

# **Possum Control for Private Land Owners**

*[Insert picture of possum]*

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## INTRODUCTION

The brushtail possum (*Trichosurus vulpecula*) is one of the most damaging pest animals in New Zealand. The possum was first introduced here from Australia in 1837 to establish a fur trade. Today, about 70 million brushtail possums live in areas spread across more than 90% of the mainland. They can survive in a wide range of habitats but reach their highest numbers (as many as 25 possums per hectare) in podocarp-broadleaf forests and along the margins between native forest and pasture.

The possum's ability to respond to increases in food supply and to disperse widely enables them to spread into new areas and to rebound quickly after control operations. Possums can live for more than 12 years and females usually breed after they are 1 year old. They typically give birth to one young per year in the autumn (March-May), but they may have a second offspring in the spring (September-November) if there is abundant food available. Possums are largely solitary and have defined home ranges, but they can share all or part of their range with other possums. The young remain with their mothers for 5-8 months, after which time males may disperse up to 20 km away.

*[Insert diagram of possum life cycle]*

Possums are omnivores, and they have a highly varied diet including leaves, ferns, fruit, seeds, bark, flowers and flower buds, invertebrates, bird eggs and chicks. Their ability to eat a wide range of food items helps them survive in diverse habitats and at times when some food items disappear.

### **Why are possums such a problem?**

Possums have become a serious and widespread problem throughout New Zealand, and they damage both private and public land in rural and urban areas. Possums may damage agricultural crops, pine forests and home gardens. Possums also carry and spread Bovine tuberculosis (Tb), which poses a major potential threat to New Zealand's beef and venison industries. In addition, possums cause serious damage to native forests and wildlife.

#### *Damage to agriculture, horticulture and forestry*

Possums love to feed on pasture plants, especially clover and herbs, and they may travel up to 1.5 km through forest each night to feed in pasture. Although possum damage to pasture is small on a national scale, losses to individual farmers can be quite substantial.

Possums will also feed on a wide range of fruits, vegetables, garden flowers and exotic trees. They prefer different foods in different seasons, for example the spring growth on willow or poplar trees and fruit and crops in the autumn. Some of the possum's favourite garden foods include:

- *Fruits:* apples, citrus fruit, peaches, plums
- *Vegetables:* carrots, parsnips, cabbages, beans, parsley, turnips, corn, swedes, potatoes, peas and silverbeet
- *Flowers:* roses, carnations, polyanthus, godetia, cyclamen and gladioli
- *Exotic trees:* willows, poplars, oaks, pines and walnuts

Possoms frequently damage shelterbelts and plantings for erosion control, and they particularly like the new growth of willows or poplars. Damage to pine forests is greatest in young stands, where possums browse the shoots and strip the bark, occasionally killing up to half of the trees.

#### *Bovine tuberculosis*

Possoms pose an economic threat to New Zealand farmers, because they carry and spread Bovine tuberculosis (Tb), a bacterial disease that can affect humans (although it is very rare now that dairy products are pasteurised), as well as cattle, deer, pigs, ferrets and cats. The disease could potentially threaten New Zealand beef and venison exports, because trade barriers could be set up unless effective control programmes are implemented.

Bovine Tb is spread by direct contact between cattle and possums, probably when cattle lick or sniff sores on sick possums. The disease is passed easily amongst possums, providing a self-sustaining reservoir of the disease. However, scientists believe that the disease would die out if possum populations were reduced and maintained at sufficiently low numbers.

Possoms with Tb may have small sores under the front and hind legs and around the groin area. The sores may have green, yellowish pus. If you find a dead possum that you suspect has Tb, place it in a plastic bag and store it in a cool place until you can contact your nearest Ministry of Agriculture and Fisheries (MAF) office. Remember that you can become infected by handling the possum, so always disinfect any clothing that may have been contaminated and wash your hands and other exposed skin thoroughly.

[Insert map of Tb endemic areas]

#### *Damage to native forests and wildlife*

Possoms are not only a problem for agriculture and horticulture. They also cause serious damage to native plants and animals. It is estimated that possums eat through 21,000 tonnes of vegetation each night. They have strong preferences for certain plant species such as rata, fivefinger, fuchsia, kamahi and kohekohe. They eat these preferred plants first until those species gradually disappear from the area. In this way, they can change the species composition of native forests and even cause the total collapse of the forest canopy in places where preferred species are abundant.

Possoms compete with native birds for food, especially flowers and fruits, and they may compete with other birds such as kiwi for den sites. They also prey on the eggs and chicks of native birds, including such rare species as the North Island kokako.

## **DETECTING AND PREVENTING POSSUM DAMAGE**

### **How do I know if possums are on my property?**

You are unlikely to see possums because they are nocturnal and sleep during the day. However, possums leave a number of signs that you can learn to recognise. Look for the following indications that possums are living or feeding in the area:

- Possums follow regular trails (often called “possum pads”) into crops. You may notice narrow tracks of flattened grass through paddocks, or narrow trails off ridges through forest.
- The bark of their preferred trees may be worn smooth, and claw marks may be seen around the base of the tree or on the trunk.
- Their droppings are small, rounded pellets about the size of jelly beans.
- In pine forest, when the catkins turn yellow, look for yellow possum droppings. You may also see bite and claw marks on the pine bark.
- Possums often bite the new buds off fruit trees and the new growth of roses. The peel of lemon or other citrus fruit may be eaten, and vegetables may be bitten or eaten entirely. Possums usually tear the leaves from plants, leaving jagged leaf stumps.

