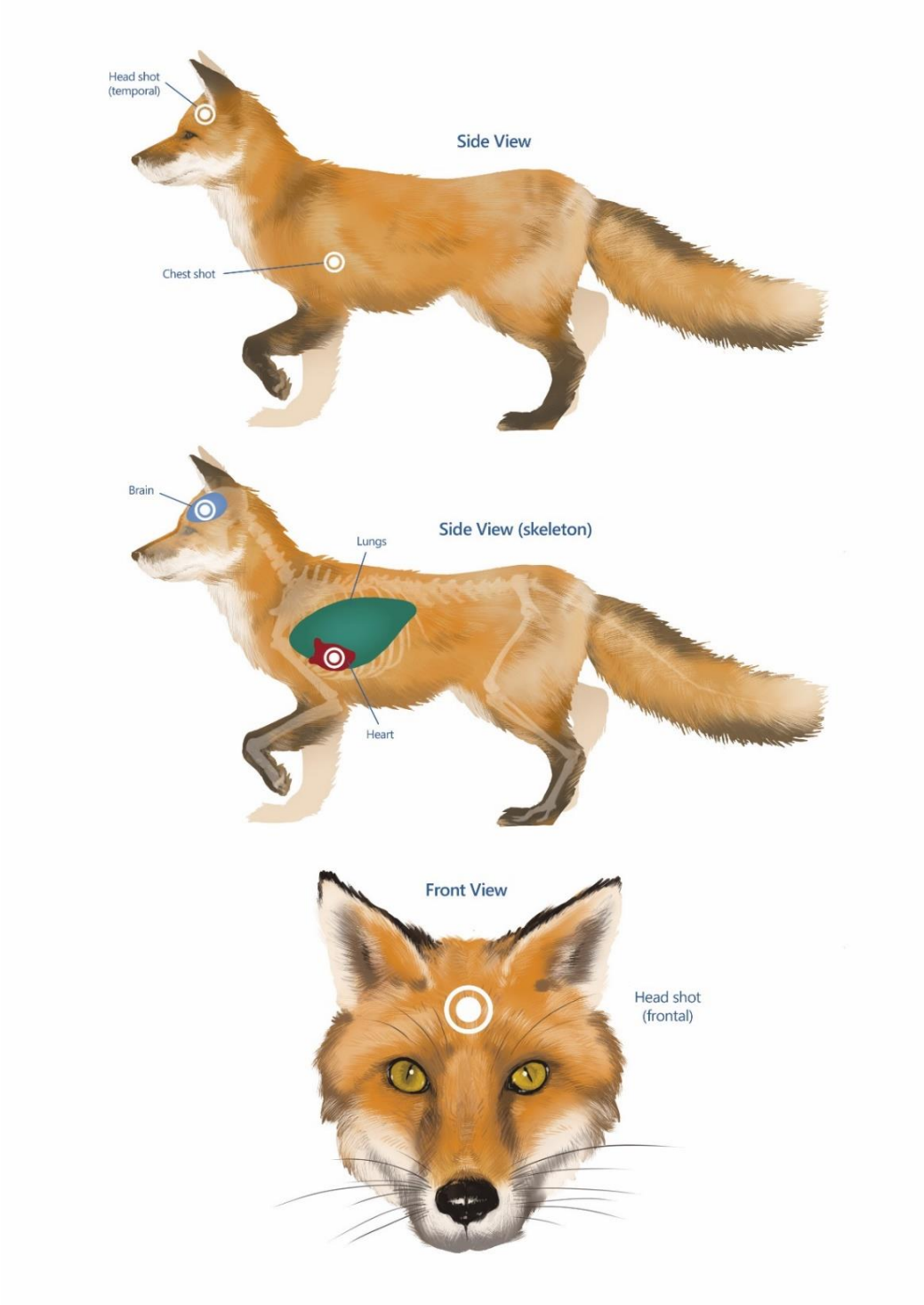
- The firearm is aimed horizontally at the side of the head at a point midway between the eye and the base of the ear.
- Death of shot animals can be confirmed by observing a combination of the following:
  - no heartbeat
  - no breathing
  - no corneal reflex (no blinking when the eyeball is touched)

  - no response to a toe pinch (a firm squeeze of the pad on the large toe).
- If death cannot be verified, a second shot to the head should be taken immediately.

