

What are rodenticides?

Rodenticides are poisons that are manufactured into bait and used to control rodents, such as rats and mice. There are several types of rodenticides approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA), including anticoagulant rodenticides and the non-anticoagulant rodenticides zinc phosphide, cholecalciferol, bromethalin and strychnine.

Rodenticide products currently registered by the APVMA have varied uses approved based on the type of poison (i.e. active constituent) they contain and the specific risks these poisons present to humans and other non-target organisms. These uses may include in and around domestic, commercial, industrial and agricultural buildings and/or in crops. Label directions for rodenticide products can be accessed on our [PubCRIS database](#), and include restraints to control how the products are used and mitigate the risks.

What is an anticoagulant rodenticide?

Anticoagulant rodenticides are a class of poisons used to kill rodents. In simple terms, anticoagulant rodenticides work by preventing blood from clotting, which results in death in rodents from internal or external bleeding typically 5 to 10 days after a lethal dose has been consumed.

Anticoagulant rodenticide baits are formulated in various ways, including blocks, pellets and treated grains, gels, powders and pastes, and are classified into 2 groups: first-generation and second-generation.

First-generation anticoagulant rodenticides

First-generation anticoagulant rodenticides (FGARs) are referred to as 'multi-dose anticoagulants', meaning that rodents must consume these baits for several consecutive feedings to consume a lethal dose. FGARs break down in rodents

quicker than second-generation anticoagulant rodenticides, so there is less chance of secondary poisoning occurring in non-target animals if they eat rodents poisoned with an FGAR.

There are 3 FGAR active constituents currently registered for use in Australia: warfarin, coumatetralyl and diphacinone. These FGARs are currently approved by the APVMA for use in and around domestic, commercial, industrial and agricultural buildings. Coumatetralyl is approved for use in crops, but only for use in covered bait stations as part of a comprehensive rodent control program.

Second-generation anticoagulant rodenticides

Second-generation anticoagulant rodenticides (SGARs) are referred to as ‘single-dose anticoagulants’. A lethal dose can be ingested in a single feeding, making SGARs substantially more potent than FGARs. SGARs are slower to break down than FGARs and pose a higher risk of secondary poisoning to non-target animals.

There are 5 SGAR active constituents currently registered for use in Australia: brodifacoum, bromadiolone, difethialone, difenacoum and flocoumafen.

These SGARs have been approved by the APVMA for use in and around domestic, commercial, industrial and agricultural buildings. SGARs are not approved for use in crops, in the open, or in other areas accessible to non-target animals or children.

The APVMA’s review of anticoagulant rodenticides

The APVMA has commenced a reconsideration of anticoagulant rodenticide approvals and registrations in accordance with Part 2, Division 4 of the Agvet Code, to reassess the potential risks associated with the use of these products and consider whether labels carry adequate instructions to protect the health and safety of people, animals, and the environment.

What is zinc phosphide?

Zinc phosphide is an inactive form of nerve toxin used in rodenticide baits. When it is eaten by a rodent it reacts with stomach acids and releases phosphine gas. The rodent then becomes sluggish and loses interest in food, which progresses to the rodent going into a coma and then dying, which typically happens quickly after consuming a fatal dose.

The phosphine gas in zinc phosphide baits can be released when the bait becomes wet. As a result, the use of products containing zinc phosphide is not approved by the APVMA for use in enclosed environments such as small buildings or houses.

If a zinc phosphide bait becomes wet in an outdoor environment, the phosphine gas will disperse quickly as the fresh air works to prevent a hazardous build-up of the toxic gas. Zinc phosphide products are currently approved by the APVMA for use outside of buildings (such as sheds, factories and food production facilities) and for use within crops, with controls in place to prevent the consumption of baits by non-target species. These include not applying the bait:

- in a trail
- to the outer 50 metres of a crop
- until mouse numbers are high enough to rapidly eat the bait.

A condition of using zinc phosphide baits outside of buildings and within crops is to conduct monitoring during a 'pre-baiting period'. If non-target species are observed feeding in the area during this period then zinc phosphide baits should not be used. In addition, if vulnerable, threatened, endangered or critically endangered species are known to occur or feed in the area then the baits should not be used.

What is the difference between zinc phosphide and anticoagulant rodenticides?

A key difference between zinc phosphide and anticoagulant rodenticides is how long the chemical remains in the rodent's body after death, and how quickly the rodent dies after eating bait formulated with the chemical.

Rodents that have eaten bait formulated with zinc phosphide typically die quickly after consuming a fatal dose. Once the rodent has been killed there is very little residual poison left in the body, which reduces the risk of secondary poisoning to non-target animals.

In comparison, high levels of anticoagulant rodenticide residue can remain in a rodent's body after death, in particular for SGARs. In the case of SGARs, a rodent can continue to feed on the poison in the 5 to 10 days it may take for the rodent to die after consuming a lethal dose, which could result in even higher levels of poison remaining in the rodent's body. This also increases the risk of secondary poisoning to non-target animals that may consume a rodent already poisoned with SGARs.

What rodenticides have been approved for use in crop situations?

Several registered products containing zinc phosphide have been approved by the APVMA under emergency permit for use in crops under specific conditions. Copies of these approvals can be found on the APVMA's [Permits database](#).

