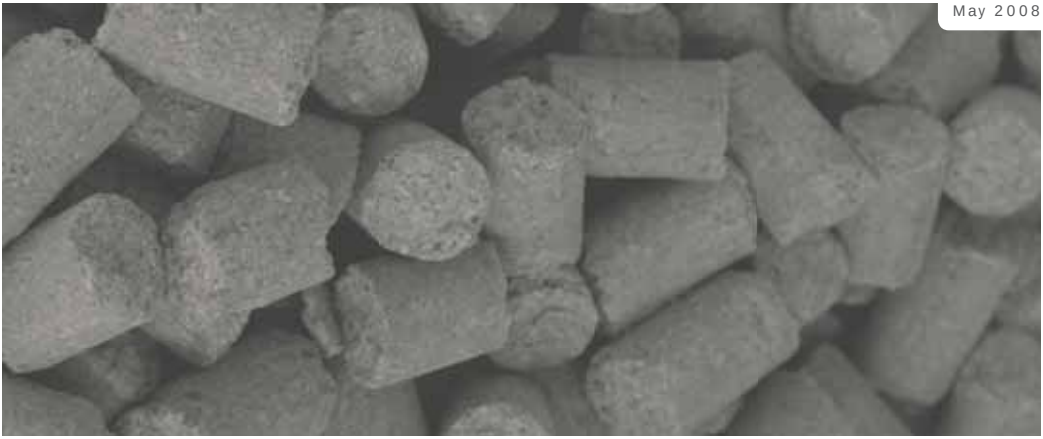
May 2008



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QUESTIONS AND ANSWERS ON 1080

Answers to commonly asked questions on 1080

National Possum Control Agencies

ABOUT NPCA

The National Possum Control Agencies was established in the early 1990s to help co-ordinate possum control. In November 2001 a constitution was approved that reaffirmed NPCA's aims and objects and the importance of co-ordination in possum control and vertebrate pest control in general.

OVERALL AIM

To provide a co-ordinating forum that will contribute to the effectiveness of all the agencies involved with the possum and vertebrate pest problem in New Zealand and to assist agencies with:

- protectin g the farming industry from the effects of bovine Tb, and
- achievin g conservation benefits and positive environmental outcomes.

National Possum Control Agencies

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Published March 2008

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ISBN: 978-1-877474-35-4

THE POSSUM PROBLEM AND 1080

The possum problem in New Zealand is enormous. Possums adversely affect the farming economy and threaten the survival of many of our endangered plant and animal species. New Zealand needs the most effective possum control programmes possible.

This publication provides up-to-date and research-based answers to commonly-asked questions about 1080 poison. It is intended to assist landowners and the general public to assess for themselves the benefits and risks associated with possum control in New Zealand.

THE POSSUM PROBLEM

Why are possums such a problem in New Zealand?

Native flora

Possums are eating the canopy of native forests, causing them to collapse. They preferentially feed on some of the tall canopy species such as tawa, rata, kohekohe, kamahi, and totara. For example, in one part of the Ruahine forest, possums took less than 10 years to reduce the proportion of rata and kamahi in the forest canopy from 74% to 8%. In the rata kamahi forest of Westland many valleys have lost 50% or more of their canopy trees.

Possums also threaten particular plant species. They have, for example, eaten a native mistletoe to extinction.

Native fauna

Possums present a threat to bird life by destroying their habitat and food sources, and preying on eggs and chicks of native birds like the kiwi, kokako and kereru.

Farming

Possums are also the main source of bovine tuberculosis (Tb) in cattle and deer herds and threaten our meat export industry. Even though other pest animals such as ferrets and wild deer also spread Tb possums are the main self-sustaining reservoir of the disease in the wild. More than 90% of new herd infections are caused by Tb vectors (infected wildlife).

How widespread is the bovine Tb problem?

As of June 2006 about 39.5% of New Zealand was occupied by Tb-infected possums. These areas are termed vector risk areas. Most Tb-infected cattle and deer herds are found in these areas.

Since active management of bovine Tb began in the mid-1970s, infection in farm livestock has decreased and continues to decrease. Meanwhile, however,Tb in wildlife has increased and spread over more of New Zealand. If the Tb-carrying wildlife is not controlled and contained, farm livestock will be at risk of re-infection and numbers of infected herds are likely to bounce back to earlier levels.