Overdose of barbiturate

- These procedures can only be performed by, or under the direction of, a veterinarian or other authorised person.
- An intramuscular (neck or back-leg muscles) or subcutaneous injection of a sedative (e.g., xylazine at 1-2 mg/kg) is usually necessary to restrain the animal before euthanasing. The injection can be administered through the wire mesh without the fox being handled using an extendable pole syringe (or 'jabstick'). A cage with a 'crush' or 'squeeze-back' is also useful to restrain the fox at one end of the cage.
- Once the fox is sedated it is euthanased with an intravenous or intraperitoneal injection of pentobarbitone sodium (approximately 150mg/kg).

Figure 3: Shot placement for foxes



Head shots (temporal or frontal) should be used for shooting foxes caught in traps. See text for details.

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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NSWFOX SOP7
Baiting of foxes with para aminopropiophenone (PAPP)

Background

Poisoning with para-aminopropiophenone (commonly known as PAPP) is used to minimise the impacts of the introduced European red fox (*Vulpes vulpes*) on native fauna and agricultural production. Lethal baiting is considered to be the most cost-effective method currently available, and foxes are amongst the most sensitive species to the effects of PAPP.

Commercially manufactured FOXECUTE® baits contain 400mg of PAPP in a 35g bait that is sufficient toxin to kill a fox. They also contain small *yellow/orange* marker beads that remain in the gut of poisoned animals which assists with differentiating death due to PAPP from other causes. In contrast, commercially prepared 1080 baits for foxes contain *red* marker beads. Baits containing PAPP are applied by hand directly to the ground and must be buried in a shallow hole. They are not approved for aerial application.

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

- Subject to an authorised control officer (ACO) risk assessment.
- Baiting with PAPP is best used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- Baiting with PAPP should not be used in areas where there is an unacceptably high risk to humans and companion animals, such as urban/residential landscapes.
- Baiting with PAPP should not be used in areas where there is a high risk of harm to wildlife. FOXECUTE® PAPP baits are toxic to some native species (i.e., marsupial carnivores, bandicoots, goannas and some birds including ducks) therefore measures must be taken to minimise the risk of non-target poisoning (for example, only baiting in winter months when goannas are least active i.e. where mean maximum temperatures are expected to be $\leq 16\ ^{\circ}C$).

- Timing of baiting programs on agricultural lands depends on farm management practices and will often occur at or before lambing/kidding. Baiting is also carried out at times when juvenile foxes are dispersing. In contrast, with most programs targeting the conservation of native fauna, PAPP baiting may be continuous and ongoing.
- Baiting of foxes with PAPP can only be carried out under conditions set down in a specific permit issued by the Australian Pesticides & Veterinary Medicines Authority (APVMA) under Commonwealth legislation (*Agricultural and Veterinary Chemicals Code Act* 1994). PAPP must also be used in accordance with the Pesticide Control (PAPP) Order (PCO) under the *Pesticides Act 1999*.
- PAPP is a restricted chemical product (under Regulation 45 of the Agricultural and Veterinary Chemicals Code Regulations 1995) and is listed as a Schedule 7 – Dangerous Poison under the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP). These listings require special precautions in the manufacture, handling, storage and use of PAPP, along with specific regulations regarding labelling or availability.
- Manufactured PAPP baits can only be obtained through an authorised control officer.
- The PAPP user should refer to the NSW Vertebrate Pesticide Manual for all relevant legislation and its application.