### **How can I prevent possum damage on my property?**

The best way to prevent possum damage is to get rid of the possums! However, there are some other things that you can do to protect your garden and trees.

- Possums nest in holes, crevices in trees and stumps, in roofs, under floors, in dry holes in banks and underneath tree roots, flax and dense vegetation. You can discourage possums from living on your land by eliminating nesting sites. Repair loose weatherboards and block other potential entryways into the roof, basement and sheds. Remove dense vegetation and piles of logs and tree stumps.
- You can protect preferred trees using a metal band that is wrapped around the tree trunk. This will only work, though, if the tree’s canopy is not linked with other trees. Covers or cages can be put around tree seedlings and shrubs to protect them.
- You can spray plants with a repellent to deter possums. Commercial brands such as *Thiroprotect* can be purchased from garden shops. Alternatively, you can make your own mixture using one of the following:
  1. 5 fresh eggs in 600 ml of water and 150 ml of acrylic paint. Stir the mixture well and spray 20 ml per tree.
  2. 10 parts melted mutton fat mixed with 1 part kerosene. Allow the mixture to set and then wipe the tree with lightly greased gloves or a cloth.

*[Insert picture of a metal band or cage over plant]*

## CONTROLLING POSSUMS

### **What method of control should I use?**

If you wish to control possums on your land, you have three general options: hunting, trapping and poisoning.

1. **Hunting:** Hunting possums can be an effective control method in small orchards and stands of trees surrounded by pasture, but it is unlikely to be viable for larger areas. In addition, it is usually significantly more expensive than poisoning and trapping because it is much more labour-intensive. Obviously, hunting is only an option in rural areas, and the law requires that anyone using a firearm must hold a current firearms license.
2. **Trapping:** In urban areas or close to houses, trapping is the best option for possum control, since poisons should not be laid in these areas. (Although many local councils restrict the use of leg-hold traps in cities, kill traps such as the Timms trap may be a good option). Traps may also be effective when possums have developed an aversion to poison baits. If previous poison operations have been conducted in your area, trapping may enable you to kill more possums.
3. **Poisoning:** Using poison baits is generally cheaper than trapping for sustained control operations, because it is less labour-intensive. Unlike traps, most poisons do not need to be checked each day. However, all poisons present certain risks to the user and to other animals such as stock, pets and native species (especially birds). These risks should be considered, and an appropriate poison should be chosen according to which animals could come into contact with the poison. The information in later sections should help you with this decision.

### **Can I combine several control methods?**

Of course, these three methods are not mutually exclusive and many people choose to combine several different methods to increase the number of possums that are killed.

For example,

- Hunting may provide a good compliment to a poison bait or trapping programme in some cases.
- Different control methods can also be used sequentially to avoid bait shyness or trap shyness. It is common to use a trapping programme to lower possum numbers initially and then to maintain that level of control using poison baits. Alternatively, trapping may be used in areas where poisoning has made the possums bait shy.
- Certain poisons such as cyanide and cholecalciferol should not be used together because they may sub-lethally poison animals and thereby increase bait shyness.

## **TRAPPING POSSUMS**

### **What type of trap should I use?**

There are two basic types of possum traps: kill traps and live traps.

#### *Kill traps*

The most popular kill trap is the Timms trap, which are made of a tough polyethylene plastic and weigh about 1.25 kg. The traps are yellow to attract possums, and they are effective and humane as possums are killed almost instantly. Gin or jaw traps are prohibited by by-laws in residential areas throughout New Zealand, and so these types of traps can only be used in rural areas.

Timms traps are mostly used in gardens and around houses to keep a small number of possums from the area. They are effective and unlikely to trap other animals if used correctly. However, Timms traps are bulky and heavy compared to leg-hold traps, so they are generally not appropriate for control over large or remote areas. They are also less effective at trapping possums than leg-hold traps.

#### *Live traps*

Certain live traps, such as cage and box traps, can also be used close to houses and in urban areas, but the user then must be willing to kill the trapped possum. It would be unethical to release the possum in another area where it would damage someone else's property or harm native species.

Most local bodies have by-laws that prevent the use of leg-hold traps in populated areas because of the risks of harming children or pets. On the other hand, leg-hold traps are the most commonly used trap for control operations that will cover remote or large areas. Leg-hold traps are much lighter and smaller than Timms traps and so it is easier to place the traps in the field. Leg-hold traps are also more effective at catching possums than other trapping methods.

The disadvantages of leg-hold traps are that animals other than possums (e.g. pets and flightless birds such as kiwi and weka) may be caught in the traps, they must be checked and re-set every day, and the trapper must kill the captured possums.

