

Standard Operating Procedure

PIG005: Poisoning of feral pigs with sodium fluoroacetate (1080)

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Background

Feral pigs (*Sus scrofa*) have a significant impact on the environment and agricultural production and are a potential reservoir and vector of exotic diseases. Control methods include poisoning, trapping, exclusion fencing, ground shooting and shooting from helicopters.

Poisoning with sodium monofluoroacetate (1080) is considered to be one of the most effective methods of quickly reducing feral pig numbers. 1080 is an odourless, tasteless white powder that has a special dye added for identification of the toxin. It is incorporated into a suitable bait material and offered along a trail or in a bait station. Free-feeding with unpoisoned bait is performed for a number of days prior to laying poisoned baits and is an essential step in a baiting program. A disadvantage of using 1080 is that it carries a high risk of non-target poisoning due to the large doses required to kill feral pigs.

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.

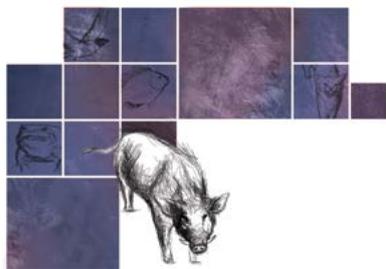
Application

- Poisoning with 1080 should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control.
- 1080 baiting of feral pigs occurs in Queensland, New South Wales and Western Australia and is considered a relatively inexpensive and effective method of reducing high pig populations.
- Poisoning is primarily used as an initial control method whilst other methods such as trapping, ground shooting and exclusion

are used as follow-up techniques to keep pig numbers at a low level.

- Baiting with 1080 should not be used in areas where there is an unacceptably high risk to humans and companion animals, such as urban/residential environments.
- 1080 use is restricted in areas where there is a high risk of poisoning domestic stock and wildlife.
- The best time to conduct a poisoning program is when surface water is scarce and pastures have dried off. At this time pigs will be concentrated near permanent water points and are more likely to eat bait due to hunger. It can be difficult to get feral pigs to take or find bait when there is abundant green feed. To achieve maximum population reductions, it is also recommended that broad scale control programs be conducted prior to breeding, which usually peaks between May and October. In south-eastern Australia, late autumn is usually the most effective period for baiting pigs.
- Although not specifically covered in this procedure, aerial baiting of feral pigs may be applicable in inaccessible and remote areas. Aerial baiting of feral pigs is not permitted in some jurisdictions and should only be considered when:
 - Difficult access makes ground baiting impractical
 - It is the most cost-effective means of control
 - It will form an integral part of a properly planned and executed control program
 - The risk to non-target species has been assessed and all steps will be taken to minimise this impact.
- Baiting of feral pigs 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*





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Chemicals Code Act 1994). 1080 must also be used in accordance with relevant State, Territory and other Commonwealth legislation. The 1080 user may need to make a referral under the EPBC Act (see Table 2).

- 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 Drugs and Poisons (SUSDP). 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 powder or concentrated solution and preparation of baits must only be performed by authorised persons who have the appropriate training.
- Prepared and manufactured 1080 baits can only be obtained by through authorised government agencies.

Animal welfare considerations

Impact on 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 pig has ingested 1080 there is a latent period, usually around an hour, before signs such as salivation, jaw chomping, vomiting, increased lethargy, and laboured respiration are observed. Although the precise nature and extent of suffering after ingestion of 1080 is unknown, it is likely that the animal will experience discomfort prior to and during vomiting. Some pigs exhibit signs of central nervous system disturbance including hyperexcitability, squealing, manic running, paralysis or convulsions, followed by coma and then death. Other animals may lie quietly, breathing slowly and laboriously until death. Time to death is variable depending upon amount 1080 absorbed but is usually around 4 hours after ingestion. With low doses, pigs can take a number of days to die.
- Vomiting is a prominent early sign of 1080 poisoning in feral pigs, occurring approximately 1–5 hours after ingestion. Most pigs vomit frequently over a number of hours. This high incidence of vomiting has the following implications:
 - Vomitus containing 1080 may cause secondary poisoning of non-target species
 - Vomiting may result in sub-lethal dosing of target animals decreasing the effectiveness of the poisoning program
 - Animals surviving a sub-lethal dose may develop an aversion to 1080, decreasing their susceptibility to subsequent poisoning programs.
- To minimise the animal welfare implications of leaving dependent piglets to die a slow death from starvation