What are the implications of bovine Tb for the New Zealand economy?

Bovine Tb is a major threat to our economy because New Zealand could be prevented from exporting beef, venison and dairy products to some prime markets if New Zealand's Tb status does not meet market requirements. There is concern that our trading partners may enforce stricter Tb requirements over the next five to ten years. The effects on the national and regional economies could be devastating.

Reducing the number of infected herds reduces the risk of adverse market perceptions of New Zealand's Tb status. Most of New Zealand's trading partners and competitors (North America, Australia, most Western European and South-east Asian countries) are officially classified as Tb-free. That means that 99.8% of all their herds officially tested free of the disease for at least three years in a row.

In New Zealand about 3% of our herds were classified as Tb-infected up to 1999 (2.8% more than our competitors). By 2006 this rate had been reduced to approximately 0. 5%. The target for 2012 is 0.2%.

Given the $8 billion value of New Zealand's dairy, beef and venison exports it is important that effective possum control is maintained to continue the current trend towards Tb free status.

What is being done to control possums and Bovine Tb?

Possum control is being carried out by various stakeholders throughout New Zealand, using a range of trapping and poisoning techniques, including the use of 1080.

The main agencies funding possum control work using 1080 are the Animal Health Board, Regional Councils and the Department of Conservation. Each agency carries out possum control for its own objectives – either reducing the Tb risk for cattle, dairy and deer herds, or reducing the threats to New Zealand's native plants and animals. However, the outcomes are complementary. For example, control work to protect conservation values also knocks down Tb-infected possums and helps limit the spread of infected wild animals.

Spending on various possum control campaigns has been boosted significantly over the last decade. The Government contribution to various control and research programmes has increased significantly, reflecting the gravity of the situation. In 2006, nearly $60 million was spent by the Animal Health Board alone on fighting Tb. Adequate ongoing funding will be required if the progress made to date through intensive Tb control programmes is to be maintained and advanced.

Case Study: Successful Bovine Tb Control

In the period 1997-2006, the number of Tb infected cattle herds in New Zealand fell by between 12% and 27% per year. This was mainly due to the impact of expanded possum control programmes complemented by stock movement control and surveillance testing.

The long-term goal of Tb possum control programmes is to eradicate the disease from possum populations by reducing possum numbers to a low level for a long enough period to break the cycle of disease transmission. A progress objective of the National Bovine Tuberculosis Pest Management Strategy was to reduce the number of infected cattle and deer herds to 0.2% over 84% of New Zealand and this was achieved in June 2006.

The Animal Health Board (AHB) forecasts that, with continued use of 1080, infection levels in cattle and deer will continue to reduce so that by 2015 or earlier, infection levels will be low enough to achieve the goal of 'Official Freedom' from Tb for New Zealand. This requires reducing the herd infection level to less than 0.2% (i.e. 99.8% of the 75,000 herds would be Tb-free). In April 2006, the level of infected herds was 0.51%.

In the intervening years there will be a strategic move towards greater use of aerial 1080 operations to contain and reduce Tb-infected possum populations in rugged or forested areas of the central North Island, northeast Hawke's Bay, Wairarapa,Tasman, Nelson, Marlborough, North Canterbury and West Coast.

The use of 1080 is key to success in this phase of the Tb campaign and to a final successful outcome.

What is New Zealand's possum control strategy?

There are two separate strategies that involve possum control.

1. The current Animal Health Board bovine Tb control strategy has achieved a 65% reduction in the number of Tb-infected cattle and deer herds over the past five years. However, Tb-infected possums and other wildlife continue to spread into previously uninfected areas. The Animal Health Board plans to expand its possum control programmes in coming years to arrest and roll back this spread. The Board's long-term goal is to achieve an officially recognised 'bovine Tb free' status in New Zealand by 2011 (not more than 0.2% infected herds).

   Regulations restrict farmers in shifting cattle and deer off the farm in areas under movement control. There are tough penalties for farmers not complying with the various regulations and Tb declaration cards must accompany movements of all cattle and deer.

2. The Department of Conservation is charged with the care of New Zealand's native plants and wildlife. Possums are a threat to native species and, in fact, threaten the survival of whole ecosystems. The Department of Conservation commits resources to possum control at priority sites to ensure the long-term survival of native species and the ecosystems that support them.