Animal welfare considerations

Target animals

- The toxicity of PAPP is due to the formation of high levels of methaemoglobin caused by the oxidation of haemoglobin in red blood cells. When the concentration of methaemoglobin is high, the oxygen carrying capacity of the blood is markedly reduced that leads to a lethal deficit of oxygen (termed *hypoxia* when oxygen levels are low or *anoxia* when oxygen is depleted) in the brain and heart, and results in lethargy followed by unconsciousness and death. Mammalian carnivores are highly susceptible to PAPP compared with other species such as birds.
- After a fox has ingested PAPP there is a lag period before signs of toxicosis such as lethargy, ataxia (difficulty maintaining balance) and salivation are observed. As methaemoglobin levels increase, cyanosis—blue colouration of the mucous membranes due to deoxygenated haemoglobin in blood vessels near the skin surface—becomes evident. Although, the duration of the lag phase, duration and severity of symptoms and time to death can be variable, in a pen study of 10 foxes, the average lag period lasted for approximately 40 minutes, clinical signs were present for around an hour and average time to death was around 1½ hours. As the toxicoses progresses, foxes become unresponsive and cannot move voluntarily, but as observed in wild dogs and feral cats, they are still likely to show signs of awareness and only become unconscious a few minutes prior to death.
- To minimise the animal welfare implications of orphaning dependent cubs, where possible, it is preferable not to undertake baiting programs when vixens are lactating. This is also the time when vixens are moving around least within their territory thus reducing the likelihood of finding baits. To maximise the effect of fox control prior to

spring lambing for example, baiting should be conducted during June and July when foxes are mating and more mobile.

Non-target animals

- Poisoning of non-target species can occur when other animals eat baits intended for wild dogs or foxes (primary poisoning). In addition to wild dogs, PAPP is highly toxic to domestic dogs and cats and may also pose a risk to several native species including varanid lizards (goannas), marsupial carnivores (spotted tail quolls, Tasmanian devils), bandicoots and also some bird species, including ducks.
- The risk of secondary poisoning (i.e., poisoning that occurs through the scavenging of tissues or entrails from a poisoned animal) from PAPP is thought to be relatively low because of the rapid degradation of the toxin, and the low concentration of PAPP in tissues of the poisoned animal. However, it is possible that species such as goannas, that are susceptible to primary poisoning, may also be susceptible to secondary poisoning if they scavenge from the stomachs of fresh carcasses.
- At the conclusion of the baiting program, collect and destroy any remaining baits by burial with a minimum of 500 mm of soil.
- Any fox (or dog) carcasses found after poisoning should be destroyed by burial with a minimum of 500 mm of soil.
- In agricultural areas where the risk to non-target species is unknown, especially where sensitive native carnivores are likely to be present, bait stations using buried, non-poisonous baits should be established and monitored. If baits are taken or disturbed by non-target animals then poison baiting should not be commenced in the area. In conservation areas where native carnivores are known to be present, operators should consult LLS when planning a baiting program.
- Camera traps – devices that detect heat-in-motion – can be used to assess visitation. The camera is triggered to take photos as the subject moves within the detection zone i.e. vicinity of bait station.
- To minimise caching by foxes, bait stations should only contain a single bait. Each bait contains a precise amount of PAPP (400 mg), which is sufficient to deliver a lethal dose to a fox. The rate is calculated to minimise sub-lethal doses and overdosing.
- To minimise the potential for toxic baits to be lethal to non-target animals, the following baiting strategies are followed:
    - *Burial placement of baits* – baits should be buried in a shallow hole and covered with soil or organic material so they are less likely to be removed by native species, particularly birds.
    - *Distance between bait stations* – baits must be spaced with no more than 4 baits per kilometre of trail or 20 baits per 100 hectares to minimise the risk of native animals finding multiple baits. Also, foxes may be less likely to cache baits when they are placed a distance apart.
    - *Marking of bait stations* – mark or record the location of buried baits so that any baits remaining at the end of the program can be collected and destroyed.

- *Timing of baiting* – this should be adjusted to reduce exposure to potentially susceptible species. For example, baiting in winter months, when goannas are less active, is preferred in areas of high goanna abundance.