it is preferable not to undertake 1080 baiting programs when sows have recently farrowed. This will vary with season and area. Peaks in mating often occur in response to the flush of green vegetation that follows heavy rain or flooding, with farrowing occurring 112–114 days later. For example, in southern NSW, most births occur in summer and autumn, whilst in the monsoonal lowlands of Northern Territory there is a peak in births in the early dry season. Weaning age of piglets varies from 2 to 3 months. At times of farrowing, sows tend to move over less distances and are usually more cryptic which may reduce the effectiveness of any pig control conducted at this time.

Impact on 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 feral pigs (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.
- Vomitus containing 1080 has the potential to kill a number of non-target animals. Pigs may vomit repeatedly for a number of hours after 1080 ingestion so it is likely that vomitus would be distributed over a wide area creating a potential hazard for non-target animals.
- Relatively large amounts of 1080 must be distributed in baits to kill feral pigs, creating a serious risk of primary poisoning in non-target species. Meat baits are of considerable concern as they contain a high concentration of 1080 (72 mg per bait), which is more than 10 times the concentration used for wild dog baits.
- Herbivorous and granivorous birds and mammals have a high risk of poisoning if they eat the grain, pellets or fruit/vegetable baits. Macropods and wombats appear to be the most at risk. Cats, dogs, native carnivorous mammals, birds and some rodents are potentially at risk when meat baits are used.
- To minimise the potential for toxic baits to be lethal to non-target animals, the following baiting strategies are used:
 - *Pre-feeding with non-poisoned bait*: allows an assessment of what animals are eating the bait.
 - *Bait type*: use of bait that is locally attractive to pigs eg. fermented grains, and less attractive to non-targets.
 - *Colouring of baits*: bait material is dyed a green or blue colour to reduce attractiveness to non-target fauna, especially birds.
 - *Use of bait stations*: bait can be placed in a fenced area which excludes livestock and other non-target

animals but allows pigs to push through to access the bait.

- *Placement of baits:* the bait should always be placed in the prime feeding areas of feral pigs.
- *Timing of baiting:* baits are best laid in the evening as feral pigs are mostly active between dusk and dawn. Baits thus laid will be mostly consumed overnight before non-target animals have access.
- *Collection of uneaten bait and feral pig carcasses:* any uneaten bait and poisoned pig carcasses are collected and destroyed or buried.

First aid for dogs

- Care must be taken to ensure that working dogs and pets do not come into contact with 1080. Dogs may eat meat baits, pelleted bait, vomitus from a poisoned pig or poisoned pig carcasses. 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 eaten material containing 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
 - Table salt - 1 to 3 tablespoons
 - Dilute hydrogen peroxide (3% solution) - 3 to 5 ml
 - Dilute mustard and water solution.

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.

Health and safety considerations

- Operators using 1080 must strictly follow the directions on the approved label when preparing for use, using, storing, transporting or disposing of the pesticide.
- 1080 is highly toxic to humans and should be handled with care. Store prepared bait and 1080 concentrate in a labelled container in a locked cabinet away from children, animals and food. Do not handle 1080 where there is a risk of contaminating drinking water or foodstuff/feed intended for human or animal consumption.
- Appropriate personal protective equipment, including cotton overalls, washable hat, elbow-length PVC or nitrile gloves and a face mask or safety glasses, should be worn

when preparing and handling 1080 baits.

- If 1080 gets on skin, immediately wash area with soap and water.
- After use and before eating, drinking or smoking, wash hands, arms and face with soap and water. Wash contaminated clothing and gloves.
- 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.
- Care must be taken when handling pig carcasses as they may carry diseases such as leptospirosis, Q fever, brucellosis, sparganosis, melioidosis and tuberculosis that can affect humans and other animals. Routinely wash hands after handling all carcasses. Carcasses can be heavy (>100 kg), so care must be taken when lifting/dragging.