   The New Zealand Biodiversity Condition Fund, administered by the Department of Conservation, is also a source of funding for possum control.

ABOUT 1080

What is 1080?

1080, or sodium fluoroacetate, is one of ten pesticides used for killing introduced mammalian pests.

Fluoroacetate is found in poisonous plants in South America, Africa and Australia. It is a plant toxin that has evolved as a defence mechanism against browsing animals. For example, very low concentrations of fluoroacetate exist in tea plants. Fluoroacetate was first synthesised by Belgian researchers in 1896. Manufactured sodium fluoroacetate and fluoroacetate-containing poisonous plants have identical effects in animals.

1080 was first used around 1944 as a rodenticide in the United States. It has been used in New Zealand since the 1950s. 1080 is water soluble and biodegradable and does not accumulate in the environment.

How did 1080 get its name?

1080 was the laboratory acquisition number given to the compound by the Denver Research Station in the United States, which tested the compound in the 1940s. They were screening a large number of compounds to identify suitable poisons for mammalian pests.

How does 1080 work?

Fluoroacetate is converted to fluorocitrate which inhibits the tricarboxylic acid cycle; the process by which energy is generated in living cells. In effect, 1080 breaks the energy-producing pathway in possums, causing them to die of heart or respiratory failure.

How is 1080 used?

For possum control, 1080 is mixed into carrot, cereal, paste or gel baits at low concentrations before being used. Each bait usually weighs about twelve grams.

In aerial operations, where baits are distributed by helicopter or light plane, cereal or carrot baits are used, with careful screening to remove any small bits that may pose a risk to non-target bird species. Each cereal or carrot bait has 0.15% of poison, so that for every 10 kilograms of bait, there will be 15 grams of poison. Usually only half that amount (three to five kg of bait) is sown per hectare, which translates to between 4.5 and 7.5 grams of toxin per hectare – about one teaspoonful. The maximum application rate allowed under the hazardous substances regulations for aerial sowing of 1080 is 30 grams per hectare.

Possum control works!

- After Kapiti Island was made possum-free in 1983, vegetation such as kohekohe, rata and fuchsia rapidly recovered. By 1988, recorded bird densities had doubled. Rats were eradicated in 1996. The island is now a sanctuary to thriving reintroduced populations of native birds including the endangered kokako and takahe, hihi (stitchbird) and North Island saddleback.

Photo: Astrid Jijkgraaf, Crown Copyright, Department of Conservation, 2003.

A similar rate of around 6 grams per hectare is sown in aerial operations for rabbit control (using up to 30 kg of carrot bait with 0.02% toxin).

In ground control operations, where baits are spread by hand or put into covered bait stations, carrot, apple, cereal, paste or gel baits can be used. The amount of toxin per hectare varies, depending on the method and bait used. For instance, jam paste containing 0.08% toxin is typically applied at 2 kg per hectare - or 1.6 grams of toxin per hectare. Where bait stations are used at a high density (10 per hectare), up to 10 kg of pellet bait at 0.15% of poison would be dispensed per hectare. That equates to 15 grams of 1080 – approximately two teaspoonfuls.

The hazardous substances regulations do not specify a maximum application rate for ground-based operations because there is more control over where bait is laid compared to aerial operations.

Why use 1080?

In large, remote and rugged areas of countryside, where access for ground-based control is difficult, aerial application of pesticide is the most effective way to control possums. At present 1080 is the only pesticide licensed for aerial distribution on the mainland.

In ground control operations, 1080 is one of many tools that can be used, and its use is integrated with cyanide, cholecalciferol, anticoagulants and traps. The choice of which poison, trap and bait to use is based on a range of factors including the non-target species in the area, community interest, cost and weather, and whether possums may be 'bait shy' from earlier control activities in the area.

Are there restrictions on the use of 1080?

1080 is a controlled substance. There are comprehensive and rigorous regulations and operating procedures that govern its use in New Zealand. It is managed in compliance with 1996 Hazardous Substances and New Organisms Act (HSNO) regulations, which cover packaging, transport, exposure limits (from workplace to environment) disposal, emergency management, record keeping to track all 1080, approved handler requirements and labelling.