The preferred leg-hold trap is the Victor No. 1 unpadded trap. Padded traps can be used to reduce injuries to trapped animals, but padded traps also lead to very high escape rates.

### **How do I use Timms traps?**

#### *Where to place the traps*

Place the Timms traps on level ground near possum dens, trails or favourite food sources. Possums will avoid travelling through wet long grass and thick weeds. You can also place the traps on tree limbs, close to where the limb joins the trunk. Traps can also be placed on ceiling rafters if possums are living under your roof.

Possums do not like heavy rain so there is no need to trap on very wet nights. Nights following wet ones may be good times to set your traps.

Cats and dogs are unlikely to be attracted to the trap if it is baited correctly (see below). However, if you fear that children or pets might interfere with the trap, un-set the trap each morning and re-set it in the evening.

#### *How to set the trap*

To set the Timms trap, turn the trap upside-down and push the bait onto the trigger wire as far as the bend. Place the trap right-side up on the ground and fix the trap to the ground with strong wire or stakes. You may wish to set additional bait about 12 mm in front of the trigger. Push down on the top of the trap with one hand, while you pull the nylon cord with the other hand until the striker bar comes down into the set position.

To make the release action more sensitive, bend the bait rod where it contacts the cross rod (about 50 mm from the tip). Bend it towards the front of the trap to make the release action more sensitive.

To release the trap, bang hard on the sides of the trap, keeping your fingers clear of the trap entrance. Alternatively, hold the nylon cord taut and use a hook (such as a coat hanger) to release the striker bar. Slowly let off the tension on the cord until the striker bar comes back against the stop.

*[Insert picture of how to set Timms trap]*

#### *What baits to use*

Fruits such as apple, citrus and kiwifruit or carrots are the best baits to use. The baits should be cut into 25-mm chunks (into quarters for apples and oranges). If the baits are too small or large, the possum will not set off the trigger. If you do not catch any possums, you should replace the bait every 2-3 days. Try varying the bait from time to time, and use something different from what they usually feed on. For example, if they love your apple tree, try citrus or kiwifruit.

Do **not** bait traps with meat or bread and jam because it may attract cats. If fruit baits are used, it is extremely unlikely that cats or small dogs will be attracted to the traps. Timms traps have been used for a number of years and there have been very few reported cases of cats being caught when the correct baiting procedures were followed.

As an extra precaution, only set the traps during the night and keep pets inside during this time, or sprinkle pepper outside the traps as an extra deterrent. Keep the traps out of reach of children and energetic pets that might turn the traps over.

You may also sprinkle a lure (such as almond or vanilla essence, curry, jelly crystals, cinnamon or aniseed) on the bait to attract possums. Alternatively, mix the lure with 1/4 cup flour and sprinkle this mixture in front of the trap entrance.

Pre-feeding may also help increase the amount of possums that you are able to catch in Timms traps. Place fresh bait in the trap for 1-2 weeks without setting the traps to encourage possums to visit them.

*How to remove and dispose of possums*

To remove a dead possum from the trap, pull the nylon cord until the possum is free and then remove the possum from the trap by the tail. Be sure to keep your fingers clear as you may have re-set the trap. Check for young possums, which may live in the mother's pouch for several months. The most humane method of killing young possums is to crush their skull with a sturdy bar or stick. Alternatively you may take the animal to the SPCA, who will humanely destroy it.

Wrap dead possums in plastic or newspaper and dispose of them with your household rubbish, or bury the dead animal. Always wash your hands thoroughly after handling possums, since they carry parasites and diseases such as giardia.

**How do I use leg-hold traps***Where to place the traps*

Leg-hold traps cannot legally be used in most populated areas. They should also be avoided where stock, pets or children may be caught in the traps. If kiwi or weka are present in the trapping area, the traps should be placed on platforms 70 cm above the ground to ensure that birds are not caught.

Each trap should be placed next to a tree and securely nailed to the tree so that the trap cannot be removed by a struggling possum. The location of each device should be marked clearly with flagging tape or coloured alligator-type clothes pegs so that they can be found later.

Place the leg-hold traps in areas that you know possums visit, such as near food sources, along possum pads, or close to dens. If you are controlling possums over a large area, place traps at evenly-spaced intervals (about 50-100 m) throughout the area.

*How to set the trap*

To set a leg-hold trap, first secure the trap to a tree or log to ensure that the trap cannot be removed. Place the trap about a hand width's distance in front of the tree. Clear the trap site of any vines or saplings that might entangle possums, and do not cover the trap with sticks or rocks. Set the trap so that the trigger plate tension is no less than 500 g to minimise the chance of capturing non-target species such as birds and rats. If kiwi and/or weka are present, you should place the traps 70 cm above ground level to ensure that the birds are not caught.

Possums are nocturnal so set your traps in the evening and check them in the morning. The Animal Welfare Act (1999) requires that leg-hold traps are checked within 12 hours of sunrise on the following day and that any caught animals are destroyed humanely. Possums do not like heavy rain so there is no need to trap on very wet nights, although nights following wet ones may be good times to set traps.

