

1080: Friend or Foe?

A Science Controversy.

By Bevan McNaughton.

Why is it Controversial?

For years Sodium Monofluoroacetate – better known as 1080 has been used for the control of animal pests. It is beneficial as a poison because Sodium Monofluoroacetate is odourless, colourless and tasteless and is cost effective.

Like many poisons 1080 also has its disadvantages, those are what have been causing concern among farmers, hunters and the general public alike.

Why did I choose this controversial issue?

Living in a rural area where such pests as Possums and rabbits can be problems I decided to enter the hot debate over this poison which is used by many government agencies in the control of such pest species to see why many people oppose the poison that they use. What I first came upon seemed very interesting and I decided that this issue would be interesting to continue with.

The History of 1080:

Fluroacetate is found in some plants found in South Africa and Australia but none of these are found in New Zealand. Witch Doctors used the plants containing the poison for centuries to poison their victims. It wasn't discovered to be a natural occurrence until 1944.

Sodium Monofluoroacetate was first synthetically manufactured in 1896 but for some reason it's toxic effects weren't recorded until 1934. In the late 1930's it was patented as a rodenticide.

Sodium Monofluoroacetate was given its common name 1080 during rodent toxicity tests carried out by the United States Fish and Wildlife Service in 1944. The laboratory number for this test was 1080 and 1080 became its trade name.

In 1954 the first trials on rabbits of 1080 baits were carried out in New Zealand but it wasn't widely used for pest control until about 1957.

How does 1080 work?

¹1080 kills its victims by entering the Krebs cycle. The Krebs Cycle (also known as the TCA cycle or Citric Acid cycle) is a very complex cycle that is the main metabolic pathway which uses glucose, amino acids and fatty acids from the break down of food molecules (carbohydrates, proteins and fats either eaten or stored within the body). The poison works by inhibiting the function of one critical enzyme in the Krebs cycle, therefore blocking the cycle. With this enzyme inhibited (therefore bringing down the whole cycle) the energy production falls as the body's cells are unable to use the glucose, amino acids and fatty acids begin to accumulate in the body's cells. Both the accumulated food molecules and little to no energy production leads to the muscles and vital organs drastically malfunctioning resulting in the animals death.

Although 1080 is extremely toxic, its effects aren't as immediate as some others (cyanide for instance). Depending on the strength of the dose, symptoms can be seen up to 1 1/2 hours, this is also dependent on the species which intakes the bait.

1080 is broken down in the soil and in water by micro-organisms that thrive on 1080 and rapidly decompose it to its benign elements. At 23°C it breaks down to trace amounts in soil after 27 days. At 5°C it stays toxic for 80 days. Because such places as Central Otago can be cool and dry 1080 can remain toxic for months to a year.

¹ 1080, It's toxicity, effects and Hazards. Ben Saunders, Research Student, Massey University. Rod and Rifle Vol. 18, No. 4, July/August 1997. Page 20-22

How much 1080 is used in New Zealand and at what doses?

The poison itself is imported from the United States, which is produced by a small company owned by Charles Wrigley. In 1955 Charles' grandfather, a chemical engineer bought the factory and manufacturing rights and since then it has been a family business. ²

Out of the five Ton a year that the factory produces of sodium monofluoroacetate, New Zealand imports 3.5 Ton of this at a cost of approximately \$700,000. ³ New Zealand is the largest importer and user of the 1080 poison and is known for it's amount of scientific research done on how the poison is used and the effects that the use of it has on the environment.

The government now uses baits at a toxicity of 0.15% per 1 gram of bait, which is equal to 1.5 grams of sodium monofluoroacetate per 1Kg of bait. To these figures, the total amount equals to 2333.3 Tons of poisoned cereal bait per year are produced in factories at Waimate and Wanganui which are owned by the Government as a State Owned Enterprise but is to be soon sold off.

Below is a table of the baits at a 0.08% potency and how much mg/kg are needed to kill at 50 and 100 percent:

Animal:	LD50 (mg/kg)	LD100(mg/kg)	Animal and average weight	Number of 0.08% baits to equal lethal dose
Goat	0.6	1.0	Goat (40 kg)	13
Pig	0.3	1.0	Pig (30 kg)	10
Deer	0.5	1.0-2.0	Deer (75 kg)	24
Rabbit	0.4	0.8	Rabbit (1.5 kg)	1
Possum	0.8	1.2	Possum (4 kg)	2
Wallaby	<1.0	1.0	Wallaby (15 kg)	5
Dog	0.07	0.1	Dog (15 kg)	1
Human	2-5	2-10	Human (75 kg man)	47

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The LD50 and LD100 tables represent how much poison is needed per kilogram of body mass for each percentage of a kill. For example the LD50 index represents an estimate of the smallest amount of poison required per kilogram of animal body weight to kill 50% of the target population. The same counts for the LD100 for a 100% kill.

Why does 1080 make a good poison?