1080 can only be used by licensed operators holding an Approved Handler Test Certificate and a Controlled Substances Licence. The use of 1080 baits is very strictly specified in the Agricultural Compounds and Veterinary Medicines Act.

All aerial possum control operations using 1080 must have the approval of a Medical Officer of Health. Very strict requirements have to be met before such a permit is issued. Local authorities may require that resource consent be obtained under the Resource Management Act for a 1080 application and will inspect the area after the drop to ensure consent conditions have been met, in which case a certificate of compliance would be issued.

The Animal Health Board and Department of Conservation also have strict codes of practice covering 1080 operating procedures that incorporate their experience in risk management and best practice built up over four decades of using 1080 in New Zealand. The Department of Conservation has also produced

Possum control works!

- New Zealand's unique giant *Powelliphanta* land snails have disappeared from most of our forests because of predation by rats and possums. After 1080 operations, snail numbers increased threefold at sites in Kahurangi National Park, with large numbers of juveniles present.

Photo: K.J. Walker, Crown Copyright, Department of Conservation, undated.

a comprehensive 'Quality Conservation Management' system for all its pest control operations, to ensure high operational standards.

The Department of Conservation's consent is required for all pesticide operations on lands administered by the Department, and regional councils closely monitor all operations.

Do other countries use 1080?

1080 is registered for use in Australia, Canada, the United States and Israel. It is restricted in many countries, including the United States, because of its potential risk to their valued non-target native mammals and predators. Consequently, they use less 1080 than in New Zealand. Australia, like New Zealand, has a large number of introduced mammals and 1080 use is common; for example, in fox and feral pig control.

In New Zealand, by comparison, we have only two native mammals (bats) and no natural predators to control the introduced possums. Consequently, we have a huge need for large-scale control but without the risks to non-target species faced by other countries.

Does 1080 persist or accumulate in the soil?

A large amount of research has been undertaken to answer this question.

Fluoroacetate is highly water–soluble. This means it is easily leached into the soil by rain. Any 1080 leaching from uneaten baits is broken down by micro-organisms into non-toxic naturally occurring substances. Consequently, 1080 does not accumulate in the soil, as some pesticides do. (DDT, for instance, can last in the environment for decades.) 1080 breaks down in as little as one to two weeks in warm wet conditions, less in heavy rain and, in colder conditions (approx 5 -10^{0} Celsius) approximately four to six months. Cereal baits break down more quickly than carrot baits.

Research suggests that 1080 is more rapidly leached from bait than any other toxicant. 1080 operations are usually conducted in winter or spring when wetter conditions assist rapid breakdown, and when normal food supplies are less plentiful so bait will be eaten up quickly.

Does 1080 pollute water supplies?

A large amount of research and monitoring has also been undertaken to answer this question.

Although operators take care to avoid major waterways during aerial operations, it is always possible that bait will fall directly or bounce into smaller watercourses. Between 1990 and 2003 water was monitored for 1080 residues following large-scale control operations, each using aerially sown 1080 baits. A total of 1649 water samples were collected and there was no evidence of significant or prolonged 1080 contamination in surface or ground waters.

Possum control works!

- Nesting success of the North Island robin increased from 11% to 72% following aerial 1080 application in Pureora Forest. Robins are now being collected from Pureora to repopulate other areas where pests have driven the birds to local extinction.

Photo: Dick Veitch, Crown Copyright, Department of Conservation, 1967.

Specifically, the results were:

- Most of the samples contained **no detectable 1080**.
- Trace amounts of 1080 were found in approx 3.5% of the water samples tested but, in most of these, the 1080 was below the two parts per billion maximum level recommended by the Ministry of Health for drinking water. The traces were found mostly within a day of the operation and were associated with sampling of small streams where baits that could be seen in the water.
- No traces were found in any water outside the areas being treated.
- In only three of the samples taken did the amount of 1080 in the water exceed the Ministry of Health's limit. The highest of these samples was 3.5 parts per billion and these residues quickly disappeared.
- All the 107 samples taken from reticulated water after aerial sowing of 1080 baits was negative.

These results are, in part, a result of strict safety procedures that limit the risk of 1080 baits reaching waterways in the first place.