*[Insert picture of how to set leg-hold trap]*

*What baits to use*

To encourage possums to visit the leg-hold traps, smear a mixture of 5 parts flour and 1 part icing sugar on the tree or log that the trap is attached to, making a blaze 10-50 cm above the ground. You may also add a lure such as cinnamon or vanilla essence to this

mixture, but you may need to change the lure that you use regularly if possums begin avoiding it.

Pre-feeding may also help increase the amount of possums that you are able to catch in leg-hold traps. Place fresh bait (fruit or carrots) in the traps for 1-2 weeks without setting the traps to encourage possums to visit them.

*How to remove and dispose of possums*

The most humane method of killing a trapped possum is to crush its skull by hitting it on the head with a hammer or a sturdy bar. It may help to place the animal's head against a hard surface such as a tree root or rock. Check the dead animal for young possums, which may live in the mother's pouch for several months.

Dead possums should be buried or disposed of at least 5 m from the trapping site if you plan to use the trap again. Always wash your hands thoroughly after handling possums, since they carry parasites and diseases such as giardia.

## **POISONING POSSUMS**

### **Should I use bait stations or bait bags?**

All but one of the poisons that are described in this guide should only be used in bait stations or bait bags. (Only cyanide pastes can be placed on stones or wood on the ground.) The major advantages of bait stations and bags are that the bait is sheltered from rain and dew so the baits may last longer and that non-target species such as stock, pets and birds are less likely to eat the baits.

Bait stations are plastic containers filled with 0.5-2 kg of bait. They are usually attached to trees or fence posts and left for some time to allow possums to feed on the bait. The most commonly used bait stations are the Philproof, which holds about 1.5 kg of bait, the Sentry which holds 400 g and the Kilmore which holds 2 kg.

A good bait station:

- Allows possums easy access;
- Protects the bait from wind and rain;
- Is easy to attach to trees or fences; and
- Prevents access by stock, pets, birds, and children.

#### *How to use bait stations*

Bait stations should be nailed to trees or posts with the opening about 25 cm above the ground. In areas where ground birds such as weka and kiwi are present, bait stations should be placed at least 70 cm above the ground on a wooden board, and you should choose stations that spill minimal bait (e.g. the Kilmore).

Bait stations should be placed near den sites, along possum pads or near preferred food sources where possible.

*[Insert picture of possum eating from bait station]*

#### *How to use bait bags*

Bait bags should be stapled to trees about 25 cm above the ground. To attract possums to the bait bags, smear a mixture of 5 parts flour to 1 part icing sugar on the tree trunk above the bag. Every few days, this blaze should be replenished and any missing bags should be replaced.

### **Should I pre-feed before poisoning?**

If you are planning to use poison baits to control possums, you may need to pre-feed for several weeks first. (Note that pre-feeding can also increase catch rates with kill and leg-hold traps as described above in the trapping section). Pre-feeding involves placing a non-toxic bait out to encourage possums to feed on the bait before switching to a toxic bait.

When possums are presented with a new food, they often eat small amounts of the food at first until they get used to it. If the possums eat small amounts of toxic bait, it may

only be enough to make them sick rather than killing them. These animals will develop what is called “bait shyness” and they will be difficult to kill using the poison.

Pre-feeding reduces bait shyness, because possums eat more when the toxic bait is placed out. However, pre-feeding is only appropriate with relatively rapid-acting poisons, such as cyanide and cholecalciferol. It is not necessary with slow-acting poisons such as brodifacoum.

Pre-feeding should generally be undertaken for about 3-14 days before you will begin poisoning. You should use the same baits that you will use to deliver the poison. Check the sections below for specific recommendations on pre-feeding with each poison.

### **What type of poison should I use?**

There are five types of poisons that are available to the public for possum control: brodifacoum, pindone, cyanide pastes, encapsulated cyanide and cholecalciferol. Sodium monofluoroacetate, or 1080 as it is commonly called, is also widely used for possum control, but it is a controlled substance and can only be used by approved operators in government departments.

In choosing which poison bait to use, you should consider the following questions:

- Is a license required to use the poison?
- How effective is the poison at killing possums?
- What types of possum populations is the poison appropriate for (e.g. low or high numbers, those with bait shyness)?
- How expensive is the poison?
- What are the potential risks of the poison to humans?
- What are the risks for stock, pets and native birds?
- Are there other safety or environmental risks to consider?

The table on the next page lists the major advantages and disadvantages of the five types of poison available to the public. Each of these poisons is discussed further in the following section. The risks of each poison to non-target animals and to humans are also discussed in separate sections later in this guide.

