



1080 poison baits for pest animal control

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This Landcare Note summarises information on the use of the registered pest animal poison 1080. It has been prepared to provide basic information on the use of 1080 in Victoria.

Pest animal problems in Victoria

Pest animals cause significant ecological and economic damage. Some pest animal species are vectors for endemic diseases or potential vectors for exotic diseases of humans, livestock and native fauna. These primary effects may influence public health, agricultural viability, catchment health and even entire eco-systems.

The *Catchment and Land Protection (CaLP) Act 1994* declares wild rabbits, wild dogs (including dingoes), feral pigs, feral goats, foxes and hares as established pest animals. Pest animals declared under the *CaLP Act 1994* must be controlled on public and private land.

Why poison?

Poisoning is primarily used to reduce a pest animal population to immediately reduce their impact. Experience shows that poisoning alone will not provide complete control of any pest animal species. Poisoning is one part of an integrated management program.

What is integrated pest management?

Integrated pest management is the combination of several measures used to achieve long-term results where the overall aim is to minimise pest animal impact.

What are the components of integrated pest management?

The components of integrated pest management are:

- defining the impact of the pest
- understanding the purpose for control
- knowing the density, distribution and harbour requirements of the pest
- a planned control program that is goal oriented and time dependent (eg. Year 1 - remove all accessible warrens, Year 2 - remove all accessible harbour, etc.)
- 100% stakeholder agreement and commitment to control options

- monitoring and evaluation established and implemented

What is the main poison used in integrated pest animal control?

The registered agricultural poison sodium monofluoroacetate or 'Compound 1080' is the main poison used. 1080 is an essential part of pest animal management in Victoria, particularly for rabbit and fox control. Pindone is also used for rabbit control, specifically where the use of 1080 is inappropriate (See Landcare Note LC0296 *Rabbit control using Pindone poison*).

What is 1080?

1080 is a registered agricultural poison and is classified as a restricted S7 poison.

Compound 1080 (sodium monofluoroacetate) is a white, powdery crystalline salt that is virtually tasteless, odourless to humans and highly soluble in water. There is no known effective antidote for 1080. The 1080 used in pest animal control is coloured for safety reasons.

Why use 1080?

1080 is an efficient, economic, environmentally safe, humane and species-selective poison. The poison 1080 has been used for more than 50 years to control rabbits, foxes, wild dogs and feral pigs.

Government-controlled-and-regulated access to 1080 has ensured appropriate use by land managers.

Is 1080 safe for me to use?

1080 has had an excellent record since its introduction in the early 1950s. No human fatalities or near fatalities have been reported. 1080 used to poison bait material is substantially diluted. As with other hazardous material, 1080 bait material must be handled carefully and safety requirements must be observed. The label of the 1080 product provides specific direction for use and handling.

Is 1080 selective?

There are many poisons that will kill animals, but there is no poison available that will only kill declared pest animals. The action of 1080 is to interfere with energy



production within cells. Hence, warm blooded vertebrates with their higher rates of energy production are more susceptible, whereas cold blooded vertebrates are relatively tolerant to 1080. 1080 can be administered at specific dose rates, making it more specific to target species and less hazardous to non-target animals and the environment, especially when compared to other poisons such as strychnine.

Bait materials are impregnated with selected concentrations of 1080, taking into consideration target species factors such as lethal dose rates, body weights and the amount of bait material likely to be consumed. These factors will vary between species and between individuals within any species. By using techniques such as free feeding, burying baits, estimating likely bait material consumption and stipulating a specific bait type and size, the potential danger to non-target species is kept to a minimum.

Does 1080 harm the environment?

It has been shown that 1080 is not persistent in the environment. There are certain widely distributed microbes (bacteria and fungi) that are capable of rapidly utilising 1080 as a food source, thereby breaking it down into harmless components.

What are the risks to non-target species?

Where 1080 baits are used in accordance to label directions and conditions specified by Department of Primary Industries (DPI) officers, the chance of non-target poisoning is greatly minimised.