In a worst case scenario, if 50 kg of 1080 bait were accidentally dropped into a farm pond during a helicopter aerial operation, at most, 75 grams of poison would enter the water. If the pond was 100 square metres in area (e.g. 10 metres x 10 metres), with an average depth of one metre, an adult would have to drink more than 400 litres of the pond water at one time in order to receive a lethal dose.

Will 1080 pollute waterways in cold weather?

Even in cold weather when biodegradation is slowed, potential public risk from such exposure is very low or nonexistent when safety procedures and directions for use are adhered to – due to dilution.

There are two means by which any 1080 present in water will be reduced to undetectable and toxicologically insignificant amounts:

1) Dilution

2) Biode gradation.

If baits were to enter water bodies, such as streams or ponds, in the course of an aerial drop, the number involved would be no more than a few and the volume of water would almost immediately dilute the 1080 to toxicologically insignificant concentrations. In most situations dilution to undetectable concentrations is likely to occur before significant biodegradation so cold weather would not be a factor in reducing 1080 levels.

Recent research by NIWA involved deliberately 'spiking' small streams with 1080 baits placed in small streams less than three metres wide. 1080 was only detected in the water for a short period (less than 24 hours). 1080 concentrations 10 metres downstream from the site where baits were added were higher than those 100 metres downstream illustrating the influence of dilution.

Possum control works!

- The breeding population of kokako increased tenfold in Mapara Forest in the Waikato after four aerial 1080 operations in eight years. Effective control of possums, rats and stoats using 1080 is saving this glorious songbird from extinction.

Photo: Rogan Colbourne, Crown Copyright, Department of Conservation, 1980s

How toxic is 1080 to humans?

1080 has the potential to kill and cause sub-lethal effects in humans; the organs most affected would be those with high energy demands such as the heart and reproductive tissue. A 15-kg child would have to eat about one-and-a-half to two 12-gram cereal baits to receive a lethal dose. An 80-kg adult would have to eat eight to nine 12-gram baits to receive a lethal dose.

Although 1080 is potentially dangerous, strict safety procedures are in place, and there have been no recorded deaths in New Zealand from accidental 1080 poisoning.

As explained above, human exposure to dangerous levels of 1080 from drinking contaminated wate r is most unlikely.

It is very important that young children are kept away from bait stations and from bait.

Can 1080 cause sub-lethal effects?

1080, like any other poison, has the potential to cause sub-lethal effects if exposure occurs above certain levels. The organs most affected would be those with high energy demands such as the heart and reproductive tissue.

Workers in the pest control industry are the only people likely to be exposed to 1080 at levels of potential risk. The broader community is protected from exposure at those levels due to strict controls on the use and handling of 1080. Safety standards are in place to prevent worker exposure and sub-lethal effects.

Is 1080 an Endocrine Disrupting Chemical?

Endocrine Disrupting Chemicals are classified by toxicologists as chemicals that have oestrogenic or anti-androgenic activity. Neither 1080 or fluorocitrate, the toxic metabolite, displays oestrogenic or anti-androgenic activity.

Does 1080 cause cancer or birth defects?

Results of three different tests1 indicate that 1080 is not mutagenic – that is, capable of inducing mutation or increasing the frequency of mutation. In studies on rats, results of developmental toxicity showed that a single dose had no effect. However, when female rats were exposed to relatively high doses for about 30% of their gestation, mild skeletal effects were detected.

These toxicology studies underpin the strict safety procedures required for workers at factories where 1080 baits are manufactured and for pest control workers using 1080 in the field. Using the study results, maximum 'no-effect' levels for sustained exposure have been defined for these workers. However, as long-term exposure to sub-lethal doses above the no-effect levels can have harmful effects, strict safety precautions are also enforced, including the use of protective clothing and pesticide handling rules.

[1] Ames test (in vitro bacterial gene mutation assay), Mouse lymphoma assay (in vitro mammalian gene mutation assay), Mouse micronucleus assay (in vivo bone marrow assay to detect chromosomal anomalies).

Possum control works!

- Kereru populations have boomed in many areas after effective possum control. Possums compete with kereru for food (leaves, flowers and fruit) and are also amongst the introduced pests that prey on the kereru eggs and chicks. Kereru play a vital role in seed dispersal in our native forests.

Photo : Crown Copyright, Department of Conservation.

What is the risk to livestock?

1080 is highly toxic to livestock, so farm stock must be kept out of areas where poisons are used for pest control until the risk of poisoning has passed.