Poison (Commercial brands available)	Advantages	Disadvantages
<b>Brodifacoum</b> ( <b>Talon®</b> , <b>Pestoff®</b> )	<ul style="list-style-type: none"> <li>• Generally available to the public. No license is required.</li> <li>• Effective against possums that have developed bait shyness or when possum numbers are very low.</li> </ul>	<ul style="list-style-type: none"> <li>• High risk of secondary poisoning of non-target species.</li> <li>• Persistent in the food chain and high risk of wildlife and game contamination.</li> <li>• Possums take 2-4 weeks to die.</li> <li>• Expensive with high possum numbers.</li> </ul>
<b>Pindone</b>	<ul style="list-style-type: none"> <li>• Generally available to the public. No license is required.</li> <li>• Effective against possums that have developed bait shyness or when possum numbers are very low.</li> <li>• Less persistent in the environment than brodifacoum.</li> </ul>	<ul style="list-style-type: none"> <li>• High risk of secondary poisoning of non-target species.</li> <li>• Possums must eat very large amounts of bait to be killed and so it is less effective than other poisons.</li> </ul>
<b>Cyanide paste baits</b>	<ul style="list-style-type: none"> <li>• The cheapest bait option available.</li> <li>• The most humane poison as it kills possums rapidly.</li> <li>• Low secondary poisoning risk.</li> <li>• Low environmental persistence.</li> </ul>	<ul style="list-style-type: none"> <li>• Use is limited to licensed operators.</li> <li>• Possums develop bait shyness which leads to decreased catches.</li> <li>• Risk of poisoning ground birds such as kiwi and weka.</li> </ul>
<b>Encapsulated cyanide (Feratox®)</b>	<ul style="list-style-type: none"> <li>• Similar advantages to cyanide paste (above) but avoids bait shyness that can develop with paste.</li> <li>• Safer to use than cyanide paste.</li> <li>• Low hazard to non-target species.</li> </ul>	<ul style="list-style-type: none"> <li>• Use is limited to licensed cyanide operators.</li> <li>• May persist in the environment for 2-3 months.</li> </ul>
<b>Cholecalciferol (Campaign®, FeraCol®)</b>	<ul style="list-style-type: none"> <li>• Generally available and no license is required.</li> <li>• Low toxicity to birds.</li> <li>• Low risk of secondary poisoning.</li> <li>• Poison does not persist in the soil or water.</li> </ul>	<ul style="list-style-type: none"> <li>• More expensive than other methods, although prefeeding can make it cost-effective.</li> <li>• Its persistence in the environment is still under research.</li> </ul>

## USING POISONS FOR POSSUM CONTROL

### **What is brodifacoum?**

Brodifacoum is an anticoagulant, which means that it reduces the blood's clotting ability and thereby causes internal haemorrhaging. The two commercially available baits that contain brodifacoum are Talon® and Pestoff®. Talon® is a cereal-based bait that uses cinnamon as a lure. Pestoff® is coated with wax, which decreases its uptake of moisture and prolongs its lifespan.

#### *The risks of using brodifacoum*

You do not need a license to use brodifacoum, and the baits are easy and safe to handle. However, the law requires that these baits are only used in bait stations to reduce the risks to non-target species. Both birds and mammals are at risk of primary and secondary poisoning from brodifacoum.

In particular, there are increasing concerns about the persistence of brodifacoum in the food chain because it accumulates in the livers of mammals. For this reason, brodifacoum should not be used in areas where wild pigs are hunted, because the poison could be passed to humans. Stock and pets should be kept out of the area until the bait stations are removed. Dogs are particularly sensitive and even small amounts of the poison can be lethal.

#### *How to use brodifacoum*

Brodifacoum baits are expensive when possum numbers are high, so an alternative control method should be used first if there are lots of possums in the area. After the initial control, wait 3 or more months before using brodifacoum.

Pre-feeding is not necessary with brodifacoum, because the possum will not react to the poison for some time (10-20 days) after ingesting the poison. This means that they will not associate feeling unwell with the poison and therefore learn to avoid the bait.

Possums often require two or three feeds to die and they will continue eating bait until they receive a lethal dose (60 grams, or one small cup). To avoid wasting bait, a "pulse baiting" strategy is recommended:

1. Keep bait stations filled for 3-4 days. Use as many stations as possible so that possums have an opportunity to eat sufficient bait.
2. Reload the bait stations every 14 days until possums stop removing bait. This 14-day cycle enables possums that have ingested a lethal dose to die so that they do not consume excess bait.

When you are finished poisoning, any unused bait should be removed from the bait stations as well as from surrounding areas where baits may have been dropped.

### **What is pindone?**

Pindone is a first-generation anticoagulant, and it is less potent than second-generation anticoagulants like brodifacoum. Pindone is used occasionally to control possums, but its low toxicity means that possums need to eat large amounts (1-2 kg) of the bait to receive a lethal dose and so it is not a very cost-effective poison. Pindone may be most

useful when possums have developed bait shyness or after an initial control operation has reduced possums to low numbers.

Pindone is less persistent than brodifacoum in the food chain, but it still causes significant secondary poisoning of birds and mammals. It should only be used in bait stations and all poison should be removed at the end of the operation.

### **What is cyanide?**

Cyanide is an asphyxiant, which means that it causes a rapid decrease in oxygen and a rapid increase in carbon dioxide. It begins working within seconds and the animal usually dies within minutes. Cyanide can be applied as either a paste or in an encapsulated form called Feratox®.

