



NSWFOX SOP8

Candid Pest Ejectors (CPEs) using sodium monofluoroacetate (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 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>

References

- Allen, B.L. (2019). Para-aminopropiophenone (PAPP) in canid pest ejectors (CPEs) kills wild dogs and European red foxes quickly and humanely. *Environmental Science and Pollution Research*, 1-8.
- Anon. (2018). *Vertebrate Pesticide Manual*. NSW Department of Primary Industries, Orange. Available at: <https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/publications/nsw-vertebrate-pesticide-manual>
- APVMA. (2008). Sodium fluoroacetate. *Final review report and regulatory decision*. Australian Pesticides & Veterinary Medicines Authority, Kingston ACT. Available at: <https://apvma.gov.au/sites/default/files/publication/15061-sodium-fluororacetate-1080-final-review-report.pdf>
- Carter, A., Luck, G.W. (2013) Fox baiting in agricultural landscapes: preliminary findings on the importance of bait-site selection. *Wildlife Research*, 40: 184-195
- Eason, C., Miller, A., Ogilvie, S. & Fairweather, A. (2011). An updated review of the toxicology and ecotoxicology of sodium fluoroacetate (1080) in relation to its use as a pest control tool in New Zealand. *New Zealand Journal of Ecology*, 35: 1-20.
- Fernández, M. G. (2018). *Behaviour, temporal activity, and control of the red fox in the city*. Doctoral dissertation, Macquarie University Sydney.
- Hunt, R. (2016) *Video: Canid Pest Ejector (CPE) for fox and wild dog control*. PestSmart. Available at: <https://pestsmart.org.au/toolkit-resource/canid-pest-ejectors-with-1080/>
- Invasive Animals CRC. (2016). *Working dog safety & first aid*. NSW Department of Primary Industries, Orange. Available at: <https://www.cwba.org.au/wp-content/uploads/2018/11/Working-dog-safety-and-first-aid.pdf>
- Kreplins, T.L., Kennedy, M.S., Dundas, S.J., Adams, P.J., Bateman, P.W. & Fleming, P.A. (2018), Corvid interference with Canid Pest Ejectors in the southern rangelands of Western Australia. *Ecological Management & Restoration*, 19: 169-172.
- Mallick, S., Pauza, M., Eason, C., Mooney, N., Gaffney, R. & Harris, S. (2016) Assessment of non-target risks from sodium fluoroacetate (1080), para-aminopropiophenone (PAPP) and sodium cyanide (NaCN) for fox-incursion response in Tasmania. *Wildlife Research*, 43: 140-152.
- Marks, C.A., Wilson, R. (2005). Predicting mammalian target-specificity of the M-44 ejector in south-eastern Australia. *Wildlife Research*, 32: 151-156.
- Marks, C. A., Hackman, C., Busana, F. & Gigliotti, F. (2000). Assuring that 1080 toxicosis in the red fox (*Vulpes vulpes*) is humane: fluoroacetic acid (1080) and drug combinations. *Wildlife Research*, 27: 483-494.
- McIlroy, J. (1981). The sensitivity of Australian animals to 1080 poison. II. Marsupial and eutherian carnivores. *Australian Wildlife Research*, 8: 385-399.
- McLeod, L. & Saunders, G. R. (2013). *Pesticides used in the management of vertebrate pests in Australia: a review*. NSW Department of Primary Industries, Orange.

- NSW Government (2017). *Pesticide Control (1080 Bait Products) Order 2017*. NSW Government Gazette: 319-354.
- OEH (2011). *NSW Threat abatement plan for predation by the red fox (Vulpes vulpes)*. Office of Environment and Heritage NSW, Sydney.
- Saunders, G., B. Coman, J. Kinnear & M. Braysher (1995). *Managing vertebrate pests: foxes*. Bureau of Resource Sciences, Australian Government Publishing Service, Canberra.
- Sherley, M. (2004). The traditional categories of fluoroacetate poisoning signs and symptoms belie substantial underlying similarities. *Toxicology Letters*, 151: 399-406.
- Shivik, J.A., Mastro, L. & Young, J. K. (2014), Animal attendance at M-44 sodium cyanide ejector sites for coyotes. *Wildlife Society Bulletin*, 38: 217-220.
- Twigg, L.E. (2014) 1080-baits for fox control: Is everything all that it seems? *Pacific Conservation Biology*, 20: 230-236.
- Twigg, L. & Parker, R. (2010). Is sodium fluoroacetate (1080) a humane poison? The influence of mode of action, physiological effects, and target specificity. *Animal Welfare*, 19: 249-263.

© State of New South Wales through the Department of Industry, 2021. You may copy, distribute and otherwise freely deal with this publication for any purpose, provided that you attribute the NSW Department of Primary Industries as the owner.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (December 2021). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent adviser.

ALWAYS READ THE LABEL

Users of agricultural or veterinary chemical products must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.