First aid for dogs

- Fox baits are highly attractive to other carnivores. Care must be taken to ensure that working dogs and domestic dogs and cats do not come into contact with fox baits.
- The PAPP dose in a single FOXECUTE® bait is sufficient to kill a 5-7kg fox and this will be lethal for smaller dogs but may not be sufficient to kill a large dog. However, normal protective measures (e.g., secure confinement, restraint and the use of muzzles where appropriate) are required for all domestic dogs in the vicinity regardless of size.
- The prognosis for poisoned dogs or cats is extremely poor unless an antidote (methylene blue) is promptly (preferably no more than 30 minutes after ingestion) administered by a veterinarian. You will need to act immediately to save a poisoned working dog, pet dog or pet cat – take your dog or cat to a vet straight way. Avoid extremes of temperature and keep your dog or cat as calm and quiet as possible.
- If the dog (do not attempt this with an affected cat) is still able to stand it may be possible to induce vomiting – to get the bait out – by giving it an emetic by mouth e.g., salty water (2 teaspoons of salt in a cup of water) or 3 to 5 'washing soda' (sodium carbonate) crystals (DO NOT use ordinary laundry detergent or powder). However, if the dog cannot stand then do not attempt to induce vomiting but take it straight to the vet.
- Veterinary intervention aims to reduce methaemoglobin back to haemoglobin (usually with methylene blue, although this too can be toxic in high doses), provide oxygen and respiratory support and to absorb toxin (with activated charcoal) and promote its excretion (with saline or sorbitol). For further information, vets should refer to Blue Healer Glovebox Antidote.

Workplace health and safety considerations

- Operators using PAPP baits must strictly follow the directions on the approved label when using, storing, transporting or disposing of the baits.
- PAPP baits can be harmful to humans if swallowed. Ingesting multiple baits may cause methaemoglobinaemia leading to anoxia, although the lethal dose of PAPP (or levels of methaemoglobin) causing fatality for humans has not been positively established.
- Store bait in the original labelled container in a locked cabinet or room away from children, animals and food. Do not handle bait where there is a risk of contaminating drinking water or foodstuff/feed intended for human or animal consumption.
- Appropriate personal protective equipment, including trousers and long-sleeved shirts or overalls and chemical resistant gloves should be worn when handling PAPP baits.
- After use and before eating, drinking or smoking, wash hands, arms and face with soap and water. Wash contaminated clothing and gloves.
- If PAPP baits are swallowed, contact a doctor or the Poisons Information Centre (Ph 13 11 26).

- For further information refer to the Material Safety Data Sheet (MSDS), provided by the manufacturer.

Equipment required

Poisoned baits

Always refer to specific permit and approved label for further details. Baits must be laid according to requirements specified under the Pesticide Control (PAPP) Order.

- FOXECUTE ® baits must only be possessed and used by an authorised control officer or person authorised under the conditions set out in the Pesticide Control (PAPP) Order.
- A single bait contains sufficient toxin to be lethal to a target fox. FOXECUTE® baits contain 400 mg of PAPP in a 35 g bait.
- Baits must be stored and transported in a secure and safe manner. It is best to obtain baits only when they are required.
- Baits must be kept, stored or transported in a container bearing the original label, as supplied by the manufacturer. They must be stored in the closed, original container in a dry, cool, well-ventilated and secure area out of direct sunlight and away from children, pets and foodstuffs.

Other equipment

- personal protective equipment
- towel, soap, dish or bucket
- first aid kit
- warning signs
- marking tape and/or pegs
- shovel or mattock for digging holes
- monitoring camera (optional).

Procedures

- An ACO must conduct a risk assessment to determine if it is appropriate to supply PAPP baits to any person. Risk assessments should consider threats to non-target species particularly domestic dogs, human health and the environment.
- ACOs must conduct a risk assessment of planned group baiting programs where baiting occurs less than the prescribed minimum distances provided in the current PAPP PCO.
- Users of PAPP must always refer to any risk assessment and to specific permit, approved label, Pesticide Control (PAPP Bait Products) Order (PCO) and the NSW DPI Vertebrate Pesticide Manual for up-to-date information on conditions of use including distance restrictions, public notification and bait preparation, distribution, storage, transportation and disposal.

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NSWFOX SOP8 Candid Pest Ejectors (CPEs) using sodium monoflouroacetate (1080) or para-aminopropiophenone (PAPP)

Background

Poisoning with sodium monofluoroacetate (1080) or para-aminopropiophenone (PAPP) is used to minimise the impact of the introduced European red fox (*Vulpes vulpes*) on native fauna and agricultural production. Foxes are amongst the most sensitive species to the effects of these toxins.