Sub-lethal doses of 1080 are eliminated from the tissue of animals that survive accidental exposure within one to two weeks.

What is the risk to dogs?

Dogs are more vulnerable to 1080 than possums. They are most likely to be exposed by scavenging possums that have been killed by 1080.

It can take three to six months for possum carcasses to degrade, and even longer in cold or dry conditions.

Dog-owners should keep their dogs away from areas treated with 1080. If this is not possible, dogs should be kept under control and muzzled until signage states the area is safe.

What is the risk to deer?

The aerial application of 1080 bait is likely to kill deer. Population recovery can be expected in 5-6 years if there is a 50% kill. Using cereal pellets rather than carrot baits appears to be related to lower deer kills. A recently developed deer repellent on aerially sown baits has been highly effective and will help reduce adverse effects on deer hunting.

What is the risk to birds?

Bird deaths have occurred but since the 1970's and 1980's, fewer species have been reported dead after 1080-poisoning operations. Most dead birds were found after large-scale operations and after trials of un-dyed, raspberry-lured, unscreened carrot bait that had a high percentage of small fragments. Fewer birds are killed today for a number of reasons:

- increased use of cereal baits, shown by research to be less attractive to birds than carrot bait
- carrot baits are screened to eliminate the small fragments
- raspberry lure has been banned
- cinnamon oil is now used as a lure for possums and this is unattractive to birds
- baits are dyed green as this colour is less attractive to birds
- bait sizes are made too large for a bird to easily ingest whole.

Studies have shown that while some individual birds may die after 1080 operations, overall bird populations are not adversely affected in the long term because of better food supply and reduced predation. Monitoring of rare species using radio-collars on birds are showing encouraging results, with no loss of birds during 1080 operations; and improvements in the recovery and retention of rare species such as kokako in areas where possums and other pests are kept at very low numbers.

What is the risk to other species?

In general, cold-blooded animals such as fish and reptiles appear to be resistant to 1080 poisoning. There are concerns about crayfish or eels being contaminated, but experimental trials have shown that poisoned eels and crayfish quickly eliminate residues. Moreover, these species, together with aquatic plant organisms are unlikely to be exposed to 1080 because only very low concentrations are likely to occur in streams (see earlier questions about water supplies and water ways).

Invertebrates (insects) have been seen feeding on carrot and cereal baits and on poisoned animals. Studies to date on the impact of 1080 on invertebrates are inconclusive, but recent studies indicate there is little, if any, impact on cave weta and tree weta populations. Because 1080 also kills rodents, which eat invertebrates, this may reduce predation and result in increased invertebrate numbers.

THE CHOICES – 1080 OR OTHER POSSUM CONTROL TECHNIOUES?

What possum control methods, other than 1080, are available?

The Department of Conservation and the Animal Health Board do use other possum control methods, especially in smaller more accessible areas, or where 1080 cannot be used, usually because of the risk to livestock or domestic animals.

There are many factors to consider. Cyanide paste, for example, can be detected by possums, so they become bait-shy. Feratox pellets, however, overcome this by encapsulating the cyanide so that possums cannot detect it, and are useful for ground control. Key points about the main possum control alternatives to 1080 are noted below.

- **Leghold traps** can be used in backcountry possum control but need to be set well above the ground if weka or kiwi are present. Legal requirement to check daily for animal welfare reasons.
- **Kill traps** meet animal welfare requirements better than leghold traps but, again, weka can be at risk.
- **Cyanide** is an effective fast-acting possum control poison, which does not cause secondary poisoning or persist in the environment. The pellet form (Feratox) is more effective and safer to handle than the paste form. Cyanide does not cause secondary poisoning and is more humane.
- **Cholecalciferol** is also effective for possum control and also does not cause secondary poisoning.it is available in a number of bait types but is expensive compared to 1080 or cyanide.
- **Anticoagulant poisons** can be used for possum control and, being safe to handle, are available to the general public e.g. Talon, containing brodifacoum. However, only the second-generation anticoagulants such as brodifacoum are effective at killing possums and, even so, possums take 2-3 weeks to die. These poisons persist in the environment and in living tissue and must be used sparingly. Most countries do not allow the field use of brodifacoum because it is one of the most persistent chemicals known. In New Zealand its use is not allowed on DoC land as it has been found to accumulate through the food-chain with residue and death of game and wildlife. Brodificoum is effective in situations where a low-density, poison/bait-shy possum population persists, but it should not be used repeatedly as it will accumulate in the food-chain. Use in areas where pigs are hunted should also be avoided.