The New Zealand government chose the poison 1080 due to the belief that it is a cost efficient poison to use. 1080 cereal and carrot baits are long lasting if they are kept dry thereby good for storage and break down readily in warm moist climates reducing the risk of long term damage in the wild. 1080 is tasteless, colourless and odourless.

Although the effects caused by 1080 poisoning look inhumane, it is a humane poisoning, the victim feels nothing and dies within 2 hours of the symptoms appearing.

1080 aerial drops can be a very quick way to control a pest species.

Aerial drops for 1080 can be very accurate if all goes according to plan.

1080 is vital for use in aerial drops in remote and inaccessible places where land application is difficult.

² The Opossum WAR. The New Zealand Herald, 12 April 1995.

³ Rising to the Bait, tension over 1080. North and South, March 1996.

Successful drops:

Two successfully reported drops were at Waipoua, Northland and at Rangitoto Island in the Waitemata harbour. The Rangitoto island drop had a 93% kill and Waipoua had an 85% kill. Waipoua had 100 tonnes of 1080 poisoned baits dropped over 17,000 hectares and there was well below safe amounts of 1080 in the water for up to 6 months after the drop.⁴

Why doesn't 1080 make a good poison?

Rural News November 18, 1996

Poison could affect trade

BY ROSS ANNABELL

 NEW Zealand could risk major political and economic trade ramifications for using a relatively unresearched pesticide such as 1080, for which there is a lack of scientific data on long-term exposure effects. That warning is given by Dr Michael Beasley, of

1080 baits at risk

BY ROSS ANNABELL

 DEPARTMENT of Conservation staff fear 1080 pollard bait may have to be abandoned, as well as carrot bait, following research that showed a 50 per cent kill of North Island robins after a major

come of such a trial could mean a complete re-think as to where and when aerial 1080 could be used. The high bird kill in Pureora Forest, coupled with deaths of livestock and dogs on adjoining farmland, has outraged some local farmers. Nearoma farmer John

in the area, and believes secondary poisoning is killing the insectivore birds. He said the massive airdrops every four years seem to be having little effect in controlling TB, with 13 steers condemned one farm in an outbreak two weeks ago. Local farmers were

The poisoning of non-target animal species:

The poisoning of native robins and tomtits in the Pureora forest by Environment Waikato.⁵

On the 17th and 18th of September 1996 an aerial drop of 1080 poisoned carrot baits was carried out for the Waikato Pureora T.B-control operation which was done for the Animal Health Board. In this drop native robins and tomtits were scientifically monitored due to the belief that in other such drops carried out, the Control Agencies were underestimating the native bird deaths and admitted that they tried to play down the extent of non-target species poisonings.

After the drop, the scientist involved in the study - a Ralph Powlesland found that about 55% of the robins and possibly that a higher percentage of the tomtits had been destroyed. It is not yet known if these birds died from eating the bait which is supposedly dyed green to make it unattractive to birds or if it was a case of secondary poisoning from these birds eating insects which had eaten poisoned baits.

⁶ During a field experiment in a Taranaki reserve in 1991, Mike Meads noticed dust from the poisoned grain (cereal) pellets dropped by a helicopter blowing across the experimental block. After the aerial drop the forest floor insect life plummeted and stayed low for up to a year after the drop.

⁷ Impact of 1080 on Weta Populations.

In a scientific study done by John Hutcheson he placed 1080 poisoned cereal baits in cages which hosted Wetas which readily fed on the bait. After eating the poisoned bait the Wetas initially suffered sublethal poisoning and had diurnal rhythms disrupted, becoming active at all times rather than sheltering during the day." 50% of the Wetas offered the baits died, this also included ones with a toxic pellet added into their drinking water and ones which got sublethal poisoning indirectly from translocation of the water into the foliage.

Due to the food cycle, Moreporks, tomtits and robins eat Wetas and therefore can suffer from secondary poisoning.

⁴ Old Pesticide - New data. New Zealand Science Monthly. March 1992, pages 15-16

⁵ Possum control, 1080 Poison, and related issues. TAANZ February 1997.

⁶ Effect of Sodium Monofluoroacetate (1080) on non-target invertebrates of Whitecliffs Conservation Area, Taranaki. Mike Meads, June 1994.

⁷ Impact of 1080 on Weta Populations. John Hutcheson, Forest Health Group. June 1989.

Bees are another problem with 1080 drops and hand laid pellets. There have been many reports of bee swarms dying after feeding upon Jam type baits and also passing the poison back into the hive therefore contaminating the honey.⁸

Poison Residues in export meat and dairy products:

Poison Residues in Game and export meat could lead to a total ban from other countries on meats such as venison. New Zealand both exports feral and farm venison. In the bush where 1080 aerial drops have taken place a deer may readily eat the poisoned bait but not eat enough to kill it. In such cases where feral meat has been processed, MAF have found traces of 1080 in the feral venison. If it was exported overseas to such countries as Germany and they found the residue in the meat it could mean an end to all venison to that country therefore seriously damaging the venison industry.