How does 1080 work?

Current understanding is that although sodium monofluoroacetate may not be poisonous in itself, it is converted in the body to fluorocitrate which blocks a vital biochemical system known as the citric acid or 'Kreb's' cycle involved with energy production in cells. A general feature in all cases is a delay, or latent period, between the ingestion of the poison and the symptoms, as time is required for conversion of the fluoroacetate to fluorocitrate. In rabbits this latent period may be as short as 30 minutes or as long as 10 hours, whilst for dogs, the latent period may vary from 15 minutes to 2 hours or longer.

What are the symptoms of 1080 poisoning?

The symptoms of 1080 poisoning are varied, but there is a tendency for herbivores to show cardiac effects and for carnivores to develop central nervous system disorders. In omnivores death tends to result from central nervous and cardiac system disorders.

Is it humane?

Available literature on the pharmacology and symptoms of 1080 poisoning indicate that:

- Humans who have suffered sub-lethal doses of 1080 have not reported pain although they showed severe epileptiform convulsions, as well as cardiac effects.
- Convulsions and squeals observed in some species occur when the animal is unconscious and are not a response to pain. Due to derangement of cells in the central nervous system, the reception of pain stimuli is decreased.
- During the latent or lag period, normal behaviour such as feeding continues. This latent period is then followed by the rapid onset of symptoms and death.

What are the safeguards in the use of 1080?

In Victoria, there are a range of legislative, administrative and operational safeguards that have been developed to ensure that 1080 poison is used appropriately to meet the pest management, environmental and safety objectives of the community.

Federal and state control

In accordance with Federal and State legislation and agreements DPI provides strict control over the use and availability of 1080 poison baits.

Only prepared baits are supplied. Land managers are not allowed to use or handle the 1080 powder or stock solution. Any land managers wanting to use a 1080 product must demonstrate a genuine need for the poison.

When are 1080 baits issued?

It is the responsibility of DPI to issue poison bait.

Poison bait will only be supplied as part of an integrated control program. All alternatives to poisoning must be considered. Land managers must demonstrate that all safety requirements; legislation and operational requirements are fully met.

Land managers refusing to comply with any specified condition may not be issued with 1080 bait.

What is needed to legally get 1080 poison baits?

1080 can only be supplied to persons who have completed a Farm Chemical User Course and are in possession of a valid Agricultural Chemical User Permit (See Landcare Note LC0367: *Frequently Asked Questions: 1080 baiting of pest animals*).

Are non-target species affected?

Research has been carried out on the toxicity of 1080 poison to both Australian native and introduced species. This research indicates that each species has its own level of tolerance to the poison. This is a major advantage and safeguard.

One of the main reasons for using 1080 is that it can be targeted quite specifically at pest species. In general foxes, rabbits, dogs and cats are most susceptible, other mammals less so, birds even less susceptible and amphibians and

reptiles the least susceptible. The susceptibility of various species to 1080 is detailed in Appendix 1.

Herbivorous animals

Herbivores tend to be more sensitive to 1080 than granivores, insectivores and omnivores.

Secondary poisoning of carnivorous mammals

An animal that eats a poisoned carcass is exposed to the risk of secondary poisoning. Studies have found that the carnivorous species commonly at risk from secondary poisoning would have to eat significant quantities (up to 3 times their body weight) of poisoned carcass at one sitting to achieve a lethal dose. The pattern for dogs and cats is different. Both species are highly susceptible to 1080 and may readily succumb to secondary poisoning.

Birds

Bird species in southern Victoria show little interest in carrot bait, which is the main bait type used in rabbit poisoning programs. In addition to the lack of interest shown by most birds to carrot bait, many species of birds are protected from 1080 poisoning by their habits (eg. honeyeaters, treetop dwellers, etc). Species that may be exposed are the ground feeders and carnivores. However, many of these species have a high tolerance for 1080 (common to most birds) which provides protection from baiting programs. For example, a wedge-tailed eagle would have to eat 7.5 kg of poisoned rabbit at one sitting to be killed by 1080. This is 2.5 times the average eagle's body weight. This makes their poisoning by secondary effects highly unlikely, if not impossible, using baits at the prescribed dosages. In addition, carnivorous birds also have a tendency to vomit after ingestion of 1080, thus further reducing risk.