Cyanide is highly toxic and should be handled with extreme caution and only by people with a cyanide license. Primary poisoning (eating cyanide baits) may pose a risk to non-target animals and to humans, but secondary poisoning (eating animals poisoned by cyanide) is not a problem because cyanide rapidly detoxifies. Cyanide is not mutagenic or carcinogenic and it does not accumulate in the soil or food chain.

#### *Restrictions on using cyanide*

The main drawback to cyanide is that **only approved operators can use the poison**. If you wish to obtain a cyanide license, you will need to contact your local MAF office. The pest management officer of the local regional council must also be notified, and the land must be conspicuously marked with signs that state the name of the person laying the poison, the name of the poison and the dates that it will be laid. The signs must be placed at every location where people normally gain access to the area.

Cyanide cannot be laid in the following places without prior consent of the appropriate authority and the medical officer of health:

- on or within 60 metres of a public road or place to which the public are entitled to have access
- inside or within 100 metres of any community, town or city boundary
- any catchment area from which water is drawn for human consumption

Empty containers must be slashed or burnt and the residue buried at least 60 cm deep.

#### *How to use cyanide paste*

Pre-feeding is important when using cyanide paste baits because possums that have been exposed to cyanide can quickly develop bait shyness. (You may also prevent the development of bait shyness by using only fresh cyanide and by always burying any remaining baits at the end of the treatment.)

To pre-feed with cyanide pastes, place a mixture of flour, icing sugar and lure at intervals of 3-5 metres for 2 nights before the poisoning. You then need to place the cyanide paste baits only where possums have interfered with the pre-feed mixture.

Cyanide paste can be bought in 500-g tubes, or you can make the paste by mixing an oil-based lure with flour or icing sugar. (Spices such as curry, cloves or cinnamon can also be used as lures.) Massage the tube of cyanide well before using it to mix the oil

into the paste. To open the tube, remove the screw cap and cut the nozzle off with a sharp knife. Ensure that the hole is not too small, or otherwise excess pressure may cause the tube to burst.

Cyanide paste baits should be laid at ground level on possum trails or near preferred feeding areas. The baits should be placed on a stone, a piece of wood, or in a small bait station (the flower pot, Romark or KK stations are the best options for cyanide). The bait should be kept away from ground moisture, because wet baits can release an acidic gas that deters possums.

After 2 nights, cyanide paste baits should be destroyed by overturning the stone or wood and forcing the bait into the ground. Neglecting to remove all of the baits may increase bait shyness and also endanger non-target animals including pets, wildlife, stock and humans.

#### *How to use Feratox®*

The major disadvantage of cyanide paste baits is that they emit an acid gas that causes possums to develop bait shyness. Feratox® eliminates this gas emission because the bait is sealed within a capsule. This also makes Feratox® safer to use, although users must still have a cyanide license and exercise caution when using the baits.

As with cyanide pastes, you should pre-feed when using Feratox® to avoid bait shyness. The manufacturer of Feratox® (Feral Control Ltd) has developed two baits for pre-feeding: a cereal pellet called Ferafeed® and a peanut-based paste. The pre-feed baits can be placed in either bait stations or in bait bags, which prevent interference by rats and non-target species and protect the bait from wet weather.

Place about 200 g of the pre-feed pellets or paste in bait stations about 1 week before you will begin poisoning. If you use bait bags instead, they should contain 40 g of paste.

After pre-feeding, 7 Feratox® pellets should be mixed with about 70 g of pre-feed bait in the bait stations. If using bait bags, place a single capsule in 40 g of paste in each bag.

Check the stations or bags every few days, replenish the bait and dispose of any dead possums near the traps. Once the treatment is finished, all baits should be removed and the poison buried.

#### **What is cholecalciferol?**

Cholecalciferol is vitamin D<sub>3</sub>, and it poisons animals by raising calcium levels in their blood and causing a heart attack within 2-6 days. Possums and rodents have a low tolerance to calcium, which makes them particularly sensitive to cholecalciferol. The two commercially available cholecalciferol products are Campaign®, which are cereal pellets, and FeraCol®, which is a paste. Campaign® has been shown to successfully control possums, but the effectiveness of FeraCol® has not yet been tested in the field. For this reason, we only describe how to use Campaign® baits in this guide.

Campaign® is available for use by the general public and its key advantage is the low risk of primary poisoning for dogs, humans, birds and other non-target animals. There is also little chance of secondary poisoning as cholecalciferol is not persistent in the

environment. It can be more expensive than other poisons, but pre-feeding may significantly reduce the costs and make it cost-effective for controlling even high density possum populations. Its high toxicity prevents possums from consuming excess bait since the animals die within 3-5 days.

*How to use Campaign®*

Pre-feeding should be done twice during the two weeks before putting out the poison bait. After pre-feeding, place 100 g of Campaign® pellets (or 200 g in areas with high possum numbers) in each bait station. Inspect the stations every few days and replenish the bait until no more is taken.