⁹In the Wairarapa nine dairy cows that had eaten hand laid 1080 baits in the owners bush had their milk sent to the local dairy factory. Later on these cows died and all hell broke loose when Kiwi Co-operative Dairies Ltd. found out that the poisoned milk entered their processing system. MAF kept this event quiet for six weeks then said that the levels would've been so low there was no risk.

Aerial and land Applications gone wrong:

Although planes and helicopters are relatively accurate in their drops there have been incidents where in the North Island the pilots have done over runs and accidentally dropped the poisoned baits on farm land. Because of this cattle and deer have died and the government has tried to keep this quiet, offering compensation to the farmers to stop their image being hurt.

Secondary poisonings:

The most news that people hear about is the incident of secondary poisonings of dogs. ¹⁰On April 23 1996 Brian Sperry was notified by the Tasman District Council of their intention to kill possums. Brian requested traps on his land, which was done. On his neighbouring land the council used apple paste for poisoning the possums.

Three months later he walked into his bush to retrieve some fencing gear 200 metres from his house. Chief, his German Shepherd dog accompanied him and fossicked in the bush for about two minutes. After arriving in Nelson half an hour later with his dog, Chief became hysterical, ran into walls, howled and lost complete controls of his bowels. 45 minutes later Chief died. Chief's body was autopsied and the Vet found small bones and fur from a Possum. The toxicology results found 0.26 mg/KG in Chiefs body. It is believed that a possum from a neighbour's property ate the poison then wandered onto Brian's property then died.

Many cases a year are reported from secondary poisonings of dogs from eating poisoned carcasses. Dogs are the most susceptible to the poison 1080. TAANZ has also found some possums which have had 1080 residue which has lasted at dangerous levels for dogs after 12 months after the possum has died.

Bait wastage:

Baits readily made for 1080 such as the carrot bait or the mixed bait such as the cereal bait have been sometimes wasted due to wash outs or the baits becoming wet before aerial application. ¹¹One example of where bait had spoiled was at Palmerston North on January 1997. Fourteen tonnes of 1080 poison pellets were buried at the Palmerston North landfill. Another example was when there was a drop and then a large downpour washed all the poison away making the drop useless and expensive.

Negative facts to 1080

There is no known cure or antidote to treat any animal or human which has been poisoned by 1080. It has been found to cause birth abnormalities in rats, even possibly humans.

⁸ Trials seeking bee-proof 1080. New Zealand Farmer, October 18, 1989 Page 7.

⁹ 1080 scare for 1080 milk. Rural news June 22 1998. Issue 203 Page 2

¹⁰ 1080 dog deaths "scandalous". Rural news, September 9, 1996. Issue 170

¹¹ Possum control, 1080 Poison, and related issues. TAANZ February 1997.

If the bait that the animal has eaten has only caused the animal to become sick, that animal will go bait shy from that type of bait.

Certain 1080 baits attract certain non-target species, this has caused many problems in some aerial drops by killing non-target species.

1080 can enter the water table and then can be ingested by more animals and even humans, although not to an extent to harm.

Conclusion:

Although the poison that New Zealand uses which contains Sodium Monofluoroacetate (1080), it appears that it is not safe for use in an environment near a colonised area.

Aerial Application:

Although aerial applications to control areas do kill off much of the pest species but it is shown that the poison also affects non-target species and therefore can do much more damage than good. To this extent of the investigation it appears best for government agencies to use aerial application in remote areas and only if the area has sustained high damage from the pest species and it is truly necessary for the aerial drop.

Bait stations and hand application.

In trials done it has been found that bait stations can be target specific so that non-target species are in danger of eating the bait. In trials of using bait stations upon a poison line it has been found that large and accurate kills of the pest species are possible in this application and it can be done at a cheaper rate than some aerial applications of the poison. This would be useful in areas away from colonised areas where damage is a large problem and the risk of T.B is also very high.

Application close to colonised land:

It appears that the use of 1080 in areas near farms and other colonised areas is very dangerous and can lead to death of stock, pets and endangers humans. Therefore other such baits like Feratox (cyanide based) or Talon would be more acceptable due to the fact that it is less toxic to larger animals and breaks down faster in the environment.

1080 is a poison that has many negative sides to its use. The reason why it is seen as a dangerous poison is due to the fact that it is not used with the care it deserves. Because of this animals and insects have become sick or have died which was unnecessary and foolish.

New Zealand has a major problem with possum population due to environmental damage and T.B in livestock. Whether New Zealand continues to use this poison will depend on a more responsible approach by the people who use it. But in the long run New Zealand's trading partners may dictate its future use.

Friend or foe??

Both, yet it is still quickly becoming foe.

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Information Collected from: Index New Zealand, TAANZ, NZDA and local newspapers.

The validity of all these sources have been checked due to the fact that each article supplying resources to government departments, other scientists, Scientific organisations or supplying scientific evidence with the article. Although the articles did contain levels of biasness the information was still sufficient for use in this controversial issue.

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