

NATSOP-RAB002 NATIONAL STANDARD OPERATING PROCEDURE: AERIAL BAITING OF RABBITS WITH SODIUM FLUOROACETATE (1080)

Voluntarily adopted by the Vertebrate Pest Committee 2012 with the Invasive Plants and Animals Committee endorsing minor updates September 2017.

BACKGROUND

Poisoning with 1080 is used to minimise the impact of the introduced European rabbit (*Oryctolagus cuniculus*) on agricultural production and the environment. Other rabbit control methods include poisoning with pindone, warren fumigation, warren and harbourage destruction, shooting, trapping, exclusion fencing and biological control with rabbit haemorrhagic disease (RHD) and myxomatosis.

Poisoning with sodium monofluoroacetate (1080) is an effective method of quickly reducing rabbit numbers and is usually performed prior to harbour destruction and warren fumigation. 1080 is an odourless, tasteless white powder that has a special dye added for identification of the toxin. It is used for poisoning of rabbits by incorporating it into a suitable bait material. Poison bait is offered either as a concentrated trail or broadcast (scattered) in a swathe on the ground, or, from the air by an agricultural aircraft with a modified hopper. Ground baiting procedures are described in [NATSOP-RAB001 National Standard Operating Procedure: Ground baiting of rabbits with sodium fluoroacetate \(1080\)](#). 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.

Rabbits are moderately susceptible to the effects of 1080; however other species, especially some native animals and birds and domestic livestock are also vulnerable to poisoning. Good baiting technique helps to minimise the risk to non-target species and maximise the effect on targeted rabbit populations.

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

APPLICATION

- Baiting with 1080 should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained and effective control.
- Poisoning is used as an initial control method to reduce rabbit populations to a more manageable level. Fumigation and ripping of warrens are then used as follow-up techniques to reduce harbour and to slow re-colonisation. Poisoning is also an important management tool in areas where rabbits are mainly surface dwelling or where it is too difficult to rip warrens.
- Controlling rabbits with 1080 bait should not be undertaken in areas where there is an unacceptably high risk to humans and/or companion animals, such as urban/residential environments.
- Aerial baiting programs should only occur when the risk of non-target uptake is minimal.
- Aerial baiting is used to treat large areas of land. It is best suited to steep, rocky/hilly areas or inaccessible islands where ground baiting techniques cannot be employed.
- Aerial baiting is useful for broad-scale application but it is less accurate than ground baiting. It should not be used where non-target animals occupy habitat close to the proposed treatment area.
- 1080 use is restricted in areas where there is a high risk of poisoning domestic stock and wildlife.

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- Because water reduces the concentration of 1080 in bait, poisoned bait should be laid when the ground surface is dry and there is a low chance of rain.
- Aerial baiting programs are best undertaken when alternative food for rabbits is scarce i.e. at the end of summer or early autumn.
- Baiting may be less effective when feed supply is abundant and also during the breeding season when juvenile rabbit movements may be limited and they are less likely to find the bait. Kittens over 17 days old can survive even if the mother is poisoned and subsequent breeding by these survivors can cause rapid recovery of the population
- 1080 is listed as a Schedule 7 substance, a restricted chemical product which requires special precautions in manufacture, handling, storage and use, along with individual regulations regarding labelling or availability.
- Baiting of rabbits 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). 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 Appendix 1.
- Handling of 1080 and preparation of bait must only be performed by authorised persons who have the appropriate training.
- Prepared and manufactured 1080 bait can only be obtained from authorised control 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, can be equally affected by both CNS and cardiac signs e.g. pigs.
- After a rabbit has ingested 1080 there is a latent period ranging from around 30 minutes to 4 hours before signs such as lethargy, laboured respiration and increased sensitivity to noise/disturbance are observed. Convulsions start suddenly, often with gasping and squealing, followed by death. Time to death is variable depending upon the amount 1080 absorbed but is usually around 3 to 4 hours. The precise nature and extent of suffering after ingestion of 1080 is unknown.
- To minimise the animal welfare implications of leaving dependant young to die a slow death from starvation it is preferable not to undertake baiting programs when rabbits are known to be breeding. This is also the time when young rabbits do not travel far from their burrows and bucks vigorously defend their territorial boundaries, making it less likely that all rabbits will have access to bait. In many areas of Australia there is a peak in breeding from late winter to early summer when pastures have greened up after rain.