Reptiles and amphibians

These groups are more tolerant to 1080 than most other species. The dose required to kill them makes it highly unlikely, if not impossible, that they would ingest enough bait to achieve a lethal dose.

Fish

Fish are highly unlikely to be affected. Fish have a high tolerance requiring about 300 times the average mammalian dose to kill them.

Reduction in non-target risk

The susceptibility of non-target species to 1080 toxicity is also limited by other aspects of the poisoning program, such as the bait material and bait placement, the concentration of 1080, the use of bait refuges, buried bait and the addition of dyes.

Chopped carrot bait has been shown to be much less attractive, especially to birds, than pellets. Poisoning of non-target mammal species is lessened when the bait trail is placed in open paddocks, rather than within the bush line. The addition of dyes on baits makes them much less attractive to birds.

Bait refuges are designed to allow rabbits to feed but keep out most native animals and birds.

The buried bait technique that is used to bait foxes and wild dogs significantly reduces non-target risk.

Evidence indicates that the recommended poisoning techniques will lessen threats to non-target wildlife populations, although some individual animals may be at risk.

Environmental aspects of 1080

Does 1080 occur naturally?

The Compound 1080 poison is known to occur in more than 30 species of plants in Australia, including *Acacia georginae* (gidgee) and a number of *Gastrolobium* (eg. heart leaf poison bush) and *Oxylobium* (eg. box poison bush) species. Each of these plant species has caused poisoning in domestic livestock.

Does 1080 persist in baits?

1080 is not persistent in baits. Some 1080 is metabolised and excreted before the death of poisoned animals. The remainder is washed out of the carcass and uneaten baits at a variable rate, dependent largely on the frequency and amount of rain and bait size.

1080 Carrot baits

Studies indicate that 40 mm of rainfall will produce an immediate and rapid decline of 1080 levels in pellet and particularly in carrot baits to safe levels for restocking. Another study found that oat baits had 1080 levels that decreased rapidly to approximately 50% after similar rainfall, but then remained stable for a number of weeks, despite subsequent smaller amounts of rain. Warm, wet weather accelerates the process of bait breakdown, increases the surface area of remaining material and leads to faster leaching, with no 1080 detectable 3 weeks after exposure.

It is important to realise that pasture growth after such rain would provide a more palatable food alternative and that baits would be considerably less conspicuous.

Without the assistance of rainfall, baits, on average, lose about one half of their toxic load in each successive 2--week period. After 4 weeks the toxicity is about one quarter of the original, and after 8 weeks about one sixteenth of the original loading. These approximations apply to all baits except those baits in sheltered or frozen locations. Blowfly larvae also play a significant role in reducing the toxicity of poisoned meat baits and carcasses.

Does 1080 persist in and degrade soils?

The poison occurs naturally in a number of Australian plants (eg. *Gastrolobium*, *Oxylobium*). Studies of the soils in which these plants grow have shown no evidence of 1080 residues. The reason is that monofluoroacetate salts are quite strongly absorbed onto root tissues and other cellulosic materials in the upper soil layers, so there is little movement through the soil. Once absorbed, a range of soil microorganisms such as *Pseufoomonas* bacteria and *Penicillium* fungi are capable of rapidly utilising 1080 as a food source, thereby breaking it down into harmless components. If soil is sterilised so that all bacteria are killed, this breakdown does not occur. In other words,

1080 is biodegradable and consequently there are no grounds for concern about persistent harmful residues of 1080 in the soil.

All 1080 concentrate used by DPI is initially mixed with water to provide a stock solution. 1080 rabbit bait stock solution is further diluted to provide a specific bait solution.

Will 1080 contaminate water supplies?