Canid pest ejectors (CPEs) are registered in NSW to contain 1080 (3mg and 6mg) and PAPP (400mg and 1000mg) in capsules for foxes and wild dogs respectively. When a fox (or wild dog) bites or pulls on the ejector head the content of the capsule is ejected. They are designed to be safe for non-target species due to the specific pull force required to activate them. Other benefits include security not offered with traditional baits - CPEs cannot be moved by target animals, can be easily armed/disarmed to ensure safety to working dogs, can be left *in situ* for long periods – only need to be checked monthly, and success can be measured – discharged capsules are usually lethal.

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

- Subject to an authorised control officer (ACO) risk assessment.
- CPEs loaded with 1080 or PAPP should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- CPEs are used on rural properties or national parks and forestry estate that are accessible by road.

- Timing of control programs on agricultural lands depends on farm management practices and will often occur at or before lambing/kidding. Control can also be carried out at times when juvenile foxes are dispersing. In contrast, use of CPEs may be continuous and ongoing in most programs targeting the conservation of native fauna.
- Control of foxes with CPEs incorporating 1080 and PAPP can only be carried out under conditions set down in a specific permit issued by the Australian Pesticides & Veterinary Medicines Authority (APVMA) under Commonwealth legislation (*Agricultural and Veterinary Chemicals Code Act 1994*).
- In NSW, 1080 and PAPP CPEs must also be used in accordance with the *Pesticides Act 1999* and the relevant Pesticide Control Orders (which include distance restrictions, signage and notification requirements).
- 1080 and PAPP are restricted chemical products (under Regulation 45 of the Agricultural and Veterinary Chemicals Code Regulations 1995) and is listed as a Schedule 7 – Dangerous Poison under the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). These listings require special precautions in the manufacture, handling, storage and use of 1080 and PAPP, along with specific regulations regarding labelling or availability.
- Handling of capsules used in CPEs and the setting of CPEs s must only be performed by an authorised person who has the appropriate training.
- 1080 and PAPP capsules can only be obtained through an authorised control officer employed by Local Land Services, National Parks and Wildlife Service, Border Fence Maintenance Board of NSW and other approved NSW public authorities.
- The user should refer to the NSW Vertebrate Pesticide Manual for all relevant legislation and its application.

Animal welfare implications

Target animals

1080

- The toxicity of 1080 is due to the conversion of fluoroacetate to fluorocitrate, which inhibits the tricarboxylic acid cycle – a mechanism necessary for cellular energy production. In general, herbivores experience cardiac failure, whereas carnivores experience central nervous system (CNS) disturbances and convulsions and then die of respiratory failure. Some species, usually omnivores such as pigs, can be equally affected by both CNS and cardiac signs.
- After a fox has ingested 1080 there is a latent period of around 30 minutes to 3 hours before initial signs such as hyperexcitability, vocalisation, manic running and vomiting/retching are observed. Although the precise nature and extent of suffering after ingestion of 1080 is unknown, it is likely that the animal will experience distress and possibly pain during this initial stage. In the final stages of toxicosis, signs of central nervous system disturbance are marked and include collapse, convulsions and tetanic spasms. During periods of prolonged convulsions, it is possible that animals are lucid between seizures, however this is difficult to assess. If animals are conscious during the

convulsive episodes or if they become conscious afterwards it is possible that they may experience pain and anxiety. There is also potential for injuries to occur after the appearance of clinical signs. Death occurs around two hours after the onset of clinical signs.

PAPP

- The toxicity of PAPP is due to the formation of high levels of methaemoglobin caused by the oxidation of haemoglobin in red blood cells. When the concentration of methaemoglobin is high, the oxygen carrying capacity of the blood is markedly reduced that leads to a lethal deficit of oxygen (termed *hypoxia* when oxygen levels are low or *anoxia* when oxygen is depleted) in the brain and heart, and results in lethargy followed by unconsciousness and death. Mammalian carnivores are highly susceptible to PAPP compared with other species such as birds.
- After a fox has ingested PAPP there is a lag period before signs of toxicosis such as lethargy, ataxia (difficulty maintaining balance) and salivation are observed. As methaemoglobin levels increase, cyanosis-blue colouration of the mucous membranes due to deoxygenated haemoglobin in blood vessels near the skin surface becomes evident. Although, the duration of the lag phase, duration and severity of symptoms and time to death can be variable, in a pen study of 10 foxes, the average lag period lasted for approximately 40 minutes, clinical signs were present for around an hour and average time to death was around 1½ hours. As the toxicoses progresses, foxes become unresponsive and cannot move voluntarily, but as observed in wild dogs and feral cats they are still likely to show signs of awareness and only become unconscious a few minutes prior to death.
- To minimise the animal welfare implications of orphaning dependent cubs, where possible, it is preferable not to undertake control programs when vixens are lactating. This is also the time when vixens are moving around least within their territory thus reducing the likelihood of finding CPEs. To maximise the effect of fox control prior to spring lambing for example, programs should be conducted during June and July when foxes are mating and more mobile.