Equipment required

Poisoned baits

- Grains eg wheat, oats, barley, sorghum, lupins, soybeans are the preferred bait for feral pigs, but alternatives include, fruit, vegetables, manufactured pellets and meat (Note: meat baits are only allowed in western and northern grazing areas of Queensland). 1080 is significantly more toxic when administered in wheat bait than in pellet bait. Grain is sometimes soaked for 24 hours (fermented) prior to 1080 application.
- Where fruit and vegetables are used they must be diced into pieces roughly 2cm by 2cm in size, or 5 grams in weight.
- In some jurisdictions manufactured pellets and grain can only be used in bait stations (not in trails).
- Where meat baits are allowed, the 1080 must be injected into the bait with a suitably calibrated syringe.
- Poisoned bait must be dyed green or blue so they are readily distinguishable from human and animal food and to reduce attractiveness to birds.
- Bait must only be prepared by authorised officers or persons under their direct supervision.
- Prepared bait must be stored and transported in a secure and safe manner. Access must be restricted to approved personnel only. Refer to relevant State and Territory legislation for details.
- Approved bait types and dose rates vary between states (see Table 1).

Other equipment

- personal protective equipment
- towel, soap, dish or bucket
- first aid kit
- warning signs
- marking tape
- hoe, disc or mattock for digging shallow furrow or specially designed baitlayer



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Table 1: Bait types and dose rates for feral pig 1080 baits

State	1080 dose rate	Application technique	Bait size	Bait material
Qld	72 mg/0.5 kg of meat 72 mg/0.25 kg of grain, fruit or vegetables	Injection Tumble mixing	Meat 500 g Grain, fruit & vegetables 250 g	Meat, grain, fruit and vegetables
NSW	0.31 to 0.46 g of 1080 per kg of bait material	Tumble mixing	N/A	Grain, apples, quinces, cucurbits or root vegetables, manufactured pellets
WA	670 mg/kg of bait material	6 kg of bait material mixed with 100 ml of 1080 concentrate (black)	N/A	Wheat, barley, lupins, pig pellets
Vic	Only shelf stable 1080 feral pig bait registered and approved for use by the APVMA			
SA NT Tas ACT	No feral pig baiting with 1080 performed			

- bait mixer (eg cement mixer or mixing drum)
- leakproof containers for storing poison bait
- carrot cutter (if required)

Procedures

Always read relevant permit for conditions and directions for use.

Notification and warning signs

- All adjoining landholders must be notified of a baiting program. A summary of neighbour notification requirements for each state and territory can be found in Table 3.
- Landholders and neighbours must be advised of the risks to humans and non-target animals associated with 1080 use. Stock should be moved from areas where they may have access to bait and domestic dogs should be muzzled or restrained for the length of the program. Pet cats should also be kept under strict control.
- Warning signs must be erected at all entry points before laying baits. Each sign should include the date laid, which toxin has been used, and for which pest animal, and contact numbers for further queries. It is recommended that signs remain up for a minimum of 4 weeks from the last day of baiting. A summary of warning sign requirements for each state and territory can be found in Table 3.

Distance restrictions

- The specified minimum distances that 1080 bait can be laid from habitation, watercourses, boundary fences and roads etc must be observed. A summary of distance restrictions for each state and territory can be found in Table 3.

Free-feeding

- Free-feeding with un-poisoned bait is an essential component of a poisoning program using non-meat baits (and is compulsory in some states - refer to approved label and relevant permit for details). The aim is to encourage the maximum number of pigs to feed readily on the bait material at selected sites, and to ensure that excessive 1080 bait is not laid.
- Unpoisoned baits must be laid for at least 3 nights before laying any poisoned baits. This may need to be extended for up to 2 weeks or more to ensure as many feral pigs as possible are feeding on the bait. Incorrect free-feeding or laying poisoned bait too early can result in substantial numbers of pigs failing to consume bait.
- Once pigs begin to feed at the bait station or along trails, progressively offer more bait material until consumption is no longer increasing. Once the amount being taken is consistent, adjust the amount to poisoned bait accordingly to ensure the minimum amount of bait remains at the end of the night.
- Stock should be removed from the area to be baited before the start of free-feeding. Giving stock access to the free feed baits will encourage them to seek out left over baits when they are returned.
- Select sites in, or close to, recent pig activity e.g. pig pads, areas of thick cover, creeks and swamp edges. Sheltered areas are preferred to minimise the effects of the weather and disturbance by non-target species. Choose sites with adequate access since large amounts of bait will need to be carried in.
- The same feed material should be used for both the unpoisoned free-feed and the poisoned bait.
- Try not to disturb or disperse the pigs during the free-feeding stage. Avoid shooting or using dogs and keep visits to the free-feeding sites as brief as possible.