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 susceptibility. Dogs are extremely susceptible, and most other carnivores are highly sensitive to 1080 poisoning. Herbivores are less sensitive, and birds and reptiles increasingly resistant. Poisoning of non-target species can occur either directly by

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eating baits intended for rabbits (primary poisoning) or through the scavenging of tissues from a poisoned animal (secondary poisoning).

- There is a potentially greater risk to non-target species with aerial application of poisoned bait than occurs with ground baiting. Poisoned rabbit carcasses cannot usually be collected, uneaten baits cannot be covered or removed and all bait will not necessarily be available to rabbits.
- To minimise the potential for toxic baits to be lethal to non-target animals, the following baiting strategies are recommended:
 - *Pre-feeding with non-poisoned bait* – allows an assessment of what animals are eating the bait.
 - *Bait type* – surface coated rather than vacuum impregnated oat baits will reduce exposure of granivorous birds to the toxin. Most of these birds will only eat the kernel and discard the poisoned husk.
 - Carrots are diced to an optimal size favoured by rabbits (2 to 5 grams). Pieces smaller than this tend to retain and absorb a higher loading of 1080 and are more likely to be eaten by birds. They will also dry out and leach 1080 more rapidly than bigger pieces.
 - *Colouring of baits* – baits that are dyed a specific green or blue colour may be unattractive or less obvious to birds.
 - *Placement of baits* – the bait should always be placed in the prime feeding areas of rabbits.
 - *Timing of baiting* – rabbits mostly feed at night, therefore bait laid in the evening will be mostly consumed overnight before diurnal non-target species such as birds will have access. However, nocturnal mammals will be at risk when bait is laid in the evening.

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 poisoned bait (especially pellets) or poisoned rabbit carcasses. The prognosis for poisoned dogs is extremely poor unless vomiting can be induced shortly after ingestion of 1080 and before clinical signs are evident.
- If a working dog or pet is known to have eaten bait or a potentially poisoned carcass, 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
 - 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.

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- 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.

EQUIPMENT REQUIRED

Bait types

- In NSW, ACT and Victoria, only carrots are used with aerial application.
- In WA, one-shot oats are commonly used with aerial application.
- Aerial baiting of rabbits is not performed in QLD, NT, SA or TAS.
- Carrot baits are readily accepted by rabbits but tend to dry out quickly in hotter climates. They must be freshly prepared and used immediately to prevent deterioration. Best results are achieved with good quality carrots that have been chopped to a standard size (cubes of about 2cm x 2cm). Sieving can be used to remove smaller pieces, ensuring a consistent bait size.
- Oats are less susceptible to drying, and are more readily available, cheaper and easier to store and distribute than carrots.

Poisoned baits

- Preparation of 1080 poisoned rabbit baits must only be performed by trained and authorised officers or, in some States, persons under their direct supervision. Specific instructions on bait preparation can be found on the approved labels and in various State guidelines e.g. vertebrate pesticide control manuals, Landcare Notes, Farmnotes etc.
- In most States, poisoned baits are prepared by the application of 1080 concentrate to oats, chopped carrots or manufactured pellets in simple mixing equipment. This creates a surface coating of the poison. Other material such as coloured dyes, sugar and starch may also be added. In Western Australia and the Northern Territory, vacuum impregnation is used to force

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air out of the grains allowing maximum absorption of 1080 into the kernel as well as the husk (one-shot oats).

- The final concentration of 1080 in bait varies depending on bait type:
- Carrot – 140 to 200mg/kg
- One-shot oats – 500mg/kg

Light fixed wing aircraft

- The aircraft must be suited to the purpose eg. agricultural aircraft and must be registered to perform the task.
- A restrained, leak-proof bait hopper and bait distribution mechanism should be used for dispensing of bait. This should be able to be calibrated so that the desired amount of bait can be delivered accurately.
- It is recommended that the aircraft be equipped with a Global Positioning System (GPS).
- The pilot must be suitably experienced and licensed to perform the task.

Other equipment

- personal protective equipment
- towel, soap, dish or bucket
- first Aid kit
- warning signs
- leak proof containers for storing poison bait
- carrot cutter (if required)
- bait mixer

PROCEDURES

Always read relevant permit for conditions and directions for use.

Notification and warning signs

- Appropriate notification of an aerial baiting program must be given to the public and adjoining landholders. A summary of neighbour notification requirements for each State and Territory can be found in Appendix 2.
- Notification should include the following information:
- program duration
- commencement date
- type of bait used
- poison used
- target animal
- location of the baiting zone

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- risks associated with 1080 including potential dangers to stock, unrestrained pets and working dogs
- contact numbers for further queries.
- Appropriate warning signs must be erected at all entry points to the baited area, on public roads that bound baited areas and on public or private lands associated with the baiting program. 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 Appendix 2.

