



# C7

## **BRODIFACOUM:** ITS USE FOR POSSUM AND RODENT CONTROL IN FORESTS AND FARMLAND

# THE PEST ANIMAL PROBLEM IN NEW ZEALAND

The pest animal problem in New Zealand is enormous. Pest animals threaten our farming economy and our native flora and fauna. Effective pest control programmes are therefore essential.

Brodifacoum is one of the toxins used to control possums and rats. Possums are the main source of bovine tuberculosis (Tb) in cattle and deer herds. This is a major threat to our economy because, if New Zealand's Tb status does not meet overseas market requirements, we could be prevented from exporting our beef, venison and dairy products. Rats and possums prey on native animals and eat the fruit, seeds and leaves of native plants, causing immense damage to our ecosystems and threatening the survival of endangered species.

Brodifacoum is particularly suited to certain situations but it needs to be used and managed with care to avoid residues, which could jeopardise meat exports (see page 8) and be a secondary poisoning hazard.



A ship's rat eats chicks taken from a fantail's nest.  
Photo: David Mudge



Possum eating berries: as well as damaging native flora and fauna, possums are carriers of Tb.  
Photo: Rod Morris

# ABOUT BRODIFACOUM

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## What is brodifacoum?

Brodifacoum (pronounced bro-die-far-koom) is a slow-acting poison used mainly for rat and possum control. It was first used for possum control in New Zealand in 1992.

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## How does brodifacoum kill animals?

Brodifacoum is an anti-coagulant chemical. If ingested by animals, including humans, it inhibits blood clotting, causing death from internal bleeding.

Typical symptoms include:

- bleeding gums and excessive bleeding from minor cuts
- lethargy and/or laboured breathing
- increased tendency to bruising
- blood in urine and faeces.

Signs of poisoning can occur within three days after a lethal dose is ingested, but may take several days to become evident. Time to death varies between species: rodents will usually die within 4-8 days of their first feed of bait, whereas possums can take 10-20 days to die.

## Who uses it and why?

Brodifacoum is used by pest control professionals, farmers, community groups and landowners. It is particularly suited to controlling low to medium density possum populations as it does not induce bait shyness. (i.e. when a pest animal stops eating a bait because it associates the taste with the symptoms caused). Where a quick knockdown of high possum populations is required, then an acute poison such as 1080, cyanide or cholecalciferol should be used.

### **Do I need a license to use brodifacoum?**

You do not need a license to purchase or use brodifacoum.

However, you will need to meet requirements for its use, storage and disposal, as well as signage. (For guidance go to [www.epa.govt.nz](http://www.epa.govt.nz) and search for vertebrate pest control.)

### **What does brodifacoum look like?**

Most brodifacoum used in forest areas comes in pellets made from cereal and containing 0.002% toxin. The pellets are coloured green or blue and must be used in bait stations. They can be wax-coated to better protect them from weather when in the field.

When rodents particularly are targeted for control, purpose-designed brodifacoum bait blocks and bait stations, in a range of shapes and sizes, may be used.

### **WHAT IS A BAIT STATION?**

A rigid, reusable device or container designed or adapted to physically contain baits in such a way as to allow unrestricted access by target pests while preventing or minimising spillage of bait and access by non-target species. Also to protect baits from the elements and extend their usable life.

Source: Ministry of Agriculture and Forestry.



Brodifacoum pellets.



The pellets should be seen in the field only when contained in bait stations

# THE RISKS FROM USING BRODIFACOUM

## What are the risks to humans?

The risk to people is extremely low as a large amount has to be eaten to fall ill. A lethal dose for humans is estimated to be about 15 mg of pure brodifacoum per kg of body weight. This equates to approximately 5 kg of bait for a toddler (ten bait stations' worth) and about 50 kg of bait for a 70 kg adult.

It is estimated that a 70 kg adult would have to consume at least 50 2-gram baits before effects on blood coagulation would be measurable.

Nevertheless, residues from repeated ingestion of even small amounts of brodifacoum can adversely affect human health. Measures must, therefore, be taken to minimise human exposure.

## What are the risks to non-target animals?

Non-target animals, such as native birds, livestock, domestic pets and feral animals are at low risk of being lethally or sub-lethally poisoned by eating baits directly (i.e. from primary poisoning.)

Brodifacoum is required to be used responsibly and only in fit-for-purpose bait stations, to minimise the risk. Only the Department of Conservation can use it aerially or on the ground on offshore islands or in 'mainland islands', subject to a strict code of practice.