## **AVOIDING NON-TARGET SPECIES**

No matter which control method you decide to use against possums, you will need to take precautions to avoid harming or killing other animals including pets, livestock and native birds. This section reviews the steps that you must take to ensure that the effects of your control on non-target species are minimised. The risks of control methods to humans are covered in a separate section.

### **How can I avoid trapping non-target species?**

There are 23 native bird species and five introduced bird species that have been caught in leg-hold traps in New Zealand. The most commonly caught birds are blackbirds and song thrushes, which feed on the ground, but weka and kiwi may also be caught. In areas where these birds are present, traps must be raised at least 70 cm above the ground.

Stock are unlikely to get caught in leg-hold traps, but dogs and cats should be kept out of areas where traps are set. Do not bait traps with items such as meat or bread and jam that could be attractive to pets.

### **How can I avoid poisoning non-target species?**

There are two ways that poison baits may kill animals. *Primary poisoning* may occur if the non-target animals eat the actual baits. Birds and mammals may also be killed through *secondary poisoning* if they scavenge on possums or rats killed by the poison.

To avoid primary poisoning, all poison baits should be treated in the following ways. The baits should:

- Contain a green dye so that they are unattractive to birds;
- Contain cinnamon oil as a repellent to some birds and invertebrates;
- Be placed in bait stations (except for cyanide paste), which should be raised in habitats with ground-dwelling birds such as kiwi, weka and robins; and
- Be removed immediately after control.

#### *Brodifacoum*

Brodifacoum baits are palatable to a range of other animals, including rats, mice, pets, stock and 33 native bird species. Brodifacoum should always be used in bait stations and stock must be excluded from the poisoned area, because the stock may rub against the bait stations and dislodge some bait.

If you suspect livestock or pets have consumed bait, immediately take the animal to a veterinary surgeon, who may administer an antidote (Vitamin K<sub>1</sub>). Symptoms of poisoning include: difficulty moving, pale gums and bleeding from the nose, mouth, ears or anus.

Brodifacoum also poses the highest risks of secondary poisoning of any of the poisons described in this guide. Birds such as owls and other raptors, cats and dogs, mustelids, deer, wild pigs and stock may all be poisoned by scavenging on possum and rodent

carcasses. Brodifacoum will persist in mammal livers for at least 9 months, so the risk of secondary poisoning is high, even for humans. For this reason, brodifacoum should only be used in bait stations and only for controlling low-density or bait-shy possum populations.

#### *Cyanide*

Birds are at less risk from cyanide than from traps or other poisons such as 1080, but cyanide paste baits may still pose some risk to kiwi and weka. The paste baits must be laid off the ground in areas where kiwi and weka are present.

No formal study has examined the risks of Feratox® to non-target species, but there is no evidence so far of birds being killed. Anecdotal reports suggest that Feratox® may kill hedgehogs, cats and stoats. Reports have been made of cyanide baits killing sheep, cattle and dogs, so stock and pets should be kept out of the poisoned area. Feratox® should only be used in bait stations or bait bags.

Cyanide does not build up in animal tissues and so the risks of secondary poisoning are very low. Nevertheless, paste baits should be destroyed after 2 nights and Feratox® pellets should be removed after completion of the poisoning.

#### *Cholecalciferol*

Cholecalciferol has a very low toxicity to birds and so the risks to native species are much lower than for other poisons. However, it may be toxic to pets and stock if eaten in large enough amounts, so always place the bait in bait stations.

Cholecalciferol is not stored at high concentrations in animal tissue and so animals are at little risk of secondary poisoning. Dogs and cats must feed on possum carcasses for some days to be poisoned, and so the risk is low compared to poisons such as 1080.

## **SAFETY ASPECTS OF USING POISONS**

When using any of the poisons described in this guide, you should follow the product instructions carefully and take the following precautions:

- Do not eat, drink or smoke while applying baits.
- Wear rubber or PVC gloves when loading bait stations or bags.
- Remove protective clothing and wash it daily after work. Wash your hands and exposed skin after handling baits or possums.
- Learn the symptoms of poisoning from the substance that you are using.
- Avoid the inhalation of bait dust by wearing a mask if appropriate.
- Avoid contamination of water supplies with baits or empty containers.
- Burn or bury the empty bait containers.
- Keep unused baits in their original pack, tightly closed and locked in a cupboard away from foodstuffs and out of reach of children.
- Once you have finished poisoning, collect and dispose of all unused bait.

### **What safety aspects should I know about brodifacoum?**

Brodifacoum is dangerous to humans if eaten or if the dust is inhaled. Avoid inhaling dust by wearing a face mask. Symptoms of brodifacoum poisoning include:

- blood in the urine, stools or sputum;
- bleeding from the nose, ears or anus;
- pale gums;
- widespread bruising; and
- difficulty in moving.

Seek medical help immediately if this poison is consumed. If it is swallowed, give the patient a glass or two of water and induce vomiting by giving them Ipecac syrup or putting your finger down their throat. Repeat until the vomit appears clear. Do not induce vomiting if the patient is unconscious or convulsing.