Assessment of site and estimation of rabbit numbers

- To reduce the risks of 1080 exposure to humans and non-target animals and to maximise effect on rabbit populations, a careful on-site risk assessment should be undertaken before a baiting program is commenced.
- It is recommended that conservation agencies be consulted to identify the presence of any 'at risk' species.
- The density of rabbits on the site should be estimated. The location and numbers of rabbits on neighbouring properties should also be approximated.
- Warrens, rabbit harbour and scratching and feeding areas should be located to ensure accurate placement of bait. Where possible, GPS records of the target areas should be taken to assist the pilot in the aerial application process.
- Contact your vertebrate pest control local authority for more information and advice on site assessment and monitoring of rabbit numbers.

Dispersal of baits

- 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 Appendix 2.
- The placement of bait is critical. Bait must be laid through feeding areas where rabbit activity is highest and preferably where the pasture is short or absent.
- Provisions must be in place to ensure that baits are dropped only within the target area. Global Positioning System (GPS) can be used to record bait dispersal locations. Alternatively, ground markers can be used to indicate to the pilot where the bait is to be laid.
- It is preferable to lay baits in the late afternoon or evening as rabbits are active between dusk and dawn.

Conventional baiting

- NSW and Victoria use a '*conventional*' baiting technique' where free-feeds of non-poisoned baits are laid prior to a single application of 1080 poisoned bait. The procedures used for each State are as follows:
- NSW – 3 free-feeds must be laid at least 3 days apart. The 1080 bait must be laid 3 to 5 days after the last free-feed.
- Victoria – 2 free-feeds are laid. The interval between the first and second feed should be not less than 6 days and that between the second and poison feed not less than 4 days.

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- Free-feeding of non-poisoned bait is an essential step to allow rabbits to become accustomed to eating bait material. It also enables an estimation of amount of poisoned bait required. Suggested quantities of bait for the first free-feeding are:

Density of rabbits	Aerial Broadcasting
Medium	Carrots (kg/ha) 4
High	6

- The amount of bait in the second free feed should be adjusted according to how much bait is taken in the first free feed i.e. increase the amount if most of the bait was taken or decrease the amount if uneaten bait remained
- The amount of poisoned bait required is usually around 30% less than the heaviest free feed consumed. This is because rabbits quickly become affected from the poison and their food consumption decreases.
- Flying at 50-80 feet above ground level, disperse bait from the aircraft in parallel swathes about 25 m apart or in a chequerboard pattern, where additional swathes are made at right angles to the original runs using the same spacing.

One-shot baiting

- Western Australia use a 'one-shot' baiting technique' where 1080 impregnated oats, proportionally mixed with untreated oats (typically one poisoned grain in 200), are laid in a swathe about 5 metres wide. The recommend rate of lay for aerial baiting with *one-shot* oats is 10 kg/km.
- Separate free feeding is not offered.
- An extended period of at least 10 days without rainfall or heavy dew is required for maximum effectiveness.

Collection of uneaten bait and rabbit carcasses.

- After aerial baiting, it is not possible to cover or collect poisoned baits; therefore the area cannot be restocked until sufficient rain has fallen to render the baits safe i.e. around 100mm of steady rain for carrots and 50mm for oats. The longer the period before re-stocking the less the

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hazard, especially if a good growth of pasture results from the rain. In hot, dry weather carrots tend to dehydrate and can remain toxic for many weeks.

- Where possible, carcasses of poisoned rabbits should be collected daily for at least 14 days after the last poison feed. They should be destroyed by incineration or buried at a minimum depth of 500mm in a disposal pit. The disposal pit must be clear of waterways (permanent or ephemeral). In most situations the baited area is inaccessible and it will be impossible to locate and destroy rabbit carcasses. Since toxic concentrations of 1080 can remain in carcasses for >75 days, poisoned areas must be considered dangerous, especially for dogs, for many weeks.

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.
- Aircraft operators must ensure that their flying operations comply with requirements of the Civil Aviation Safety Authority.