In practice about 40-50 mm of rainfall is necessary to leach out the 1080 in the bait. 1080 will always be diluted down manyfold by other water in a watercourse and the migration of the 1080 into the watercourse is delayed by the adsorption effects of the pasture/soil system. All these factors makes it inconceivable that contamination of water supplies by 1080 leaching could constitute a health hazard.

Are there any alternative poisons?

Pindone is an anti-coagulant poison that can be used in urban areas as an alternative to 1080 for rabbit control. Pindone has an effective antidote (Vitamin K1).

Pindone is ideally suited to be used in urban situations, semi urban areas and along the urban-rural fringe.

Pindone is available as a commercially prepared bait, (oats and pindone) sold as *Rabbait* ® / ALDI BUNNYBAIT™ Pindone oat bait.

New techniques in pest animal control

New techniques of pest animal management will be adopted when they become available. Such techniques must be safe, environmentally friendly, humane, effective, economically viable and target specific.

Further information

Contact any local office of the DPI (refer to your local telephone directory for address and telephone numbers).

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Appendix 1 Follows

Appendix 1: Toxicity estimates for 1080

The relative susceptibility of various species to 1080 and the corresponding quantities of poisoned baits that would be lethal (based mainly on McIlroy 1984 and 1986). Species are ranked in decreasing order to overall susceptibility.

	LD50 (mg/kg)	Body weight (kg)	Lethal dose (mg)	Lethal Amount of Bait				
				Carrots 0.2a (g)	Pellets 0.46a (g)	Oats 0.38a (g)	Fox bait 3.3b (no.)	Predator bait 4.5b (no.)
Bush rat	1.13	0.12	0.1	0.7	0.3	0.4	0.04	0.03
Rabbit	0.37	1.5	0.6	2.8	1.2	1.5	*	*
Fox	0.12	4.7	0.6	2.8	1.2	1.5	0.17	0.13
Domestic cat	0.4	4.2	1.7	*	*	*	0.51	0.37
Brush-tail possum	0.67	2.6	1.7	8.7	3.8	4.6	*	*
Dingo	0.11	16.0	1.8	*	3.8	*	0.53	0.39
Kookaburra	>6.0	0.3	1.8	*	3.8	*	0.53	0.39
Magpie	9.93	0.32	3.2	15.9	6.9	8.4	0.96	0.71
Common wombat	0.15	25.0	3.8	18.8	8.1	9.8	*	*
Swamp wallaby	<0.2	20.0	4.0	20.0	8.7	10.5	1.21	0.89
Tiger quoll	1.85	2.8	5.2	*	*	*	1.57	1.15
Brown bandicoot	7.0	1.23	8.6	*	*	*	*	*
Eastern grey kangaroo	0.22	47.0	10.3	51.7	22.4	27.2	*	*
Human (child)	0.71	25.0	17.8	88.8	38.6	46.8	5.3	3.9
Goat	0.5	37.0	18.5	92.5	40.1	48.7	*	*
Sheep	0.52	38.0	19.8	98.8	42.9	52.0	*	*
Wedge-tailed eagle	9.5	3.1	29.5	*	*	*	8.92	6.54
Gould's monitor	43.6	0.84	36.6	*	*	*	11.10	8.14
Human (adult)	0.71	75.0	52.5	262.5	114.1	138.1	15.9	11.6
Pig	1.04	55.0	57.2	286.0	124.1	150.4	17.33	12.71
Red kangaroo	3.2	30.0	96	480.0	208.3	252.5	*	*
Cattle	0.39	520.0	202.8	1014.0	440.1	533.4	*	*
Horse	0.14	500.0	205.0	1025.0	444.9	539.2	*	*
Western grey kangaroo	20.0	35.0	700.0	3500.0	1519.0	1841.0	*	*
Emu	278.0	40.0	11120.0	55600.0	24130.0	29245.6	3369.7	2471.1

< less than
 a. 1080 content in g/kg
 > greater than

b. 1080 content in mg/bait
 * species unlikely to consume this type of bait

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