Safety precautions taken when 1080 is being used

Here are some of the things that will happen just before baits are used in an area.

- Warning signs will be placed at all entrances to areas where baits will be used.
- Letters will be sent to people who live nearby.
- Staff from the Department of Conservation or the Regional Council will often visit schools to talk to the children about 1080.
- A public information notice about the possum control operation may appear in the local newspaper.
- The warning signs will stay up until tests show that there is no further danger from the 1080 baits.
- All transport of 1080 must comply with strict requirements of the Land Transport Rule: Dangerous Goods 1999
- Pesticide Summaries' listing any animal pest control operations using pesticides in the area are compiled by all DOC offices.

- **Pindone** is less effective and very large amounts of baits need to be eaten to kill possums. It has a moderate risk of environmental persistence although a low risk of secondary poisoning. Possums take 2-3 weeks to die from Pindone poisoning.
- **Phosphorus** is an effective possum control poison but causes longer periods of pain and sickness than 1080 or cyanide. It causes secondary poisoning.

All these methods are labour-intensive as they involve hand application of poison baits or setting traps. Other factors that are also taken into account in planning possum control include topography and accessibility of possum control areas, the presence of and risk to non-target species, climate and the outcomes of community consultation. Based on the advantages and risks of 1080 and alternative control techniques, 1080 is the toxin of choice for large scale possum control operations, integrated with Feratox and traps for ground control. Often a suite of methods will be used depending on what stage of the operation is being addressed.

It should also be noted that **biological control** to reduce the fertility of possums is being researched and shows promise. However, in practice this will require making possum baits from genetically modified plant material or releasing a genetically modified organism such as a nematode or virus. Gaining regulatory and public approval for this is likely to be very difficult. There is also concern that if a living GM possum control agent was developed in New Zealand it could cross the Tasman with disastrous consequences for marsupials native to Australia.

What proportion of possum control is done with 1080?

Operations that involve aerial 1080 distribution usually focus on large, rugged areas of control. Aerial operations cover only about 5-10% of possum control areas.

Most possum control in New Zealand is done by ground-based operations using a range of control techniques, including hunting and trapping as well as poisons..

1080 and dogs

1080 is especially dangerous to dogs - it kills them.

When 1080 is being used, a number of precautions should be taken:

- Dogs must be kept away from the targeted areas where 1080 warning signs are displayed.
- Make sure dogs are kept tied up or on a lead while a 1080 drop is being carried out.
- If for some reason a dog must be taken to a 1080-drop area, make sure that it is muzzled and, where practical, make sure it is on a lead.
- Feed dogs on meat rather than biscuits during and after a 1080 operation, so that they are less inclined to scavenge dead possums.

Remember, if a dog is able to gain access to an area where 1080 has been used, and eats a poisoned possum, it can die.

How is the choice made between aerial 1080 operations and other forms of possum control?

Numerous factors are considered when deciding how best to carry out possum control. These include: cost, topography, community interest, availability of skilled and reliable hunters, weather conditions, the time available and any past control methods used.

- **Cost:** Aerial control costs are fairly standard but ground control costs can vary widely due to differences in ground conditions, accessibility, and availability of skilled staff.
- **Topography:** Ground control may be preferred on easy country and near residential areas, but aerial control may be preferred where access or ground conditions are very difficult.
- **Weather:** Weather can present difficulties for aerial control operations. For instance, wet conditions can spoil the baits prior to an aerial drop and intense rainfall can leach 1080 from baits before possums get to them.
- **Community interest:** The opinions of affected and interested parties are taken into account in planning an operation. For example, any animal pest control operation on land managed by the Department of Conservation requires an Assessment of Environmental Effects (AEE), which will include community consultation.

Honey production on Rangitoto

Severe possum damage to the pohutukawa forests on Rangitoto Island led to a dramatic decline in honey production.

Honey harvests, although subject to weather variations, had been reasonably steady for many years and a bumper crop of 20 tons was recorded in the summer of 1972-1973. However, possum damage began to adversely affect production and, by 1990, production had dwindled to a barely economic 5-6 tons.