Coumatetralyl, an FGAR, is approved for use in a limited range of crops under specific conditions as part of a comprehensive rodent control program.

Cholecalciferol, another chemical used in rodenticide baits, is registered for use in macadamia and orchards as part of a specific management strategy.

Why is the use of second-generation anticoagulant rodenticides in crop situations not approved?

SGARs pose a greater secondary poisoning risk than zinc phosphide, the FGAR coumatetralyl and cholecalciferol. Currently, they are only approved for use in certain situations in and around buildings. This use is considered, in general, to present a lower risk to non-target species due to a lack of direct access to the bait and more restricted access of predators to poisoned mice under the conditions of use set out on the product labels.

Recent applications for the use of SGARs in crop situations

On 13 May 2021, the APVMA received [2 applications](#) from the New South Wales Department of Primary Industries (NSW DPI) seeking emergency use permits to use an unregistered bromadiolone-based product around the perimeter of crops. One application was subsequently withdrawn by NSW DPI on 9 June 2021.

On 23 June 2021, the APVMA issued NSW DPI with a [proposed decision](#) to refuse the emergency permit application for bromadiolone, as the APVMA could not be satisfied the use of the product met the statutory criteria, specifically in relation to:

- the environment, including the risks of secondary poisoning to non-target species including birds, fish and reptiles
- residues, including the toxicity of the chemical to people who may eat predatory freshwater fish (such as Murray cod) or reptiles (such as goannas or snakes) harvested from treated areas.

NSW DPI was provided 28 days to respond to the proposed decision. The APVMA did not receive a response to the proposed decision and on 22 July 2021, the APVMA issued a notice to NSW DPI refusing the application.

What are the statutory criteria?

Before a chemical product can be sold in Australia or a permit can be issued, it must first go through a scientific assessment by the APVMA so we can determine if it meets the statutory criteria for safety, efficacy, trade and labelling, to ensure the proposed use pattern(s):

- will not be harmful to human beings
- will not have an unintended effect that is harmful to animals, plants or things, or to the environment
- will be effective when used as directed
- will not unduly prejudice trade.

The label for the chemical product is also assessed to determine it meets the statutory criteria for labelling.

This process provides Australians with confidence that agricultural and veterinary (agvet) chemical products registered by the APVMA or approved under permit are safe and effective to use in accordance with label directions or permit conditions.

How does the APVMA determine if a product or permit meets the statutory criteria?

The APVMA uses a risk-based approach to determine the safety of the proposed use of a product or permit. The first step of this process is to assess the hazard of the product by reviewing the results of scientific tests, information available in published scientific literature, and the data provided by the applicant.

Once we've determined the potential hazard of the product, the next step is to assess the exposure resulting from its use by undertaking a risk assessment to consider whether the proposed use of the product would not be likely to have an effect that is harmful to human beings or have an unintended effect that is harmful to animals, plants or the environment.

In assessing the potential risks to people, we consider the possible effects of handling or using the product, from consuming food containing its residues and contact after the product has been used. For rodenticides, the effects of handling rodent carcasses are also considered.

As part of our environmental safety assessment, we consider the potential for off-target poisoning. This includes primary and secondary poisoning and poisoning through the food chain.

For rodenticides, primary poisoning can include the consumption of the bait by animals (such as birds) that are not the intended target. It can also include effects from the bait on species that live in soil that may come into contact with the bait, as well as potential effects in contaminated waterways.

Secondary poisoning occurs through the consumption of poisoned animals either before or after death. The possibility of accumulation in the food chain (when primary predators are not necessarily affected but higher predators may be poisoned due to higher levels of poison in the animals they prey on) is also considered as part of our environmental safety assessment.

What is a 'risk-based approach'?

In determining whether a product or permit meets the statutory criteria, we use a risk-based approach that considers the full range of hazards and risks associated with the proposed use(s) of the product or permit, and how the risk to people, animals and the environment can be minimised through instructions for use and safety directions.

The hazard of a product is based on the inherent properties of an active constituent or formulated product to cause harm. This assessment sets out how poisonous a product may be.

An exposure assessment is carried out to determine the amount of the product or active a person, an animal, or the environment will be exposed to during and after use of the product in line with the label directions.

The risk assessment then considers the effects of the active or product, along with the exposure, to determine whether the overall risk is acceptable. Where a product is of very low toxicity, a larger exposure is possible before it is of concern. However, where a product is very toxic only a small amount of exposure would be acceptable.

The possibility to lower the risk of a product, usually through limiting the exposure to the product, is considered as part of the risk management strategy inherent in a risk-based approach. If the risk cannot be lowered to an acceptable level, the use is not considered to be acceptable.

How do I use rodenticide baits safely?

Rodenticide baits approved by the APVMA are safe to use according to label directions or permit conditions. To check whether a product has been approved by the APVMA, you should flip the pack and check the back for an APVMA approval number.

Rodenticide baits are toxic to humans and animals and may cause severe health issues if not used in accordance with the approved label directions or permit conditions. Users of rodenticide baits must always read and comply with these directions or conditions, including wearing the appropriate personal protective equipment (PPE) when handling rodenticides, checking on bait stations or handling rodent carcasses.

Who can I contact about the use of rodenticides?

The APVMA regulates agvet chemical products up to and including the point of retail sale. Queries about the use of rodenticide baits should be directed to your [state or territory regulator](#).