Research has shown that anticoagulant toxins persist in the liver for many months, if not years. This means there is potential for secondary exposure through:

- scavenging the carcass of an animal killed by brodifacoum, or
- consuming meat or dairy products derived from livestock or from feral animals that have been exposed to brodifacoum and in which residues are present.

This risk is minimised through responsible use and notification protocols.

Brodifacoum is a potential risk to dogs as they could suffer brodifacoum poisoning if they:

- eat the bait directly from bait stations (more than 250 g);
- scavenge several possum carcasses containing brodifacoum.

## What are the risks to the environment?

Brodifacoum has very low solubility in water and binds strongly to soils. This makes it almost immobile and unlikely to leach into water courses or get into water supplies. It is biodegradable but degrades slowly over weeks to months, depending on the soil type, temperature and presence of micro-organisms that help to break it down. Plants are unlikely to absorb brodifacoum, due to its low water solubility.

Although residues can accumulate in the liver tissue of living animals, brodifacoum is used at very low levels in bait. In recent years, less than four kilograms of pure brodifacoum was used per year for possum control across the whole of New Zealand.

**TABLE 1**

Table 1 shows how much brodifacoum would be required for an oral dose that would be lethal to 50% of a population (LD50) of the species listed, based on the standard 0.002% ratio of toxin in brodifacoum bait.

SPECIES	Body weight (kg)	Estimated mg of brodifacoum per kg body weight for LD50 toxicity	References	Amount of brodifacoum for toxicity (mg)	Amount of brodifacoum bait required (g)	Number of bait stations (500 g each) for LD50	Number of brodifacoum pellets (average 2g each) for LD50
PUKEKO	0.85	0.95	A	0.81	40.4	<1	20
MALLARD DUCK	1.1	0.26	B	0.29	14.3	<1	8
PIG	40	0.50	C	20	1,000	2	500
CAT	3	25.00	A	75	3,750	7.5	1,875
DOG	10	3.50	A	35	1,750	3.5	875
SHEEP	50	11.00	D	550	27,500	55	13,750
DEER	80	est 11.00 *		880	44,000	88	22,000
CATTLE	320	est 11.00 *		3,520	176,000	352	88,000
HORSE	400	0.125 **	E	50	2,500	5	1,250

\* LD50 for deer and cattle is unknown. The estimate is based on sheep LD50 as all three species are ruminants.

\*\* Not an LD50 estimate, but an oral exposure that produced symptoms requiring Vitamin K treatment in horses.

### References:

- A. Godfrey, M.E.R. (1985). Non-target and secondary poisoning hazards of 'second generation' anticoagulants. *Acta Zoologica Fennica* 173: 209-212.
- B. United States Environmental Protection Agency (1998) Re-registration Eligibility Decision (RED) Rodenticide Cluster. EPA738-R-98-007, United States Environmental Protection Agency. Prevention, Pesticides and Toxic Substances (7508W).
- C. O'Brien, P. H. and Lukins, B. (1990). Comparative dose-response relationships and acceptability of warfarin, brodifacoum and phosphorus to feral pigs. *Australian wildlife research* 17, 101-112.
- D. Godfrey, M. E. R., Laas, F. J., and Rammell, C. G. (1985). The acute toxicity of brodifacoum to sheep. *New Zealand Journal of Experimental Agriculture* 13: 23-25.
- E. Boermans, H. J., I. Johnstone, W. D. Black, and M. Murphy. (1991). Clinical signs, laboratory changes and toxicokinetics of brodifacoum in the horse. *Canadian Journal of Veterinary Research* 55:21-27.

# HOW CAN WE KEEP OURSELVES AND NON-TARGET ANIMALS SAFE?

As with all types of toxic bait, brodifacoum baits are potentially dangerous, and should be handled and dispensed with care.

## Use brodifacoum responsibly

Users must:

- always transport and store it in approved packaging where it cannot be accessed by children, unauthorised people, livestock or pets;
- always read the information on the product label about precautions, emergency management, directions for use, residue warnings and legal obligations – and follow the specified conditions of use;
- always use fit-for-purpose bait stations (see definition on page 4). Remember that brodifacoum must be used in bait stations and must be used in such a way to prevent access by non-target animals and livestock;
- always erect poison signs at all access points to the area where the poison is being used, and around the perimeter. The signs must remain in place for a minimum of 12 months after baiting has ceased;
- collect and bury as many carcasses as possible to prevent scavenging by non-target animals. (Remember: even if you are targeting possums, rodents may be a by-kill.)