Possums and wallabies were eradicated in the early 1990s, starting with a 1080 drop in 1990.

New shoots on the previously bare pohutukawa tree trunks began appearing within weeks of the drop, but honey production didn't increase immediately, according to Mike Stuckey of Waitemata Honey.

"You could see huge amounts of growth – in the canopy and underneath as well – but it was mainly foliage with no immediate increase in flowering. They just put all their energy into recovery. Then, flowering gradually started to increase and improved pretty steadily."

An exceptional flowering season in the 2007-2008 summer saw a total honey harvest of 18 tons from fewer hives than the bumper crop of 1972-1973.

"I reckon it took about ten years for the trees to recover fully," says Mike. "The island is a totally different place now and it's not just the pohutukawas – the other trees like rewarewa are all flourishing too, and the bird life."

The Department of Conservation is now planning to eradicate the remaining seven species of mammalian pests on the island.

What about a possum bounty?

Hunters can make a valuable contribution to possum control and a bounty system sounds an attractive option.

However, a bounty system does not encourage hunters to achieve the high kill rate required for effective Tb control, threatened species conservation and forest protection. Past experience shows bounty hunters tend to move on to another area when hunting pressure in one place has made possums scarcer and, therefore, more time-consuming to catch.

A bounty system does not achieve targeted protection because:

- it is not in the hunters' interests to achieve the low numbers required for Tb control or conservation because their income depends on how many possums they catch;
- hunters tend to target the most accessible areas, which may not have the greatest priority for protection. Current possum control efforts are carefully targeted to where they are most needed.

How do we know possum control is successful?

There are two ways of monitoring or checking operational success.

- **The benefits** of possum control can be measured, such as improved protection or restoration of conservation values and reduction in the prevalence of bovine Tb. These benefits can be measured by such indicators as regrowth of forest canopy species previously eaten by possums or reduction in the number of cattle Tb reactors or infected herds. It can take several years before the true success of an operation is known because there is a time lag between the reduction in possum numbers and the response in the conservation or Tb indicators.
- **Possum population densities** can also be measured to give an indication of the likely success of an operation. This is usually expressed as either the relative number of possums remaining, or the percentage kill, calculated by the specially developed Residual Trap Catch Index (or RTCI).

Photo: Chris Clark, Crown Copyright, Department of Conservation, 1970s.

THE 1080 REASSESSMENT

Why was 1080 re-assessed in 2006 and 2007?

The risks and benefits of 1080 use were reviewed by the Environmental Risk Management Authority for several reasons:

- we now know a lot more about 1080 since we started to use it over 40 years ago, from considerable scientific research and from practical experience in its use;
- there has been considerable public concern about the use of 1080 in New Zealand;
- the use of 1080 has increased in recent years; mainly for possum control.

What was the result of the 1080 reassessment?

The Environmental Risk Management Authority (ERMA) released its decision in August 2007. It decided to allow the continued use of 1080 but with additional controls on aerial application summarised as follows:

- **A watch list** of all aerial 1080 operations to be maintained to enable the Authority to actively monitor all future 1080 aerial operations;
- **Strengthened** controls to further mitigate the risks involved in 1080 aerial drops;
- **Best practice** promoted in relation to pre-operation planning, consultation and notification as well as the management of 1080 aerial operations;
- **Further research** into alternatives to 1080 for pest control and the effects of 1080.

USEFUL CONTACTS

Who to contact for more information?

- Regional Councils and the Department of Conservation are possum control agencies: contact their local offices for more information.
- For more information about the 1080 Reassessment, contact ERMA: phone 0800 376 234 or email **info@ermanz.govt.nz.**
- For information about the control of bovine Tb, contact the Animal Health Board: phone 0800 4824 636 (or 0800 4 TB INFO)
- The National Possum Control Agencies (NPCA) can also help with information: phone (04) 499 7559 or email **npca@xtra.co.nz**

REMEMBER . . .

1080 is a poison, and all poisons are dangerous. 1080 must be treated with respect, and must be used safely. Further information on 1080, or safety precautions to be taken with 1080, can be obtained from the nearest office of the Department of Conservation or your regional council.



National Possum Control Agencies