Non-target animals

- Poisoning of non-target species can occur either directly by activating the device (primary poisoning) or through the scavenging of tissues or vomitus from a poisoned animal (secondary poisoning).
- 1080 is toxic to a wide range of species including birds, mammals and reptiles; however, there are marked differences in sensitivity. Foxes are extremely sensitive, and most other mammalian carnivores are highly sensitive to 1080 poisoning. Herbivores are less sensitive, and birds and reptiles increasingly more tolerant.
- PAPP is toxic to domestic dogs and cats and may also pose a risk to several native species including varanid lizards (goannas), marsupial carnivores (spotted tail quolls, bandicoots and also some bird species, including ducks.
- The risk of secondary poisoning (i.e., poisoning that occurs through the scavenging of tissues or entrails from a poisoned animal) from PAPP is thought to be relatively low

because of the rapid degradation of the toxin, and the low concentration of PAPP in tissues of the poisoned animal. However, it is possible that species such as goannas, that are susceptible to primary poisoning, may also be susceptible to secondary poisoning if they scavenge from the stomachs of fresh carcasses.

- CPEs are relatively target specific, achieved through the required upward pull force to activate the device. This tends to exclude likely non-targets such as domestic stock, birds and small mammals. However, some risk still remains.
- The susceptibility of non-target species to 1080 or PAPP poisoning is determined by many factors including sensitivity to the poison, body weight, placement, timing and level of exposure.
- Camera traps – devices that detect heat-in-motion – can be used to assess visitation. The camera is triggered to take photos as the subject moves within the detection zone i.e. vicinity of bait station.
- To minimise non-target exposure, do not set more than four 1080 ejectors per kilometre of trail or sixteen 1080 ejectors per hundred (100) hectares.
- To minimise non-target exposure, do not set more than five PAPP ejectors per kilometre of trail or twenty 1080 ejectors per hundred (100) hectares.
- To the extent possible, carcasses of animals poisoned by 1080 or PAPP should be recovered and buried with a minimum of 500 mm of soil.

First aid for dogs

- CPEs may be attractive to other carnivores such as domestic dogs. Care must be taken to ensure that working dogs and pets do not come into contact with activated CPEs. The prognosis for poisoned dogs is extremely poor unless vomiting can be induced shortly after ingestion of the bait and before clinical signs are evident.

1080

- If a working dog or pet is known to have consumed 1080 but is NOT yet showing signs of poisoning, induce vomiting by giving one of the following emetics by mouth:
  - washing soda crystals (sodium carbonate) – 3 to 5 crystals orally, DO NOT use laundry detergents or powders
  - table salt – 2 teaspoons of salt in 1 cup of water; more or less depending on the size of the dog
  - dilute hydrogen peroxide (3% solution) – 3 to 5ml
  - If the dog has vomited, clean it up immediately as the vomit is toxic.
- THEN SEEK VETERINARY ATTENTION IMMEDIATELY. The sooner action is taken following poisoning the better the prognosis.
- If these emetics are not immediately to hand or you are not having success in making the dog vomit it is better to seek veterinary attention immediately rather than waste time.
- If the dog has already begun to show signs of toxicosis (retching and vomiting, frenzied behaviour such as running and howling, convulsions, difficulty breathing etc.), DO NOT induce vomiting, but seek veterinary attention without delay.