Humans could also be exposed by eating the meat (especially livers) of animals that have either eaten brodifacoum or that have eaten the carcasses of other poisoned animals (e.g. wild pigs that have fed on possum carcasses). Brodifacoum should not be used in areas where hunters might harvest wild pigs. Stock that has been exposed to the poison must be withheld from stock houses to avoid human consumption of contaminated meat.

Long-term exposure to brodifacoum may lead to the development of osteoporosis. Repeated exposure to a related anticoagulant (warfarin) has been linked to developmental malformations in pregnant women.

### **What safety aspects should I know about cyanide?**

Cyanide is very hazardous because it releases an acidic gas when exposed to air. Eating cyanide or inhaling the gas can lead to poisoning within seconds. Cyanide may also pose a health risk if the bait gets onto footwear. Avoid inhaling cyanide fumes by

working in a well-ventilated area and by not breathing in fumes while opening tubes and laying baits.

Signs of cyanide poisoning include:

- hyperventilation,
- headache,
- nausea,
- vomiting, and
- generalised weakness.

Long-term exposure to cyanide could lead to neurological effects (e.g. Parkinson's diseases).

Cyanide operators are required by law to place signs in the poisoned area that state the name of the operator, the name of the poison and the date the baits were placed out.

Feratox® is safer to use than cyanide pastes, because the poison is enclosed in a capsule and so there is no risk of inhaling the chemical while the capsules are unbroken.

### **What safety aspects should I know about cholecalciferol?**

No known accidental deaths have occurred from cholecalciferol poisoning. Long-term exposure may cause:

- calcification in the arteries leading to atherosclerosis;
- calcium being moved from the skeleton into soft tissues, which can lead to fatigue, weight loss, headache, paraesthesia, depression, albuminuria and naematuria; and
- foetal abnormalities, abortions and fertility problems when exposed to very high doses.

Cholecalciferol is unlikely to cause secondary poisoning. However, using a precautionary approach, it is not recommended that humans eat game from areas where baits have been used for several weeks after the poison is removed.

### **Do these poisons persist in the environment?**

- *Brodifacoum* is insoluble and so unlikely to contaminate streams or groundwater. It is persistent in soils, which can be minimised by always using bait stations.
- *Cyanide* paste is rapidly degraded by moisture and so is unlikely to persist for long in the environment.
- *Feratox*® may persist in the environment for 2-3 months, but it is unlikely to contaminate waterways if it is used in bait stations.
- *Cholecalciferol* will not easily enter surface water because of its low solubility. Restricting it to bait stations also minimises its spread into waterways. No published information is available for its persistence in soils, although its chemical characteristics suggest that only minimal leaching is likely.

## LEGAL REQUIREMENTS AND RESTRICTIONS

There are three key legal restrictions to consider when planning possum control on private land:

- Certain traps and poisons can only be used in some areas. You should be aware of local by-laws that might restrict the options available to you for controlling possums on your property. For example, in most urban areas poisons and leg-hold traps are not permitted. In areas with ground-dwelling birds such as kiwi and weka, precautions should be taken such as raising traps or bait stations above the ground.
- If you are trapping, you should be familiar with the restrictions of the Animal Welfare Act (1999). It requires that all live traps be inspected within 12 hours of sunrise each day they remain set. (Kill traps do not need to be inspected daily.) Trapped possums must be removed and killed as soon as possible and in a way that minimises pain and suffering.
- If you wish to use cyanide, *you must obtain a cyanide license*. All of the other poisons listed in this guide are available for use by the general public. All cyanide users should review the Pesticides (Vertebrate Pest Control) Regulations (1983), which gives the following stipulations for using cyanide.
  1. Operators must have a license to use cyanide.
  2. Operators should keep cyanide in labelled containers with serial numbers. Containers must be closed and stored securely in a locked cupboard.
  3. Cyanide must be used according to the approved label and instructions provided.
  4. Notices must be placed at all locations that the public have access to the poisoned area. The signs must remain until all baits have been destroyed.
  5. Livestock must not have access to the bait.
  6. Empty cyanide containers should be disposed of immediately by burning, burial or return.
  7. The Regional Council should be notified of the proposed poison operation.
  8. Cyanide cannot be laid in the following places without prior consent of the appropriate authority and the medical officer of health:
    - on or within 60 metres of a public road or place to which the public are entitled to have access;
    - inside or within 100 metres of any community, town or city boundary; and
    - in any catchment area from which water is drawn for human consumption.

## **BUYING POSSUM CONTROL EQUIPMENT**

Pest Management Services carry most possum baits including Campaign®, Feratox®, Pindone and Talon, as well as a range of possum traps, bait stations, lures and night shooting equipment. For a price list or more information, contact:

**Pest Management Services**

Phone: 0800 1114 NO PESTS

(0 800 111 411 1466)

E-mail: [nopests@man.quik.co.nz](mailto:nopests@man.quik.co.nz)

Feral Control Ltd. are the manufacturers of Feratox®, Ferafeed® and Feracol®. Their products can be obtained by contacting:

**Feral Control Ltd.**

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