For detailed guidance on best practice use of brodifacoum go to NPCA publications section at [www.npca.org.nz](http://www.npca.org.nz):

- A13: *Responsible use of Bait Stations: an Operators Guide*
- A3: *Private Landowner's Guide to Possum Control: Control Tools and Techniques*
- B2: *Vertebrate Toxic Agents: Minimum Requirements for Safe Use and Handling.*



Brodifacoum should be kept in the manufacturers' packaging (left) until dispensed in a bait station and bait stations should be positioned out of reach of stock and wild game (right).]





## **Prevent food contamination**

### **Farm animals**

Should any user or landowner suspect that livestock has had access to any quantity of brodifacoum he/she should:

- isolate the suspected at-risk stock, and
- inform the Ministry of Agriculture and Forestry (MAF) – **PHONE 0800 693 721**.

MAF will advise on the steps to be taken.

Livestock exposed to brodifacoum should not be sent to slaughter or sold.

- It is an offence under the Animal Products Regulations to send animals for slaughter that contain any detectable poison residue.
- If it is decided to send contaminated livestock to the meatworks, the MAF veterinarian at the processing plant must be contacted before freighting the animals.
- If deaths occur in the livestock, and there is evidence that brodifacoum was a causative factor, any animals that may have had access to brodifacoum toxin and that are slaughtered for consumption, should be tested to ensure maximum residue limits are not exceeded.

If dairy cattle may have been exposed to brodifacoum:

- immediately notify the dairy supply company.

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**Detection of brodifacoum in meat could jeopardise New Zealand's meat export trade.**

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## Wild game animals

### Commercial hunters

Wild animals cannot be hunted commercially for consumption in areas where poisons have been laid (including in the buffer zones) until the specified caution period has elapsed. The buffer zones for brodifacoum are:

- within 5 km of the poisoning area for pigs, and
- within 2 km of the poisoning area for other large species such as deer.

To supply regulated meat (commercial hunting), you must be certified and must work under an approved Operations Manual. (See <http://foodsafety.govt.nz/elibrary/industry/administrative-manual-supplier-amdt-3/index.htm> to find out more.) A certified supplier:

- cannot supply carcasses taken from a brodifacoum operational area (including the buffer zone) within 3 years of the poisoning terminating;
- must provide appropriate statements when supplying carcasses about the poison status of the land from which the animals have been taken.

### RECREATIONAL HUNTERS

The same buffer zones and caution periods are recommended to recreational hunters. Guidance is available at:

[www.foodsmart.govt.nz/whats-in-our-food/chemicals-nutrients-additives-toxins/poison-residues](http://www.foodsmart.govt.nz/whats-in-our-food/chemicals-nutrients-additives-toxins/poison-residues)

[www.foodsmart.govt.nz/food-safety/hunting-collecting-fishing/hunters](http://www.foodsmart.govt.nz/food-safety/hunting-collecting-fishing/hunters)



### **Keep people safe where brodifacoum is being used**

- Obey all warning signs
- Do not touch any bait stations or baits
- Warn children of the danger
- Keep children under supervision and, if possible, away from the area.

### **Keep pets safe where brodifacoum is being used**

Keep pets away from the area where brodifacoum is being used if possible.

- Keep dogs under strict control and prevent them from scavenging dead animals.
- Cats are not normally attracted to the pellets.
- Keep free-range poultry housed if brodifacoum is being used near their usual run.

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**Do not rely on the treatment. Prevention is the only sure way of protecting animals and pets from poisoning.**

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### **IF YOU SUSPECT POISONING**

If you suspect a person has ingested brodifacoum, contact a medical practitioner. Blood coagulation levels can be monitored and, if found to be reduced, can be successfully treated with Vitamin K1.

If your dog eats brodifacoum bait or a poisoned carcass, induce vomiting with washing soda crystals. If an animal or pet displays the symptoms of poisoning described on page 3,

take it to the nearest veterinary clinic for treatment with Vitamin K1, an effective antidote. This may need to be administered for several weeks.

Post-mortem examination and analysis of tissue samples for residues can clarify whether or not brodifacoum was the cause of an animal's death. This autopsy should be carried out as soon as possible by a registered veterinary specialist.

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**Obey all warning signs and do not touch bait stations or brodifacoum pellets.**

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# NOTES

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# IN AN EMERGENCY, CONTACT THE NATIONAL POISONS CENTRE 0800 POISONS (0800 764 766)

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If you are concerned about the use of brodifacoum in your area, whether by professional pest control operators or others, contact either:

- The pest control operator, whose contact phone number should be on the warning signs, or
- Environmental Protection Authority (EPA) hazardous substances compliance line at 0800 376 234 or email [hsinfo@epa.govt.nz](mailto:hsinfo@epa.govt.nz).

**Local Government  
New Zealand**  
*te pūtahi matakokiri*



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