- Veterinary intervention aims to decrease 1080 absorption and facilitate excretion; control seizures; and support respiration and cardiac function.
- See *First Aid – 1080 and your dog* for more information: https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/1st_aid_booklet-1.pdf

PAPP

- The PAPP dose in a single ejector capsule will be lethal for smaller dogs. However, normal protective measures (e.g., secure confinement, restraint and the use of muzzles where appropriate) are required for all domestic dogs in the vicinity regardless of size.
- The prognosis for PAPP poisoned dogs or cats is extremely poor unless an antidote (methylene blue) is promptly (preferably no more than 30 minutes after ingestion) administered by a veterinarian. You will need to act immediately to save a poisoned working dog, pet dog or pet cat – take your dog or cat to a vet straight way. Avoid extremes of temperature and keep your dog or cat as calm and quiet as possible.
- If the dog (do not attempt this with an affected cat) is still able to stand it may be possible to induce vomiting by giving it an emetic by mouth e.g., salty water (2 teaspoons of salt in a cup of water) or 3 to 5 'washing soda' (sodium carbonate) crystals (DO NOT use ordinary laundry detergent or powder). However, if the dog cannot stand then do not attempt to induce vomiting but take it straight to the vet.
- Veterinary intervention aims to reduce methaemoglobin back to haemoglobin (usually with methylene blue, although this too can be toxic in high doses), provide oxygen and respiratory support and to absorb toxin (with activated charcoal) and promote its excretion (with saline or sorbitol). For further information vets should refer to Blue Healer Glovebox Antidote.

Workplace health and safety considerations

- Always wear eye protection and gloves when setting and checking CPEs.
- Never hold head over the top of a CPE, always face the side.
- If poisoning occurs, contact a doctor or the Poisons Information Centre (Ph 13 11 26) IMMEDIATELY. Urgent hospital treatment is likely to be needed. There is no effective antidote to 1080.
- For further information refer to the Material Safety Data Sheet (MSDS), available from the supplier, the Pesticide Control (1080 and PAPP Ejector Capsules) Order, and the NSW DPI Vertebrate Pesticide Manual.

Procedures

Equipment required

- The CPE (available from commercial suppliers) consists of the stake, ejector and bait head.
- Eye protection.
- Gloves.

- Setting pliers.
- Oil for ejector piston (vegetable oil or sewing machine oil).
- Driving bolt and hammer.

Selection of CPE sites

- CPEs should be set where foxes are most likely to find and investigate the unfamiliar lure odour e.g., along trails and fence lines, beside regularly used boundary pads, near scent pads and around scratch points. They should not be placed in a position accessible to children, livestock, domestic animals or pets.
- For broad scale control CPEs can be placed every 200-250 m, possibly alternating between sides of the trail.
- The location of all CPE sites must be accurately recorded and marked. This information should be readily available to others in case the operator is unable to return to check them.

Setting of CPEs

- Ensure the ejector is well oiled and use the setting pliers to ensure the trigger is functioning correctly. Use setting pliers to depress the piston inside the casing and lift the trigger to 90 degrees.
- Use a driving bolt to hammer the stake into the ground, with the notch (or 'gate') facing the operator. Do not hammer the stake head directly as it will damage the functionality.
- Load dried meat onto the bait head, put 1080 capsule inside the bait head and carefully screw onto the ejector. Place the assembled ejector into the stake, sliding the trigger into the notch and lock in place with the locking pin.
- Hide the CPE in some grasses to protect from birds.
- A lure such as blood and bone can be used to attract foxes to the CPE.
- When checking the CPE, carefully separate the ejector from the bait head and replace the bait and oil.
- An ACO must conduct a risk assessment to determine if it is appropriate to supply 1080 capsules to any person. Risk assessments should consider threats to non-target species particularly domestic dogs, human health and the environment.
- ACOs must conduct a risk assessment of planned group baiting programs where baiting occurs less than the prescribed minimum distances provided in the current 1080 PCO.
- Users of 1080 and PAPP must always refer to any risk assessment and to specific permit, approved label and Pesticide Control (1080 and PAPP Ejector Capsules) Order (PCO) for up-to-date information on conditions of use including distance restrictions, public notification and bait preparation, distribution, storage, transportation and disposal.
    - Pesticide Control (1080 Bait Products) Order: https://www.epa.nsw.gov.au/your-environment/pesticides/pesticides-nsw-overview/pesticide-control-orders
    - NSW DPI Vertebrate Pesticide Manual: https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/publications/nsw-vertebrate-pesticide-manual

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