REFERENCES

1. Anon. (1997). Vertebrate Pesticide Manual: A guide to the use of vertebrate pesticides in Queensland. Department of Resources, Queensland.
2. Anon. (2004). Vertebrate Pest Control Manual. Agricultural Protection Program. NSW Agriculture.
3. Bloomfield, T. (1999). Rabbits: Trail baiting with 1080. Landcare Notes LC0293. Department of Natural Resources and Environment, Victoria.
4. Coman (1994). District Rabbit control: A guide for co-ordinators and leaders. Landcare Australia and Bureau of Rural Sciences.
5. Dobbie, W. (1997). Rabbit control in Central Australia: A guide for landholders. Centralian Land Management Association, Alice Springs.
6. Eason, C., Aroha Miller, Shaun Ogilvie, and Alastair Fairweather. 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): 1-20.
7. Eason, C. T. 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.
8. Eisler, R. (1995). Sodium monofluoroacetate (1080) hazards to fish, wildlife, and invertebrates: A synoptic review. National Biological Service, U. S. Department of the Interior, Washington.
9. Goh, C. (undated). First Aid: 1080 and Your Dog. Pest Animal Control CRC. Document available electronically from Pest Animal Control website:
10. Lund, D. (2001). Farmnote no. 88/2001. Landholder use of 1080 One Shot oat rabbit bait. Department of Agriculture. Forrestfield, Western Australia.
11. McIlroy, J. C. (1982). The sensitivity of Australian animals to 1080 poison III. * Marsupial and eutherian herbivores *Australian Wildlife Research*, **9**, 487-503.
12. McIlroy, J. C. (1986). The sensitivity of Australian animals to 1080 poison IX. * Comparisons between the major groups of animals and the potential danger non-target species face from 1080 poisoning campaigns. *Australian Wildlife Research*, **13**, 39-48.
13. Sherley, M. 2007. "Is sodium fluoroacetate (1080) a humane poison?" *Animal Welfare* 16: 449-458.

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14. Sherley, Miranda. 2004. "The traditional categories of fluoroacetate poisoning signs and symptoms belie substantial underlying similarities." *Toxicology Letters* 151 (3): 399-406.
15. Twigg, L. E, and R. W Parker. 2010. "Is sodium fluoroacetate (1080) a humane poison? The influence of mode of action, physiological effects, and target specificity." *Animal Welfare* 19: 249-263(15)
16. Twigg, L. and Lowe, T. (2003). Farmnote no. 38/2003. Bait stations and rabbit control. Department of Agriculture. Forrestfield, Western Australia.
17. Vertebrate Pest Committee 1080 Working Group (2002). Report to Vertebrate Pests Committee: 1080 Policies, Practices and Procedures in Australia and New Zealand.
18. Williams, K., Parer, I., Coman, B., Burley, J. and Braysher, M. (1995). *Managing vertebrate pests: rabbits*. Australian Government Publishing Service, Canberra.

APPENDICES

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

Federal

Environment Protection and Biodiversity Conservation Act 1999

Information available from the Department of Sustainability, Environment, Water, Population and Communities website: <http://www.environment.gov.au/epbc/>

Australian Capital Territory

Environment Protection Act 1997

New South Wales

Pesticides Act 1999

Northern Territory

Poison and Dangerous Drugs Act 1999

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

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Victoria

Agricultural and Veterinary Chemical (Control of Use) Act 1992

Western Australia

Poisons Act 1964

Poisons Regulations 1965

Distance restrictions, neighbour notification and warning signs requirements for aerial baiting of rabbits using 1080

State	Specified Minimum Distances	Neighbour Notification	Warning Signs
NSW and ACT	Property/Boundary fence 100m -except where a group of adjoining landholders agree in writing as part of a coordinated rabbit control program Habitation 500m Domestic water supply 200m Public roads 200m Waterline of large water storage facilities 10m	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.	All entry points From start of baiting for minimum of 4 weeks

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State	Specified Minimum Distances	Neighbour Notification	Warning Signs
	Aerial baiting of rabbits in water catchment areas requires specific prior approval from the DG of NSW Agriculture		
QLD	No aerial baiting		
NT	No aerial baiting		
VIC	Property/boundary fence 50 m Habitation 200m Domestic drinking water 100m Watercourse/permanent water 50m	24 hours prior to baiting	All entry points For duration of baiting
SA	No aerial baiting		
TAS	No aerial baiting		
WA	Property boundaries 500m	72 hours prior to baiting	All entry points to the baited

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State	Specified Minimum Distances	Neighbour Notification	Warning Signs
	<p>Constructed recreational sites 500m</p> <p>Public roads 250m</p>		<p>area or other relevant locations.</p> <p>For duration of baiting and then for 1 month after the baits are rendered safe</p>

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