Laying of baits

- After free-feeding, an adequate volume of poisoned bait material is laid each night, for a maximum of 3 consecutive nights, using either bait trailing or bait stations.

Bait trailing

- A trail of bait can be laid in a furrow. Furrows can be cut with a single disc plough or a bait layer and should be about 10 cm wide and 2 cm deep.
- Trail baiting can be used only in paddocks which contain no domestic stock.
- In some jurisdictions grain and pellets cannot be used in trails - refer to approved label and relevant permit for details.

Bait stations

- A bait station is a fenced enclosure/exclosure (usually 20 x 50 m) for use in paddocks holding livestock. They are designed to exclude livestock but to allow pigs to get in by pushing underneath the fence. It contains a shallow hole to hold bait.
- To exclude sheep, the bait station is usually constructed of fabricated wire or hinged joint mesh. For cattle, the fence needs to be stronger with at least five rows of barbed wire recommended.
- To prevent stock from getting in, the distance from the ground to the bottom wire should not be more than 25 cm.

Collection of uneaten baits and pig carcasses

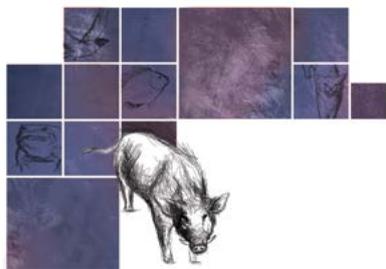
- In some jurisdictions, 1080 baits must not be used for more than 3 consecutive days - refer to approved label and relevant permit for details. If necessary, free-feeding may recommence to determine if any pigs remain.
- All bait that is uneaten 4 days after being laid must be collected and destroyed either by incineration or burying in a 1 m deep disposal pit. Buried baits must be covered with at least 500 mm of soil.
- All reasonable steps should be taken to collect the carcasses of poisoned feral pigs. It is important to remember that some pigs can take 48 hours to die and may travel up to 8 kilometres from the baiting site. The carcasses should be collected for up to 14 days after the laying of poison baits has ceased. Destroy carcasses by incineration or burial in a 1 m deep disposal pit, covered with a minimum of 500 mm of soil.

Procedural notes

- Users of 1080 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 and bait preparation, distribution, storage, transportation and disposal.

Further information

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3. NSW Agriculture (2004). *Vertebrate Pest Control Manual*. NSW Agriculture, Orange NSW
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5. Eason C, Miller A, Ogilvie S and 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.
6. Eason CT and Wickstrom M (2001). *Vertebrate Pesticide Toxicology Manual (poisons): Information on poisons used as vertebrate pesticides*. Technical Series 23. Department of Conservation, Wellington, New Zealand.
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9. Marsack P (1991). *Free-feeding of feral pigs*. Infonote No. 27/91, Agdex 673. Agriculture Protection Board of Western Australia.
10. Mclroy JC (1983). The sensitivity of Australian animals to 1080 poison V. The sensitivity of feral pigs, *Sus scrofa*, to 1080 and its implications for poisoning campaigns. *Australian Wildlife Research* 10:139-148.
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12. O'Brien PH (1988). The toxicity of sodium monofluoroacetate (Compound 1080) to captive feral pigs, *Sus scrofa*. *Australian Wildlife Research* 15:163-170.
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15. Sherley M (2004). The traditional categories of fluoroacetate poisoning signs and symptoms belie substantial underlying similarities. *Toxicology Letters* 151:399-406.
16. Twigg LE and Parker RW (2010). Is sodium fluoroacetate (1080) a humane poison? The influence of mode of action, physiological effects, and target specificity. *Animal Welfare* 19: 249-263.
17. Vertebrate Pest Committee 1080 Working Group (2002). *Report to Vertebrate Pests Committee: 1080 Policies, Practices and Procedures in Australia and New Zealand*.



