

Standard Operating Procedure: FOX007: Baiting of foxes with para-aminopropiophenone (PAPP)

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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. Other fox control methods include poisoning with sodium fluoroacetate (commonly known as 1080), shooting, trapping, den fumigation, den destruction, livestock guarding animals and exclusion fencing. Lethal baiting is considered to be the most cost-effective method currently available.

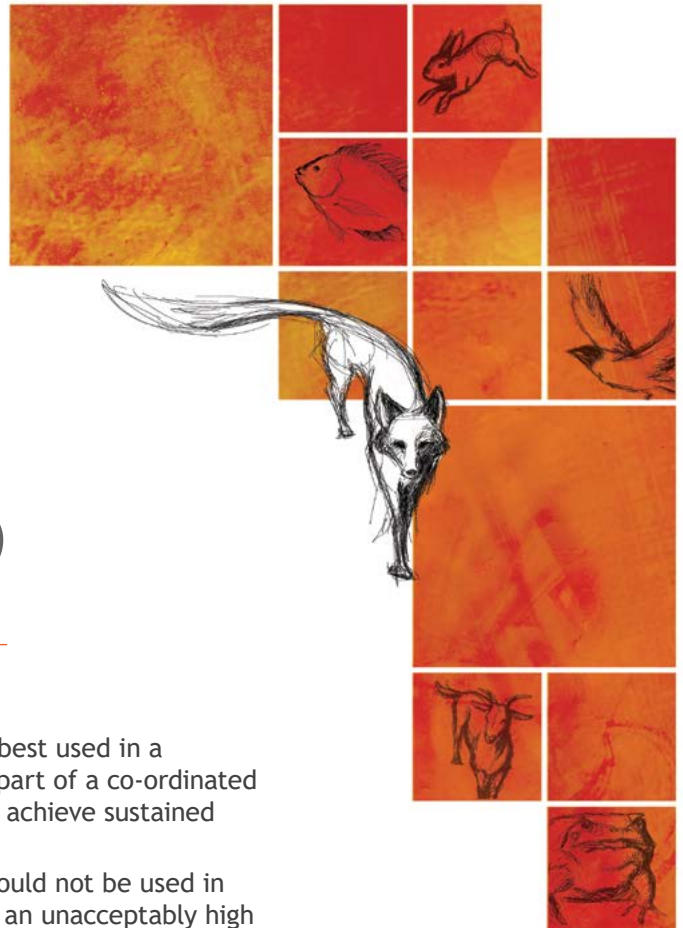
PAPP is a yellow, crystalline compound that is incorporated into commercially prepared meat baits. Commercially manufactured FOXECUTE® baits contain 400mg of PAPP in a 35g bait which is sufficient toxin to kill a fox. They also contain small *yellow/orange* marker beads that remain in the gut of poisoned animals which assists with differentiating death due to PAPP from other causes. In contrast, commercially prepared 1080 baits for foxes contain red marker beads.

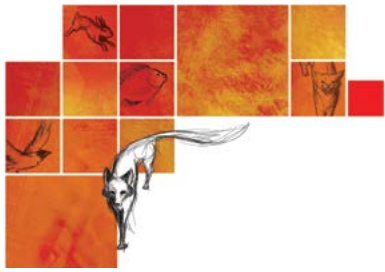
Baits containing PAPP are applied by hand directly to the ground and must be buried in a shallow hole. They are not approved for aerial application. Foxes are amongst the most sensitive species to the effects of PAPP. Good baiting technique helps to minimise the risk to non-target species and maximise the effect on targeted fox populations.

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

Application

- 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 ≤ 16 °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 FOXECUTE® (containing PAPP) can only be carried out under conditions set down in the Australian Pesticides & Veterinary Medicines Authority (APVMA) approved label or permit that are issued under Commonwealth legislation (Agricultural and Veterinary Chemicals Code Act 1994).
- The APVMA approved label specifically references relevant state, and territory regulations regarding the supply and use of FOXECUTE®, which are consistent with





FOX007: Baiting of foxes with PAPP

the national codes of practice, and standard operating procedures for using 'baits' to manage wild canids.

- 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 authorised state government agencies responsible for vertebrate pest control such as Local Land Services in NSW.

Animal welfare considerations

Impact on 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 which 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 toxicosis 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 (i.e. August and September). 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.

Impact on non-target animals

- Poisoning of non-target species can occur when other animals eat baits intended for wild dogs (primary poisoning). In addition to wild dogs, PAPP is highly toxic for 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.