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Table 2: Relevant federal, state and territory legislation for the use of 1080

<p>Federal</p> <ul style="list-style-type: none"> • <i>Environment Protection and Biodiversity Conservation Act 1999</i> <p>Australian Capital Territory</p> <ul style="list-style-type: none"> • <i>Environment Protection Act 1997</i> <p>New South Wales</p> <ul style="list-style-type: none"> • <i>Pesticides Act 1999</i> <p>Northern Territory</p> <ul style="list-style-type: none"> • <i>Poison and Dangerous Drugs Act 1999</i> • <i>Territory Parks and Wildlife Conservation Act 1998</i> <p>Queensland</p> <ul style="list-style-type: none"> • <i>Health (Drugs and Poisons) Regulations 1996</i> <p>South Australia</p> <ul style="list-style-type: none"> • <i>Controlled Substances Act 1984</i> 	<ul style="list-style-type: none"> • <i>Controlled Substances (Poison) Regulations 1996</i> <p>Tasmania</p> <ul style="list-style-type: none"> • <i>Poisons Act 1971</i> • <i>Agricultural and Veterinary Chemicals (Control of Use) Act 1995</i> <p>Victoria</p> <ul style="list-style-type: none"> • <i>Agricultural and Veterinary Chemical (Control of Use) Act 1992</i> <p>Western Australia</p> <ul style="list-style-type: none"> • <i>Poisons Act 1964</i> • <i>Poisons Regulations 1965</i>
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Table 3: Requirements for distance restrictions, neighbour notification and warning signs when using 1080 baits for feral pigs

State	Specified Minimum Distances	Neighbour Notification	Warning Signs
NSW	<ul style="list-style-type: none"> • Property/Boundary fence 5 m • Habitation 500 m • Domestic water supply 100 m • Public roads 200 m • Waterline of large water storage facilities 10 m 	<ul style="list-style-type: none"> • 72 hours prior to baiting • Baiting must begin within 7 days of notification and must be completed within 14 days of notification. Further notification is required if 1080 baits are used beyond this 14 day period 	<ul style="list-style-type: none"> • All entry points • From start of baiting for minimum of 4 weeks
Qld	<ul style="list-style-type: none"> • Property/Boundary fence 5 m • Habitation 2 km • Declared road 50 m • Town area 5 km 	<ul style="list-style-type: none"> • 72 hours prior to baiting 	<ul style="list-style-type: none"> • All entry points • Kept for a minimum of 1 month after baiting
Vic	<ul style="list-style-type: none"> • Dwelling 150m • Permanent or flowing water bodies 20m • Domestic drinking water supply 20m • Boundary fences 5m • Edge of formed public roadways 5m 	<ul style="list-style-type: none"> • Written notification 72 hours prior to baiting • If the use does not commence within 10 days of notification, a further 72 hours written notice to neighbours of intention to lay baits is required. • Notification is not required where the distance between the location where the 1080 is laid and the adjoining property is more than 2 kilometres 	<ul style="list-style-type: none"> • All entry points • For duration of baiting and must remain in place until four weeks after the bait program has been completed
WA	<ul style="list-style-type: none"> • Property boundaries 20 m • Habitation 100 m • Roads/stock routes/reserves/recreational path 20 m • Dams/watercourse 20 m • Picnic/recreational sites 500 m • Pastoral areas: • Towns/settled area/dwelling 5 km • Roads/public place 1 km 	<ul style="list-style-type: none"> • 72 hours prior to baiting 	<ul style="list-style-type: none"> • All entrances to the property where the baits are laid, and at other strategic points in the vicinity of the baits, for the duration of baiting and for one month after.
SA NT Tas ACT	No feral pig baiting with 1080 performed		