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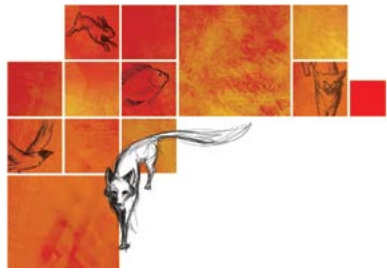
- In agricultural areas where the risk to non-target species is unknown, especially where sensitive native carnivores are likely to be present, bait stations using buried, non-poisonous baits should be established and monitored. If baits are taken or disturbed by non-target animals then poison baiting should not be commenced in the area. In conservation areas where native carnivores are known to be present, operators should consult state-specific guidelines when planning a baiting program.
- Visitation of bait stations by non-target animals and foxes can be monitored using cameras and/or sand pads (a 1m² area of raked earth or sand established on top of the buried bait). For sand pads to effectively detect and allow identification of footprints they should be checked daily.
- To minimise caching by foxes, bait stations must 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* - bury baits approximately 8cm under the ground. Foxes will readily dig up buried baits but they are less likely to be removed by native species, particularly birds.
 - *Distance between bait stations* - space baits at least 200m apart 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. If quolls are thought to occur in the area, bait stations should be spaced at least 500 metres 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.
- 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 detailed information vets should refer to the Briefing Note for Veterinarians.

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.

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.



FOX007: Baiting of foxes with PAPP

Equipment required

Poisoned baits

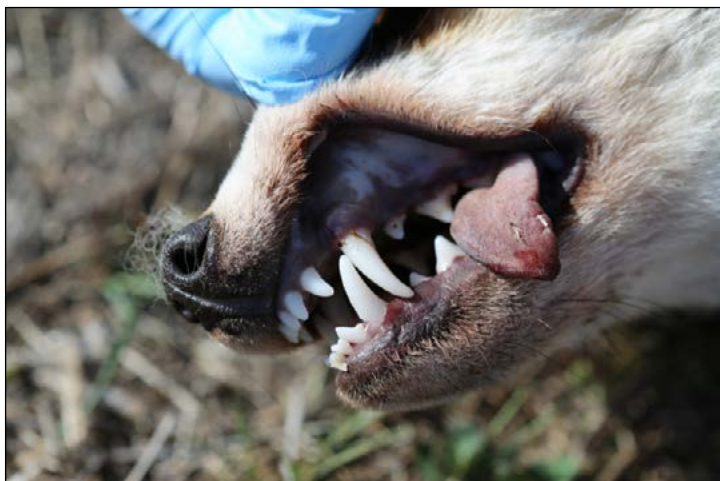
Always refer to specific permit and approved label for further details.

Baits must be laid according to requirements specified by the relevant state/territory authority.

- FOXECUTE® baits must only be supplied to and used by personnel authorised by the relevant state or territory government authority or persons under their direct supervision.
- A single bait contains sufficient toxin to be lethal to a target fox. FOXECUTE® baits contain 400mg of PAPP in a 35g 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
- rake and small amount of (preferably local) sand or soil for preparing sand pads
- monitoring camera (optional)



Fox showing blue gums characteristic of PAPP poisoning.

Procedures

Notification and warning signs

- Neighbour notification and signage requirements may vary from state to state, therefore it is essential that bait users familiarise themselves with the requirements specified by the relevant state/territory authority.
- All adjoining landholders must be notified of a baiting program at least 72 hours in advance and a record of the notifications must be kept.
- Warning signs are compulsory for all lands where baiting occurs. Landholders and neighbours should be advised of the risks to humans and non-target animals associated with PAPP use. As PAPP is lethal to domestic dogs, measures should be taken to securely confine or restrain all domestic dogs, and use muzzles where appropriate for the duration of the program and after baiting when viable baits are likely to be present. Domestic cats are also susceptible to PAPP poisoning and should be confined to prevent them from eating baits. Depending on environmental conditions baits can remain potentially lethal for many weeks.
- Warning signs must be erected at all entry points before laying baits. Each sign must include the date laid, which toxin has been used, and for which pest animal, and contact numbers for further queries. Signs must remain up for a minimum of 4 weeks from the last day of baiting.

Distance restrictions

- The specified minimum distances that PAPP baits can be laid from habitation, watercourses, boundary fences and roads etc. must be observed. Generally, baits must be placed at least 150m from a dwelling; 20m from permanent or flowing water bodies; 5m from boundary fences; and 5m from the edge of formed public roadways.
- Requirements may vary from state to state, therefore it is essential that bait users familiarise themselves with the requirements specified by the relevant state/territory authority.

Laying of baits

- Place single baits 200 - 500 metres apart along fences, tracks and trails or areas frequented by foxes. Approximately one bait station per 5-10 ha (up to 20 bait stations per km²) is needed for effective fox control.
- Bury baits in a shallow hole dug with a mattock or similar instrument. Cover with around 8cm of soil.
- Bait sites must be identified with marker tape and/or pegs so that baits can be recovered if not taken. A GPS may also be used to record bait locations.
- If using free-feeding and/or monitoring of bait take, baits should be checked every day and toxic PAPP baits laid

only where no non-target activity has been detected.

- Check bait stations 2 or 3 times per week and replace baits that have been taken. A single round of bait placement will generally not control all foxes in an area. For effective control, it is necessary to conduct a 4 to 6 week program. Replacement of baits should continue until bait take stops.
- At the conclusion of the baiting program collect and destroy any remaining PAPP baits either by taking the baits in the original and labelled container to an approved waste management facility or, if an approved waste management facility is not available, by burying in a 1 metre deep disposal pit. Buried baits must be covered with at least 500 mm of soil. The disposal pit must be specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots in compliance with relevant local, state or territory government regulations.

Procedural notes

- The length of time that baits contain a lethal dose of PAPP can be highly variable and depends on factors such as how the baits are laid, soil moisture and temperature. The rate of breakdown of PAPP in FOXECUTE® baits is slower than that of 1080 baits with levels remaining high enough to cause death in foxes for up to several weeks after laying.
- Users of PAPP must always refer to the relevant federal, state and territory legislation for more detailed and up-to-date information on conditions of use including distance restrictions, public notification, distribution, storage, transportation and disposal of baits.

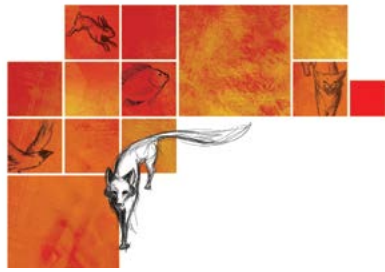
Further information

Contact the relevant federal, state or territory government agency from the following list of websites:

- Australian Department of the Environment and Energy
<http://www.environment.gov.au/>
 - Australian Department of Agriculture and Water Resources
<http://www.agriculture.gov.au/>
 - ACT Transport Canberra and City Services
<http://www.tccs.act.gov.au/city-living>
 - NSW Department of Primary Industries
<http://www.dpi.nsw.gov.au>
 - NT Department of Land Resource Management
<https://landresources.nt.gov.au/>
 - QLD Department of Agriculture and Fisheries
<https://www.daf.qld.gov.au/>
 - SA Department of Primary Industries and Regions
<http://www.pir.sa.gov.au/biosecurity>
 - TAS Department of Primary Industries, Parks, Water and Environment
<http://dpiwpe.tas.gov.au/>
 - VIC Department of Economic Development, Jobs, Transport and Resources
<http://economicdevelopment.vic.gov.au/>
 - WA Department of Agriculture and Food
<https://www.agric.wa.gov.au/>
- Also refer to:
- PestSmart Connect: www.pestsmart.org.au
 - Australian Pest and Veterinary Medicines Authority: apvma.gov.au



Image: Kim Bradley



FOX007: Baiting of foxes with PAPP

References

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Appendix

Relevant federal, state and territory legislation for the use of PAPP.

Federal

- *Environment Protection and Biodiversity Conservation Act 1999*

Australian Capital Territory

- *Environment Protection Act 1997*

New South Wales

- *Pesticides Act 1999*

Northern Territory

- *Medicines, Poisons and Therapeutic Goods Act 2012*
- *Territory Parks and Wildlife Conservation Act 1998*

Queensland

- *Health (Drugs and Poisons) Regulations 1996*

South Australia

- *Controlled Substances Act 1984*
- *Controlled Substances (Poison) Regulations 1996*

Tasmania

- *Poisons Act 1971*
- *Agricultural and Veterinary Chemicals (Control of Use) Act 1995*

Victoria

- *Agricultural and Veterinary Chemical (Control of Use) Act 1992*

Western Australia

- *Poisons Act 1964*
- *Poisons Regulations 1965*